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Chapter 8

How Is Capital Budgeting Used to Make Decisions?

Julie Jackson is the president and owner of Jackson's Quality Copies, a store that makes photocopies for its customers and that has several copy machines. Julie has the following discussion with Mike Haley, the company's accountant:

Julie:	<i>Mike, I think it's time to buy a new copy machine. Our volume of copies has increased dramatically over the last year, and we need a copier that does a better job of handling the big jobs.</i>
Mike:	<i>Do you have any idea how much the new machine will cost?</i>
Julie:	<i>We can purchase a new copier for \$50,000, maintenance costs will total \$1,000 a year, and the copier is expected to last 7 years. Since the new machine is quicker and will require less attention by our employees, we should save about \$11,000 a year in labor costs.</i>
Mike:	<i>Will it have any salvage value at the end of seven years?</i>
Julie:	<i>Yes. The salvage value should be about \$5,000.</i>
Mike:	<i>How soon do you want to do this?</i>
Julie:	<i>As soon as possible. From what I can tell, this is a winning proposition. The cash inflows of \$82,000 that we will get from the labor cost savings and the salvage value exceed the cash outflows of \$57,000 that we expect to spend on the machine and annual maintenance costs. What do you think?</i>
Mike:	<i>Let me take a look at the numbers before we jump into this. We have to consider more than just total cash inflows and outflows. I'll get back to you by the end of the week.</i>
Julie:	<i>Okay, thanks for your help!</i>

Jackson's Quality Copies is facing a decision common to many organizations: whether to invest in equipment that will last for many years or to continue with existing equipment. This type of decision differs from the decisions covered in the previous chapter because long-term investment decisions affect organizations for several years. We will return to Julie's plan to purchase a new copier after we provide background information on long-term investment decisions.

8.1 Capital Budgeting and Decision Making

LEARNING OBJECTIVE

1. Apply the concept of the time value of money to capital budgeting decisions.

Question: What is the difference between management decisions made in and management decisions made in this chapter?

Answer: The types of decisions covered in this chapter and are similar in that they require an analysis of differential revenues and costs. However, involves short-run operating decisions (e.g., special orders from customers), while this chapter focuses on long-run capacity decisions (e.g., purchasing long-lived assets to increase capacity for many years).

Organizations make a variety of long-run investment decisions. The San Francisco Symphony invests in stage risers for its orchestra members. McDonald's invests in new restaurants. Honda Motor Co. invests in new manufacturing facilities. Bank of America invests in new branches. These examples have one common feature: all of these companies are investing in assets that will affect the organization for several years.

Question: The process of analyzing and deciding which long-term investments to make is called a capital budgeting decision, also known as a capital expenditure decision. Capital budgeting decisions involve using company funds (capital) to invest in long-term assets. How does the evaluation of these types of capital budgeting decisions differ from short-term operating decisions discussed in ?

Answer: When looking at capital budgeting decisions that affect future years, we must consider the time value of money. The time value of money concept is the premise that a dollar received today is worth more than a dollar received in the future. To clarify this point, suppose a friend owes you \$100. Would you prefer to receive \$100 today or 3 years from today? The money is worth more to you if you receive it today because you can invest the \$100 for 3 years.

For capital budgeting decisions, the issue is how to value future cash flows in today's dollars. The term cash flow refers to the amount of cash received or paid at a specific point in time. The term present value describes the value of future cash flows (both in and out) in today's dollars.

Business in Action 8.1

Capital Budgeting Decisions at **JCPenney** and **Kohl's**

JCPenney Company has over 1,000 department stores in the United States, and **Kohl's Corporation** has over 800. Both companies cater to a "middle market." In October 2006, Kohl's announced plans to open 65 new stores. At about the same time,

JCPenney announced plans to open 20 new stores, 17 of which would be stand-alone stores. This was a departure from JCPenney's typical approach of serving as an anchor store for regional shopping malls.

The decision to open new stores is an example of a capital budgeting decision because management must analyze the cash flows associated with the new stores over the long term.

Source: James Covert, "Chasing Mr. and Mrs. Middle Market: J.C. Penney, Kohl's Open 85 New Stores," *The Wall Street Journal*, October 6, 2006.

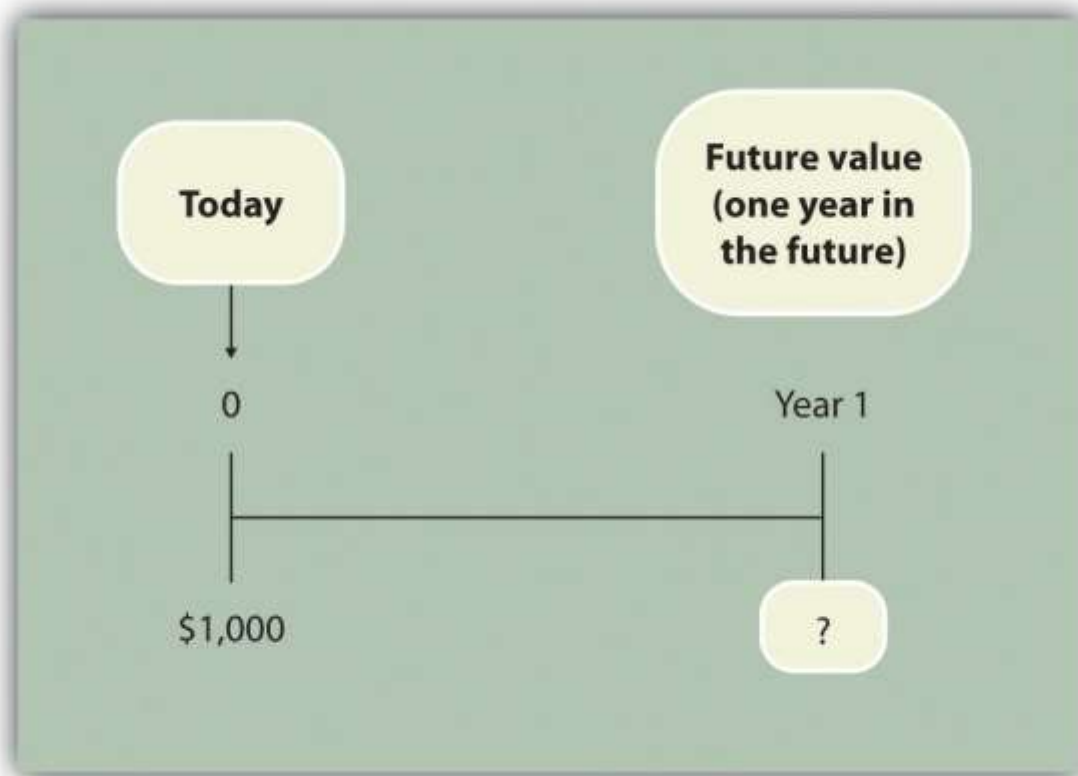
When managers evaluate investments in long-term assets, they want to know how much cash would be spent on the investment and how much cash would be received as a result of the investment. The investment proposal is likely rejected if cash inflows do not exceed cash outflows. (Think about a personal investment. If you would receive only \$700 in the future from an investment of \$1,000 today, you undoubtedly would not make the investment because you would lose \$300!) If cash inflows are expected to exceed cash outflows, managers must consider when the cash inflows and outflows occur before taking on the investment. (Again, consider an investment of \$1,000 today. If you expect to receive \$1,050 in 20 years rather than at the end of 1 year, you would probably think twice before investing because it would take 20 years to make \$50!)

Question: We use two methods to evaluate long-term investments, both of which consider the time value of money. What are these two methods?

Answer: The first is called the net present value (NPV) method, and the second is called the internal rate of return method. Before presenting these two methods, let's discuss the time value of money (present value) concepts.

The Present Value Formula

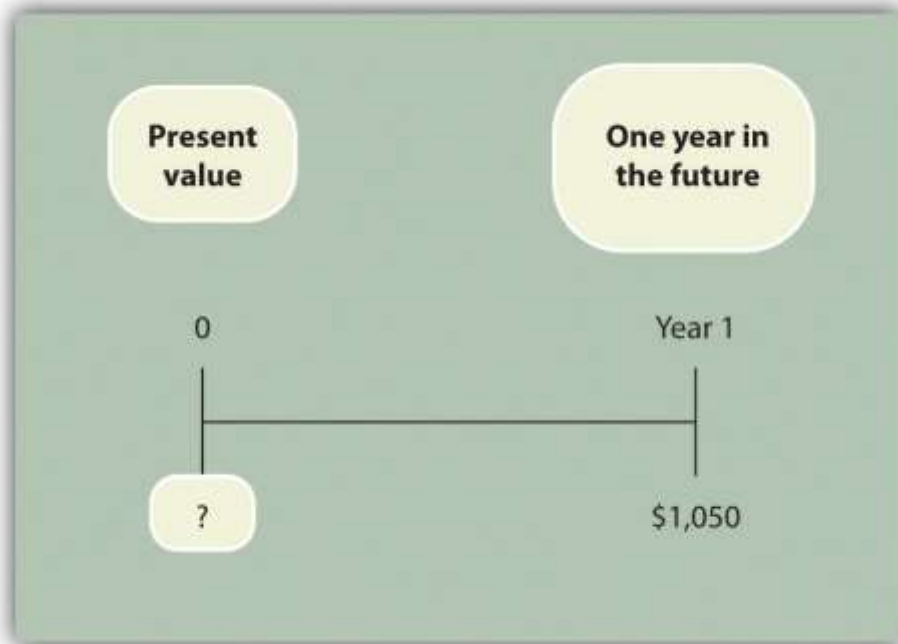
Question: Suppose you invest \$1,000 for 1 year at an interest rate of 5 percent per year, as shown in the following timeline. How much will you have at the end of 1 year (or what is the future value of the investment)?



Answer: You will have \$1,050:

$$\$1,050 = \$1,000 \times (1 + .05)$$

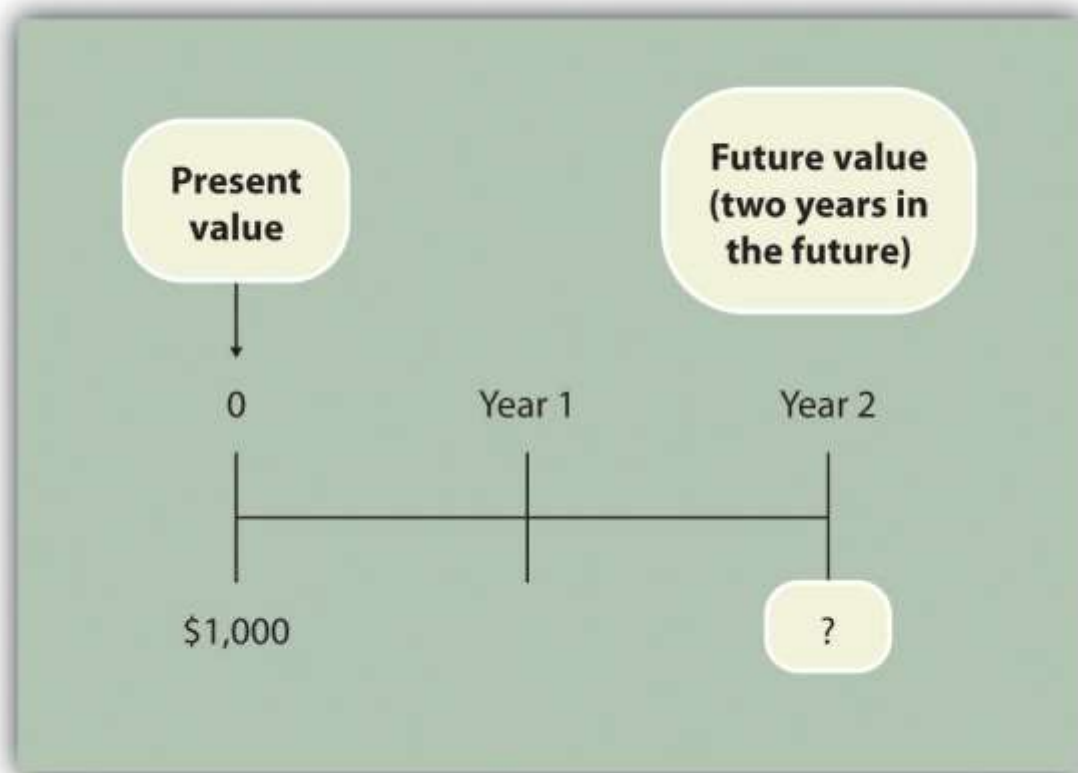
Question: Let's change course and find the present value of the same future cash flow. If you receive \$1,050 in 1 year, how much is that worth in today's dollars assuming an annual interest rate of 5 percent?



Answer: The present value is \$1,000, calculated as follows:

$$\$1,000 = \$1,050(1 + .05)$$

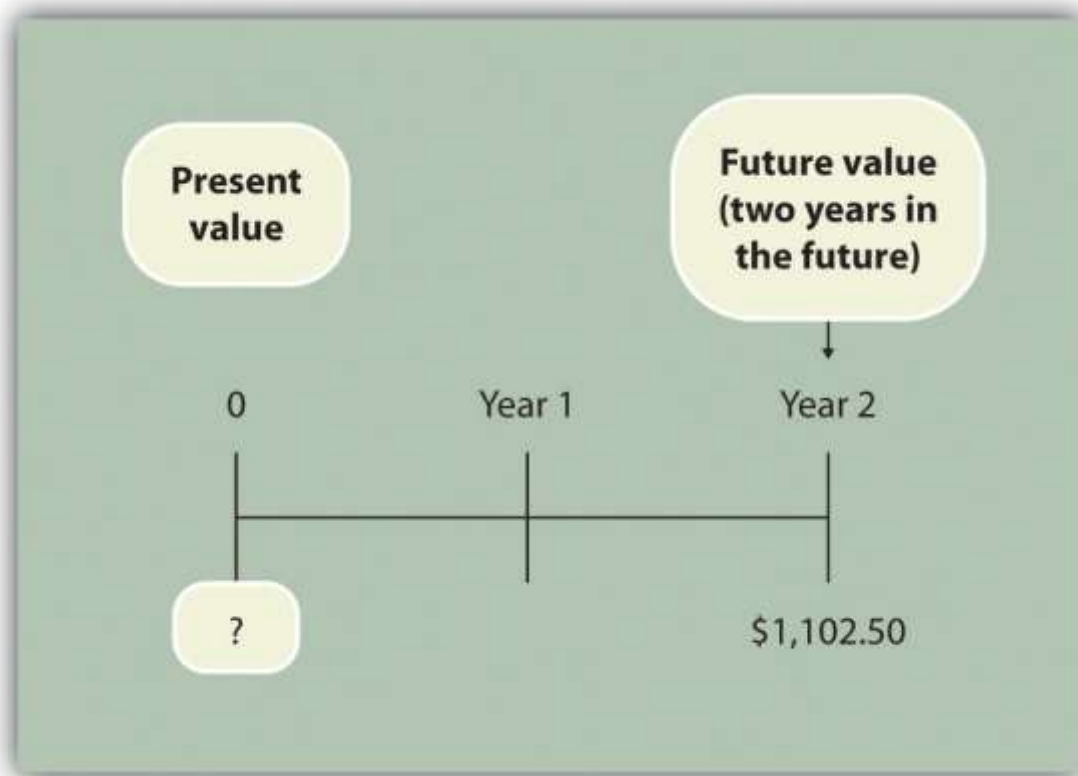
Question: Let's go back to finding a future value. Assume you invest \$1,000 today at an annual rate of 5 percent for 2 years. How much will you have at the end of 2 years?



Answer: At the end of 1 year, you will have \$1,050 ($= \$1,000 \times [1 + .05]$). At the end of the second year, you will have \$1,102.50, which is $\$1,050 \times (1 + .05)$. The equation is

$$\$1,102.50 = \$1,000 \times (1 + .05) \times (1 + .05) \text{ or } \$1,102.50 = \$1,000 \times (1 + .05)^2$$

Question: Again, let's change course and find the present value of the same future cash flow. If you receive \$1,102.50 in 2 years, how much is that worth in today's dollars assuming an annual interest rate of 5 percent?



Answer: The present value is \$1,000, calculated as follows:

$$\$1,000 = \$1,102.50(1 + .05)^2$$

These examples show that one equation can be used to find the present value of a future cash flow. The equation is

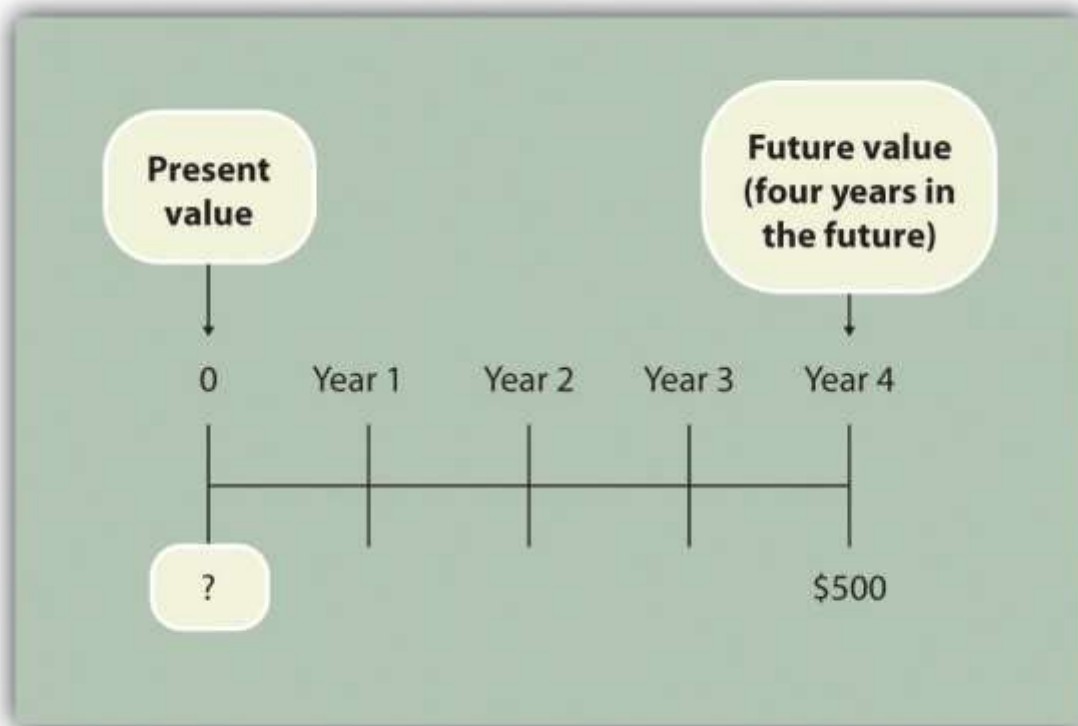
Key Equation

$$P = F_n(1 + r)^{-n}$$

where

P = Present value of an amount
 F_n = Amount received n years in the future
 r = Annual interest rate
 n = Number of years

Question: Let's use this formula to solve for the following: Assume \$500 will be received 4 years from today, and the annual interest rate is 10 percent. What is the present value of this cash flow?



Answer: The present value is \$341.51, calculated as follows:

$$P = F / (1 + r)^n = \$500 / (1 + .10)^4 = \$500 / 1.4641 = \$341.51$$

Present Value Tables

Question: Although most managers use spreadsheets, such as Excel, to perform present value calculations (discussed later in this chapter), you can also use the present value tables in the appendix to this chapter, labeled and , for these calculations. simply provides the present value

of \$1 (i.e., $F = \$1$) given the number of years (n) and the interest rate (r). How are these tables used to calculate present value amounts?

Answer: Let's look at an example to see how these tables work. Assume \$1 will be received 4 years from today ($n = 4$), and the interest rate is 10 percent ($r = 10$ percent). What is the present value of this cash flow? Look at the appendix. Find the column labeled 10 percent and the row labeled 4. The present value is \$0.6830, or \$0.68 rounded. The table amount given is often called a factor. The factor in this example is 0.6830 (note that the formula to find this factor is shown at the top of).

Now assume all the same facts, except that \$500 rather than \$1 will be received in 4 years. To find the present value, simply multiply the factor found in by \$500, as follows:

Present value = Amount received in the future \times Present value factor = $\$500 \times 0.6830 = \341.50

Notice that this present value is the same as the one we calculated using the formula $P = F_n \div (1 + r)^n$, with the exception of a small difference due to rounding the factor in . Next, we use present value concepts to evaluate projects with the NPV method.

KEY TAKEAWAY

- Present value calculations tell us the value of future cash flows in today's dollars. The present value of a cash flow can be calculated by using the formula $P = F_n \div (1 + r)^n$. It can also be calculated by using the tables in the appendix of this chapter. Simply find the factor in given the number of years (n) and annual interest rate (r). Then multiply the factor by the future cash flow, as follows:

Present value = Amount received in the future \times Present value factor

REVIEW PROBLEM 8.1

For each of the following independent scenarios, calculate the present value of the cash flow described. Round to the nearest dollar.

1. You will receive \$5,000, 5 years from today, and the interest rate is 8 percent.

2. You will receive \$80,000, 9 years from today, and the interest rate is 10 percent.
3. You will receive \$400,000, 20 years from today, and the interest rate is 20 percent.
4. You will receive \$250,000, 10 years from today, and the interest rate is 15 percent.

Solution to Review Problem 8.1

Two approaches can be used to find the present value of a cash flow. The first requires using the formula $P = Fn \div (1 + r)^n$. The second requires using in the appendix to find the present value factor and inserting it in the following formula:

Present value = Amount received in the future \times Present value factor (from)

We show both approaches in the following solutions.

1. Using the formula $P = Fn \div (1 + r)^n$, we get

$$\$3,403 = \$5,000 \div (1 + .08)^5$$

Using , we get

$$\text{Present value } \$3,403 = \text{Future value} \times \text{Present value factor} = \$5,000 \times 0.6806$$

2. Using the formula $P = Fn \div (1 + r)^n$, we get

$$\$33,928 = \$80,000 \div (1 + .10)^9$$

Using , we get

$$\text{Present value } \$33,928 = \text{Future value} \times \text{Present value factor} = \$80,000 \times 0.4241$$

3. The small difference between the two approaches is due to rounding the factor in .

Using the formula $P = Fn \div (1 + r)^n$, we get

$$10,434 = \$400,000 \div (1 + .20)^{20}$$

Using , we get

$$\text{Present value } \$10,440 = \text{Future value} \times \text{Present value factor} = \$400,000 \times 0.0261$$

4. The small difference between the two approaches is due to rounding the factor .

Using the formula $P = F_n \div (1 + r)^n$, we get

$$\$61,796 = \$250,000 \div (1 + .15)^{10}$$

Using , we get

$$\text{Present value } \$61,800 = \text{Future value} \times \text{Present value factor} = \$250,000 \times 0.2472$$

8.2 Net Present Value

LEARNING OBJECTIVE

1. Evaluate investments using the net present value (NPV) approach.

Question: Now that we have the tools to calculate the present value of future cash flows, we can use this information to make decisions about long-term investment opportunities. How does this information help companies to evaluate long-term investments?

Answer: The net present value (NPV) method of evaluating investments adds the present value of all cash inflows and subtracts the present value of all cash outflows. The term discounted cash flows is also used to describe the NPV method. In the previous section, we described how to find the present value of a cash flow. The term net in net present value means to combine the present value of all cash flows related to an investment (both positive and negative).

Recall the problem facing Jackson's Quality Copies at the beginning of the chapter. The company's president and owner, Julie Jackson, would like to purchase a new copy machine. Julie feels the investment is worthwhile because the cash inflows over the copier's life total \$82,000, and the cash outflows total \$57,000, resulting in net cash inflows of \$25,000 ($= \$82,000 - \$57,000$). However, this approach ignores the timing of the cash flows. We know from the previous section that the further into the future the cash flows occur, the lower the value in today's dollars.

Question: How do managers adjust for the timing differences related to future cash flows?

Answer: Most managers use the NPV approach. This approach requires three steps to evaluate an investment:

Step 1. Identify the amount and timing of the cash flows required over the life of the investment.

Step 2. Establish an appropriate interest rate to be used for evaluating the investment, typically called the required rate of return. (This rate is also called the discount rate or hurdle rate.)

Step 3. Calculate and evaluate the NPV of the investment.

Let's use Jackson's Quality Copies as an example to see how this process works.

Step 1. Identify the amount and timing of the cash flows required over the life of the investment.

Question: What are the cash flows associated with the copy machine that Jackson's Quality Copies would like to buy?

Answer: Jackson's Quality Copies will pay \$50,000 for the new copier, which is expected to last 7 years. Annual maintenance costs will total \$1,000 a year, labor cost savings will total \$11,000 a year, and the company will sell the copier for \$5,000 at the end of 7 years. Figure 8.1 "Cash Flows for Copy Machine Investment by Jackson's Quality Copies" summarizes the cash flows related to this investment. Amounts in parentheses are cash outflows. All other amounts are cash inflows.

Figure 8.1 Cash Flows for Copy Machine Investment by Jackson's Quality Copies

Timeline	Today 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Purchase price	\$(50,000)							
Maintenance cost		\$ (1,000)	\$ (1,000)	\$ (1,000)	\$ (1,000)	\$ (1,000)	\$ (1,000)	\$ (1,000)
Labor savings		11,000	11,000	11,000	11,000	11,000	11,000	11,000
Salvage value								5,000
Total cash in (out)	\$(50,000)	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 15,000

Step 2. Establish an appropriate interest rate to be used for evaluating the investment.

Question: How do managers establish the interest rate to be used for evaluating an investment?

Answer: Although managers often estimate the interest rate, this estimate is typically based on the organization's cost of capital. The cost of capital is the weighted average costs associated with debt and equity used to fund long-term investments. The cost of debt is simply the interest rate associated with the debt (e.g., interest for bank loans or bonds issued). The cost of equity is more difficult to determine and represents the return required by owners of the organization. The weighted average of these two sources of capital represents the cost of capital (finance textbooks address the complexities of this calculation in more detail).

The general rule is the higher the risk of the investment, the higher the required rate of return (assume required rate of return is synonymous with interest rate for the purpose of calculating the NPV). A firm evaluating a long-term investment with risk similar to the firm's average risk will typically use the cost of capital. However, if a long-term investment carries higher than average risk for the firm, the firm will use a required rate of return higher than the cost of capital.

The accountant at Jackson's Quality Copies, Mike Haley, has established the cost of capital for the firm at 10 percent. Since the proposed purchase of a copy machine is of average risk to the company, Mike will use 10 percent as the required rate of return.

Step 3. Calculate and evaluate the NPV of the investment.

Question: How do managers calculate the NPV of an investment?

Answer: Figure 8.2 "NPV Calculation for Copy Machine Investment by Jackson's Quality Copies" shows the NPV calculation for Jackson's Quality Copies. Examine this table carefully. The cash flows come from Figure 8.1 "Cash Flows for Copy Machine Investment by Jackson's Quality Copies". The present value factors come from Figure 8.9 "Present Value of \$1 Received at the End of " in the appendix ($r = 10$ percent; $n = \text{year}$). The bottom row, labeled present value is calculated by multiplying the total cash in (out) \times present value factor, and it represents

total cash flows for each time period in today's dollars. The bottom right of Figure 8.2 "NPV Calculation for Copy Machine Investment by Jackson's Quality Copies" shows the NPV for the investment, which is the sum of the bottom row labeled present value.

Figure 8.2 NPV Calculation for Copy Machine Investment by Jackson's Quality Copies

Timeline (n) →	Today 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	
Purchase price	\$(50,000)								
Maintenance cost		\$ (1,000)	\$ (1,000)	\$ (1,000)	\$ (1,000)	\$ (1,000)	\$ (1,000)	\$ (1,000)	
Labor savings		11,000	11,000	11,000	11,000	11,000	11,000	11,000	
Salvage value								5,000	
Total cash in (out)	\$(50,000)	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 15,000	
PV factor ($r = 10\%$)	$\times 1.0000$	$\times 0.9091$	$\times 0.8264$	$\times 0.7513$	$\times 0.6830$	$\times 0.6209$	$\times 0.5645$	$\times 0.5132$	
Present value	\$(50,000) +	\$ 9,091 +	\$ 8,264 +	\$ 7,513 +	\$ 6,830 +	\$ 6,209 +	\$ 5,645 +	\$ 7,698 =	\$ 1,250

The NPV is \$1,250. Because NPV is > 0 , accept the investment. (The investment provides a return greater than 10 percent.)

The NPV Rule

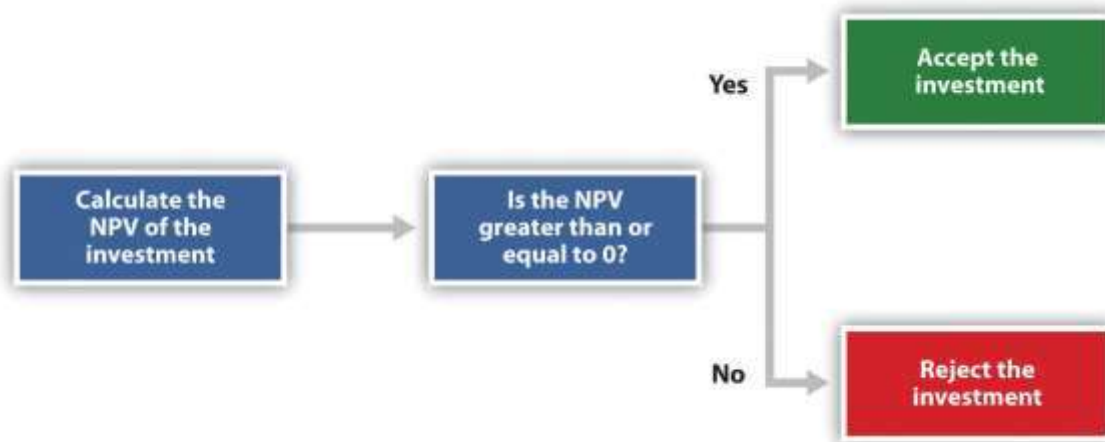
Question: Once the NPV is calculated, how do managers use this information to evaluate a long-term investment?

Answer: Managers apply the following rule to decide whether to proceed with the investment:

NPV Rule: If the NPV is greater than or equal to zero, accept the investment; otherwise, reject the investment.

As summarized in Figure 8.3 "The NPV Rule", if the NPV is greater than zero, the rate of return from the investment is higher than the required rate of return. If the NPV is zero, the rate of return from the investment equals the required rate of return. If the NPV is less than zero, the rate of return from the investment is less than the required rate of return. Since the NPV is greater than zero for Jackson's Quality Copies, the investment is generating a return greater than the company's required rate of return of 10 percent.

Figure 8.3 The NPV Rule



Note that the present value calculations in [Figure 8.3 "The NPV Rule"](#) assume that the cash flows for years 1 through 7 occur at the end of each year. In reality, these cash flows occur throughout each year. The impact of this assumption on the NPV calculation is typically negligible.

Business in Action 8.2

Cost of Capital by Industry

Cost of capital can be estimated for a single company or for entire industries. **New York University's Stern School of Business** maintains cost of capital figures by industry. Almost 7,000 firms were included in accumulating this information. The following sampling of industries compares the cost of capital across industries. Notice that high-risk industries (e.g., computer, e-commerce, Internet, and semiconductor) have relatively high costs of capital.

Air transportation	11.48 percent
Auto and truck	11.04 percent
Auto parts	9.56 percent
Beverage (soft drinks)	8.16 percent
Computer	14.49 percent
E-commerce	15.65 percent

Grocery	9.79 percent
Internet	15.98 percent
Retail store	9.30 percent
Semiconductor	19.03 percent

Source: New York University's Stern Business School, "Home Page," <http://pages.stern.nyu.edu>.

Annuity Tables

Question: Notice in Figure 8.1 "Cash Flows for Copy Machine Investment by Jackson's Quality Copies" that the rows labeled maintenance cost and labor savings have identical cash flows from one year to the next. Identical cash flows that occur in regular intervals, such as these at Jackson's Quality Copies, are called an annuity. How can we use annuities in an alternate format to calculate the NPV?

Answer: In Figure 8.4 "Alternative NPV Calculation for Jackson's Quality Copies", we demonstrate an alternative approach to calculating the NPV.

Figure 8.4 Alternative NPV Calculation for Jackson's Quality Copies

Item Description	(A) Cash Flow In (Out)	(B) Present Value Factor ($r = 10\%$)	(A) \times (B) Present Value
Purchase price (today)	\$ (50,000)	1.000*	\$ (50,000)
Annual maintenance costs (years 1–7)	(1,000)	4.8684**	(4,868)
Annual labor savings (years 1–7)	11,000	4.8684**	53,552
Salvage value (end of year 7)	5,000	0.5132*	2,566
Net present value			<u>\$ 1,250</u>

*Because this is not an annuity, use Figure 8.9 "Present Value of \$1 Received at the End of " in the appendix.

****Because this is an annuity, use Figure 8.10 "Present Value of a \$1 Annuity Received at the End of Each Period for " in the appendix. The number of years (n) equals seven since identical cash flows occur each year for seven years.**

Note: the NPV of \$1,250 is the same as the NPV in Figure 8.2 "NPV Calculation for Copy Machine Investment by Jackson's Quality Copies".

The purchase price and salvage value rows in Figure 8.4 "Alternative NPV Calculation for Jackson's Quality Copies" represent one-time cash flows, and thus we use Figure 8.9 "Present Value of \$1 Received at the End of " in the appendix to find the present value factor for these items (these are not annuities). The annual maintenance costs and annual labor savings rows represent cash flows that occur each year for seven years (these are annuities). We use Figure 8.10 "Present Value of a \$1 Annuity Received at the End of Each Period for " in the appendix to find the present value factor for these items (note that the number of years, n, equals seven since the cash flows occur each year for seven years). Simply multiply the cash flow shown in column (A) by the present value factor shown in column (B) to find the present value for each line item. Then sum the present value column to find the NPV. This alternative approach results in the same NPV shown in Figure 8.2 "NPV Calculation for Copy Machine Investment by Jackson's Quality Copies".

Business in Action 8.3

Winning the Lottery

Like many other states, California pays out lottery winnings in installments over several years. For example, a \$1,000,000 lottery winner in California will receive \$50,000 each year for 20 years.

Does this mean that the State of California must have \$1,000,000 on the day the winner claims the prize? No. In fact, California has approximately \$550,000 in cash to pay \$1,000,000 over 20 years. This \$550,000 in cash represents the present value of a \$50,000 annuity lasting 20 years, and the state invests it so that it can provide \$1,000,000 to the winner over 20 years.

Source: California State Lottery, "California State Lottery Home Page," <http://www.calottery.com>.

KEY TAKEAWAY

- Present value calculations tell us the value of cash flows in today's dollars. The NPV method adds the present value of all cash inflows and subtracts the present value of all cash outflows related to a long-term investment. If the NPV is greater than or equal to zero, accept the investment; otherwise, reject the investment.

REVIEW PROBLEM 8.2

The management of Chip Manufacturing, Inc., would like to purchase a specialized production machine for \$700,000. The machine is expected to have a life of 4 years, and a salvage value of \$100,000. Annual maintenance costs will total \$30,000. Annual labor and material savings are predicted to be \$250,000. The company's required rate of return is 15 percent.

1. Ignoring the time value of money, calculate the net cash inflow or outflow resulting from this investment opportunity.
2. Find the NPV of this investment using the format presented in [Figure 8.2 "NPV Calculation for Copy Machine Investment by Jackson's Quality Copies"](#).
3. Find the NPV of this investment using the format presented in [Figure 8.4 "Alternative NPV Calculation for Jackson's Quality Copies"](#).
4. Should Chip Manufacturing, Inc., purchase the specialized production machine? Explain.

Solution to Review Problem 8.2

1. The net cash inflow, ignoring the time value of money, is \$280,000, calculated as follows:

Timeline (n) →	Today 0	Year 1	Year 2	Year 3	Year 4	
Purchase price	\$(700,000)					
Maintenance costs		\$(30,000)	\$(30,000)	\$(30,000)	\$(30,000)	
Labor and material savings		250,000	250,000	250,000	250,000	
Salvage value					100,000	
Total cash in (out)	<u>\$(700,000) +</u>	<u>\$220,000 +</u>	<u>\$220,000 +</u>	<u>\$220,000 +</u>	<u>\$320,000 =</u>	<u>\$ 280,000</u>

2. The NPV is \$(14,720), calculated as follows:

Timeline (n) →	Today 0	Year 1	Year 2	Year 3	Year 4	
Purchase price	\$(700,000)					
Maintenance costs		\$(30,000)	\$(30,000)	\$(30,000)	\$(30,000)	
Labor and material savings		250,000	250,000	250,000	250,000	
Salvage value					100,000	
Total cash in (out)	<u>\$(700,000)</u>	<u>\$ 220,000</u>	<u>\$ 220,000</u>	<u>\$ 220,000</u>	<u>\$ 320,000</u>	
PV factor (r = 15%)	<u>× 1.0000</u>	<u>× 0.8696</u>	<u>× 0.7561</u>	<u>× 0.6575</u>	<u>× 0.5718</u>	
Present value	<u>\$(700,000) +</u>	<u>\$ 191,312 +</u>	<u>\$ 166,342 +</u>	<u>\$ 144,650 +</u>	<u>\$ 182,976 =</u>	<u>\$ (14,720)</u>

3. The alternative format used for calculating the NPV is shown as follows. Note that the NPV here is identical to the NPV calculated previously in part 2.

Item Description	(A) Cash Flow In (Out)	(B) Present Value Factor (r = 15%)	(A) × (B) Present Value
Purchase price (today)	\$(700,000)	1.000*	\$(700,000)
Annual maintenance costs (years 1–4)	(30,000)	2.8550**	(85,650)
Annual labor and material savings (years 1–4)	250,000	2.8550**	713,750
Salvage value (end of year 4)	100,000	0.5718*	57,180
Net present value			<u>\$ (14,720)</u>

*Because this is not an annuity, use Figure 8.9 "Present Value of \$1 Received at the End of " in the appendix.

**Because this is an annuity, use Figure 8.10 "Present Value of a \$1 Annuity Received at the End of Each Period for " in the appendix. The number of years (n) equals four since identical cash flows occur each year for four years.

4. Because the NPV is less than 0, the return generated by this investment is less than the company's required rate of return of 15 percent. Thus Chip Manufacturing, Inc., should *not* purchase the specialized production machine.

8.3 The Internal Rate of Return

LEARNING OBJECTIVE

1. Evaluate investments using the internal rate of return (IRR) approach.

Question: Using the internal rate of return (IRR) to evaluate investments is similar to using the net present value (NPV) in that both methods consider the time value of money. However, the IRR provides additional information that helps companies evaluate long-term investments. What is the IRR, and how does it help managers make decisions related to long-term investments?

Answer: The internal rate of return (IRR) is the rate required (r) to get an NPV of zero for a series of cash flows. The IRR represents the time-adjusted rate of return for the investment being considered. The IRR decision rule states that if the IRR is greater than or equal to the company's required rate of return (recall that this is often called the hurdle rate), the investment is accepted; otherwise, the investment is rejected.

Most managers use a spreadsheet, such as Excel, to calculate the IRR for an investment (we discuss this later in the chapter). However, we can also use trial and error to approximate the IRR. The goal is simply to find the rate that generates an NPV of zero. Let's go back to the Jackson's Quality Copies example. provides the projected cash flows for a new copy machine and the NPV calculation using a rate of 10 percent. Recall that the NPV was \$1,250, indicating the investment generates a return greater than the company's required rate of return of 10 percent.

Although it is useful to know that the investment's return is greater than the company's required rate of return, managers often want to know the exact return generated by the investment. (It is often not enough to state that the exact return is something higher than 10 percent!) Managers also like to rank investment opportunities by the return each investment is expected to generate. Our goal now is to determine the exact return—that is, to determine the IRR. We know from that

the copy machine investment generates a return greater than 10 percent. summarizes this calculation with the 2 columns under the 10 percent heading.

The far right side of shows that the NPV is \$(2,100) if the rate is increased to 12 percent (recall our goal is to find the rate that yields an NPV of 0). Thus the IRR is between 10 and 12 percent. Next, we try 11 percent. As shown in the middle of , 11 percent provides an NPV of \$(469). Thus the IRR is between 10 and 11 percent; it is closer to 11 percent because \$(469) is closer to 0 than \$1,250. (Note that as the rate increases, the NPV decreases, and as the rate decreases, the NPV increases.)

Figure 8.5 Finding the IRR for Jackson's Quality Copies

Item Description	Cash Flow In (Out)	10%		11%		12%	
		Factor at 10%	Present Value	Factor at 11%	Present Value	Factor at 12%	Present Value
Purchase price (today)	\$(50,000)	1.000*	\$(50,000)	1.000*	\$(50,000)	1.000*	\$(50,000)
Maintenance cost (years 1–7)	(1,000)	4.8684**	(4,868)	4.7122**	(4,712)	4.5638**	(4,564)
Labor savings (years 1–7)	11,000	4.8684**	53,552	4.7122**	51,834	4.5638**	50,202
Salvage value (end of year 7)	5,000	0.5132*	2,566	0.4817*	2,409	0.4523*	2,262
Net present value			\$ 1,250		\$ (469)		\$ (2,100)

*Because this is not an annuity, use in the appendix.

**Because this is an annuity, use in the appendix. The number of years (n) equals seven since identical cash flows occur each year for seven years.

Note: the NPV of \$(469) is closest to 0. Thus the IRR is close to 11 percent.

This trial and error approach allows us to approximate the IRR. As stated earlier, if the IRR is greater than or equal to the company's required rate of return, the investment is accepted; otherwise, the investment is rejected. For Jackson's Quality Copies, the IRR of approximately 11

percent is greater than the company's required rate of return of 10 percent. Thus the investment should be accepted.

Computer Application

Using Excel to Calculate NPV and IRR

Let's use the Jackson's Quality Copies example presented at the beginning of the chapter to illustrate how Excel can be used to calculate the NPV and IRR. Two steps are required to calculate the NPV and IRR using Excel. All cell references are to the following spreadsheet shown.

	A	B	C	D	E	F	G	H	I	J
1		Today	Year	Year	Year	Year	Year	Year	Year	
2	Timeline →	0	1	2	3	4	5	6	7	
3	Purchase price	(\$50,000)								
4	Maintenance cost		(\$1,000)	(\$1,000)	(\$1,000)	(\$1,000)	(\$1,000)	(\$1,000)	(\$1,000)	
5	Labor savings		\$11,000	\$11,000	\$11,000	\$11,000	\$11,000	\$11,000	\$11,000	
6	Salvage value								\$5,000	
7	Total cash in (out)	(\$50,000)	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$15,000	
8										
9										
10	Required rate of return	0.10								
11										
12										
13										
14										
15										
16	Function used to calculate net present value in cell H16 is:	=NPV(B10,C7:I7)+B7								
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28	Function used to calculate internal rate of return in cell H28 is:	=IRR(B7:I7,0.12)								
29										
30										
31										
32										
33										
34										
35										
36										

Cell B10 is the required rate of return

Cell C7 is the cash flow at the end of Year 1

Cell I7 is the last in the series of cashflows, which is at the end of Year 7

Cell B7 is the cash flow at Time 0 and must be added to the NPV

Answer: \$1,250

Cells B7 through I7 represent the series of cash flows starting at Time 0

0.12 (or 12%) is our guess at the IRR to help the program with a starting point

Answer: 10.72%

Step 1. Enter the data in the spreadsheet.

Rows 1 through 7 in the spreadsheet show the cash flows associated with the proposal to purchase a new copy machine at Jackson's Quality Copies (first presented in).

Step 2. Input the functions to calculate NPV and IRR.

We selected cell H16 to calculate the NPV, so this is where the NPV function is input. Cell E16 shows the function in detail with dialogue boxes provided for clarification. Notice that the resulting NPV of \$1,250 shown in cell H16 is the same as the NPV calculated in and .

We selected cell H28 to calculate the IRR, so this is where the IRR function is input. Cell E28 shows the function in detail. Notice that the resulting IRR of 10.72 percent shown in cell H28 is very close to our approximation of slightly less than 11 percent shown in . As an alternative to entering a function directly into the spreadsheet, the NPV function under the *Formulas* menu in Excel can be used. Simply select the cell in the spreadsheet where you would like the answer to appear (H16 in this case), and go to the *Formulas* menu. Click on the *fx* symbol or *Insert Function* on the formula bar. Search for the function by typing in *NPV*, select *NPV* where it appears in the box, then select *OK*. When asked for the *Rate*, enter the cell where the rate appears (B10). Then under *Value 1* enter the cells containing the series of cash flows, starting with year 1 (shown as C7:I7, which means C7 through I7). Select *OK*. Now go back and add the cash flow at time 0 (B7) to the end of the NPV function. The resulting formula will look like the formula shown in E16, and the answer will appear in the cell where the function is entered (H16).

The IRR function can be inserted into a cell using the same process presented previously. Select the cell in the spreadsheet where you would like the answer to appear (H28), and go to the *Formulas* menu. Click on the *fx* symbol or *Insert Function* on the formula bar. Search for the function by typing in *IRR*, select *IRR* where it appears in the box below, then select *OK*. When asked for *Values*, enter the cells containing the series of cash flows, starting with time 0 (shown as B7:I7, which means B7 through I7). When asked for a *Guess*, enter your best guess as to what the IRR might be (this provides the system with a starting point), then select *OK*. The resulting formula will look like the formula shown in E28, and the answer will appear in the cell where the function is entered (H28).

KEY TAKEAWAY

- The IRR is the rate required (r) to get an NPV of zero for a series of cash flows and represents the time-adjusted rate of return for an investment. If the IRR is greater than or equal to the company's required rate of return (often called the hurdle rate), the investment is accepted; otherwise, the investment is rejected.

REVIEW PROBLEM 8.3

This review problem is a continuation of , and uses the same information. The management of Chip Manufacturing, Inc., would like to purchase a specialized production machine for \$700,000. The machine is expected to have a life of 4 years, and a salvage value of \$100,000. Annual maintenance costs will total \$30,000. Annual labor and material savings are predicted to be \$250,000. The company's required rate of return is 15 percent.

- Based on your answer to , use trial and error to approximate the IRR for this investment proposal.
- Should Chip Manufacturing, Inc., purchase the specialized production machine? Explain.

Solution to Review Problem 8.3

1. In , the NPV was calculated using 15 percent (the company's required rate of return). Knowing that 15 percent results in an NPV of \$(14,720), and therefore seeing the return is less than 15 percent, we decreased the rate to 13 percent. As shown in the following figure, this resulted in an NPV of \$15,720, which indicates the return is higher than 13 percent. Using a rate of 14 percent results in an NPV very close to 0 at \$224. Thus the IRR is close to 14 percent.

Item Description	Cash Flow In (Out)	13%		14%		15%	
		Factor at 13%	Present Value	Factor at 14%	Present Value	Factor at 15%	Present Value
Purchase price (today)	\$(700,000)	1.000*	\$(700,000)	1.000*	\$(700,000)	1.000*	\$(700,000)
Maintenance costs (years 1–4)	(30,000)	2.9745**	(89,235)	2.9137**	(87,411)	2.8550**	(85,650)
Labor and material savings (years 1–4)	250,000	2.9745**	743,625	2.9137**	728,425	2.8550**	713,750
Salvage value (end of year 4)	100,000	0.6133*	61,330	0.5921*	59,210	0.5718*	57,180
Net present value			\$ 15,720		\$ 224		\$ (14,720)

**Because this is not an annuity, use in the appendix.*

***Because this is an annuity, use in the appendix. The number of years (n) equals four since identical cash flows occur each year for four years.*

2. Because the IRR of 14 percent is less than the company's required rate of return of 15 percent, Chip Manufacturing, Inc., should *not* purchase the specialized production machine.

8.4 Other Factors Affecting NPV and IRR Analysis

LEARNING OBJECTIVE

1. Understand the impact of cash flows, qualitative factors, and ethical issues on long-term investment decisions.

Question: We have described the net present value (NPV) and internal rate of return (IRR) approaches to evaluating long-term investments. With both of these approaches, there are several important issues that must be considered. What are these important issues?

Answer: These issues include focusing on cash flows, factoring in inflation, assessing qualitative factors, and ethical considerations. All are described next.

Focusing on Cash Flows

Question: Which basis of accounting is used to calculate the NPV and IRR for long-term investments, cash or accrual?

Answer: Both methods of evaluating long-term investments, NPV and IRR, focus on the amount of cash flows and when the cash flows occur. Note that the timing of revenues and costs in financial accounting using the accrual basis is often not the same as when the cash inflows and outflows occur. A sale can be recorded in one period, and the cash be collected in a future period. Costs can occur in one period, and the cash be paid in a future period. For the purpose of making NPV and IRR calculations, managers typically use the time period when the cash flow occurs.

When a company invests in a long-term asset, such as a production building, the cash outflow for the asset is included in the NPV and IRR analyses. The depreciation taken on the asset in future periods is not a cash flow and is not included in the NPV and IRR calculations. However, there is a cash benefit related to depreciation (often called a depreciation tax shield) since income taxes paid are reduced as a result of recording depreciation expense. We explore the impact of income taxes on NPV and IRR calculations later in the chapter.

Factoring in Inflation

Question: Is inflation included in cash flow projections when calculating the NPV and IRR?

Answer: Most managers make cash flow projections that include an adjustment for inflation. When this is done, a rate must be used that also factors in inflation over the life of the investment. As discussed earlier in the chapter, the required rate of return used for NPV calculations is based on the firm's cost of capital, which is the weighted average cost of debt and equity. Since the cost of debt and equity already includes the effect of inflation, no inflation adjustment is necessary when establishing the required rate of return.

The important point here is that cash flow projections must include adjustments for inflation to match the required rate of return, which already factors in inflation. If cash flows are not adjusted for inflation, managers are likely underestimating future cash flows and therefore underestimating the NPV of the investment opportunity. This is particularly pronounced for economies that have relatively high rates of inflation.

For the purposes of this chapter, assume all cash flows and required rates of return are adjusted for inflation.

Be Aware of Qualitative Factors

Question: So far, this chapter has focused on using cash flow projections and the time value of money to evaluate long-term investments. Using these quantitative factors to make decisions allows managers to support decisions with measurable data. For example, the investment opportunity at Jackson's Quality Copies presented at the beginning of the chapter was accepted

because the NPV of \$1,250 was greater than 0, and the IRR of 11 percent was greater than the company's required rate of return of 10 percent. Why do most companies also consider nonfinancial factors, often called qualitative factors, when making a long-term investment decision?

Answer: Although using quantitative factors for decision making is important, qualitative factors may outweigh the quantitative factors in making a decision. For example, a large manufacturer of medical devices recently invested several million dollars in a small start-up medical device firm. When asked about the NPV analysis, the manager responsible for the investment indicated, “My staff did a quick and dirty NPV analysis, which indicated we should not invest in the company. However, the technology they were using for their device was of such strategic importance to us, we could not pass up the investment.” This is an example of qualitative factors (strategic importance to the company) outweighing quantitative factors (negative NPV).

Similar situations often arise when companies must invest in long-term assets even though NPV and IRR analyses indicate otherwise. Here are a few examples:

- Investing in new production facilities may be essential to maintaining a reputation as the industry leader in innovation, even though the quantitative analysis (NPV and IRR) points to rejecting the investment. (It is difficult to quantify the benefits of being the “industry leader in innovation.”)
- Investing in pollution control devices for an oil refinery may provide social benefits even though the quantitative analysis (NPV and IRR) points to rejecting the investment. (Although a reduction in fines and legal costs may be quantifiable and included in the analyses, it is difficult to quantify the social benefits.)
- Investing in a new product line of entry-level automobiles may increase foot traffic at the showroom, resulting in increased sales of other products, even though the quantitative analysis (NPV and IRR) points to rejecting the investment. (It is difficult to quantify the impact of the new product line on sales of existing product lines.)

- Clearly, managers must look at the financial information and analysis when considering whether to invest in long-term assets. However, the analysis does not stop with financial information. Managers and decision makers must also consider qualitative factors.

Ethical Issues

Question: Our discussion of NPV and IRR methods implies that managers can easily make capital budgeting decisions once NPV and IRR analyses are completed and qualitative factors have been considered. However, managers sometimes make decisions that are not in the best interest of the company. Why might managers make decisions that are not in the best interest of the company?

Answer: Several examples are provided next.

Short-Term Incentives Affect Long-Term Decisions

Managers are often evaluated and compensated based on annual financial results. The financial results are typically measured using financial accounting data prepared on an accrual basis.

Suppose you are a manager considering an investment opportunity to start a new product line that has a positive NPV. Because the NPV is positive, you should accept the investment proposal. However, revenues and related cash inflows are not significant until after the second year. In the first two years, revenues are low and depreciation charges are high, resulting in significantly lower overall company net income than if the project were rejected. Assuming you are evaluated and compensated based on annual net income, you may be inclined to reject the new product line regardless of the NPV analysis.

Many companies are aware of this conflict between the manager's incentive to improve short-term results and the company's goal to improve long-term results. To mitigate this conflict, some companies offer managers part ownership in the company (e.g., through stock options), creating an incentive to increase the value of the company over the long run.

Modifying Cash Flow Estimates to Get Approval

Managers often have a vested interest in getting proposals approved regardless of NPV and IRR results. For example, assume a manager spent several years developing a plan to construct a new production facility. Because of the significant work involved, and the projected benefits of building a new facility, the manager wants to see the proposal approved. However, the NPV analysis indicates the production facility proposal does not meet the company's minimum required rate of return. As a result, the manager decides to inflate projected cash inflows to get a positive NPV, and the project is approved.

Clearly, a conflict exists between the company's desire to accept projects that meet or exceed the required rate of return and the manager's desire to get approval for a "pet" project regardless of its profitability. Again, having part ownership in a company provides an incentive for managers to reject proposals that will not increase the value of the company.

Another way to mitigate this conflict is to conduct a postaudit, which compares the original capital budget with the actual results. Managers who provide misleading capital budget analyses are identified through this process. Postaudits provide an incentive for managers to provide accurate estimates.

KEY TAKEAWAY

- Although accountants are responsible for providing relevant and objective financial information to help managers make decisions, several important factors play a significant role in the decision-making process as described here:
 - NPV and IRR analyses use cash flows to evaluate long-term investments rather than the accrual basis of accounting.
 - Cash flow projections must include adjustments for inflation to match the required rate of return, which already factor in inflation.
 - Using quantitative factors to make decisions allows managers to support decisions with measurable data. However, nonfinancial factors (often called qualitative factors) must be considered as well.

- Circumstances sometimes exist that cause managers to make decisions that are not in the best interest of the company. For example, managers may be evaluated on short-term financial results even though it is in the best interest of the company to invest in projects that are profitable in the long term. Thus projects that reduce short-term profitability in lieu of significant long-term profits may be rejected.

REVIEW PROBLEM 8.4

1. Why must cash flow projections include adjustments for inflation?
 2. Why is it important for organizations to consider qualitative factors when making capital budgeting decisions?
3. Assume the manager of Best Electronics earns an annual bonus based on meeting a certain level of net income. The company is currently considering expanding by adding a second retail store. The second store is expected to become profitable three years after opening. The manager is responsible for making the final decision as to whether the second store should be opened and would be in charge of both stores.
1. Why might the manager refuse to invest in the new store even though the investment is projected to achieve a return greater than the company's required rate of return?
 2. What can the company do to mitigate the conflict between the manager's interest of achieving the bonus and the company's desire to accept investments that exceed the required rate of return?

Solution to Review Problem 8.4

1. Projected cash flows must include an adjustment for inflation to match the required rate of return. The required rate of return is based on the company's weighted average cost of debt and equity. The cost of debt and equity already factors in inflation. Thus the cash flows must also factor in inflation to be consistent with the required rate of return.

2. Although managers prefer to make capital budgeting decisions based on quantifiable data (e.g., using NPV or IRR), nonfinancial factors may outweigh financial factors. For example, maintaining a reputation as the industry leader may require investing in long-term assets, even though the investment does not meet the minimum required rate of return. The management believes the qualitative factor of being the industry leader is critical to the company's future success and decides to make the investment.

3. Best Electronics is considering opening a second store.

1. The manager's bonus is based on achieving a certain level of net income each year, and the new store will likely cause net income to decrease in the first two years. Thus the manager may not be able to achieve the net income necessary to qualify for the bonus if the company invests in the new store.
2. To mitigate this conflict, Best Electronics can offer the manager part ownership in the company (perhaps through stock options). This would provide an incentive for the manager to increase profit—and therefore company value—over many years. The company may also adjust the net income required to earn a bonus to account for the losses expected in the new store for the first two years.

8.5 The Payback Method

LEARNING OBJECTIVE

1. Evaluate investments using the payback method.

Question: Although the net present value (NPV) and internal rate of return (IRR) methods are the most commonly used approaches to evaluating investments, some managers also use the payback method. What is the payback method, and how does it help managers make decisions related to long-term investments?

Answer: The payback method evaluates how long it will take to “pay back” or recover the initial investment. The payback period, typically stated in years, is the time it takes to generate enough cash receipts from an investment to cover the cash outflows for the investment.

Managers who are concerned about cash flow want to know how long it will take to recover the initial investment. The payback method provides this information. Managers may also require a payback period equal to or less than some specified time period. For example, Julie Jackson, the owner of Jackson’s Quality Copies, may require a payback period of no more than five years, regardless of the NPV or IRR.

Note that the payback method has two significant weaknesses. First, it does not consider the time value of money. Second, it only considers the cash inflows until the investment cash outflows are recovered; cash inflows after the payback period are not part of the analysis. Both of these weaknesses require that managers use care when applying the payback method.

Payback Method Example

Question: What is the payback period for the proposed purchase of a copy machine at Jackson’s Quality Copies?

Answer: The payback period is five years. Here’s how we calculate it. Figure 8.6 "Summary of Cash Flows for Copy Machine Investment by Jackson’s Quality Copies" repeats the cash flow estimates for Julie Jackson’s planned purchase of a copy machine for Jackson’s Quality Copies, the example presented at the beginning of the chapter.

Figure 8.6 Summary of Cash Flows for Copy Machine Investment by Jackson’s Quality Copies

Timeline	Today 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Purchase price	\$(50,000)							
Maintenance cost		\$ (1,000)	\$ (1,000)	\$ (1,000)	\$ (1,000)	\$ (1,000)	\$ (1,000)	\$ (1,000)
Labor savings		11,000	11,000	11,000	11,000	11,000	11,000	11,000
Salvage value								5,000
Total cash in (out)	\$(50,000)	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 15,000

The payback method answers the question “how long will it take to recover my initial \$50,000 investment?” With annual cash inflows of \$10,000 starting in year 1, the payback period for this investment is 5 years ($= \$50,000 \text{ initial investment} \div \$10,000 \text{ annual cash receipts}$). This calculation is relatively simple when one investment is made at the beginning, and annual cash inflows are identical. However, some investments require cash outflows at different points throughout the life of the asset, and cash inflows can vary from one year to the next. Table 8.1 "Calculating the Payback Period for Jackson’s Quality Copies" provides a format to help calculate the payback period for these more complex investments. Note that the review problem at the end of this segment provides an example of how to calculate the payback period to the nearest month when uneven cash flows are expected.

Table 8.1 Calculating the Payback Period for Jackson’s Quality Copies

	Investment (Cash Outflow)	Cash Inflow	Unrecovered Investment Balance
Year 0	\$(50,000)	-	\$(50,000) ^a
Year 1	-	\$10,000	(40,000) ^b
Year 2	-	10,000	(30,000) ^c
Year 3	-	10,000	(20,000)
Year 4	-	10,000	(10,000)
Year 5	-	10,000	0
Year 6	-	10,000	0
Year 7	-	15,000	0
^a \$(50,000) = \$(50,000) initial investment. ^b \$(40,000) = \$(50,000) unrecovered investment balance + \$10,000 year 1 cash			

	Investment (Cash Outflow)	Cash Inflow	Unrecovered Investment Balance
inflow.			
c $\$(30,000) = \$(40,000)$ unrecovered investment balance at end of year 1 + \$10,000 year 2 cash inflow.			

Weaknesses of the Payback Method

Question: Why is it a problem to ignore the time value of money when calculating the payback period?

Answer: Suppose you have 2 investments of \$10,000 to choose from. The first investment generates cash inflows of \$8,000 in year 1, \$2,000 in year 2, and \$1,000 in year 3. The second investment generates cash inflows of \$2,000 in year 1, \$8,000 in year 2, and \$1,000 in year 3. The two investments are summarized here:

	Investment I	Investment II
Year 0	\$(10,000)	\$(10,000)
Year 1	8,000	2,000
Year 2	2,000	8,000
Year 3	1,000	1,000

Both investments have a payback period of two years. Does this mean both investments are of equal value? No because the first investment generates far more cash in year 1 than the second investment. In fact, it would be preferable to calculate the IRR to compare these two investments. The IRR for the first investment is 6 percent, and the IRR for the second investment is 5 percent.

Question: Why is it a problem to ignore the cash flows after the payback period?

Answer: Suppose \$50,000 can be invested in 2 separate investments with the following cash flows:

	Investment I	Investment II
Year 0	\$(50,000)	\$(50,000)
Year 1	25,000	2,000
Year 2	25,000	2,000
Year 3	3,000	46,000
Year 4	0	35,000

The first investment has a payback period of two years, and the second investment has a payback period of three years. If the company requires a payback period of two years or less, the first investment is preferable. However, the first investment generates only \$3,000 in cash after its payback period while the second investment generates \$35,000 after its payback period. The payback method ignores both of these amounts even though the second investment generates significant cash inflows after year 3. Again, it would be preferable to calculate the IRR to compare these two investments. The IRR for the first investment is 4 percent, and the IRR for the second investment is 18 percent.

Although the payback method is useful in certain situations where companies are concerned about recovering investments as quickly as possible (e.g., companies on the verge of bankruptcy), it is not a measure of profitability. The NPV and IRR methods compare the profitability of each investment by considering the time value of money for all cash flows related to the investment.

Wrap-Up of Chapter Example

In the Jackson's Quality Copies example featured throughout this chapter, the company is considering whether to purchase a new copy machine for \$50,000. A week has passed since Mike Haley, accountant, discussed this investment with Julie Jackson, president and owner. Refer to Figure 8.2 "NPV Calculation for Copy Machine Investment by Jackson's Quality Copies", Figure 8.4 "Alternative NPV Calculation for Jackson's Quality Copies", and Figure 8.5 "Finding the IRR for Jackson's Quality Copies", and Table 8.1 "Calculating the Payback Period for Jackson's Quality Copies" as you learn what Mike's findings are.

<i>Julie:</i>	<i>Hi Mike, any news on the copy machine proposal?</i>
<i>Mike:</i>	<i>I ran the numbers for the new copy machine, and I think you'll like the results. It's not as simple as looking at the difference between cash outflows of \$57,000 and cash inflows of \$82,000 over the life of the asset. We also have to see when the cash flows occur and convert them into today's dollars.</i>
<i>Julie:</i>	<i>OK. What did you find?</i>
<i>Mike:</i>	<i>The NPV is \$1,250 using a required rate of return of 10 percent. This means the investment will generate a return of more than 10 percent after converting the cash flows into today's dollars.</i>
<i>Julie:</i>	<i>Great! I realize the return is expected to be above 10 percent. Do you have a sense of how far above 10 percent?</i>
<i>Mike:</i>	<i>Yes. The IRR is about 11 percent. I also calculated the payback period to give you an idea of how long it will take to recover our initial \$50,000 investment.</i>
<i>Julie:</i>	<i>Good idea. My hope is that we won't be waiting too long to recover the original investment.</i>
<i>Mike:</i>	<i>It will take 5 years to fully recover the \$50,000 investment.</i>
<i>Julie:</i>	<i>Wow! That seems like a long time.</i>

	<i>It is. But realize we bring in an additional \$25,000 after the payback period. Also, the payback method does not measure the profitability of the investment, it simply tells us how long before the initial investment is recovered. Unless we anticipate cash flow problems, I wouldn't place too much importance on the payback period.</i>
<i>Mike:</i>	<i>The NPV and IRR calculations are the best for evaluating this investment.</i>
<i>Julie:</i>	<i>Good point. We don't expect to have cash flow problems. We have plenty of capital, and the business has generated positive cash flow for the past 10 years. Let's order the new machine!</i>

Business in Action 8.4

Capital Budgeting at Fortune 1000 Companies

Studies completed over the past 40 years have indicated that managers prefer to use IRR and payback methods over NPV when evaluating long-term investments. However, a recent survey of *Fortune* 1000 chief financial officers indicates that NPV is now the most preferred method. According to this survey, the percentage of firms that *always* or *often* use each method is as follows:

NPV	85 percent
IRR	77 percent
Payback	53 percent

This survey also shows that companies with capital budgets exceeding \$500,000,000 are more likely to use these methods than are companies with smaller capital budgets. This is probably because larger companies have more specialized personnel in their finance and accounting departments, which enables them to use more sophisticated approaches in evaluating long-term investments.

Source: Patricia A. Ryan and Glenn P. Ryan, "Capital Budgeting Practices of the Fortune 1000: How Have Things Changed?" *Journal of Business and Management* 8, no. 4 (2002).

KEY TAKEAWAY

- The payback method evaluates how long it will take to “pay back” or recover the initial investment. The payback period, typically stated in years, is the time it takes to generate enough cash receipts from an investment to cover the cash outflow(s) for the investment. Although this method is useful for managers concerned about cash flow, the major weaknesses of this method are that it ignores the time value of money, and it ignores cash flows after the payback period.

REVIEW PROBLEM 8.5

This review problem is a continuation of [Note 8.22 "Review Problem 8.3"](#) and [Note 8.26 "Review Problem 8.4"](#) and uses the same information. The management of Chip Manufacturing, Inc., would like to purchase a specialized production machine for \$700,000. The machine is expected to have a life of 4 years and a salvage value of \$100,000. Annual maintenance costs will total \$30,000. Annual labor and material savings are predicted to be \$250,000.

- Use the format in [Table 8.1 "Calculating the Payback Period for Jackson's Quality Copies"](#) to calculate the payback period. Clearly state your conclusion.
- Describe the two major weaknesses of the payback method.

Solution to Review Problem 8.5

- The payback period is slightly more than three years since only \$40,000 is left to be recovered after three years, as shown in the following table.

	Investment (Cash Outflow)	Cash Inflow	Unrecovered Investment Balance
Year 0	\$(700,000)	-	\$(700,000)
Year 1	-	\$220,000 ^a	(480,000)
Year 2	-	220,000 ^a	(260,000)
Year 3	-	220,000 ^a	(40,000)
Year 4	-	320,000 ^b	0

$$^a \$220,000 = \$250,000 \text{ annual savings} - \$30,000 \text{ annual costs.}$$

$$^b \$320,000 = \$250,000 \text{ annual savings} - \$30,000 \text{ annual costs} + \$100,000 \text{ salvage value.}$$

2. A more precise calculation can be performed assuming the \$220,000 cash inflow for year 4 occurs evenly throughout the year and the \$100,000 salvage value cash inflow occurs at the end of year 4. With these assumptions, we simply need to calculate how many months are required in year 4 to recover the remaining \$40,000. \$40,000 divided by \$220,000 equals 0.18 (rounded). Thus 0.18 of a year, or approximately 2 months ($= 0.18 \times 12 \text{ months}$), is required to recover the remaining \$40,000. This more precise calculation results in a payback period of three years and two months. Note that the salvage value is ignored as this cash inflow occurs at the end of year 4 when the machine is sold.

3. First, the payback method does *not* consider the time value of money (no present value or IRR calculations are performed). Second, it only considers the cash inflows until the investment cash outflows are recovered; cash inflows after the payback period are not part of the analysis. For Chip Manufacturing, Inc., the payback period is three years and two months. However, significant cash inflows totaling \$280,000 occur after the payback period and therefore are ignored ($\$280,000 = \$320,000 \text{ year 4 cash inflows} - \$40,000 \text{ remaining investment recovered in the first 2 months of year 4}$).

8.6 Additional Complexities of Estimating Cash Flows

LEARNING OBJECTIVE

1. Evaluate investments with multiple investment and working capital cash flows.

Question: The examples in this chapter are intended to help you learn the basics of evaluating investments using the net present value (NPV), internal rate of return (IRR), and payback methods. However, there are two additional items related to estimating cash flows that must be

considered: investment cash outflows and working capital. How do these two items impact long-term investment decisions?

Answer: These items impact the analysis of long-term investments as described next.

Investment Cash Outflows

The examples thus far have assumed that cash outflows for the investment occur only at the beginning of the investment. However, some investments require cash outflows at varying points throughout the life of the project. For example, suppose the **JCPenney Company** plans to open a new store, which requires a \$10,000,000 investment at the beginning of the project for construction of the building. However, the building will be expanded at the end of year 4, at a cost of \$2,000,000, to meet an expected increase in demand. The \$2,000,000 cash outflow must be included in the cash flows of the project for year 4 when calculating the NPV, IRR, and payback period.

Working Capital

Working capital is defined as current assets (cash, accounts receivable, inventory, and the like) minus current liabilities (accounts payable, wages payable, and accrued liabilities, for instance). Many long-term investments require working capital. For example, JCPenney will need cash in its registers when it opens the new store. Working capital is also required to fund inventory and accounts receivable. Working capital necessary for long-term investments should be included as a cash outflow, typically at the beginning of the project.

Some long-term investments have an expected life, at the end of which working capital is returned to the company for investment elsewhere. When this happens, the working capital is included in the cash flow analysis as a cash outflow at the beginning of the project and a cash inflow at the end of the project.

KEY TAKEAWAY

- Investment proposals often include investment cash outflows at varying points throughout the life of the project. These cash flows

must be included when evaluating investment proposals using NPV, IRR, and payback period methods. Many investments include working capital cash flows required to fund items such as inventory and accounts receivable. Working capital is included as a cash outflow, typically at the beginning of the project, and is often returned back to the company as a cash inflow later in the project.

REVIEW PROBLEM 8.6

The management of Environmental Engineering, Inc. (EEI), would like to open an office for 6 years in a high-growth area of Las Vegas. The initial investment required to purchase an office building is \$250,000, and EEI needs \$50,000 in working capital for the new office. Working capital will be returned to EEI at the end of 6 years. EEI expects to remodel the office at the end of 3 years at a cost of \$200,000.

Annual *net* cash receipts from daily operations (cash receipts minus cash payments) are expected to be as follows:

Year 1	\$ 60,000
Year 2	\$ 80,000
Year 3	\$120,000
Year 4	\$150,000
Year 5	\$160,000
Year 6	\$110,000

Although the company's cost of capital is 8 percent, management set a required rate of return of 12 percent due to the high risk associated with this project.

1. Find the NPV of this investment using the format presented in .
2. Use trial and error to approximate the IRR for this investment proposal.
3. Based on your answers to **1** and **2**, should EEI open the new office? Explain.

4. Use the format in to calculate the payback period.

Solution to Review Problem 8.6

1. The NPV is \$27,571, as shown in the following figure.

Timeline (n) →	Today 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
Building cost	\$(250,000)							
Working capital	(50,000)							
Net cash receipts		\$ 60,000	\$ 80,000	\$120,000	\$150,000	\$160,000	\$110,000	
Remodel cost				(200,000)				
Return of working capital							50,000	
Total cash in (out)	\$(300,000)	\$ 60,000	\$ 80,000	\$(80,000)	\$150,000	\$160,000	\$160,000	
PV factor (r = 12%)	× 1.0000	× 0.8929	× 0.7972	× 0.7118	× 0.6355	× 0.5674	× 0.5066	
Present value	\$(300,000) +	\$ 53,574 +	\$ 63,776 +	\$(56,944) +	\$ 95,325 +	\$ 90,784 +	\$ 81,056 =	\$ 27,571

*Note: The NPV is \$27,571. Because NPV is > 0, accept the investment.
(The investment provides a return greater than 12 percent.)*

2. The IRR is between 14 and 15 percent (approximately 14.5 percent). The IRR is the rate that generates a NPV of zero. Because the NPV is positive at 12 percent, the return is higher than 12 percent. The NPV is calculated as follows using a rate of 14 percent, NPV = \$5,007, and 15 percent, NPV = \$(5,446). Thus the IRR is between 14 and 15 percent.

NPV at 14 percent is

Total cash in (out)	\$(300,000)	\$ 60,000	\$ 80,000	\$(80,000)	\$150,000	\$160,000	\$160,000	
PV factor (r = 14%)	× 1.0000	× 0.8772	× 0.7695	× 0.6750	× 0.5921	× 0.5194	× 0.4556	
Present value	\$(300,000) +	\$ 52,632 +	\$ 61,560 +	\$(54,000) +	\$ 88,815 +	\$ 83,104 +	\$ 72,896 =	\$ 5,007

NPV at 15 percent is

Total cash in (out)
PV factor ($r = 15\%$)
Present value

$\$(300,000)$
 $\times 1.0000$
 $\$(300,000) +$

$\$ 60,000$
 $\times 0.8696$
 $\$ 52,176$

3. Yes. The NPV is positive at \$27,571, and the IRR of 14.5 percent is higher than the company's required rate of return of 12 percent. Thus EEI should open the office in Las Vegas.

4. The payback period is approximately 4.5 years. This approximation assumes the \$90,000 unrecovered investment at the end of year 4 will be recovered about halfway through year 5.

	Investment (Cash Outflow)	Cash Inflow	Unrecovered Investment Balance
Year 0	$\$(300,000)$	-	$\$(300,000)$
Year 1	-	\$ 60,000	$(240,000)^a$
Year 2	-	80,000	$(160,000)^b$
Year 3	$(200,000)$	120,000	$(240,000)^c$
Year 4	-	150,000	$(90,000)$
Year 5	-	160,000	0
Year 6	-	160,000	0

^a $\$(240,000) = \$(300,000)$ unrecovered investment + \$60,000 year 1 cash inflow.

^b $\$(160,000) = \$(240,000)$ unrecovered investment at end of year 1 + \$80,000
year 2 cash inflow.

^c $\$(240,000) = \$(160,000)$ unrecovered investment at end of year 2 – \$200,000
year 3 investment + \$120,000 year 3 cash inflow.

5. A more precise calculation can be performed assuming the \$160,000 cash inflow for year 5 occurs evenly throughout the year. Simply calculate how many months are required in year 5 to recover the remaining \$90,000. \$90,000 divided by \$160,000 equals 0.56 (rounded). Thus 0.56 of a year, or approximately 7 months ($= 0.56 \times 12$ months), is required to recover the remaining \$90,000. This more precise calculation results in a payback period of four years and seven months.

8.7 The Effect of Income Taxes on Capital Budgeting Decisions

LEARNING OBJECTIVE

1. Understand the impact that income taxes have on capital budgeting decisions.

Question: Throughout the chapter, we assumed no income taxes were involved. This is a reasonable assumption for not-for-profit entities and governmental agencies. However, firms that pay income taxes must consider the impact income taxes have on cash flows for long-term investments. How do for-profit organizations include income taxes in their analysis when making long-term investment decisions?

Answer: Let's look at an example to help explain how this works. The management of Scientific Products, Inc. (SPI), is considering a five-year contract to build scientific instruments for a large school district. The initial investment required to purchase production equipment is \$400,000 (to be depreciated over 5 years using the straight-line method, with no salvage value). An additional \$50,000 in working capital is required for the contract. Working capital will be returned to SPI at

the end of five years. Annual net cash receipts from daily operations (cash receipts minus cash payments) are shown as follows. Since depreciation expense is not a cash outflow, it is not included in these amounts.

Year 1	\$ 50,000
Year 2	\$ 60,000
Year 3	\$120,000
Year 4	\$200,000
Year 5	\$130,000

Management established a required rate of return of 10 percent for this proposal. The company's tax rate is 40 percent. (The complexities of government tax codes have a significant impact on the tax rate used. For simplicity, we use a tax rate of 40 percent for this example.)

When taxes are involved, it is important to understand which cash flows are affected by the tax rate and which are not. We look at this by addressing the following capital budgeting items:

- Investment cash outflows
- Working capital cash outflows and inflows
- Revenue cash inflows and expense cash outflows
- Depreciation

Provides a detailed example of how companies adjust for income taxes when evaluating long-term investments. Examine carefully, including the footnotes, as we explain each of these items.

Figure 8.7 NPV Calculation with Income Taxes for Scientific Products, Inc.

Timeline (n) →	Today 0	Year 1	Year 2	Year 3	Year 4	Year 5	
Purchase price ^a	\$(400,000)						
Working capital ^a	(50,000)					\$ 50,000	
Annual after-tax cash receipts ^b		\$ 30,000	\$ 36,000	\$ 72,000	\$120,000	78,000	
Annual depreciation tax savings ^c		32,000	32,000	32,000	32,000	32,000	
Total cash in (out)	\$(450,000)	\$ 62,000	\$ 68,000	\$104,000	\$152,000	\$160,000	
PV factor (r = 10%)	× 1.0000	× 0.9091	× 0.8264	× 0.7513	× 0.6830	× 0.6209	
Present value	\$(450,000) +	\$ 56,364 +	\$ 56,195 +	\$ 78,135 +	\$103,816 +	\$ 99,344 =	\$ (56,146)

Note: the NPV is \$(56,146).

Since NPV is < 0, reject the investment. (The investment provides a return less than 10 percent.)

a Initial investment purchase price and working capital do not directly affect net income and therefore are not adjusted for income taxes.

b Amount equals net cash receipts before taxes $\times (1 - \text{tax rate})$. For year 1, $\$30,000 = \$50,000 \times (1 - 0.40)$; for year 2, $\$36,000 = \$60,000 \times (1 - 0.40)$; and so forth.

c Depreciation tax savings = Depreciation expense \times Tax rate. Depreciation expense is $\$80,000$ ($= \$400,000 \text{ cost} \div 5 \text{ year useful life}$). Thus annual depreciation tax savings is $\$32,000$ ($= \$80,000 \text{ depreciation expense} \times 0.40 \text{ tax rate}$).

1. Investment Cash Outflows. The initial investment in production equipment of \$400,000 is not adjusted for income taxes because it does not directly affect net income. Thus this amount is included in full in .
2. Working Capital Cash Outflows and Inflows. Working capital of \$50,000 is not adjusted for income taxes since it does not affect net income. Thus this amount is included in full as a cash outflow at the beginning of the project and again in full when returned to the company at the end of the project, as shown in .
3. Revenues and Expenses. When a company must pay income taxes, all revenue cash inflows and expense cash outflows affect net income and therefore affect income taxes paid. The goal is to determine the after-tax cash flow. This is calculated in the equation that follows. The tax rate for Scientific Products, Inc., is 40 percent. Thus net cash

receipts (revenue cash inflows minus expense cash outflows) are multiplied by 0.60 (= 1 – 0.40). This results in an after-tax cash flow, as shown in .

Key Equation

After-tax revenue cash inflow = Before-tax cash inflow \times (1 – tax rate)
After-tax expense cash outflow = Before-tax cash outflow \times (1 – tax rate)

4. Depreciation. Although depreciation expense is not a cash outflow, it does reduce taxable income and thereby reduces taxes that are paid (recall that the entry to record depreciation for financial accounting purposes does not affect cash; debit depreciation expense and credit accumulated depreciation). The term used to describe this tax savings is depreciation tax shield. The tax savings resulting from depreciation are calculated as follows:

Key Equation

Depreciation tax savings cash inflow = Depreciation expense \times Tax rate

The production equipment, which has a purchase price of \$400,000, has a useful life of 5 years and no salvage value. SPI uses the straight-line method, which depreciates the original cost evenly over the useful life of the asset. Thus depreciation expense is \$80,000 (= \$400,000 \div 5 years). This is multiplied by the tax rate of 40 percent to get the annual tax savings of \$32,000 (= \$80,000 \times 0.40), as shown in .

Question: Based on the information presented in , should SPI accept the investment proposal?

Answer: As you can see in , the NPV is negative (\$[56,146]), so SPI's management should reject the investment proposal. provides a summary of how income taxes influence cash flows for long-term investments. (Note that this section is intended to give you a general overview of how income taxes effect capital budgeting decisions. Finance textbooks provide more detail regarding how to adjust cash flows for income taxes in more complex situations.)

Figure 8.8 How Income Taxes Affect Capital Budgeting Cash Flows

<u>Cash Flow before Taxes</u>		<u>Adjustment to Get After-Tax Cash Flows</u>
Investment cash outflow	→	No adjustment necessary; cash flow does not affect taxable net income
Working capital cash outflow and inflow	→	No adjustment necessary; cash flow does not affect taxable net income
Revenue cash inflow	→	Multiply by $(1 - \text{tax rate})$
Expense cash outflow	→	Multiply by $(1 - \text{tax rate})$

KEY TAKEAWAY

- Companies that pay income taxes must consider the impact income taxes have on cash flows for long-term investments, and make the necessary adjustments. Investment and working capital cash flows are not adjusted because these cash flows do not affect taxable income. Revenue cash inflows and expense cash outflows are adjusted by multiplying the cash flow by $(1 - \text{tax rate})$. Although depreciation expense is not a cash outflow, it provides tax savings. The tax savings is calculated by multiplying depreciation expense by the tax rate. Once these adjustments are made, we can calculate the NPV and IRR.

REVIEW PROBLEM 8.7

Car Repair, Inc., would like to purchase a new machine for \$400,000. The machine will have a life of 4 years with no salvage value, and is expected to generate annual cash revenue of \$180,000. Annual cash expenses, excluding depreciation, will total \$20,000. The company uses the straight-line depreciation method, has a tax rate of 30 percent, and requires a 10 percent rate of return.

- Find the NPV of this investment using the format presented in .
- Should the company purchase the machine? Explain.

Solution to Review Problem 8.7

- The NPV is \$50,112 as shown in the following figure.

	Today 0	Year 1	Year 2	Year 3	Year 4	
Purchase price ^a	\$(400,000)					
After-tax cash revenue ^b		\$126,000	\$126,000	\$126,000	\$126,000	
After-tax cash expenses ^c		(14,000)	(14,000)	(14,000)	(14,000)	
Depreciation tax savings ^d		30,000	30,000	30,000	30,000	
Total cash in (out)	\$(400,000)	\$142,000	\$142,000	\$142,000	\$142,000	
PV factor (r = 10%)	× 1.0000	× 0.9091	× 0.8264	× 0.7513	× 0.6830	
Present value	\$(400,000) +	\$129,092 +	\$117,349 +	\$106,685 +	\$ 96,986 =	\$ 50,112

^a Initial investment purchase price does not directly affect net income and therefore is not adjusted for income taxes.

^b Amount equals cash revenue before taxes $\times (1 - \text{tax rate})$; $\$126,000 = \$180,000 \times (1 - 0.30)$.

^c Amount equals cash expense before taxes $\times (1 - \text{tax rate})$; $\$14,000 = \$20,000 \times (1 - 0.30)$.

^d Depreciation tax savings = Depreciation expense \times Tax rate. Depreciation expense is $\$100,000$ ($= \$400,000 \text{ cost} \div 4 \text{ year useful life}$). Thus annual depreciation tax savings is $\$30,000$ ($= \$100,000 \text{ depreciation expense} \times 0.30 \text{ tax rate}$).

2. Yes, the company should purchase the machine. The positive NPV of $\$50,112$ shows the return of this proposal is above the company's required rate of return of 10 percent.

8.8 Appendix: Present Value Tables

Figure 8.9 *Present Value of \$1 Received at the End of n Periods*

Periods	Rate per Period															
	2%	0%	1%	0%	0%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	0.9804	0.9804	0.9804	0.9804	0.9804	0.9804	0.9804	0.9804	0.9804	0.9804	0.9804	0.9804	0.9804	0.9804	0.9804	0.9804
3	0.9608	0.9608	0.9608	0.9608	0.9608	0.9608	0.9608	0.9608	0.9608	0.9608	0.9608	0.9608	0.9608	0.9608	0.9608	0.9608
4	0.9412	0.9412	0.9412	0.9412	0.9412	0.9412	0.9412	0.9412	0.9412	0.9412	0.9412	0.9412	0.9412	0.9412	0.9412	0.9412
5	0.9216	0.9216	0.9216	0.9216	0.9216	0.9216	0.9216	0.9216	0.9216	0.9216	0.9216	0.9216	0.9216	0.9216	0.9216	0.9216
6	0.9020	0.9020	0.9020	0.9020	0.9020	0.9020	0.9020	0.9020	0.9020	0.9020	0.9020	0.9020	0.9020	0.9020	0.9020	0.9020
7	0.8824	0.8824	0.8824	0.8824	0.8824	0.8824	0.8824	0.8824	0.8824	0.8824	0.8824	0.8824	0.8824	0.8824	0.8824	0.8824
8	0.8628	0.8628	0.8628	0.8628	0.8628	0.8628	0.8628	0.8628	0.8628	0.8628	0.8628	0.8628	0.8628	0.8628	0.8628	0.8628
9	0.8432	0.8432	0.8432	0.8432	0.8432	0.8432	0.8432	0.8432	0.8432	0.8432	0.8432	0.8432	0.8432	0.8432	0.8432	0.8432
10	0.8236	0.8236	0.8236	0.8236	0.8236	0.8236	0.8236	0.8236	0.8236	0.8236	0.8236	0.8236	0.8236	0.8236	0.8236	0.8236
11	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040
12	0.7844	0.7844	0.7844	0.7844	0.7844	0.7844	0.7844	0.7844	0.7844	0.7844	0.7844	0.7844	0.7844	0.7844	0.7844	0.7844
13	0.7648	0.7648	0.7648	0.7648	0.7648	0.7648	0.7648	0.7648	0.7648	0.7648	0.7648	0.7648	0.7648	0.7648	0.7648	0.7648
14	0.7452	0.7452	0.7452	0.7452	0.7452	0.7452	0.7452	0.7452	0.7452	0.7452	0.7452	0.7452	0.7452	0.7452	0.7452	0.7452
15	0.7256	0.7256	0.7256	0.7256	0.7256	0.7256	0.7256	0.7256	0.7256	0.7256	0.7256	0.7256	0.7256	0.7256	0.7256	0.7256
16	0.7060	0.7060	0.7060	0.7060	0.7060	0.7060	0.7060	0.7060	0.7060	0.7060	0.7060	0.7060	0.7060	0.7060	0.7060	0.7060
17	0.6864	0.6864	0.6864	0.6864	0.6864	0.6864	0.6864	0.6864	0.6864	0.6864	0.6864	0.6864	0.6864	0.6864	0.6864	0.6864
18	0.6668	0.6668	0.6668	0.6668	0.6668	0.6668	0.6668	0.6668	0.6668	0.6668	0.6668	0.6668	0.6668	0.6668	0.6668	0.6668
19	0.6472	0.6472	0.6472	0.6472	0.6472	0.6472	0.6472	0.6472	0.6472	0.6472	0.6472	0.6472	0.6472	0.6472	0.6472	0.6472
20	0.6276	0.6276	0.6276	0.6276	0.6276	0.6276	0.6276	0.6276	0.6276	0.6276	0.6276	0.6276	0.6276	0.6276	0.6276	0.6276
21	0.6080	0.6080	0.6080	0.6080	0.6080	0.6080	0.6080	0.6080	0.6080	0.6080	0.6080	0.6080	0.6080	0.6080	0.6080	0.6080
22	0.5884	0.5884	0.5884	0.5884	0.5884	0.5884	0.5884	0.5884	0.5884	0.5884	0.5884	0.5884	0.5884	0.5884	0.5884	0.5884
23	0.5688	0.5688	0.5688	0.5688	0.5688	0.5688	0.5688	0.5688	0.5688	0.5688	0.5688	0.5688	0.5688	0.5688	0.5688	0.5688
24	0.5492	0.5492	0.5492	0.5492	0.5492	0.5492	0.5492	0.5492	0.5492	0.5492	0.5492	0.5492	0.5492	0.5492	0.5492	0.5492
25	0.5296	0.5296	0.5296	0.5296	0.5296	0.5296	0.5296	0.5296	0.5296	0.5296	0.5296	0.5296	0.5296	0.5296	0.5296	0.5296
26	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100
27	0.4904	0.4904	0.4904	0.4904	0.4904	0.4904	0.4904	0.4904	0.4904	0.4904	0.4904	0.4904	0.4904	0.4904	0.4904	0.4904
28	0.4708	0.4708	0.4708	0.4708	0.4708	0.4708	0.4708	0.4708	0.4708	0.4708	0.4708	0.4708	0.4708	0.4708	0.4708	0.4708
29	0.4512	0.4512	0.4512	0.4512	0.4512	0.4512	0.4512	0.4512	0.4512	0.4512	0.4512	0.4512	0.4512	0.4512	0.4512	0.4512
30	0.4316	0.4316	0.4316	0.4316	0.4316	0.4316	0.4316	0.4316	0.4316	0.4316	0.4316	0.4316	0.4316	0.4316	0.4316	0.4316

Note: Factor= $1/(1+r)^n$

Figure 8.10 Present Value of a \$1 Annuity Received at the End of Each Period for n Periods

Periods	Rate per Period															
	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	25%	30%	
1	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8928	0.8850	0.8772	0.8696	0.8624	0.8333	0.8000	0.7692	
2	1.8594	1.8334	1.8080	1.7833	1.7591	1.7355	1.7125	1.6901	1.6681	1.6467	1.6257	1.6050	1.5278	1.4400	1.3609	
3	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869	2.4437	2.4018	2.3612	2.3216	2.2832	2.2457	2.1005	1.9520	1.8161	
4	3.5460	3.4651	3.3872	3.3121	3.2397	3.1699	3.1024	3.0373	2.9743	2.9137	2.8550	2.7980	2.5887	2.3616	2.1662	
5	4.3295	4.2124	4.1002	3.9927	3.8897	3.7908	3.6959	3.6048	3.5172	3.4331	3.3522	3.2737	2.9906	2.6993	2.4356	
6	5.0757	4.9173	4.7665	4.6229	4.4859	4.3553	4.2305	4.1114	3.9975	3.8887	3.7845	3.6856	3.3255	2.9514	2.6427	
7	5.7864	5.5824	5.3893	5.2064	5.0330	4.8684	4.7122	4.5638	4.4226	4.2883	4.1604	4.0385	3.6046	3.1611	2.8021	
8	6.4632	6.2096	5.9713	5.7466	5.5348	5.3349	5.1467	4.9676	4.7988	4.6389	4.4873	4.3436	3.8372	3.3289	2.9247	
9	7.1078	6.8017	6.5152	6.2469	5.9952	5.7590	5.5370	5.3282	5.1317	4.9464	4.7716	4.6080	4.0210	3.4631	3.0190	
10	7.7217	7.3601	7.0236	6.7101	6.4177	6.1446	5.8892	5.6502	5.4262	5.2161	5.0188	4.8341	4.1925	3.5705	3.0915	
11	8.3064	7.8869	7.4987	7.1390	6.8052	6.4951	6.2065	5.9377	5.6869	5.4527	5.2337	5.0280	4.3271	3.6564	3.1473	
12	8.8633	8.3838	7.9427	7.5361	7.1607	6.8137	6.4924	6.1944	5.9176	5.6603	5.4206	5.1952	4.4392	3.7251	3.1903	
13	9.3936	8.8527	8.3577	7.9038	7.4869	7.1034	6.7499	6.4235	6.1218	5.8424	5.5831	5.3337	4.5327	3.7801	3.2233	
14	9.8986	9.2950	8.7455	8.2442	7.7862	7.3667	6.9819	6.6282	6.3025	6.0021	5.7245	5.4661	4.6106	3.8241	3.2487	
15	10.3797	9.7122	9.1079	8.5595	8.0607	7.6061	7.1909	6.8109	6.4624	6.1422	5.8474	5.5716	4.6755	3.8593	3.2682	
16	10.8378	10.1059	9.4466	8.8514	8.3126	7.8237	7.3792	6.9740	6.6039	6.2651	5.9542	5.6624	4.7296	3.8874	3.2832	
17	11.2741	10.4773	9.7632	9.1216	8.5436	8.0216	7.5488	7.1196	6.7291	6.3729	6.0472	5.7423	4.7746	3.9099	3.2948	
18	11.6896	10.8276	10.0591	9.3719	8.7556	8.2014	7.7016	7.2497	6.8399	6.4674	6.1280	5.8127	4.8122	3.9279	3.3037	
19	12.0853	11.1581	10.3356	9.6036	8.9501	8.3649	7.8393	7.3658	6.9380	6.5504	6.1982	5.8712	4.8335	3.9244	3.3105	
20	12.4622	11.4699	10.5940	9.8181	9.1285	8.5136	7.9633	7.4694	7.0248	6.6231	6.2593	5.9227	4.8696	3.9339	3.3158	
21	12.8212	11.7641	10.8355	10.0168	9.2922	8.6487	8.0751	7.5620	7.1016	6.6870	6.3125	5.9637	4.8913	3.9631	3.3198	
22	13.1630	12.0416	11.0612	10.2007	9.4424	8.7715	8.1757	7.6446	7.1695	6.7429	6.3587	5.9999	4.9094	3.9705	3.3230	
23	13.4886	12.3034	11.2722	10.3711	9.5802	8.8832	8.2664	7.7184	7.2297	6.7921	6.3988	5.4321	4.9245	3.9764	3.3254	
24	13.7986	12.5504	11.4693	10.5288	9.7066	8.9947	8.3487	7.7843	7.2829	6.8351	6.4330	5.4509	4.9371	3.9811	3.3272	
25	14.0939	12.7834	11.6536	10.6748	9.8226	9.0770	8.4217	7.8431	7.3300	6.8729	6.4641	5.4669	4.9476	3.9849	3.3286	
26	14.3752	13.0032	11.8258	10.8100	9.9290	9.1609	8.4881	7.8957	7.3717	6.9061	6.4906	5.4804	4.9563	3.9879	3.3297	
27	14.6430	13.2105	11.9867	10.9352	10.0266	9.2372	8.5478	7.9426	7.4086	6.9352	6.5135	5.4919	4.9636	3.9903	3.3305	
28	14.8981	13.4062	12.1371	11.0511	10.1161	9.3066	8.6016	7.9844	7.4412	6.9607	6.5335	5.5016	4.9697	3.9923	3.3312	
29	15.1411	13.5907	12.2777	11.1584	10.1983	9.3690	8.6501	8.0218	7.4701	6.9830	6.5509	5.5098	4.9747	3.9938	3.3317	
30	15.3725	13.7648	12.4090	11.2578	10.2737	9.4269	8.6938	8.0552	7.4957	7.0027	6.5660	5.5168	4.9789	3.9950	3.3321	

Note: Factor= $1-(1+r)^{-nr}$

END-OF-CHAPTER EXERCISES

Questions

1. What is the difference between capital budgeting decisions covered in this chapter and management decisions covered in ?
2. What concept must be considered when looking at cash flows over several years for a long-term investment? Explain.
3. What is meant by the term *present value*?

4. What is the formula used to calculate the present value of a future cash flow? Describe each component.
5. Describe the three steps required to evaluate investments using the net present value method.
6. How do most firms establish the required rate of return used to calculate the net present value?
7. What is meant by the term *internal rate of return*? Explain the IRR decision rule?
8. For the purpose of calculating net present value and internal rate of return, do companies use the accrual basis of accounting? Explain.
9. Why might a firm choose to accept a long-term investment even if the net present value is below zero?
10. What might cause a manager to reject a long-term investment even though the net present value is positive?
11. Describe the two steps required to calculate net present value and internal rate of return when using Excel.
12. What is the payback method, and why do managers use this method?
13. What are the two weaknesses associated with the payback method?
14. Refer to What method of evaluating long-term investments is most popular? Why do you think the payback method is the least-used method?
15. What does the term *working capital* refer to, and how does working capital affect the evaluation of long-term investments?
16. Assume a company pays income taxes. How are revenue and expense cash flows adjusted for income taxes when calculating the net present value?
17. Assume a company pays income taxes. How does depreciation expense affect cash flows even though it is a noncash expense?

Brief Exercises

18. **Investment Decision at Jackson's Quality Copies.** Refer to the dialogue at Jackson's Quality Copies presented at the beginning of the chapter. What is Julie Jackson

proposing? What information did Mike, the accountant, get from Julie to evaluate the proposal?

19. Present Value Calculations. For each of the following independent scenarios, use in the appendix to calculate the present value of the cash flow described.

1. \$10,000 will be received 4 years from today. The rate is 10 percent.
2. \$10,000 will be received 4 years from today. The rate is 20 percent.
3. \$50,000 will be received 15 years from today. The rate is 12 percent.
4. \$50,000 will be received 15 years from today. The rate is 6 percent.

20. Present Value Calculations (Annuities). For each of the following independent scenarios, use in the appendix to calculate the present value of the cash flow described. Round to the nearest dollar.

1. \$1,000 will be received at the end of each year for 6 years. The rate is 12 percent.
2. \$1,000 will be received at the end of each year for 6 years. The rate is 15 percent.
3. \$10,000 will be received at the end of each year for 6 years. The rate is 7 percent.
4. \$250,000 will be received at the end of each year for 4 years. The rate is 10 percent.

21. Net Present Value Calculations. Freefall, Inc., has two independent investment opportunities, each requiring an initial investment of \$65,000. The company's required rate of return is 8 percent. The cash inflows for each investment are provided as follows.

	Investment Y	Investment Z
Year 1	\$ 35,000	\$ 5,000
Year 2	25,000	15,000
Year 3	15,000	25,000
Year 4	5,000	35,000
Total inflows	<u>\$ 80,000</u>	<u>\$ 80,000</u>

Required:

- Without resorting to calculations, which investment will have the highest net present value? Explain.
- Calculate the net present value for each investment (remember to include the initial investment cash outflow in your calculation). Should the company invest in either investment? Round to the nearest dollar.

Internal Rate of Return Calculation. An investment costing \$50,000 today will result in cash savings of \$5,000 per year for 15 years. Use trial and error to approximate the internal rate of return for this investment proposal.

Evaluating Qualitative Factors. Chem, Inc., produces chemical products. The company recently decided to invest in expensive pollution control devices even though the negative net present value pointed toward rejecting this investment. What qualitative factor likely led the company to make the investment in spite of the negative net present value?

Ethical Issues in Making a Capital Budgeting Decision. Assume the manager of a store earns an annual bonus based on meeting a certain level of net income, which has been achieved consistently over the past five years. The company is currently considering the addition of a second store, which is expected to become profitable after two years. The manager is responsible for making the final decision whether the second store should be opened and would receive an annual bonus only if a certain level of net income were achieved for both stores combined.

Why might the manager refuse to invest in the new store even though the investment is projected to achieve a return greater than the company's required rate of return?

Net Present Value Calculation Using Excel. An investment costing \$200,000 today will result in cash savings of \$85,000 per year for 3 years. The company's required rate of return is 11 percent. Use Excel to calculate the net present value of this investment in a format similar to the one in the *Computer Application* box in the chapter.

Payback Period Calculation. Textile Services, Inc., plans to invest \$80,000 in a new machine. Annual cash inflows from this investment will be \$25,000, and annual cash outflows will be \$5,000. Determine the payback period for this investment.

Net Present Value Analysis with Multiple Investments. A project requiring an investment of \$20,000 today and \$10,000 one year from today, will result in cash savings of \$4,000 per year for 15 years. Find the net present value of this investment using a rate of 10 percent. Round to the nearest dollar.

Net Present Value Calculation with Taxes. An investment costing \$200,000 today will result in cash savings of \$85,000 per year for 3 years. The company has a tax rate of 40 percent, and requires an 11 percent rate of return. Find the net present value of this investment using the format shown in . Round to the nearest dollar.

Exercises: Set A

29. **Net Present Value Analysis.** Architect Services, Inc., would like to purchase a blueprint machine for \$50,000. The machine is expected to have a life of 4 years, and a salvage value of \$10,000. Annual maintenance costs will total \$14,000. Annual savings are predicted to be \$30,000. The company's required rate of return is 11 percent.

Required:

- a. Ignoring the time value of money, calculate the net cash inflow or outflow resulting from this investment opportunity.

- b. Find the net present value of this investment using the format presented in .
- c. Should the company purchase the blueprint machine? Explain.

Internal Rate of Return Analysis. Architect Services, Inc., would like to purchase a blueprint machine for \$50,000. The machine is expected to have a life of 4 years, and a salvage value of \$10,000. Annual maintenance costs will total \$14,000. Annual savings are predicted to be \$30,000. The company's required rate of return is 11 percent (this is the same data as the previous exercise).

Required:

- a. Use trial and error to approximate the internal rate of return for this investment proposal. Round to the nearest dollar.
- b. Should the company purchase the blueprint machine? Explain.

Payback Period Calculation. Architect Services, Inc., would like to purchase a blueprint machine for \$50,000. The machine is expected to have a life of 4 years, and a salvage value of \$10,000. Annual maintenance costs will total \$14,000. Annual savings are predicted to be \$30,000 (this is the same data as the previous exercise). Determine the payback period for this investment using the format shown in .

Net Present Value Analysis with Multiple Investments, Alternative Format. Conway Construction Corporation would like to purchase a fleet of trucks at a cost of \$260,000. Additional equipment needed to maintain the fleet of trucks will be purchased at the end of year 2 for \$40,000. The trucks are expected to have a life of 8 years, and a salvage value of \$20,000. Annual costs for maintenance, insurance, and other cash expenses will total \$42,000. Annual net cash receipts resulting from this purchase are predicted to be \$135,000. The company's required rate of return is 14 percent.

Required:

- a. Find the net present value of this investment using the format presented in .

- b. Should the company purchase the new fleet of trucks? Explain.

Calculating NPV and IRR Using Excel. Wood Products Company would like to purchase a computerized wood lathe for \$100,000. The machine is expected to have a life of 5 years, and a salvage value of \$5,000. Annual maintenance costs will total \$20,000. Annual net cash receipts resulting from this machine are predicted to be \$45,000. The company's required rate of return is 15 percent.

Required:

- a. Use Excel to calculate the net present value and internal rate of return in a format similar to the *Computer Application* spreadsheet shown in the chapter.
- b. Should the company purchase the wood lathe? Explain.

Net Present Value Analysis with Taxes. Timberline Company would like to purchase a new machine for \$100,000. The machine will have a life of 5 years with no salvage value, and is expected to generate annual cash revenue of \$50,000. Annual cash expenses, excluding depreciation, will total \$24,000. The company uses the straight-line depreciation method, has a tax rate of 40 percent, and requires a 12 percent rate of return.

Required:

- a. Find the net present value of this investment using the format presented in . Round to the nearest dollar.
- b. Should the company purchase the machine? Explain.

Exercises: Set B

35. Net Present Value Analysis. Wood Products Company would like to purchase a computerized wood lathe for \$100,000. The machine is expected to have a life of 5 years, and a salvage value of \$5,000. Annual maintenance costs will total \$20,000. Annual net cash receipts resulting from this machine are predicted to be \$45,000. The company's required rate of return is 15 percent.

Required:

- a. Ignoring the time value of money, calculate the net cash inflow or outflow resulting from this investment opportunity.
- b. Find the net present value of this investment using the format presented in . Round to the nearest dollar.
- c. Should the company purchase the wood lathe? Explain.

Internal Rate of Return Analysis. Wood Products Company would like to purchase a computerized wood lathe for \$100,000. The machine is expected to have a life of 5 years, and a salvage value of \$5,000. Annual maintenance costs will total \$20,000. Annual net cash receipts resulting from this machine are predicted to be \$45,000. The company's required rate of return is 15 percent (this is the same data as the previous exercise).

Required:

- a. Use trial and error to approximate the internal rate of return for this investment proposal.
- b. Should the company purchase the wood lathe? Explain.

Payback Period Calculation. Wood Products Company would like to purchase a computerized wood lathe for \$100,000. The machine is expected to have a life of 5 years, and a salvage value of \$5,000. Annual maintenance costs will total \$20,000. Annual net cash receipts resulting from this machine are predicted to be \$45,000. The company's required rate of return is 15 percent (this is the same data as the previous exercise). Determine the payback period for this investment using the format shown in .

Net Present Value Analysis and Qualitative Factors, Alternative Format. Pete's Plumbing Supplies would like to expand into a new warehouse at a cost of \$500,000. The warehouse is expected to have a life of 20 years, and a salvage value of \$100,000. Annual costs for maintenance, insurance, and other cash expenses will total \$60,000. Annual net cash receipts resulting from this expansion are predicted to be \$115,000. The company's required rate of return is 12 percent.

Required:

- a. Find the net present value of this investment using the format presented in . Round to the nearest dollar.
- b. Should the company purchase the new warehouse? Explain.
- c. Provide one qualitative factor that might cause the company to reach a different conclusion than the one reached in requirement *b*.

Calculating NPV and IRR Using Excel. Pete's Plumbing Supplies would like to expand into a new warehouse at a cost of \$500,000. The warehouse is expected to have a life of 20 years, and a salvage value of \$100,000. Annual costs for maintenance, insurance, and other cash expenses will total \$60,000. Annual net cash receipts resulting from this expansion are predicted to be \$115,000. The company's required rate of return is 12 percent.

Required:

- a. Use Excel to calculate the net present value and internal rate of return in a format similar to the *Computer Application* spreadsheet shown in the chapter.
- b. Should the company purchase the warehouse? Explain.

Net Present Value Analysis with Taxes. Quality Chocolate, Inc., would like to purchase a new machine for \$200,000. The machine will have a life of 4 years with no salvage value, and is expected to generate annual cash revenue of \$90,000. Annual cash expenses, excluding depreciation, will total \$10,000. The company uses the straight-line depreciation method, has a tax rate of 30 percent, and requires a 14 percent rate of return.

Required:

- a. Find the net present value of this investment using the format presented in . Round to the nearest dollar.
- b. Should the company purchase the machine? Explain.

Problems

41. Evaluating Alternative Investments. Washington Brewery has two independent investment opportunities to purchase brewing equipment so the company can meet growing customer demand. The first option (equipment A) requires an initial investment of \$230,000 for equipment with an expected life of 5 years and a salvage value of \$20,000. The second option (equipment B) requires an initial investment of \$120,000 for equipment with an expected life of 4 years and a salvage value of \$15,000. The company's required rate of return is 10 percent. Additional cash flow information for each investment is provided as follows.

	Year 1	Year 2	Year 3	Year 4	Year 5
Equipment A					
Utility savings	\$ 12,000	\$ 14,000	\$ 15,000	\$ 16,000	\$ 17,000
Additional revenue	45,000	48,000	50,000	55,000	60,000
Maintenance costs	(5,000)	(8,000)	(10,000)	(13,000)	(16,000)
Equipment B					
Utility savings	\$ 8,000	\$ 9,000	\$ 10,000	\$ 10,000	-
Additional revenue	35,000	36,000	38,000	42,000	-
Maintenance costs	(6,000)	(8,000)	(9,000)	(11,000)	-

42. Required:

- Calculate the net present value for each investment using the format presented in . (Remember to include the initial investment cash outflow and salvage value in your calculation.) Round to the nearest dollar.
- Which, if any, investment is preferable? Explain.

Net Present Value, Internal Rate of Return, and Payback Period

Analyses. Sherwin Moore Paint Company would like to further automate its production process by purchasing production equipment for \$660,000. The equipment is expected to have a useful life of 8 years, and will be sold at the end of 8 years for \$40,000. The equipment requires significant maintenance work at an annual cost of \$75,000. Labor and material cost savings, shown in the table, are also expected to be significant.

Year 1	\$160,000
Year 2	\$190,000
Year 3	\$200,000
Year 4	\$240,000
Year 5	\$280,000
Year 6	\$220,000
Year 7	\$180,000
Year 8	\$155,000

The company's required rate of return is 11 percent. Assume the company requires all investments to be recovered within five years.

Required:

- Find the net present value of this investment using the format presented in . Round to the nearest dollar.
- Use trial and error to approximate the internal rate of return for this investment proposal.
- Determine the payback period for this investment using the format shown in .

- d. Based on your findings in requirements **a**, **b**, and **c**, should the company purchase the production equipment? Explain.

Calculating NPV and IRR Using Excel. Sherwin Moore Paint Company would like to further automate its production process by purchasing production equipment for \$660,000. The equipment is expected to have a useful life of 8 years, and will be sold at the end of 8 years for \$40,000. The equipment requires significant maintenance work at an annual cost of \$75,000. Labor and material cost savings, shown in the table, are also expected to be significant.

Year 1	\$160,000
Year 2	\$190,000
Year 3	\$200,000
Year 4	\$240,000
Year 5	\$280,000
Year 6	\$220,000
Year 7	\$180,000
Year 8	\$155,000

The company's required rate of return is 11 percent.

Required:

- a. Use Excel to calculate the net present value and internal rate of return in a format similar to the *Computer Application* spreadsheet shown in the chapter.
- b. Should the company purchase the production equipment? Explain.

Net Present Value Analysis, Multiple Investments, and Qualitative Factors. Oil Production, Inc., would like to drill oil from land the company

already owns. The equipment is expected to cost \$4,000,000, has a useful life of 5 years, and will be sold at the end of 5 years for \$400,000. Annual costs for maintenance and other cash expenses will total \$550,000. Annual net cash receipts resulting from the sale of oil are predicted to be \$1,900,000. Working capital of \$270,000 is required at the beginning of the project and will be returned at the end of 5 years. The equipment will require refurbishing at the end of year 3 at a cost of \$300,000. Although the company's cost of capital is 15 percent, management established a required rate of return of 20 percent due to the high risk associated with this project.

Required:

- a. Find the net present value of this investment using the format presented in . Round to the nearest dollar.
- b. Use trial and error to approximate the internal rate of return for this investment proposal.
- c. Should the company accept the proposal? Explain.
- d. What qualitative factors might improve management's view of this proposal?

Calculating NPV and IRR Using Excel. Oil Production, Inc., would like to drill oil from land the company already owns. The equipment is expected to cost \$4,000,000, has a useful life of 5 years, and will be sold at the end of 5 years for \$400,000. Annual costs for maintenance and other cash expenses will total \$550,000. Annual net cash receipts resulting from the sale of oil are predicted to be \$1,900,000. Working capital of \$270,000 is required at the beginning of the project and will be returned at the end of 5 years. The equipment will require refurbishing at the end of year 3 at a cost of \$300,000. Although the company's cost of capital is 15 percent, management established a required rate of return of 20 percent due to the high risk associated with this project.

Required:

- a. Use Excel to calculate the net present value and internal rate of return in a format similar to the *Computer Application* spreadsheet shown in the chapter.
- b. Should the company accept the proposal? Explain.

Net Present Value, Internal Rate of Return, and Payback Period

Analyses; Ethical Issues. Tower CD Stores would like to open a retail store in Houston. The initial investment to purchase the building is \$420,000, and an additional \$50,000 in working capital is required. Since this store will be operating for many years, the working capital will not be returned in the near future. Tower expects to remodel the store at the end of 3 years at a cost of \$100,000. Annual net cash receipts from daily operations (cash receipts minus cash payments) are expected to be as follows.

Year 1	\$ 80,000
Year 2	\$115,000
Year 3	\$118,000
Year 4	\$140,000
Year 5	\$155,000
Year 6	\$167,000
Year 7	\$175,000

The company's required rate of return is 13 percent. Assume management decided to limit the analysis to 7 years.

Required:

- a. Find the net present value of this investment using the format presented in . Round to the nearest dollar.
- b. Use trial and error to approximate the internal rate of return for this investment proposal.

- c. Based on your answer to requirements **a** and **b**, should Tower open the new store? Explain.
- d. Use the format presented in to calculate the payback period (include working capital in the initial investment). Assuming management requires all investments to be recovered within three years, should Tower CD Store open the new store?
- e. What is the weakness of using the payback period method to evaluate long-term investments?
- f. Assume the manager of the company wanted to live in Houston and intentionally inflated the projected annual cash receipts so that the proposal would be accepted. The proposal would otherwise have been rejected. Explain how the company's use of a postaudit would help to prevent this type of unethical behavior.

Net Present Value with Taxes. Refer to the Tower CD Stores information presented in the previous problem. Assume the costs associated with the purchase of the building are depreciated over 20 years using the straight-line method, with no salvage value. Costs associated with the building remodel are depreciated over 10 years with no salvage value, starting with year 4. The company's tax rate is 40 percent. Again, management will limit the analysis to seven years.

Required:

- a. Find the net present value of this investment using the format presented in . Round to the nearest dollar.
- b. Should Tower open the new store? Explain.
- c. How did income taxes affect the decision being made by Tower CD Stores?

One Step Further: Skill-Building Cases

48. **Opening New Retail Stores.** Refer to Provide two examples of cash outflows and one example of cash inflows resulting from the decision to open a new store.

49. **Determining the Cost of Capital by Industry.** Refer to the Why do you think the cost of capital in the beverage industry is low relative to the cost of capital in other industries?

50. **The California Lottery and Present Value Concepts.** Refer to the Why does the State of California need only \$550,000 to pay a \$1,000,000 lottery winner?

51. **Internet Project: Capital Expenditures at Intel.** Go to **Intel's** Web site (<http://www.intel.com>) and enter "annual report" or "10K report" in the search feature. Find the most recent annual report or 10K report and review the *Consolidated Statements of Cash Flows* portion of the company's financial statements. Find the *Additions to property, plant and equipment* line item in the *Investing Activities* section of the statement, and answer the following questions. Be sure to submit a printed copy of the consolidated statements of cash flows with your answers.

- a. How much cash did **Intel** spend on additions to property, plant, and equipment in the most current year? How does this amount compare with amounts spent in the previous two years?
- b. Describe two capital budgeting decision techniques that were likely used by **Intel** to make long-term investment decisions.

Group Activity: Qualitative Factors. Each of the following scenarios is being considered at three separate companies.

1. A large regional energy company uses coal to produce electricity that is sold to local power companies. Although government regulations will not require a cleaner process for at least five years, the company is considering spending millions of dollars on equipment that will reduce pollutants from its production process. However, the net present value analysis indicates this proposal should be rejected.
2. A producer of mountain bikes known for its expensive, high-quality bikes would like to introduce a less expensive entry-level line of mountain bikes. However, the projected internal rate of return for this proposal is lower than the company's minimum required rate of return.

3. A maker of computer chips with a reputation of staying on the cutting edge of technology would like to invest in a new production facility. However, the net present value analysis indicates this proposal should be rejected.

Required:

Your instructor will divide the class into groups of two to four students, and assign one of the three independent scenarios listed previously to each group. Each group must perform the requirements listed here:

1. Identify at least two qualitative factors that may lead to accepting the proposal.
2. Discuss each option, based on the findings of your group, with the class.

Comprehensive Cases

53. Ethical Issues in Capital Budgeting. Loomis Nursery grows a variety of plants for wholesale distribution. The company would like to expand its operations and is considering a move to one of two locations. The first location, Wyatville, is one hour from the ocean and therefore attractive for employees who like to travel on weekends. The second location, Kenton, is not as close to the ocean, and much further from desirable vacation destinations.

The company's controller, Lisa Lennox, created a net present value analysis for each location. The Kenton location had a positive net present value, and the Wyatville location had a negative net present value. Upon providing this information to the chief financial officer of the company, Max Madden, Lisa was asked to "review the numbers carefully and make sure all the benefits of moving to Wyatville were included in the analysis." Lisa knew that Max preferred vacationing near the ocean and had a strong desire to move

operations to Wyatville. However, she was unable to find any errors in her analysis and could not identify any additional benefits.

Lisa approached Max with this information. Max responded, “There is no way Kenton should have a higher net present value than Wyatville. Redo your analysis to show that Wyatville has the highest net present value, and have it on my desk by the end of the week.”

Required:

- a. Is Max Madden’s request ethical? Explain.
- b. How should Lisa handle this situation? (It may be helpful to review the presentation of ethics in .)

Ethical Issues in Capital Budgeting. Toyonda Motor Company produces a variety of products including motorcycles, all-terrain vehicles, marine engines, automobiles, light trucks, and heavy-duty trucks. Each division manager at Toyonda Motor Company is paid a base salary and is given an annual cash bonus if the division achieves profits of at least 10 percent of the value of assets invested in the division (this is called *return on investment*).

Peggy Parkins, manager of the Light Truck Division, is considering investing in new production equipment. The net present value of the proposal is positive, and Peggy is convinced the new equipment will provide a competitive edge in future years. However, because of the significant up-front cost and related depreciation, short-term profits will be negatively affected by this investment. In fact, the new equipment will reduce return on investment below the 10 percent threshold for at least 3 years, which will prevent Peggy from receiving her annual bonuses for at least 3 years. However, profits are expected to increase significantly after the three-year period. Peggy is planning to retire in two years and therefore would prefer to reject the proposal to invest in new production equipment.

Required:

- a. Describe the ethical conflict facing Peggy Parkins.
- b. What type of employee compensation system might prevent this type of conflict?

Chapter 9

How Are Operating Budgets Created?

Jerry Feltz is the president and owner of Jerry's Ice Cream, a producer of high-quality ice cream sold to specialty grocery stores. Jerry is holding a meeting with the company's managers to discuss plans for this coming year. Managers at the meeting are Tom Benson, the sales manager; Lynn Young, the production manager; and Michelle Hopkins, the treasurer and controller.

<i>Jerry:</i>	<i>It looks as if we are having another great year. Customers love our ice cream, and sales are up. It's time to begin the budgeting process for next year. Tom, do you have any thoughts on what our sales will look like for next year?</i>
<i>Tom:</i>	<i>I think we will continue to see significant sales growth. But it's difficult to predict exactly how much growth. On the low end, I would expect about 10 percent; on the high end, perhaps 25 percent.</i>
<i>Lynn:</i>	<i>Wow! I knew sales were going well, but I had no idea we were expecting to grow 10 percent to 25 percent next year. It will take some serious planning to produce enough ice cream to handle this growth.</i>
<i>Michelle:</i>	<i>I agree. We need to make sure production has enough capacity to handle the growth, and cash flow planning will be critical to ensure we don't run out of cash in the process of ramping up production.</i>
<i>Jerry:</i>	<i>Tom, talk with our salespeople and industry contacts so we can get a solid estimate of quarterly sales for next year. If sales really are expected to grow as you say, we will face a huge challenge!</i>
<i>Tom:</i>	<i>I'll have something for you by the end of next week.</i>
<i>Michelle:</i>	<i>I'll start the budgeting process once we have the sales information from Tom.</i>

<i>Lynn:</i>	<i>The sooner we start the budgeting process, the better, particularly if I have to hire more employees and find more production space.</i>
<i>Jerry:</i>	<i>Let's meet in two weeks to discuss the results of Tom's research and to set up a plan to handle the growth. Thanks for your help!</i>

Many companies encounter the same issue of growing sales that is facing Jerry's Ice Cream. Those that *plan* for growth have a better chance of succeeding than those that sit idle and hope it all works out. Operating budgets are used to (1) plan operations and (2) control operations. We describe both of these objectives next and then devote the remainder of this chapter to the planning phase by creating an operating budget for Jerry's Ice Cream. We cover the control phase in [Chapter 10 "How Do Managers Evaluate Performance Using Cost Variance Analysis?"](#).

9.1 Planning and Controlling Operations

LEARNING OBJECTIVE

1. Understand how operating budgets are used for planning and control.

Question: If you have established a personal budget, you know the importance of planning to achieve your goals. Assume one of your goals is to purchase a new car. It is not enough to simply state, "I want to buy a new car next year." If you do not plan ahead for a big expense like this, you may find that you don't have enough money for a reasonable down payment or that you have very large monthly payments. If you plan ahead, you may see that working some additional hours, cutting back on entertainment, or a combination of both, allows you to buy the car and avoid these problems. Organizations are no different, except their needs tend to be more involved. How do organizations formally plan for the future?

Answer: Let's look at Jerry's Ice Cream to answer this question. The company wants to increase sales next year, but will have difficulty doing this without some type of plan, often called a budget. A budget is a plan of the resources needed to achieve the organization's goals. An operating budget is a short-term budget (typically one year) that focuses on the daily operations of the organization. Before presenting the detailed schedules of an operating budget, we first discuss how organizations use budgets to plan and control their activities.

The Planning Phase

Question: How are budgets used to help organizations plan future activities?

Answer: Budgets are established in advance to help organizations communicate their plans to employees and to help employees coordinate activities across the entire organization. Imagine Jerry's Ice Cream operating without a budget. If production has no forewarning of an increase in customer demand, Lynn Young, production manager, has no opportunity to plan for an increase in production. Inefficiencies will occur as Lynn struggles to keep pace with demand (e.g., employees working overtime or materials purchased at the last minute at a premium). Cash flow may suffer as spending initially outpaces cash receipts, which would force the company to borrow money quickly at a high interest rate. In the worst case, the company would run out of product, miss out on sales, and perhaps run out of cash.

Turn the example around and assume Jerry's Ice Cream does have a budget in place for the coming year. The budget communicates the organization's plans to Lynn, production manager, and Michelle, treasurer and controller, showing that sales are expected to increase. Lynn can then plan accordingly by hiring additional employees, arranging for the purchase of additional materials, and finding more space for production. Michelle can also plan accordingly by arranging for a short-term loan at a reasonable interest rate to meet short-term cash needs. As described here, the planning phase uses the budget to communicate plans to employees and to help employees coordinate activities across the organization.

The Control Phase

Question: How do organizations use budgets to control operations?

Answer: Organizations use budgets to evaluate performance. By comparing the budget with actual results, companies can determine whether employees, and the company as a whole, have performed as expected.

For example, assume Jerry's Ice Cream estimates sales for the first quarter of next year will be 40,000 units at \$6 per unit. Actual sales turn out to be 38,000 units at \$6.20 per unit. The company can evaluate sales manager Tom Benson's performance by comparing the budget to

actual results. For unit sales, Tom did not perform as well as expected (38,000 units actually sold versus 40,000 in budgeted unit sales). However, Tom exceeded expectations for sales price (\$6.20 per unit actual sales price versus budgeted sales price of \$6).

The next chapter covers the control phase of budgeting in depth. We now turn to the process of creating an operating budget to plan a company's operations for the coming year. Creating an operating budget is an essential part of business. Depending on the type of product offered and the size of the company, operating budgets vary widely in complexity. International companies in particular face difficult hurdles when it comes to budgeting, as described in .

Business in Action 9.1

Challenges of Budgeting for International Operations

Companies with operations in several different countries, called *multinational companies*, face numerous challenges in establishing operating budgets. Most experts agree that foreign exchange rates have the biggest impact on budgeting for multinationals. Specific exchange rates are used when the budget is established. However, these rates can fluctuate significantly and are likely to differ when companies compare actual results with the initial budget. This makes the budget control process difficult because exchange rate variations might cause the differences between actual results and the budget.

Exchange rate fluctuations, along with other market characteristics—such as economic uncertainty and unpredictable government activities—make budgeting for multinational companies a challenging task.

Source: Ken Milani and Juan Rivera, "The Rigorous Business of Budgeting for International Operations," *Management Accounting Quarterly* 5, no. 2 (2004): 38–50.

KEY TAKEAWAY

- Organizations establish budgets to communicate their plans to employees and to coordinate the activities of employees across the entire organization. Budgets are often compared with actual results to evaluate employee and organizational performance.

REVIEW PROBLEM 9.1

Why do most organizations prepare an operating budget?

Solution to Review Problem 9.1

Most organizations prepare an operating budget for two reasons. First, budgets help managers communicate plans to employees, which in turn helps employees coordinate activities across the entire organization. Second, budgets are often compared to actual results to evaluate employee and organizational performance.

9.2 The Budgeting Process

LEARNING OBJECTIVE

1. Understand the process used to establish budgets.

Question: Some companies prefer to take a “top-down” approach to budgeting, in which upper management establishes the budget with little input from other employees. These budgets are imposed on the organization and do little to motivate employees or to gain acceptance by employees. What method of budgeting is more effective than the top-down approach?

Answer: Successful companies approach budgeting from the bottom up. This requires the involvement of various employees within the organization, not just upper management. Lower-level employees often know more about their functional areas than upper management, and they can be an excellent source of information for budgeting purposes. Although getting input from employees throughout the organization can be time consuming, this approach tends to increase employee motivation and acceptance of the budget.

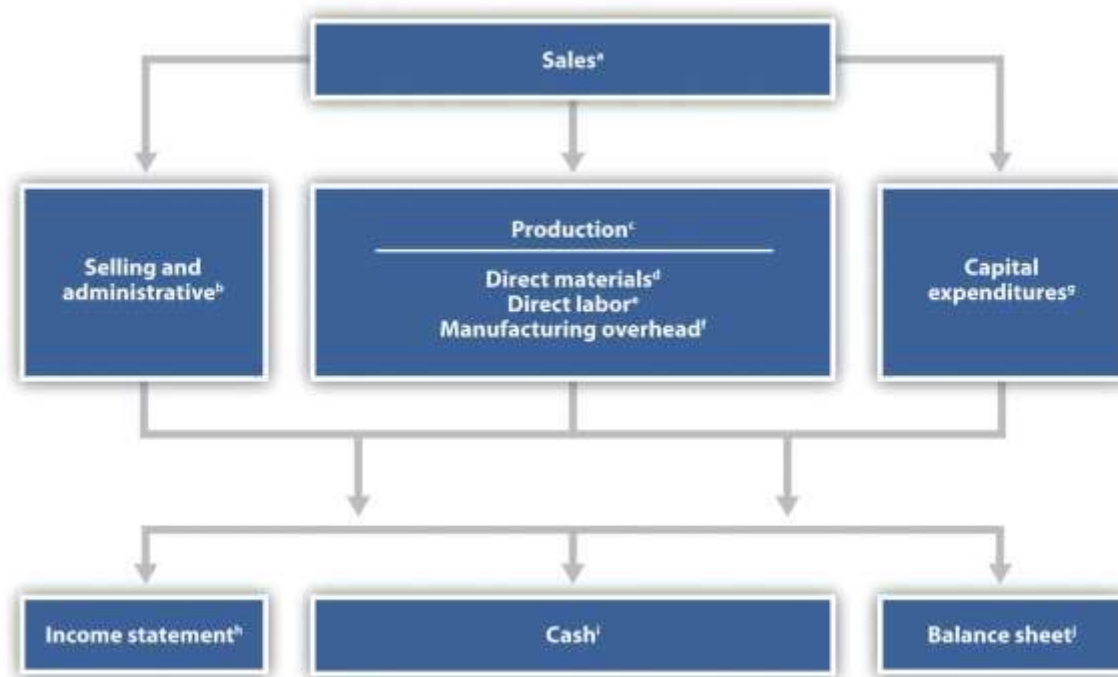
Most organizations have a budget committee that supervises the budgeting process.

A budget committee is a group within the organization responsible for overseeing and approving the master budget. A master budget is a series of budget schedules outlining the organization's plans for the upcoming period (typically for a year and presented in monthly or quarterly time periods). The master budget can take many different forms but often includes schedules that provide planning for sales, production, selling and administrative expenses, and capital

expenditures. These schedules lead to the budgeted income statement, cash flows, and balance sheet (also part of the master budget).

shows the components of the master budget with references to the figure in which we present each component for Jerry's Ice Cream.

Figure 9.1 Master Budget Schedules



^a See for the sales budget.

^b See for the selling and administrative budget.

^c See for the production budget.

^d See for the direct materials purchases budget.

^e See for the direct labor budget.

^f See for the manufacturing overhead budget.

^g See for the capital expenditures budget.

^h See for the budgeted income statement.

ⁱ See for the cash budget.

See for the budgeted balance sheet.

KEY TAKEAWAY

- Some companies take a top-down approach to budgeting (upper management establishes the budget with little input from others), while other companies take a bottom-up approach (lower level employees are involved in the budgeting process). The bottom-up approach tends to be more effective as employees are more inclined to accept the budget. Regardless of the approach used, the budget committee (made up of a group within the organization) is responsible for overseeing and approving the master budget.

REVIEW PROBLEM 9.2

1. What is a master budget?
2. Why do successful companies tend to use the bottom-up approach to establish a master budget?

Solution to Review Problem 9.2

1. A master budget is a series of budget schedules outlining the organization's plans for the upcoming period, typically prepared monthly, quarterly, or annually. The master budget includes budgets for sales, production, operating expenses, and capital expenditures. Managers use this information to create budgeted financial statements (income statement, cash flows, and balance sheet).
2. The bottom-up approach requires involvement of employees throughout the organization, not just upper management, to create the operating budget. Successful companies use this approach because lower-level employees tend to know more about their functional areas than upper management, providing for more accurate budget information. Also, employee involvement in the budget process increases the likelihood employees will accept the budget.

9.3 The Master Budget

LEARNING OBJECTIVE

1. Develop the components of a master budget.

Question: Developing a master budget is a lengthy process. Where do companies start when preparing a master budget?

Answer: Study Figure 9.1 "Master Budget Schedules" carefully, as it serves as the road map for the master budget presented throughout this chapter for Jerry's Ice Cream. Notice that the budgeting process starts with the sales budget. Also, note that the budgets described next are for a manufacturing company. Manufacturing companies tend to have more budget schedules than other types of organizations because their operations are more complex. Once you understand budgeting in a manufacturing environment, you can easily modify the process to perform budgeting in other organizations, as discussed later in the chapter. As we work through the master budget for Jerry's Ice Cream, assume the company prepares quarterly budgets.

Sales Budget

Question: The sales budget is the starting point for the master budget, as shown in Figure 9.1 "Master Budget Schedules". What is a sales budget, and how is it prepared?

Answer: The sales budget is an estimate of units of product the organization expects to sell times the expected sales price per unit. This is perhaps the most important budget as it drives most of the other budgets. For example, the production budget and related materials, labor, and overhead budgets are based on expected sales.

Forecasting sales often involves extensive research and numerous sources. Companies, such as Jerry's Ice Cream, typically start with their sales staff since salespeople have daily contact with customers and direct information about customer demand. Some companies pay for market trend data to learn about industry and product trends. Many organizations hire market research consultants to obtain and review industry data and ultimately to predict customer demand. Larger companies sometimes employ economists to develop sophisticated models used to project sales. Smaller, less sophisticated organizations simply base their estimates on past trends. Figure 9.2

"Estimating Sales" shows how companies obtain sales information from sales people, market research consultants, and economists.

Figure 9.2 Estimating Sales

Tom Benson, sales manager at Jerry's Ice Cream, talked with his salespeople and reviewed market trends for ice cream using data obtained from a market research firm. His estimate, shown in Figure 9.3 "Sales Budget for Jerry's Ice Cream", assumes the company will increase sales 15 percent this coming year. Thus, to get projected sales for quarter 1, Tom simply multiplied last year's first quarter sales by 1.15. The average price per unit last year was \$6 (1 unit = 1 gallon), and Tom does not expect any change in this price. The sales budget is presented in Figure 9.3 "Sales Budget for Jerry's Ice Cream".

Figure 9.3 Sales Budget for Jerry's Ice Cream

Jerry's Ice Cream Sales Budget Year Ending December 31					
	Quarter				Year
	1	2	3	4	
Sales in units (1 unit = 1 gallon)	40,000	48,000	60,000	52,000	200,000
Sales price per unit	x \$6	x \$6	x \$6	x \$6	x \$6
Sales revenue	\$240,000	\$288,000	\$360,000	\$312,000	\$1,200,000

Production Budget

Question: The production budget is developed next and is based on sales budget projections. What is a production budget, and how is it prepared?

Answer: If the organization uses a just-in-time production system, where production occurs just in time to ship the products to the customer, units produced each quarter would be exactly the same as projected sales. However, most companies, including Jerry's Ice Cream, maintain a certain level of finished goods inventory. Thus production is typically not the same as projected

sales. The production budget is an estimate of units to be produced and is based on sales projections plus an estimate of desired ending finished goods inventory less beginning finished goods inventory, as summarized in the following:

Key Equation

$$\text{Units to be produced} = \text{Expected sales in units} + \text{Desired units of ending inventory} - \text{Units in beginning inventory}$$

Jerry's Ice Cream plans to sell 40,000 units in the first quarter, as shown in Figure 9.3 "Sales Budget for Jerry's Ice Cream". For the sake of simplicity, assume work-in-process inventory is insignificant, and therefore beginning and ending work-in-process inventory is zero. (We assume beginning and ending work-in-process inventory is zero throughout this chapter.) The management prefers to maintain 10 percent of next quarter's sales in ending inventory. Thus 4,800 units will be in inventory at the end of the first quarter ($= 48,000 \text{ unit sales in second quarter} \times 10 \text{ percent}$). Units needed for the first quarter total 44,800 ($= 40,000 \text{ unit sales} + 4,800 \text{ units desired ending inventory}$). However, Jerry's will not produce 44,800 units because inventory will be left over from the fourth quarter of last year. This beginning inventory will be 4,000 units ($= 40,000 \text{ unit sales in first quarter} \times 10 \text{ percent}$). Thus actual production will total 40,800 units:

$$40,800 \text{ Units to be produced} = 40,000 \text{ Expected sales in units} + 4,800 \text{ Desired units of ending inventory} - 4,000 \text{ Units in beginning inventory}$$

Figure 9.4 "Production Budget for Jerry's Ice Cream" presents the production budget for each of the 4 quarters of the coming year. Examine this figure carefully, particularly the last line labeled units to be produced. Lynn Young, the production manager, will be concerned about the spike in production during the third quarter of 59,200 units. The third quarter, from July 1 through September 30, is the peak sales season for ice cream. It will be difficult for Lynn to plan for this increase in production from the first and second quarters to the third quarter. However, this is exactly why companies prepare budgets—to plan for the future!

Figure 9.4 Production Budget for Jerry's Ice Cream

Jerry's Ice Cream Production Budget Year Ending December 31					
	Quarter				
	1	2	3	4	Year
Sales in units*	40,000	48,000	60,000	52,000	200,000
Add desired ending finished good inventory**	4,800	6,000	5,200	4,400	4,400
Total finished goods inventory needed	44,800	54,000	65,200	56,400	204,400
Deduct beginning finished goods inventory***	(4,000)	(4,800)	(6,000)	(5,200)	(4,000)
Units to be produced	40,800	49,200	59,200	51,200	200,400

*Information from Figure 9.3 "Sales Budget for Jerry's Ice Cream".

**Desired ending inventory = 10 percent \times Next quarter sales; for the first quarter, $4,800 = 0.10 \times 48,000$. Fourth quarter desired ending inventory of 4,400 units is based on an estimate of sales in the first quarter of next year.

***Beginning inventory = Inventory at end of previous quarter; for example, second quarter beginning inventory = First quarter ending inventory.

Once Jerry's Ice Cream knows how many units it must produce each quarter, budgets are established for the individual components of production: direct materials, direct labor, and manufacturing overhead. We present these budgets next.

REVIEW PROBLEM 9.3

Carol's Cookies produces cookies for resale at grocery stores throughout North America. The company is currently in the process of establishing a master budget on a quarterly basis for this coming fiscal year, which ends December 31. *Prior year* quarterly sales were as follows (1 unit = 1 batch):

First quarter	64,000 units
Second quarter	76,800 units
Third quarter	96,000 units

Fourth quarter	83,200 units
----------------	--------------

Unit sales are expected to increase 25 percent, and each unit is expected to sell for \$8. The management prefers to maintain ending finished goods inventory equal to 10 percent of next quarter's sales. Assume finished goods inventory at the end of the fourth quarter budget period is estimated to be 9,000 units.

1. Prepare a sales budget for Carol's Cookies using a format similar to [Figure 9.3 "Sales Budget for Jerry's Ice Cream"](#). (Hint: be sure to increase last year's unit sales by 25 percent.)
2. Prepare a production budget for Carol's Cookies using the format shown in [Figure 9.4 "Production Budget for Jerry's Ice Cream"](#).

Solution to Review Problem 9.3

1. The following is a sales budget:

Carol's Cookies Sales Budget Year Ending December 31					
	Quarter				
	1	2	3	4	Year
Prior year sales in units (1 unit = 1 batch)	64,000	76,800	96,000	83,200	320,000
Budget increase of 25 percent	× 1.25	× 1.25	× 1.25	× 1.25	× 1.25
Projected sales in units	80,000	96,000	120,000	104,000	400,000
Sales price per unit	× \$8	× \$8	× \$8	× \$8	× \$8
Sales revenue	\$640,000	\$768,000	\$960,000	\$832,000	\$3,200,000

2. The following is a production budget:

Carol's Cookies Production Budget Year Ending December 31					
	Quarter				
	1	2	3	4	Year
Sales in units (from sales budget)	80,000	96,000	120,000	104,000	400,000
Add desired ending finished goods inventory*	9,600	12,000	10,400	9,000	9,000
Total finished goods inventory needed	89,600	108,000	130,400	113,000	409,000
Deduct beginning finished goods inventory**	(8,000)	(9,600)	(12,000)	(10,400)	(8,000)
Units to be produced	81,600	98,400	118,400	102,600	401,000

*Desired ending inventory = 10 percent \times Next quarter sales; for the first quarter, $9,600 = 0.10 \times 96,000$. Fourth quarter desired ending inventory of 9,000 units is given.

**Beginning inventory = Inventory at end of previous quarter; for example, Second quarter beginning inventory = First quarter ending inventory.

Direct Materials Purchases Budget

Question: The number of units of finished goods to be produced each quarter from the production budget is the starting point for the direct materials purchases budget. What is a direct materials purchases budget, and how is it prepared?

Answer: The direct materials purchases budget is an estimate of raw materials needed to achieve a desired level of production. Figure 9.4 "Production Budget for Jerry's Ice Cream", the production budget, shows that 40,800 finished units will be produced in the first quarter. We will now establish a direct materials purchases budget that answers the questions: how many pounds of material must be purchased during the first quarter to achieve this production, and what is the cost of these materials?

Assume two pounds of material are required to produce one unit of product. Thus the amount of materials required to produce 40,800 units of ice cream is 81,600 pounds ($= 40,800 \text{ units} \times 2 \text{ pounds per unit}$). This amount is labeled as materials needed in production in the direct materials purchases budget shown in Figure 9.5 "Direct Materials Purchases Budget for Jerry's Ice

Cream". (To simplify this example, assume sugar is the only material used. However, other materials, such as cream and vanilla, are typically required to produce ice cream.)

Figure 9.5 Direct Materials Purchases Budget for Jerry's Ice Cream

Jerry's Ice Cream Direct Materials Purchases Budget Year Ending December 31					
	Quarter				
	1	2	3	4	Year
Units to be produced*	40,800	49,200	59,200	51,200	200,400
Materials required per unit (pounds)	× 2	× 2	× 2	× 2	× 2
Materials needed in production	81,600	98,400	118,400	102,400	400,800
Add desired ending inventory**	19,680	23,680	20,480	20,000	20,000
Materials needed in inventory	101,280	122,080	138,880	122,400	420,800
Deduct beginning inventory***	(16,320)	(19,680)	(23,680)	(20,480)	(16,320)
Direct materials to be purchased (pounds)	84,960	102,400	115,200	101,920	404,480
Cost of materials per pound	× \$1	× \$1	× \$1	× \$1	× \$1
Cost of materials to be purchased	\$84,960	\$102,400	\$115,200	\$101,920	\$404,480
Direct materials cost per unit****					\$ 2.00

*Information from Figure 9.4 "Production Budget for Jerry's Ice Cream".

**Desired ending inventory = 20 percent × Next quarter production needs; for the first quarter, 19,680 = 0.20 × 98,400. Fourth quarter desired ending inventory of 20,000 pounds is based on an estimate of materials needed in production first quarter of next year.

***Beginning inventory = Inventory at end of previous quarter; for example, Second quarter beginning inventory = First quarter ending inventory.

****\$2 direct materials cost per unit = 2 pounds of materials required per unit × \$1 per pound.

Will the company buy 81,600 pounds of material in the first quarter? Probably not. Jerry's will have materials in beginning raw materials inventory and prefers to maintain a certain level of ending raw materials inventory. Thus direct materials purchased is based on materials needed in production plus an estimate of desired ending raw materials inventory less beginning raw materials inventory. We summarize this in the following equation. Notice the similarity of this equation to the inventory equation presented earlier for the production budget.

Key Equation

Materials to be purchased = Materials needed in production + Desired materials in ending inventory – Materials in beginning inventory

Assume the management prefers to maintain raw materials ending inventory equal to 20 percent of next quarter's materials needed in production. Thus 19,680 pounds of material will be in inventory at the end of the first quarter (= 98,400 pounds of materials needed in production in second quarter \times 20 percent). Materials needed in inventory total 101,280 pounds (= 81,600 pounds of materials needed in production + 19,680 pounds of material in desired ending inventory). However, Jerry's will not purchase 101,280 pounds of materials because inventory will be left over from the fourth quarter of last year. This beginning inventory will be 16,320 pounds (= 81,600 pounds of material needed in production in first quarter \times 20 percent). Thus direct materials purchased in the first quarter will total 84,960 pounds:

$84,960 \text{ Materials} = 81,600 \text{ Materials needed in production} + 19,680 \text{ Desired materials in ending inventory} - 16,320 \text{ Materials in beginning inventory}$

To estimate the cost of purchasing 84,960 pounds of material, multiply the number of pounds to be purchased by the cost per pound. Assume the cost per pound of material for Jerry's is \$1. This results in a cost of \$84,960 for materials to be purchased during the first quarter, as shown at the bottom of Figure 9.5 "Direct Materials Purchases Budget for Jerry's Ice Cream" (= 84,960 pounds to be purchased \times \$1 per pound).

Review the direct materials purchases budget shown in Figure 9.5 "Direct Materials Purchases Budget for Jerry's Ice Cream" carefully, particularly the line labeled direct materials to be purchased. The purchasing manager at Jerry's Ice Cream uses this information, along with the price per pound, to negotiate the purchase of materials with suppliers.

Direct Labor Budget

Question: The direct materials purchases budget is the first of three supporting budgets for production. The second is the direct labor budget. What is the direct labor budget, and how is it prepared?

Answer: The direct labor budget is an estimate of direct labor hours, and related costs, necessary to achieve a desired level of production. Knowing Jerry's Ice Cream plans to produce 40,800 units of ice cream during the first quarter, this budget answers the questions: how many direct labor hours will be necessary to achieve this production, and what will this labor cost?

Assume it takes 0.10 direct labor hours (or 6 minutes) to produce 1 unit of product. Thus 4,080 hours of direct labor will be required to produce 40,800 units of product (= 40,800 finished units produced \times 0.10 direct labor hours per unit). Given an average hourly rate of \$13, the direct labor cost for the first quarter totals \$53,040 (= 4,080 hours \times \$13 per hour). This information is shown in the direct labor budget presented in Figure 9.6 "Direct Labor Budget for Jerry's Ice Cream".

Figure 9.6 Direct Labor Budget for Jerry's Ice Cream

Jerry's Ice Cream Direct Labor Budget Year Ending December 31					
	Quarter				
	1	2	3	4	Year
Units to be produced*	40,800	49,200	59,200	51,200	200,400
Direct labor hours per unit	$\times 0.10$	$\times 0.10$	$\times 0.10$	$\times 0.10$	$\times 0.10$
Total direct labor hours needed in production	4,080	4,920	5,920	5,120	20,040
Labor rate per hour	$\times \$13$	$\times \$13$	$\times \$13$	$\times \$13$	$\times \$13$
Total direct labor cost	\$ 53,040	\$ 63,960	\$ 76,960	\$ 66,560	\$260,520
Direct labor cost per unit**					\$ 1.30

*From Figure 9.4 "Production Budget for Jerry's Ice Cream".

**\$1.30 direct labor cost per unit = 0.10 direct labor hours per unit \times \$13 per hour.

Carefully review the direct labor budget shown in Figure 9.6 "Direct Labor Budget for Jerry's Ice Cream". The production manager at Jerry's Ice Cream, Lynn Young, uses this information to ensure the appropriate number of employees is available to meet production goals. Notice that the number of direct labor hours needed in production for the third quarter is significantly higher than each of the two previous quarters. Again, this is why organizations prepare budgets: to plan for these types of events. Lynn will have to start planning for this spike in direct labor hours, either by asking employees to work overtime or by hiring additional employees.

Manufacturing Overhead Budget

Question: The manufacturing overhead budget is the third of three supporting production budgets. What is a manufacturing overhead budget, and how is it prepared?

Answer: The manufacturing overhead budget is an estimate of all production costs, other than direct materials and direct labor, necessary to achieve a desired level of production. This budget is presented in Figure 9.7 "Manufacturing Overhead Budget for Jerry's Ice Cream". Notice that overhead costs are separated into variable and fixed components.

Figure 9.7 Manufacturing Overhead Budget for Jerry's Ice Cream

Jerry's Ice Cream Manufacturing Overhead Budget Year Ending December 31					
	Quarter				
	1	2	3	4	Year
Units to be produced*	40,800	49,200	59,200	51,200	200,400
Variable overhead costs					
Indirect materials (\$0.15 per unit)	\$ 6,120	\$ 7,380	\$ 8,880	\$ 7,680	\$ 30,060
Indirect labor (\$0.10 per unit)	4,080	4,920	5,920	5,120	20,040
Other (\$0.25 per unit)	10,200	12,300	14,800	12,800	50,100
Total variable overhead costs	\$ 20,400	\$ 24,600	\$ 29,600	\$ 25,600	\$100,200
Fixed overhead costs					
Salaries	15,000	15,000	15,000	15,000	60,000
Rent	10,000	10,000	10,000	10,000	40,000
Depreciation	10,070	10,070	10,070	10,070	40,280
Total fixed overhead costs	\$ 35,070	\$ 35,070	\$ 35,070	\$ 35,070	\$140,280
Total overhead costs	55,470	59,670	64,670	60,670	240,480
Deduct depreciation ^a	(10,070)	(10,070)	(10,070)	(10,070)	(40,280)
Cash payments for overhead	\$ 45,400	\$ 49,600	\$ 54,600	\$ 50,600	\$200,200
Manufacturing overhead per unit**					\$ 1.20

*From Figure 9.4 "Production Budget for Jerry's Ice Cream".

** $\$1.20 = \$240,480 \text{ total overhead cost} \div 200,400 \text{ units to be produced for the year.}$

^Deduct depreciation to get the actual cash payment for overhead. This information is needed for the cash budget presented in Figure 9.11 "Cash Budget for Jerry's Ice Cream".

By definition, total variable overhead costs change with changes in production and are calculated by multiplying units to be produced by the cost per unit. For example, indirect materials cost for the first quarter of \$6,120 is calculated by taking 40,800 units to be produced \times \$0.15 cost per unit. Fixed costs generally do not change with changes in production and therefore remain the same each quarter. (Note: In some situations, fixed overhead costs can change from one quarter to the next. For example, hiring additional salaried personnel during the year would increase fixed overhead costs, and purchasing equipment during the year would increase depreciation costs. In this example, we assume fixed overhead costs do not change during the year.)

Depreciation is deducted at the bottom of the manufacturing overhead budget to determine cash payments for overhead because depreciation is not a cash transaction. We use this information later in the chapter for the cash budget.

REVIEW PROBLEM 9.4

Carol's Cookies, the company featured in the last review problem and in the next three, is now preparing the budget for direct materials purchases, direct labor, and manufacturing overhead.

Direct Materials Purchases Budget Information

Each unit of product requires 1.5 pounds of direct materials per unit, and the cost of direct materials is \$2 per pound. Management prefers to maintain ending raw materials inventory equal to 30 percent of next quarter's materials needed in production. Assume raw materials inventory at the end of the fourth quarter budget period is estimated to be 41,000 pounds.

Direct Labor Budget Information

Each unit of product requires 0.20 direct labor hours at a cost of \$12 per hour.

Manufacturing Overhead Budget Information

Variable overhead costs are:

Indirect materials	\$0.20 per unit
Indirect labor	\$0.15 per unit
Other	\$0.35 per unit

Fixed overhead costs each quarter are:

Salaries	\$28,000
Rent	\$22,000
Depreciation	\$16,165

1. Prepare a direct materials purchases budget for Carol's Cookies using the format shown in [Figure 9.5 "Direct Materials Purchases Budget for Jerry's Ice Cream"](#).
2. Prepare a direct labor budget for Carol's Cookies using the format shown in [Figure 9.6 "Direct Labor Budget for Jerry's Ice Cream"](#).
3. Prepare a manufacturing overhead budget for Carol's Cookies using the format shown in [Figure 9.7 "Manufacturing Overhead Budget for Jerry's Ice Cream"](#).

Solution to Review Problem 9.4

1.

**Carol's Cookies
Direct Materials Purchases Budget
Year Ending December 31**

	Quarter				Year
	1	2	3	4	
Units to be produced (from production budget)	81,600	98,400	118,400	102,600	401,000
Materials required per unit (pounds)	× 1.5	× 1.5	× 1.5	× 1.5	× 1.5
Materials needed in production	122,400	147,600	177,600	153,900	601,500
Add desired ending inventory*	44,280	53,280	46,170	41,000	41,000
Materials needed in inventory	166,680	200,880	223,770	194,900	642,500
Deduct beginning inventory**	(36,720)	(44,280)	(53,280)	(46,170)	(36,720)
Direct materials to be purchased (pounds)	129,960	156,600	170,490	148,730	605,780
Cost of materials per pound	× \$2	× \$2	× \$2	× \$2	× \$2
Cost of materials to be purchased	\$259,920	\$313,200	\$340,980	\$297,460	\$1,211,560
Direct materials cost per unit**					\$ 3.00

*Desired ending inventory = 30 percent × Next quarter production needs; for the first quarter, $44,280 = 0.30 \times 147,600$ pounds. Fourth quarter desired ending inventory of 41,000 pounds is given.

**Beginning inventory = Inventory at end of previous quarter; for example, Second quarter beginning inventory = First quarter ending inventory.

***\$3 direct materials cost per unit = 1.5 pounds of materials required per unit × \$2 per pound.

2.

**Carol's Cookies
Direct Labor Budget
Year Ending December 31**

	Quarter				Year
	1	2	3	4	
Units to be produced (from production budget)	81,600	98,400	118,400	102,600	401,000
Direct labor hours per unit	× 0.20	× 0.20	× 0.20	× 0.20	× 0.20
Total direct labor hours needed in production	16,320	19,680	23,680	20,520	80,200
Labor rate per hour	× \$12	× \$12	× \$12	× \$12	× \$12
Total direct labor cost	\$195,840	\$236,160	\$284,160	\$246,240	\$962,400
Direct labor cost per unit*					\$ 2.40

*\$2.40 direct labor cost per unit = 0.20 direct labor hours per unit × \$12 per hour.

3.

Carol's Cookies Manufacturing Overhead Budget Year Ending December 31					
	Quarter				Year
	1	2	3	4	
Units to be produced (from production budget)	81,600	98,400	118,400	102,600	401,000
Variable overhead costs					
Indirect materials (\$0.20 per unit)	\$ 16,320	\$ 19,680	\$ 23,680	\$ 20,520	\$ 80,200
Indirect labor (\$0.15 per unit)	12,240	14,760	17,760	15,390	60,150
Other (\$0.35 per unit)	28,560	34,440	41,440	35,910	140,350
Total variable overhead costs	\$ 57,120	\$ 68,880	\$ 82,880	\$ 71,820	\$280,700
Fixed overhead costs					
Salaries	28,000	28,000	28,000	28,000	112,000
Rent	22,000	22,000	22,000	22,000	88,000
Depreciation	16,165	16,165	16,165	16,165	64,660
Total fixed overhead costs	\$ 66,165	\$ 66,165	\$ 66,165	\$ 66,165	\$264,660
Total overhead costs	123,285	135,045	149,045	137,985	545,360
Deduct depreciation ^	(16,165)	(16,165)	(16,165)	(16,165)	(64,660)
Cash payments for overhead	\$107,120	\$118,880	\$132,880	\$121,820	\$480,700
Manufacturing overhead per unit*					\$ 1.36

*\$1.36 = \$545,360 total overhead cost ÷ 401,000 units to be produced for the year.

^Deduct depreciation to get the actual cash payment for overhead. This information is needed for the cash budget prepared later.

Selling and Administrative Budget

Question: Now that the sales and production-related budgets are complete, it is time to estimate selling and administrative costs. What is a selling and administrative budget, and how is it prepared?

Answer: The selling and administrative budget is an estimate of all operating costs other than production. This budget is presented in Figure 9.8 "Selling and Administrative Budget for Jerry's Ice Cream".

Although many organizations may have variable and fixed costs in this budget, Jerry's Ice Cream treats all selling and administrative costs as fixed costs. Once again, depreciation is deducted at the bottom of this budget to determine cash payments for selling and administrative costs, which we use later in the chapter for the cash budget.

Figure 9.8 Selling and Administrative Budget for Jerry's Ice Cream

Jerry's Ice Cream Selling and Administrative Budget Year Ending December 31					
	Quarter				
	1	2	3	4	Year
Salaries	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 160,000
Rent	8,000	8,000	8,000	8,000	32,000
Advertising	5,000	5,000	5,000	5,000	20,000
Depreciation	3,000	3,000	3,000	3,000	12,000
Other	2,000	2,000	2,000	2,000	8,000
Total selling administrative costs	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 232,000
Deduct depreciation*	(3,000)	(3,000)	(3,000)	(3,000)	(12,000)
Cash payments for selling and administrative**	\$ 55,000	\$ 55,000	\$ 55,000	\$ 55,000	\$ 220,000

*Deduct depreciation to get the actual cash payment for selling and administrative costs.

**This information is needed for the cash budget presented in Figure 9.11 "Cash Budget for Jerry's Ice Cream".

Budgeted Income Statement

Question: Budgets completed to this point include sales (Figure 9.3 "Sales Budget for Jerry's Ice Cream"), production (Figure 9.4 "Production Budget for Jerry's Ice Cream"), direct materials (Figure 9.5 "Direct Materials Purchases Budget for Jerry's Ice Cream"), direct labor (Figure 9.6 "Direct Labor Budget for Jerry's Ice Cream"), manufacturing overhead (Figure 9.7 "Manufacturing Overhead Budget for Jerry's Ice Cream"), and selling and administrative

(Figure 9.8 "Selling and Administrative Budget for Jerry's Ice Cream"). *Jerry's Ice Cream now has enough information to prepare the budgeted income statement. What is a budgeted income statement, and how is it prepared?*

Answer: The budgeted income statement is an estimate of the organization's profit for a given budget period. Most organizations, including Jerry's Ice Cream, prepare the budgeted income statement using the accrual basis of accounting: revenues are recorded when earned and expenses are recorded when incurred. The budgeted income statement for Jerry's Ice Cream is presented in Figure 9.9 "Budgeted Income Statement for Jerry's Ice Cream". The cash budget we prepare later in the chapter will show when cash is received and paid.

Figure 9.9 Budgeted Income Statement for Jerry's Ice Cream

Jerry's Ice Cream Budgeted Income Statement Year Ending December 31					
	Quarter				
	1	2	3	4	Year
Sales	\$ 240,000	\$ 288,000	\$ 360,000	\$ 312,000	\$1,200,000
Deduct costs of goods sold*	(180,000)	(216,000)	(270,000)	(234,000)	(900,000)
Gross margin	\$ 60,000	\$ 72,000	\$ 90,000	\$ 78,000	\$ 300,000
Deduct selling and administrative costs	(58,000)	(58,000)	(58,000)	(58,000)	(232,000)
Net income	\$ 2,000	\$ 14,000	\$ 32,000	\$ 20,000	\$ 68,000

Per unit cost of goods sold calculation:		Year
Direct materials	\$ 2.00	
Direct labor	1.30	
Manufacturing overhead	1.20	
Total cost of goods sold per unit	\$ 4.50	

*Cost of goods sold = Per unit cost of \$4.50 (see above) × Units sold (from Figure 9.3 "Sales Budget for Jerry's Ice Cream"); for the first quarter, \$180,000 cost of goods sold = \$4.50 unit cost × 40,000 units.

The first line in the budgeted income statement, sales, comes from the sales budget in Figure 9.3 "Sales Budget for Jerry's Ice Cream". The next line, cost of goods sold, is calculated by

multiplying unit sales from Figure 9.3 "Sales Budget for Jerry's Ice Cream" by the cost per unit. The cost per unit calculation is shown at the bottom of Figure 9.9 "Budgeted Income Statement for Jerry's Ice Cream". Carefully review this calculation. Since Jerry's Ice Cream uses full-absorption costing, all manufacturing costs related to goods sold are included (or fully absorbed) in cost of goods sold. Figure 9.5 "Direct Materials Purchases Budget for Jerry's Ice Cream", Figure 9.6 "Direct Labor Budget for Jerry's Ice Cream", and Figure 9.7 "Manufacturing Overhead Budget for Jerry's Ice Cream" provide this information on a per unit basis for direct materials, direct labor, and manufacturing overhead, respectively.

The third line, gross margin, is simply sales minus cost of goods sold. The fourth line, selling and administrative costs, comes from the selling and administrative budget in Figure 9.8 "Selling and Administrative Budget for Jerry's Ice Cream". The bottom line of the budgeted income statement, net income, is gross margin minus selling and administrative costs. Income tax expense is not included in this example for the sake of simplicity. However, income taxes can significantly reduce projected net income and cash flows.

Question: How do companies use the budgeted income statement to improve operations?

Answer: The budgeted income statement is perhaps the most carefully scrutinized component of the master budget. The management and employees throughout the organization use this information for planning purposes and to evaluate company performance. The board of directors and budget committee are responsible for approving the budget and often review periodic reports comparing actual net income to budgeted net income to determine if profit goals are being achieved. Lenders and owners often review the budget to ensure the organization is on track to meet its goals. The budgeted income statement answers the question: what profits does the organization expect to achieve?

After completing the budgeted income statement, only three budgets remain: the capital expenditures budget, the cash budget, and the budgeted balance sheet. We discuss the capital expenditures budget next.

REVIEW PROBLEM 9.5

Carol's Cookies estimates that all selling and administrative costs are fixed. Quarterly selling and administrative cost estimates for the coming year are

Salaries	\$60,000
Rent	\$ 7,000
Advertising	\$10,000
Depreciation	\$ 8,000
Other	\$ 1,000

1. Prepare a selling and administrative budget for Carol's Cookies using the format shown in Figure 9.8 "Selling and Administrative Budget for Jerry's Ice Cream".
2. Prepare a budgeted income statement for Carol's Cookies using the format shown in Figure 9.9 "Budgeted Income Statement for Jerry's Ice Cream".

Solution to Review Problem 9.5

1.

Carol's Cookies Selling and Administrative Budget Year Ending December 31					
	Quarter				
	1	2	3	4	Year
Salaries	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 240,000
Rent	7,000	7,000	7,000	7,000	28,000
Advertising	10,000	10,000	10,000	10,000	40,000
Depreciation	8,000	8,000	8,000	8,000	32,000
Other	1,000	1,000	1,000	1,000	4,000
Total selling and administrative costs	\$ 86,000	\$ 86,000	\$ 86,000	\$ 86,000	\$ 344,000
Deduct depreciation*	(8,000)	(8,000)	(8,000)	(8,000)	(32,000)
Cash payments for selling and administrative**	\$ 78,000	\$ 78,000	\$ 78,000	\$ 78,000	\$ 312,000

**Deduct depreciation to get the actual cash payment for selling and administrative costs.*

****This information is needed for the cash budget prepared later.**

2.

Carol's Cookies Budgeted Income Statement Year Ending December 31					
	Quarter				
	1	2	3	4	Year
Sales (from sales budget)	\$ 640,000	\$ 768,000	\$ 960,000	\$ 832,000	\$3,200,000
Deduct costs of goods sold*	(540,800)	(648,960)	(811,200)	(703,040)	(2,704,000)
Gross margin	\$ 99,200	\$ 119,040	\$ 148,800	\$ 128,960	\$ 496,000
Deduct selling and administrative costs**	(86,000)	(86,000)	(86,000)	(86,000)	(344,000)
Net income	\$ 13,200	\$ 33,040	\$ 62,800	\$ 42,960	\$ 152,000

Per unit cost of goods sold calculation	Year
Direct materials (from direct materials purchases budget)	\$ 3.00
Direct labor (from direct labor budget)	2.40
Manufacturing overhead (from manufacturing overhead budget)	1.36
Total cost of goods sold per unit	\$ 6.76

*Cost of goods sold = Per unit cost of \$6.76 (see above) × Units sold (from sales budget); for first quarter, \$540,800 cost of goods sold = \$6.76 unit cost × 80,000 units.

**From selling and administrative budget.

Capital Expenditures Budget

Question: What is a capital expenditures budget, and how is it prepared?

Answer: The capital expenditures budget is an estimate of the long-term assets to be purchased during the budget period. This includes purchases of tangible long-term assets such as property, plant, and equipment, and intangible assets, such as patents, copyrights, and trademarks. This budget can have a significant impact on cash flow and requires careful planning and analysis (Chapter 8 "How Is Capital Budgeting Used to Make Decisions?" presents a detailed discussion of capital budgeting). As shown in Figure 9.10 "Capital Expenditures Budget for Jerry's Ice Cream", Jerry's Ice Cream plans to purchase computers and production equipment at the end of the fourth quarter.

Figure 9.10 Capital Expenditures Budget for Jerry's Ice Cream

Jerry's Ice Cream Capital Expenditures Budget Year Ending December 31					
	Quarter				Year
	1	2	3	4	
Selling and administrative computers	-	-	-	\$ 10,000	\$ 10,000
Production equipment	-	-	-	15,000	15,000
Total	-	-	-	\$ 25,000	\$ 25,000

Note: These acquisitions will have no effect on depreciation expense in the fourth quarter. Items will be purchased at the end of the year. Thus depreciation begins the following year.

Because long-term asset purchases occur at the end of the year, depreciation will begin the following year. Thus depreciation shown in the manufacturing overhead and selling and administrative budgets will not be affected until the following year. The cash outlay required to make these purchases is reflected in the cash budget presented next.

Cash Budget

Question: What is a cash budget, and how is it prepared?

Answer: The cash budget is an estimate of the amount and timing of cash inflows and outflows for the budget period. Although the budgeted income statement provides an estimate of profitability, it stops short of providing cash flow information. For example, some of the \$240,000 in first quarter sales revenue will be collected during the first quarter and some will be collected the following quarter. A section of the cash budget will show when cash from sales will be received.

The cash budget has the following sections, each of which is described after Figure 9.11 "Cash Budget for Jerry's Ice Cream":

- Cash collections from sales

- Cash payments for purchases of materials
- Other cash collections and payments

Figure 9.11 "Cash Budget for Jerry's Ice Cream" shows the cash budget for Jerry's Ice Cream. Amounts shown in parentheses represent cash outflows; amounts without parentheses represent cash inflows.

Figure 9.11 Cash Budget for Jerry's Ice Cream

Jerry's Ice Cream Cash Budget Year Ending December 31					
	Quarter				
	1	2	3	4	Year
Cash collections from sales*					
Fourth quarter prior year (assumed)	\$ 180,000				\$ 180,000
First quarter (\$240,000 sales)	144,000	\$ 96,000			240,000
Second quarter (\$288,000 sales)		172,800	\$ 115,200		288,000
Third quarter (\$360,000 sales)			216,000	\$ 144,000	360,000
Fourth quarter (\$312,000 sales)				187,200	187,200
Total cash collections	\$ 324,000	\$ 268,800	\$ 331,200	\$ 331,200	\$1,255,200
Cash payments for purchases of materials**					
Fourth quarter prior year (assumed)	(30,000)				(30,000)
First quarter (\$84,960 purchases)	(59,472)	(25,488)			(84,960)
Second quarter (\$102,400 purchases)		(71,680)	(30,720)		(102,400)
Third quarter (\$115,200 purchases)			(80,640)	(34,560)	(115,200)
Fourth quarter (\$101,920 purchases)				(71,344)	(71,344)
Total cash payments for purchases	\$ (89,472)	\$ (97,168)	\$ (111,360)	\$ (105,904)	\$ (403,904)
Other cash payments***					
Direct labor	(53,040)	(63,960)	(76,960)	(66,560)	(260,520)
Manufacturing overhead***	(45,400)	(49,600)	(54,600)	(50,600)	(200,200)
Selling and administrative***	(55,000)	(55,000)	(55,000)	(55,000)	(220,000)
Capital expenditures	—	—	—	(25,000)	(25,000)
Total other cash payments	\$ (153,440)	\$ (168,560)	\$ (186,560)	\$ (197,160)	\$ (705,720)
Excess of collections over payments^	81,088	3,072	33,280	28,136	145,576
Beginning cash balance^^	10,000	91,088	94,160	127,440	10,000
Ending cash balance^^^	\$ 91,088	\$ 94,160	\$ 127,440	\$ 155,576	\$ 155,576

*Based on sales budget shown in Figure 9.3 "Sales Budget for Jerry's Ice Cream". All sales are on credit: 60 percent collected in the quarter of sale and 40 percent collected the following quarter.

****Based on purchases budget shown in Figure 9.5 "Direct Materials Purchases Budget for Jerry's Ice Cream". All purchases are on credit: 70 percent paid in the quarter of purchase and 30 percent paid the following quarter.**

*****Does not include depreciation since depreciation expense does not involve a cash payment. See related figures for calculations.**

^Excess of collections over payments = Cash collections from sales – Cash payments for materials purchases – Other cash payments.

^^ Beginning cash balance = Cash balance at end of previous period. Balance for first quarter is given.

^^^ Ending cash balance = Excess of collections over payments for the quarter + Beginning cash balance.

Cash Collections from Sales

Question: Assume all sales at Jerry's Ice Cream are on credit. How long does it take, on average, for Jerry's to collect on credit sales?

Answer: On average, 60 percent of credit sales are collected in the quarter sold and the remaining 40 percent is collected the following quarter. These percentage estimates are based on previous experience and take into consideration credit terms offered to customers. Since Jerry's Ice Cream only sells to customers with an excellent credit record, it anticipates no bad debts.

As you examine the cash collections from sales section of Jerry's cash budget, notice that \$180,000 in cash will be collected in the first quarter related to credit sales made in the previous quarter (this amount is given). Next, you will see \$144,000 in cash collected in the first quarter related to first quarter sales (= 60 percent collected in quarter of sale × \$240,000 first quarter sales). The remaining \$96,000 will be collected in the second quarter, as shown in Figure 9.11 "Cash Budget for Jerry's Ice Cream" (= 40 percent × \$240,000 first quarter sales).

Cash Payments for Purchases of Materials

Question: Assume all purchases at Jerry's Ice Cream are on credit. How long does it take, on average, for Jerry's to pay for these credit purchases?

Answer: On average, 70 percent of purchases are paid in the quarter purchased and the remaining 30 percent is paid the following quarter. These percentage estimates are based on previous experience and take into account credit terms offered by suppliers.

As you look at the cash payments for purchases of materials section of Jerry's cash budget, notice that \$30,000 in cash will be paid in the first quarter related to purchases made in the previous quarter (this amount is given). Next, you will see \$59,472 in cash paid in the first quarter related to first quarter purchases ($= 70 \text{ percent paid in quarter purchased} \times \$84,960 \text{ first quarter purchases}$). The remaining \$25,488 will be paid in the second quarter, as shown in Figure 9.11 "Cash Budget for Jerry's Ice Cream" ($= 30 \text{ percent} \times \$84,960 \text{ first quarter purchases}$). Figure 9.5 "Direct Materials Purchases Budget for Jerry's Ice Cream" shows how cash flows into the company for customer sales and out of the company for purchases of materials.

Other Cash Collections and Payments

Question: What other cash collections and cash payments must be considered at Jerry's Ice Cream?

Answer: Assume Jerry's Ice Cream has other cash payments but no other cash collections. Direct labor cash payments are from Figure 9.6 "Direct Labor Budget for Jerry's Ice Cream". Manufacturing overhead cash payments are from Figure 9.7 "Manufacturing Overhead Budget for Jerry's Ice Cream". Recall that depreciation was subtracted from total overhead costs in Figure 9.7 "Manufacturing Overhead Budget for Jerry's Ice Cream" to calculate the cash payments for overhead. Selling and administrative cash payments are from Figure 9.8 "Selling and Administrative Budget for Jerry's Ice Cream", where a similar depreciation adjustment was made. Capital expenditure cash payments are from Figure 9.10 "Capital Expenditures Budget for Jerry's Ice Cream".

The other cash collections and payments section is also where organizations include financing activities such as cash collections from the sale of bonds or cash payments for the repayment of bank loans. Jerry's Ice Cream does not have any of these financing activities.

The bottom section of the cash budget is where the ending cash balance is calculated for each budget period. The manager responsible for cash planning, typically the treasurer, scrutinizes this section carefully. Some organizations must borrow cash to fund the timing difference between when cash is used for production and when cash is received from sales. The cash budget will signal when short-term borrowing is necessary and allows time for the treasurer to arrange for financing. The cash budget presented in Figure 9.11 "Cash Budget for Jerry's Ice Cream" shows that Jerry's will not need to borrow cash in any of the four quarters. In fact, Jerry's Ice Cream will have a hefty reserve of cash totaling \$155,576 at the end of the fourth quarter.

REVIEW PROBLEM 9.6

Carol's Cookies has the following information pertaining to the capital expenditures and cash budgets.

Capital Expenditures

The company plans to purchase selling and administrative equipment totaling \$20,000 and production equipment totaling \$28,000. Both will be purchased at the end of the fourth quarter and will not affect depreciation expense for the coming year.

Cash Budget

All sales are on credit. The company expects to collect 70 percent of sales in the quarter of sale, 25 percent of sales in the quarter following the sale, and 5 percent will not be collected (bad debt). Accounts receivable at the end of last year totaled \$200,000, all of which will be collected in the first quarter of this coming year.

All direct materials purchases are on credit. The company expects to pay 80 percent of purchases in the quarter of purchase and 20 percent the following quarter.

Accounts payable at the end of last year totaled \$50,000, all of which will be paid in the first quarter of this coming year.

The cash balance at the end of last year totaled \$20,000.

1. Prepare a capital expenditures budget for Carol's Cookies using the format shown in Figure 9.10 "Capital Expenditures Budget for Jerry's Ice Cream".
2. Prepare a cash budget for Carol's Cookies using the format shown in Figure 9.11 "Cash Budget for Jerry's Ice Cream".

Solution to Review Problem 9.6

1.

Carol's Cookies Capital Expenditures Budget Year Ending December 31					
	Quarter				Year
	1	2	3	4	
Selling and administrative equipment	-	-	-	\$ 20,000	\$ 20,000
Production equipment	-	-	-	28,000	28,000
Total	-	-	-	\$ 48,000	\$ 48,000

Note: These acquisitions will have no effect on depreciation expense in the fourth quarter. Items will be purchased at the end of the year. Thus depreciation begins the following year.

2.

**Carol's Cookiest
Cash Budget
Year Ending December 31**

	Quarter				Year
	1	2	3	4	
Cash collections from sales*					
Fourth quarter prior year (assumed)	\$ 200,000				\$ 200,000
First quarter (\$640,000 sales)	448,000	\$ 160,000			608,000
Second quarter (\$768,000 sales)		537,600	\$ 192,000		729,600
Third quarter (\$960,000 sales)			672,000	\$ 240,000	912,000
Fourth quarter (\$832,000 sales)				582,400	582,400
Total cash collections	\$ 648,000	\$ 697,600	\$ 864,000	\$ 822,400	\$ 3,032,000
Cash payments for purchases of materials**					
Fourth quarter prior year (assumed)	(50,000)				(50,000)
First quarter (\$259,920 purchases)	(207,936)	(51,984)			(259,920)
Second quarter (\$313,200 purchases)		(250,560)	(62,640)		(313,200)
Third quarter (\$340,980 purchases)			(272,784)	(68,196)	(340,980)
Fourth quarter (\$297,460 purchases)				(237,968)	(237,968)
Total cash payments for purchases	\$ (257,936)	\$ (302,544)	\$ (335,424)	\$ (306,164)	\$ (1,202,068)
Other cash payments					
Direct labor (from direct labor budget)	(195,840)	(236,160)	(284,160)	(246,240)	(962,400)
Manufacturing overhead***	(107,120)	(118,880)	(132,880)	(121,820)	(480,700)
Selling and administrative****	(78,000)	(78,000)	(78,000)	(78,000)	(312,000)
Capital expenditures*****				(48,000)	(48,000)
Total other cash payments	\$ (380,960)	\$ (433,040)	\$ (495,040)	\$ (494,060)	\$ (1,803,100)
Excess (shortage) of collections over payments^	9,104	(37,984)	33,536	22,176	26,832
Beginning cash balance^^	20,000	29,104	(8,880)	24,656	20,000
Ending cash balance^^^	\$ 29,104	\$ (8,880)	\$ 24,656	\$ 46,832	\$ 46,832

*Based on sales budget. All sales are on credit: 70 percent collected in the quarter of sale, 25 percent collected the following quarter, and 5 percent bad debt.

**Based on purchases budget. All purchases are on credit: 80 percent paid in the quarter of purchase and 20 percent paid the following quarter.

***From manufacturing overhead budget. Amount does not include depreciation.

****From selling and administrative budget. Amount does not include depreciation.

*****From capital expenditures budget.

^Excess of collections over payments = Cash collections from sales – Cash payments for materials purchases – other cash payments.

*^^ Beginning cash balance = Cash balance at end of previous period.
Balance for first quarter is given.*

^^^ Ending cash balance = Excess of collections over payments for the quarter + Beginning cash balance.

Budgeted Balance Sheet

Question: The budgeted balance sheet is the last piece of the budget process. What is the budgeted balance sheet, and how is it prepared?

Answer: The budgeted balance sheet is an estimate of the ending balances for all balance sheet accounts. Managers use this to assess the impact that budgeted sales and costs will have on the financial condition of the organization. We present the budgeted balance sheet for Jerry's Ice Cream in Figure 9.12 "Budgeted Balance Sheet for Jerry's Ice Cream".

Information needed to prepare the budgeted balance sheet for Jerry's Ice Cream is shown throughout the chapter and is referenced in Figure 9.12 "Budgeted Balance Sheet for Jerry's Ice Cream". Additional information is provided here:

Plant and equipment (net) expected at the end of the budget period (December 31) is \$530,000.

Common stock issued and outstanding at the end of the budget period (December 31) is expected to be \$650,000.

Actual retained earnings at the end of last year totaled \$101,600, and no cash dividends will be paid during the current budget period ending December 31.

Figure 9.12 Budgeted Balance Sheet for Jerry's Ice Cream

**Jerry's Ice Cream
Budgeted Balance Sheet
December 31**

Current assets:		
Cash	\$ 155,576	
Accounts receivable*	124,800	
Raw materials inventory**	20,000	
Finished goods inventory***	19,800	
Total current assets		\$ 320,176
Plants and equipment (net)^		530,000
Total assets		<u>\$ 850,176</u>
Current liabilities		
Accounts payable^^		30,576
Shareholders' equity		
Common stock^	650,000	
Retained earnings^^^	169,600	
Total shareholders' equity		819,600
Total liabilities and shareholders' equity		<u>\$ 850,176</u>

*\$124,800 = \$312,000 in fourth quarter sales (*Figure 9.3 "Sales Budget for Jerry's Ice Cream"*) × 40 percent to be collected next quarter (*Figure 9.11 "Cash Budget for Jerry's Ice Cream"*).

**\$20,000 = 20,000 pounds (*Figure 9.5 "Direct Materials Purchases Budget for Jerry's Ice Cream"*) × \$1 per pound (*Figure 9.5 "Direct Materials Purchases Budget for Jerry's Ice Cream"*).

***\$19,800 = 4,400 units (*Figure 9.4 "Production Budget for Jerry's Ice Cream"*) × \$4.50 (*Figure 9.9 "Budgeted Income Statement for Jerry's Ice Cream"*).

^Given.

^^ \$30,576 = \$101,920 in fourth quarter purchases (*Figure 9.5 "Direct Materials Purchases Budget for Jerry's Ice Cream"*) × 30 percent to be paid next quarter (*Figure 9.11 "Cash Budget for Jerry's Ice Cream"*).

$\text{\$169,600} = \text{\$101,600 in retained earnings at end of last year (given)} + \text{\$68,000 budgeted net income for the year (Figure 9.9 "Budgeted Income Statement for Jerry's Ice Cream")}$.

Computer Application

Using Excel to Develop an Operating Budget

Managers often use spreadsheets to develop operating budgets. Spreadsheets help managers perform *what-if* analysis by linking the components of the master budget and automatically making changes to budget schedules when certain estimates are revised. For example, if managers at Jerry's Ice Cream wanted to see *what* would happen *if* sales in units were decreased by 10 percent from the initial projection shown in Figure 9.3 "Sales Budget for Jerry's Ice Cream", they would simply reduce sales by 10 percent, and all budget schedules affected by this change would automatically be updated in the spreadsheet.

An example of how to use Excel to develop an operating budget for Jerry's Ice Cream follows. Notice the tabs at the bottom of the spreadsheet. The first tab is for the sales budget worksheet, the second tab is for the production budget worksheet, the next tab is for the direct materials purchases budget worksheet, and so on. All these worksheets are linked so changes to certain estimates are reflected in the appropriate budget schedules.

Jerry's Ice Cream Production Budget Year Ending December 31					
	Quarter				Year
	1	2	3	4	
Sales in units	40,000	48,000	60,000	52,000	200,000
Add desired ending finished goods inventory	4,800	6,000	5,200	4,400	4,400
Total finished goods inventory needed	44,800	54,000	65,200	56,400	204,400
Deduct beginning finished goods inventory	(4,000)	(4,800)	(6,000)	(5,200)	(4,000)
Units to be produced	40,800	49,200	59,200	51,200	200,400

Spreadsheet programs are not the only way managers use technology to facilitate the budgeting process. As indicated in Note 9.30 "Business in Action 9.2" the Web is also a useful tool when it comes to efficient budgeting.

Business in Action 9.2

Moving from Spreadsheets to Intranet Budgeting

The **Pacific Northwest National Laboratory (PNNL)** is one of nine multiprogram national laboratories of the U.S. Department of Energy. **PNNL** is operated by **Battelle Science and Technology International**, a global science and technology enterprise that conducts \$3,000,000,000 worth of research and development annually.

The Facilities & Operations (F&O) Business Office at **PNNL** has over 130 budget activities, each of which requires an annual budget. The total annual budget is \$70,000,000. Prior to 2000, activity managers were required to use Excel to process budget information. The F&O Business Office then uploaded this information to formulate the division's budget.

As the F&O Business Office began the budget process for 2001, management decided to build a Web-based, or *intranet*, budget and planning system. The new system allowed managers to use the Web to input budget information directly, thus eliminating the need to upload initial budgets and subsequent budget changes.

Moving to intranet budgeting benefited **PNNL's** F&O Business Office in several ways. Activity managers no longer had to use Excel to enter budget information, which saved 450 hours. The F&O Business Office saved 60 hours by no longer having to upload Excel budget information. Budget reports are easy to create, and the system provides real-time reports for analysis and project management.

Many organizations are adopting intranet budgeting as the primary source of planning and control. As the financial specialist at **PNNL** stated, intranet budgeting provides “a tool that is easy to use, accurate, and simple and will continue to save us time and money.”

Sources: Mary F. Astley, “Intranet Budgeting,” *Strategic Finance*, May 2003; Pacific Northwest National Laboratory, “Home Page,” <http://www.pnl.gov>.

REVIEW PROBLEM 9.7

Assume Carol's Cookies will collect 25 percent of fourth quarter budgeted sales in full next year (this represents accounts receivable at the end of the fourth quarter). The following account balances are expected at the end of the fourth quarter:

- Property, plant, and equipment (net): \$320,000

- Common stock: \$450,000

Retained earnings at the end of last year totaled \$56,180, and no cash dividends are anticipated for the budget period ending December 31.

Prepare a budgeted balance sheet for Carol's Cookies using the format shown in Figure 9.12 "Budgeted Balance Sheet for Jerry's Ice Cream".

Solution to Review Problem 9.7

Carol's Cookies Budgeted Balance Sheet December 31		
Current assets		
Cash (from cash budget)	\$ 46,832	
Accounts receivable*	208,000	
Raw materials inventory**	82,000	
Finished goods inventory***	60,840	
Total current assets		\$ 397,672
Plant and equipment (net)^		320,000
Total assets		<u>\$ 717,672</u>
Current liabilities		
Accounts payable^^		59,492
Shareholders' equity		
Common stock^	450,000	
Retained earnings^^^	208,180	
Total shareholders' equity		658,180
Total liabilities and shareholders' equity		<u>\$ 717,672</u>

*\$208,000 = \$832,000 in fourth quarter sales (from sales budget) × 25 percent to be collected next quarter (given).

**\$82,000 = 41,000 pounds × \$2 per pound (from direct materials budget).

***\$60,840 = 9,000 units (from production budget) × \$6.76 cost per unit (from budgeted income statement).

[^]Given.

^{^^} \$59,492 = \$297,460 in fourth quarter purchases (from direct materials budget) × 20 percent to be paid next quarter (given).

^{^^^} \$208,180 = \$56,180 in retained earnings end of last year (given) + \$152,000 budgeted net income (from budgeted income statement).

Wrap-Up of Chapter Example

The management group at Jerry's Ice Cream is reconvening to discuss sales growth anticipated for the next budget period.

<i>Jerry:</i>	<i>Tom, I recall you saying we should expect growth between 10 percent and 25 percent next year. Have you been able to narrow this down a bit?</i>
<i>Tom:</i>	<i>Yes, I've talked with our salespeople and industry contacts. We also obtained trend data from a market research firm. Based on this information, sales should increase about 15 percent this coming year. Most agree this growth is a result of our high-quality product and our ability to quickly adjust flavors to accommodate consumer tastes.</i>
<i>Jerry:</i>	<i>This is great news. It looks like our ice cream is really catching on!</i>
<i>Michelle:</i>	<i>I received Tom's projection a few days ago and already have a preliminary budget for next year. Lynn, you will have to do some serious planning to guarantee we have enough materials and employees for the third quarter spike in sales.</i>
<i>Lynn:</i>	<i>Yes, I realize we have some work to do to ensure we have enough resources to meet budgeted production levels.</i>
<i>Jerry:</i>	<i>Can't we just hire a few more employees and let our suppliers know we will need more materials?</i>

<i>Lynn:</i>	<i>The problem is that we have a spike in production during the third quarter. Production goes from 49,200 units in the second quarter to 59,200 units in the third quarter and back down to 51,200 units in the fourth quarter. I don't think materials will be an issue—our supplier has already assured me this will not be a problem. But I can't just hire new employees in the third quarter and fire them in the fourth quarter.</i>
<i>Jerry:</i>	<i>Perhaps our existing employees can work overtime, or we can hire temporary employees.</i>
<i>Lynn:</i>	<i>Hiring temporary employees would be my preference, particularly since college students are looking for part-time work during the summer months. Working overtime would really cause problems with our budgeted hourly rate of \$13.</i>
<i>Jerry:</i>	<i>Michelle, do we have any cash flow problems with the anticipated growth?</i>
<i>Michelle:</i>	<i>Fortunately not. If all goes as planned, we should have more than \$90,000 in the bank at the end of each quarter.</i>
<i>Jerry:</i>	<i>Excellent! Let's do our best to stay on track. Michelle, I'd like an update at the end of the first quarter to see if actual profit meets or exceeds budgeted profit.</i>
<i>Michelle:</i>	<i>No problem. I'll have it for you as soon as the books are closed for the first quarter.</i>
<i>Jerry:</i>	<i>Now that we all have some idea of what to expect this coming year, we can make sure the resources are in place to make it happen. This should be an exciting and challenging year for us. Let's meet again next month to discuss our progress in preparing for next year.</i>

This narrative provides an example of how the master budget is used for planning purposes. It is much more efficient to plan in advance for significant increases in sales and production than to wait and deal with production issues as they occur. The master budget can also be used for

control purposes by evaluating company performance. We discuss the control phase of budgeting further in Chapter 10 "How Do Managers Evaluate Performance Using Cost Variance Analysis?".

KEY TAKEAWAY

- The master budget for a manufacturing company includes budget schedules for sales, production, direct materials, direct labor, manufacturing overhead, selling and administrative, the income statement, capital expenditures, cash, and the balance sheet. The sales budget is most important because sales projections drive the other budgets.

9.4 Budgeting in Nonmanufacturing Organizations

LEARNING OBJECTIVE

1. Describe operating budgets for merchandising, service, and not-for-profit organizations.

The examples used thus far to describe a master budget have been limited to manufacturing companies. Manufacturing companies tend to have comprehensive operating budgets and therefore serve as a good starting point in learning how to develop a master budget. However, all types of organizations use operating budgets.

Merchandising Organizations

Question: What do operating budgets look like for merchandising organizations?

Answer: Merchandising organizations typically purchase finished goods and sell them to retail or wholesale customers. Because merchandisers do not produce goods, they do not use production or production-related budgets.

provides an overview of the master budget schedules for a merchandising organization. If you compare this diagram with (master budget schedules for a manufacturing company), you will notice that production and production-related budgets are not applicable to merchandising

organizations. Direct materials are not needed, and all labor and overhead costs are included in the selling and administrative budget.

Figure 9.13 Master Budget Schedules for a Merchandising Organization



The most important aspect of budgeting for merchandising organizations is the merchandise purchases budget. The merchandise purchases budget estimates the units of merchandise to be purchased and the cost per unit. Much like the production budget for a manufacturing company, the merchandise purchases budget estimates units to be purchased (instead of units to be produced) and is based on sales projections, as well as an estimate of desired ending merchandise inventory less beginning merchandise inventory.

Service Organizations

Question: What do operating budgets look like for service organizations?

Answer: Service organizations, such as architectural and accounting firms, provide services rather than tangible goods. These organizations do not have raw materials, finished goods, or merchandise inventories, and therefore they do not have production or merchandise purchases budgets. Instead, the focus is on projected sales revenue from services provided and the labor necessary to achieve sales revenue projections. Service organizations must constantly estimate

services to be provided and make sure labor force resources are available to meet customer demand.

Not-for-Profit Organizations

Question: Not-for-profit organizations, such as school districts and charitable organizations, also use budgets for planning and control purposes. The budgeting process in most not-for-profit organizations is critical because the approved budget often serves as the legal authority for expenditures. What do operating budgets look like for not-for-profit organizations?

Answer: Because not-for-profit organizations are very diverse in nature—for example, some provide a service, while others collect money to help victims of natural disasters or to promote medical research—it is difficult to generalize about which master budget components apply and which do not. However, with an understanding of the budget components used by manufacturing, merchandising, and service organizations, one can establish a budgeting process for virtually any not-for-profit organization. For an example of how one not-for-profit organization goes about the budgeting process, read .

Business in Action 9.3

Budgeting at a Not-for-Profit Organization

Yearly, a small not-for-profit symphony in California establishes an operating budget with revenues totaling \$200,000. The symphony's treasurer oversees the budget committee, which is made up of three board members. The budget committee is responsible for creating, approving, and monitoring the budget.

The budget committee begins the budgeting process by reviewing information from the year before. All board members and office staff are given spreadsheets showing last year's results and are asked to provide input for the next budget period. For example, the committee responsible for ticket sales estimates sales revenue based on expected ticket sales times the average sales price. Anticipated increases in sales price are considered in the sales budget.

Expenses are also budgeted based on last year's actual results. Those requesting increases in budgeted expenditures must justify them. Once revenues and expenses are

established for the next budget period, the bookkeeper enters the information using QuickBooks software and prints a preliminary budget report, which the budget committee reviews. Once the budget committee has balanced the budget, reviewed it for reasonableness, and approved it, it goes to the board of directors for approval. The control phase of the budgeting process requires that all expenditures be in accordance with the budget. Any expenditure exceeding the budget by more than \$25 must be approved by the board of directors. A financial report comparing *actual* revenues and expenditures with *budgeted* revenues and expenditures (produced using QuickBooks software) is submitted to the board of directors monthly.

KEY TAKEAWAY

- Merchandising organizations do not produce goods, and therefore do not have production or production-related budgets. Instead, merchandisers prepare a merchandise purchases budget. Service companies do not have production or merchandise purchases budgets. Instead, service organizations focus on projected sales and labor costs. Not-for-profit organizations also use budgets for planning and control purposes. The format depends on the service being provided.

REVIEW PROBLEM 9.8

Patel and Company performs accounting services for its customers. The company had the following net income for the most recent year:

Patel and Company
Income Statement
Most Recent Year Ending December 31

	Quarter				
	1	2	3	4	Year
Service revenue	\$135,000	\$137,500	\$155,000	\$165,000	\$592,500
Deduct operating expenses:					
Manager salaries	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$240,000
Staff salaries	25,000	25,000	25,000	25,000	100,000
Administrative staff wages	10,000	10,000	10,000	10,000	40,000
Supplies	11,500	11,500	11,500	11,500	46,000
Rent	7,000	7,000	7,000	7,000	28,000
Utilities	2,000	2,000	2,000	2,000	8,000
Insurance	14,000	14,000	14,000	14,000	56,000
Miscellaneous	6,500	6,500	6,500	6,500	26,000
Total operating expenses	\$136,000	\$136,000	\$136,000	\$136,000	\$544,000
Net income	\$ (1,000)	\$ 1,500	\$ 19,000	\$ 29,000	\$ 48,500

The following information was gathered to help prepare next year's budgeted income statement:

- Service revenue will increase 10 percent (e.g., first quarter service revenue for next year will be 10 percent higher than the first quarter shown previously).
- Manager and staff salaries will increase 5 percent, and a new staff accountant will be hired at the beginning of the second quarter at a quarterly salary of \$12,000.
- Administrative staff wages will increase 10 percent.
- Supplies and rent will remain the same.
- Utilities will increase 5 percent.
- Insurance will increase 25 percent.
- Miscellaneous expenses will decrease 10 percent.

Prepare a quarterly budgeted income statement for **Patel and Company**; include a column summarizing the year.

Solution to Review Problem 9.8

Patel and Company
Budgeted Income Statement
This Coming Year Ending December 31

	Quarter				
	1	2	3	4	Year
Service revenue*	\$ 148,500	\$ 151,250	\$ 170,500	\$ 181,500	\$ 651,750
Deduct operating expenses:					
Manager salaries**	\$ 63,000	\$ 63,000	\$ 63,000	\$ 63,000	\$ 252,000
Staff salaries***	26,250	38,250	38,250	38,250	141,000
Administrative staff wages^	11,000	11,000	11,000	11,000	44,000
Supplies^^	11,500	11,500	11,500	11,500	46,000
Rent^^^	7,000	7,000	7,000	7,000	28,000
Utilities^^^^	2,100	2,100	2,100	2,100	8,400
Insurance@	17,500	17,500	17,500	17,500	70,000
Miscellaneous@@	5,850	5,850	5,850	5,850	23,400
Total operating expenses	\$ 144,200	\$ 156,200	\$ 156,200	\$ 156,200	\$ 612,800
Net income (loss)	\$ 4,300	\$ (4,950)	\$ 14,300	\$ 25,300	\$ 38,950

*First quarter budget of \$148,500 = \$135,000 in last year's first quarter revenue \times (1 + .10).

**Quarterly budget of \$63,000 = \$60,000 in last year's quarterly salaries \times (1 + .05).

***First quarter budget of \$26,250 = \$25,000 in last year's first quarter salaries \times (1 + .05). Second, third, and fourth quarter budgets include newly hired staff at \$12,000 a quarter.

^Quarterly budget of \$11,000 = \$10,000 in last year's quarterly budget \times (1 + .10).

^^ No change from last year.

^^^ Quarterly budget of \$2,100 = \$2,000 in last year's quarterly budget \times (1 + .05).

@ Quarterly budget of \$17,500 = \$14,000 in last year's quarterly budget \times (1 + .25).

@@ Quarterly budget of \$5,850 = \$6,500 in last year's quarterly budget \times (1 - .10).

9.5 Ethical Issues in Creating Operating Budgets

LEARNING OBJECTIVE

1. Understand ethical issues associated with budgeting.

Question: Although bottom-up budgeting, in which management elicits input from employees throughout the company, is effective in actively engaging those who have to achieve the budgeted goals, this type of budgeting is not free from problems. Ethical issues often arise in the budgeting process, particularly when employees and managers are evaluated by comparing their actual results to the budget. How might ethical issues arise in the budgeting process?

Answer: To demonstrate how ethical dilemmas might arise, assume you are a manager and you help upper management establish the master budget (this is the planning phase). Furthermore, you are evaluated based on achieving budgeted profit on a quarterly basis (this is the control phase). In fact, you will receive a \$10,000 quarterly bonus, in addition to your base salary, if you meet or exceed budgeted profit. There is an inherent conflict between the planning and control phases of this process. You are helping the company plan, but you also want to be sure budgeted profit is as low as possible so you can get the \$10,000 bonus.

Establishing a sales and profit budget that is considerably lower than what will likely happen causes problems for the entire organization. Production may be short of materials and labor, causing inefficiencies in the production process. Selling and administrative support may be lacking due to underestimating sales. Customers will not be satisfied if they must wait for the product. The dilemma you face as a manager in this situation is whether to do what is best for you (set a low profit estimate to earn the bonus) or do what is best for the company (estimate accurately so the budget reflects true sales and production needs).

Organizations must recognize this conflict and have processes in place to ensure both the interests of individual employees and the interests of the organization as a whole are served. For example, employees can be rewarded not just for meeting goals but also for providing accurate estimates. Perhaps a long-term stock option incentive system would provide motivation to do

what is best for the organization, thereby increasing shareholder value. Whatever incentive system is implemented, organizations must promote honest employee input and beware of fraudulent reporting to achieve financial targets.

KEY TAKEAWAY

- An inherent conflict often exists between the planning and control phases of budgeting. During the planning phase, organizations are most concerned about getting accurate estimates that lead to positive results. The control phase requires evaluating performance of employees by comparing actual results to the operating budget. Employees often must decide between doing what is best for the individual employee and what is best for the organization.

REVIEW PROBLEM 9.9

Assume you are the manager of the computer division of High Tech Retail, Inc. You are asked to help the company prepare a budgeted income statement for the computer division before the start of each fiscal year. At the completion of each fiscal year, division managers receive a bonus equal to 10 percent of actual net income in excess of budgeted net income.

Describe the ethical conflict facing you as division manager when asked to help create the budgeted income statement for your division.

Solution to Review Problem 9.9

Employees who are evaluated in the control phase by comparing actual results to budgeted information have an incentive to create a budget that is easy to achieve, and perhaps unrealistic. This can create problems for the organization as a whole since inventory purchases are made based on budgeted sales. If each of the division managers submits a sales budget that significantly underestimates sales, the company will likely have a shortage of inventory and lose out on sales as customers go elsewhere to find the product. Although the managers will have an easier time achieving sales and profit goals, the company as a whole will suffer. The ethical

dilemma of choosing between doing what is best for the division manager and what is best for the organization can ultimately lead to lower sales and dissatisfied customers.

END-OF-CHAPTER EXERCISES

Questions

1. Describe the planning phase of budgeting.
2. Describe the control phase of budgeting.
3. Refer to Describe two characteristics that make budgeting difficult for multinational companies.
4. Why do successful companies tend to use the bottom-up approach to budgeting?
5. Briefly describe the components of a master budget for a manufacturing organization.
6. Why is the sales budget the most important component of the master budget?
7. Describe the information used by companies to estimate sales.
8. Describe how *units to be produced* is calculated in the production budget.
9. How does a production budget help the production manager plan for the future?
10. Why is depreciation deducted at the bottom of the manufacturing overhead budget?
11. Why do companies that prepare a budgeted income statement also prepare a cash budget?
12. Refer to *Business in Action* 9.2 titled “Moving from Spreadsheets to Intranet Budgeting.” What are the advantages of using intranet budgeting? What are some possible disadvantages?
13. How does the master budget for a merchandising organization differ from the master budget for a manufacturing organization?
14. Describe the difference between service organization budgets and manufacturing organization budgets.
15. Refer to Describe the two procedures that the symphony uses in the control phase of budgeting.
16. Describe the ethical conflict that can occur between the planning and control phases of the budgeting process.



17. Why might a sales budget that intentionally underestimates sales have a negative impact on the organization?

Brief Exercises

18. **Budgeting at Jerry's Ice Cream.** Refer to the dialogue for Jerry's Ice Cream presented at the beginning of the chapter and the follow-up dialogue after .

Required:

- a. In the opening dialogue, why is Jerry Feltz concerned about the sales growth expected for the coming year?
- b. In the follow-up dialogue, why is the company's treasurer and controller concerned about the third quarter?

Budget Sequence. Indicate the order in which the following budget schedules are prepared.

1. Direct materials purchases
2. Manufacturing overhead
3. Income statement
4. Direct labor
5. Selling and administrative
6. Cash
7. Production
8. Balance sheet
9. Sales
10. Capital expenditures

Sales Budget. Schwartz and Company expects to sell 100 units in the first quarter, 90 units in the second quarter, 150 units in the third quarter, and 160 units in the fourth quarter. The average sales price per unit is expected to be \$3,000. Prepare a sales budget for each quarter and include a column for the year ending December 31.

Production Budget. Schwartz and Company expects to sell 100 units in the first quarter and 90 units in the second quarter. Assuming the company prefers to maintain finished goods inventory equal to 10 percent of the next quarter's sales,

prepare a production budget for the first quarter using as a guide. (Hint: you are preparing a production budget for the first quarter only.)

Direct Materials Purchases Budget. The production budget for Kaminski Products shows the company expects to produce 500 units in the first quarter and 600 units in the second quarter. Each unit requires 10 pounds of direct materials at a cost of \$2 per pound. The company prefers to maintain raw materials inventory equal to 20 percent of next quarter's materials needed in production. Prepare a direct materials purchases budget using as a guide. (Hint: you are preparing a direct materials purchases budget for the first quarter only.)

Direct Labor Budget. The production budget for Kaminski Products shows the company expects to produce 500 units in the first quarter. Assuming each unit of product requires 3 direct labor hours at a cost of \$13 per hour, prepare a direct labor budget for the first quarter using as a guide. (Hint: you are preparing a direct labor budget for the first quarter only.)

Manufacturing Overhead Budget. The production budget for Kaminski Products shows the company expects to produce 500 units in the first quarter. Assume variable overhead cost per unit is \$5 for indirect materials, \$8 for indirect labor, and \$3 for other items. Fixed overhead cost per quarter is \$30,000 for salaries, \$20,000 for rent, and \$8,000 for depreciation. Prepare a manufacturing overhead budget for the first quarter using as a guide (Hint: you are preparing a manufacturing overhead budget for the first quarter only.)

Sales Cash Collections Budget. All sales for Malik and Associates are on credit. Accounts receivable at the end of last quarter totaled \$100,000. Credit sales for the first quarter of the upcoming period are expected to be \$300,000. The company expects to collect 70 percent of sales in the quarter of the sale, and 30 percent the quarter following the sale. Prepare a sales cash collections budget for the first quarter of the upcoming period using the top of as a guide. (Hint: you are preparing a sales cash collections budget for the first quarter only.)

Purchases Cash Payments Budget. All direct material purchases made by Keen and Company are on credit. Accounts payable at the end of last quarter totaled \$50,000. Purchases for the first quarter of the upcoming period are expected to be \$200,000. The company expects to pay 40 percent of purchases in the quarter of purchase and 60 percent the quarter following the purchase. Prepare a purchases cash payments budget for the first quarter of the upcoming period using the middle of as a guide. (Hint: you are preparing a purchases cash payments budget for the first quarter only.)

Sales Budget for Service Organization; Ethical Issues. Rami and Associates is an accounting firm that estimates revenues based on billable hours. The company expects to charge 8,000 hours to clients in the first quarter, 9,000 hours in the second quarter, 7,000 hours in the third quarter and 8,500 hours in the fourth quarter. The average hourly billing rate is expected to be \$100.

Required:

- a. Prepare a services revenue budget for each quarter and include a column for the year ending December 31. (Hint: this is similar to a sales budget except sales are measured in labor hours rather than in units, and revenue is measured as an average hourly billing rate rather than a sales price per unit.)
- b. Since the manager of the company is given a bonus if actual billable hours exceed budgeted billable hours, the manager intentionally underestimated the number of expected billable hours for each quarter. How might this underestimate affect the company?

Exercises: Set A

28. Sales and Production Budgets. Templeton Corporation produces windows used in residential construction. Unit sales last year, ending December 31, are as follow:

First quarter	40,000
---------------	--------

Second quarter	50,000
Third quarter	52,000
Fourth quarter	48,000

29. Unit sales are expected to increase 10 percent this coming year over the same quarter last year. Average sales price per window will remain at \$200.

30. Assume finished goods inventory is maintained at a level equal to 5 percent of the next quarter's sales. Finished goods inventory at the end of the fourth quarter budget period is estimated to be 2,300 units.

31. *Required:*

- a. Prepare a sales budget for Templeton Corporation using a format similar to . (Hint: be sure to increase last year's unit sales by 10 percent.)
- b. Prepare a production budget for Templeton Corporation using a format similar to .

Direct Materials Purchases and Direct Labor Budgets. Templeton Corporation produces windows used in residential construction. The company expects to produce 44,550 units in the first quarter, 55,110 units in the second quarter, 56,980 units in the third quarter, and 52,460 units in the fourth quarter. (This information is derived from the previous exercise for Templeton Corporation.)

With regards to direct materials, each unit of product requires 12 square feet of glass at a cost of \$1.50 per square foot. Management prefers to maintain ending raw materials inventory equal to 10 percent of next quarter's materials needed in production. Raw materials inventory at the end of the fourth quarter budget period is estimated to be 65,000 square feet.

With regards to direct labor, each unit of product requires 2 labor hours at a cost of \$15 per hour.

Required:

- a. Prepare a direct materials purchases budget for Templeton Corporation using a format similar to .
- b. Prepare a direct labor budget for Templeton Corporation using a format similar to .

Manufacturing Overhead Budget. Templeton Corporation produces windows used in residential construction. The company expects to produce 44,550 units in the first quarter, 55,110 units in the second quarter, 56,980 units in the third quarter, and 52,460 units in the fourth quarter. (This information is the same as in the previous exercise for Templeton Corporation.) The following information relates to the manufacturing overhead budget.

Variable Overhead Costs	
Indirect materials	\$2.50 per unit
Indirect labor	\$3.20 per unit
Other	\$1.70 per unit
Fixed Overhead Costs per Quarter	
Salaries	\$50,000
Rent	\$60,000
Depreciation	\$36,370

Required:

Prepare a manufacturing overhead budget for Templeton Corporation using a format similar to .

Budgets for Cash Collections from Sales and Cash Payments for Purchases. Templeton Corporation produces windows used in residential construction. The dollar amount of the company's quarterly sales and direct materials purchases are projected to be as follows (this information is derived from the previous exercises for Templeton Corporation):

	1st	2nd	3rd	4th
Sales	\$8,800,000	\$11,000,000	\$11,440,000	\$10,560,000
Direct materials purchases	\$ 820,908	\$ 995,346	\$ 1,017,504	\$ 947,352

Assume all sales are made on credit. The company expects to collect 60 percent of sales in the quarter of sale and 40 percent the quarter following the sale. Accounts receivable at the end of last year totaled \$3,000,000, all of which will be collected in the first quarter of the coming year.

Assume all direct materials purchases are on credit. The company expects to pay 70 percent of purchases in the quarter of purchase and 30 percent the following quarter. Accounts payable at the end of last year totaled \$325,000, all of which will be paid in the first quarter of this coming year.

Required:

- Prepare a budget for cash collections from sales. Use a format similar to the top section of .
- Prepare a budget for cash payments for purchases of materials. Use a format similar to the middle section of . Round to the nearest dollar.

Service Company Budgeted Income Statement and Ethical Issues. Lawn Care, Inc., has two owners who maintain lawns for residential customers. The company had the following net income for the most current year.

Lawn Care, Inc.
Income Statement
Most Recent Year Ending December 31

	Quarter				
	1	2	3	4	Year
Service revenue	\$130,000	\$135,000	\$150,000	\$140,000	\$555,000
Deduct operating expenses:					
Owner salaries	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$120,000
Crew wages	40,000	40,000	40,000	40,000	160,000
Administrative staff wages	8,000	8,000	8,000	8,000	32,000
Supplies	12,000	12,000	12,000	12,000	48,000
Office rent	2,000	2,000	2,000	2,000	8,000
Utilities	1,000	1,000	1,000	1,000	4,000
Insurance	19,000	19,000	19,000	19,000	76,000
Miscellaneous	5,000	5,000	5,000	5,000	20,000
Total operating expenses	\$117,000	\$117,000	\$117,000	\$117,000	\$468,000
Income before taxes	13,000	18,000	33,000	23,000	87,000
Income taxes (30% rate)	(3,900)	(5,400)	(9,900)	(6,900)	(26,100)
Net income	\$ 9,100	\$ 12,600	\$ 23,100	\$ 16,100	\$ 60,900

The following information was gathered from the owners to help prepare this coming year's budgeted income statement:

- Service revenue will increase 15 percent (e.g., first quarter service revenue for this coming year will be 15 percent higher than the first quarter shown previously).
- Owner salaries will increase 8 percent.
- Crew wages will increase 12 percent.
- Administrative staff wages will increase 5 percent, and a new staff member will be hired at the beginning of the third quarter at a quarterly rate of \$7,000.
- Supplies will increase 9 percent.
- Office rent, utilities, and miscellaneous expenses will remain the same.
- Insurance will increase 18 percent.
- The tax rate will remain at 30 percent.

Required:

- i. Prepare a quarterly budgeted income statement for Lawn Care, Inc., and include a column summarizing the year.
- j. The owners of Lawn Care, Inc., have decided to expand and are in need of additional cash to expand operations. Unknown to the owners, the company's accountant intentionally inflated the revenue projections for this coming year to make the company look better when applying for a loan. Is this behavior ethical? Explain. (It may be helpful to review the presentation of ethics in .)

Exercises: Set B

33. Sales and Production Budgets. Catalina, Inc., produces tents used for camping. Unit sales last year, ending December 31, follow.

First quarter	6,000
Second quarter	10,000
Third quarter	12,000
Fourth quarter	8,000

34. Unit sales are expected to increase 30 percent this coming year over the same quarter last year. Average sales price per tent will remain at \$300.
35. Assume finished goods inventory is maintained at a level equal to 10 percent of the next quarter's sales. Finished goods inventory at the end of the fourth quarter budget period is estimated to be 1,900 units.
36. *Required:*
- a. Prepare a sales budget for Catalina, Inc., using a format similar to . (Hint: be sure to increase last year's unit sales by 30 percent.)
 - b. Prepare a production budget for Catalina, Inc., using a format similar to .

Direct Materials Purchases and Direct Labor Budgets. Catalina, Inc., produces tents used for camping. The company expects to produce 8,320

units in the first quarter, 13,260 units in the second quarter, 15,080 units in the third quarter, and 11,260 units in the fourth quarter (this information is derived from the previous exercise for Catalina, Inc.).

With regards to direct materials, each unit of product requires 8 yards of material, at a cost of \$4 per yard. Management prefers to maintain ending raw materials inventory equal to 15 percent of next quarter's materials needed in production. Raw materials inventory at the end of the fourth quarter budget period is estimated to be 14,000 yards.

With regards to direct labor, each unit of product requires 3 labor hours at a cost of \$16 per hour.

Required:

- a. Prepare a direct materials purchases budget for Catalina, Inc., using a format similar to .
- b. Prepare a direct labor budget for Catalina, Inc., using a format similar to .

Manufacturing Overhead Budget. Catalina, Inc., produces tents used for camping. The company expects to produce 8,320 units in the first quarter, 13,260 units in the second quarter, 15,080 units in the third quarter, and 11,260 units in the fourth quarter. (This information is the same as in the previous exercise for Catalina, Inc.) The following information relates to the manufacturing overhead budget.

Variable Overhead Costs	
Indirect materials	\$0.20 per unit
Indirect labor	\$4.20 per unit
Other	\$2.70 per unit
Fixed Overhead Costs per Quarter	

Salaries	\$100,000
Rent	\$ 30,000
Depreciation	\$ 44,908

Required:

Prepare a manufacturing overhead budget for Catalina, Inc., using a format similar to .

Budgets for Cash Collections from Sales and Cash Payments for Purchases. Catalina, Inc., produces tents used for camping. The dollar amount of the company's quarterly sales and direct materials purchases are projected to be as follows (this information is derived from the previous exercises for Catalina, Inc.):

	1st	2nd	3rd	4th
Sales	\$2,340,000	\$3,900,000	\$4,680,000	\$3,120,000
Direct materials purchases	\$ 289,952	\$ 433,056	\$ 464,224	\$ 362,272

Assume all sales are made on credit. The company expects to collect 80 percent of sales in the quarter of sale and 20 percent the quarter following the sale. Accounts receivable at the end of last year totaled \$400,000, all of which will be collected in the first quarter of the coming year.

Assume all direct materials purchases are on credit. The company expects to pay 90 percent of purchases in the quarter of purchase and 10 percent the following quarter. Accounts payable at the end of last year totaled \$30,000, all of which will be paid in the first quarter of this coming year.

Required:

- a. Prepare a budget for cash collections from sales. Use a format similar to the top section of .
- b. Prepare a budget for cash payments for purchases of materials. Use a format similar to the middle section of . Round to the nearest dollar.

Service Company Budgeted Income Statement. Civil Engineers, LLC, has five engineers who design and maintain wetlands. The company had the following net income for the most current year.

Civil Engineers, LLC Income Statement Most Recent Year Ending December 31					
	Quarter				
	1	2	3	4	Year
Service revenue	\$ 270,000	\$ 275,000	\$ 310,000	\$ 330,000	\$1,185,000
Deduct operating expenses:					
Engineer salaries	\$ 120,000	\$ 120,000	\$ 120,000	\$ 120,000	\$ 480,000
Biologist salaries	50,000	50,000	50,000	50,000	200,000
Administrative staff wages	20,000	20,000	20,000	20,000	80,000
Supplies	23,000	23,000	23,000	23,000	92,000
Rent	14,000	14,000	14,000	14,000	56,000
Utilities	4,000	4,000	4,000	4,000	16,000
Insurance	28,000	28,000	28,000	28,000	112,000
Miscellaneous	13,000	13,000	13,000	13,000	52,000
Total operating expenses	\$ 272,000	\$ 272,000	\$ 272,000	\$ 272,000	\$1,088,000
Net income (loss)	\$ (2,000)	\$ 3,000	\$ 38,000	\$ 58,000	\$ 97,000

The following information was gathered from management to help prepare this coming year's budgeted income statement:

- Service revenue will increase 3 percent (e.g., first quarter service revenue for this coming year will be 3 percent higher than the first quarter shown previously).
- Existing engineer and biologist salaries will increase 5 percent, and a new biologist will be hired at the beginning of the second quarter at a quarterly salary of \$10,000.
- Administrative staff wages will increase 15 percent.
- Supplies and rent will remain the same.

- Utilities will increase 8 percent.
- Insurance will increase 20 percent.
- Miscellaneous expenses will decrease 5 percent.

Required:

Prepare a quarterly budgeted income statement for Civil Engineers, LLC, and include a column summarizing the year.

Problems

38. Budgeting for Sales, Production, Direct Materials, Direct Labor, and Manufacturing Overhead; Ethical Issues. Sanders Swimwear, Inc., produces swimsuits. The following information is to be used for the operating budget this coming year.

- Average sales price for each swimsuit is estimated to be \$50. Unit sales for this coming year ending December 31 are expected to be as follows:

First quarter	3,000
Second quarter	5,000
Third quarter	20,000
Fourth quarter	6,000

- Finished goods inventory is maintained at a level equal to 10 percent of the next quarter's sales. Finished goods inventory at the end of the fourth quarter budget period is estimated to be 400 units.
- Each unit of product requires 3 yards of direct materials, at a cost of \$4 per yard. Management prefers to maintain ending raw materials inventory equal to 20 percent of next quarter's materials needed in production. Raw materials inventory at the end of the fourth quarter budget period is estimated to be 9,500 yards.

- Each unit of product requires 0.5 direct labor hours at a cost of \$12 per hour.

- Variable manufacturing overhead costs are

Indirect materials	\$0.60 per unit
Indirect labor	\$3.50 per unit
Other	\$2.80 per unit

- Fixed manufacturing overhead costs per quarter are

Salaries	\$30,000
Other	\$ 5,000
Depreciation	\$ 9,330

39. Required:

- Prepare a sales budget using the format shown in .
- Prepare a production budget using the format shown in .
- Prepare a direct materials purchases budget using the format shown in .
- Prepare a direct labor budget using the format shown in .
- Prepare a manufacturing overhead budget using the format shown in .
- As the production manager, what concerns, if any, do you have about production requirements for each of the four quarters?
- Assume the sales budget was developed based on input provided by the company's vice president of sales. The vice president is paid a base salary plus a bonus if actual sales exceed budgeted sales. How might this influence the vice president's estimate of quarterly sales? What effect might this have on the company?

Budgeting for Sales, Production, Direct Materials, Direct Labor, and Manufacturing Overhead. Hershel's Chocolate produces chocolate bars and

sells them by the case (1 unit = 1 case). Information to be used for the operating budget this coming year follows:

- Average sales price for each case is estimated to be \$25. Unit sales for this coming year, ending December 31, are expected to be as follows:

First quarter	80,000
Second quarter	84,000
Third quarter	88,000
Fourth quarter	97,000

- Finished goods inventory is maintained at a level equal to 15 percent of the next quarter's sales. Finished goods inventory at the end of the fourth quarter budget period is estimated to be 13,000 units.
- Each unit of product requires 5 pounds of cocoa beans for direct materials, at a cost of \$3 per pound. Management prefers to maintain ending raw materials inventory equal to 10 percent of next quarter's materials needed in production. Raw materials inventory at the end of the fourth quarter budget period is estimated to be 43,000 pounds.
- Each unit of product requires 0.10 direct labor hours at a cost of \$14 per hour.

- Variable manufacturing overhead costs are

Indirect materials	\$0.20 per unit
Indirect labor	\$0.15 per unit
Other	\$0.10 per unit

- Fixed manufacturing overhead costs per quarter are

Salaries	\$80,000
Other	\$70,000
Depreciation	\$55,625

Required:

- Prepare a sales budget using the format shown in .
- Prepare a production budget using the format shown in .
- Prepare a direct materials purchases budget using the format shown in .
- Prepare a direct labor budget using the format shown in .
- Prepare a manufacturing overhead budget using the format shown in .
Round to the nearest dollar.
- As the production manager, what concerns, if any, do you have about production requirements for each of the four quarters?

Selling and Administrative Budget and Budgeted Income

Statement.(The previous problem must be completed before working this problem.) Hershel's Chocolate produces chocolate bars. Management estimates all selling and administrative costs are fixed. Quarterly selling and administrative cost estimates for the coming year follow.

Salaries	\$170,000
Rent	\$ 65,000
Advertising	\$120,000
Depreciation	\$ 75,000
Other	\$ 36,000

Required:

- Use the information presented previously to prepare a selling and administrative budget. Refer to the format shown in .

- b. Use the information from the previous problem and from requirement *a* of this problem to prepare a budgeted income statement. Refer to the format shown in .
- c. How will management use the information presented in the budgeted income statement?

Budgeting for Cash Collections and Cash Payments. Hershel's Chocolate produces chocolate bars. The treasurer at Hershel's Chocolate is preparing the cash budget and would like to know when cash collections from sales and cash payments for materials will occur. The dollar amount of the company's quarterly sales and direct materials purchases are projected to be as follows (this information is the result of working the previous problems for Hershel's Chocolate):

	1st	2nd	3rd	4th
Sales	\$2,000,000	\$2,100,000	\$2,200,000	\$2,425,000
Direct materials purchases	\$1,215,000	\$1,276,125	\$1,349,400	\$1,417,575

- o All sales are made on credit. The company expects to collect 60 percent of sales in the quarter of sale and 40 percent the quarter following the sale. Accounts receivable at the end of last year totaled \$770,000, all of which will be collected during the first quarter of this coming year.
- o All direct materials purchases are on credit. The company expects to pay 80 percent of purchases in the quarter of purchase and 20 percent the following quarter. Accounts payable at the end of last year totaled \$257,000, all of which will be paid during the first quarter of this coming year.

Required:

- c. Prepare a budget for cash collections from sales. Refer to the format shown at the top of .

- d. Prepare a budget for cash payments for purchases of materials. Refer to the format shown in the middle section of .
- e. How will the treasurer use this information?

Services Revenue and Direct Labor Budgets for Service Organization; Ethical Issues. Engineering, Inc., provides structural engineering services for its clients. Billable hours for each month of the first quarter of this coming budget period are expected to be as follows:

January	2,000
February	2,200
March	3,000

The average hourly billing rate is estimated to be \$150.

Required:

- a. Prepare a services revenue budget for Engineering, Inc., for each month of the first quarter and include a total column for the quarter. (Hint: this is similar to a sales budget except sales are measured in labor hours rather than in units, and revenue is measured as an average hourly billing rate rather than a sales price per unit.)
- b. The average cost for each hour of direct labor is expected to be \$50. Assume total direct labor hours are expected to be 20 percent higher than billable direct labor hours presented previously. This is caused by employees working on projects that are not billable to clients (e.g., recruiting and community work). Prepare a direct labor budget for each month of the first quarter and include a total column for the quarter. (Hint: this budget will have three lines: *projected direct labor hours*, *labor rate per hour*, and *total direct labor cost*.)
- c. Assume the manager of the company is given a monthly bonus if actual billable hours exceed budgeted billable hours. How might this influence the

manager's estimate of monthly billable hours for budgeting purposes?
What effect might this have on the company?

Merchandising Company Master Budget. Big Apple Sporting Goods is a retail store that sells a variety of sports equipment. The company's fiscal year ends on December 31. Information to be used for the operating budget this coming year follows.

Sales and Merchandise Purchases Budget Information

- Sales for this coming year ending December 31 are expected to be as follows:

First quarter	\$600,000
Second quarter	\$650,000
Third quarter	\$660,000
Fourth quarter	\$800,000

- Cost of goods sold is 40 percent of sales (this is the first line of the merchandise purchases budget). Merchandise inventory is maintained at a level equal to 20 percent of the next quarter's cost of goods sold. Merchandise inventory at the end of the fourth quarter budget period is estimated to be \$55,000.

Selling and Administrative Budget Information

- Management estimates all selling and administrative costs are fixed.
- Quarterly selling and administrative cost estimates for the coming year are

Salaries	\$150,000
Rent	\$ 25,000
Advertising	\$ 40,000

Depreciation	\$ 18,000
Other	\$ 12,000

Capital Expenditure and Cash Budget Information

- The company plans to pay cash for property, plant, and equipment totaling \$35,000 at the end of the fourth quarter. This purchase will not affect depreciation expense for the coming year.
- The company expects to collect 70 percent of sales in the quarter of sale and 30 percent the quarter following the sale. Accounts receivable at the end of last year totaled \$200,000, all of which will be collected during the first quarter of this coming year.
- All inventory purchases are on credit. The company expects to pay 80 percent of inventory purchases in the quarter of purchase and 20 percent the following quarter. Accounts payable at the end of last year totaled \$68,000, all of which will be paid during the first quarter of this coming year.
- The cash balance at the beginning of this coming year is expected to be \$90,000.

Budgeted Balance Sheet Information

- Assume 30 percent of fourth quarter budgeted sales will be collected in full the following year (this represents accounts receivable at the end of the fourth quarter).

- Expected account balances at the end of the fourth quarter are

Property, plant, and equipment (net)	\$120,000
Common stock	\$175,000

- Actual retained earnings at the end of the last year totaled \$252,000, and no cash dividends will be paid during the current budget period ending December 31.

Required:

- l. Prepare a quarterly sales budget. (Hint: this budget will not have any units of product, only total sales revenue.)
- m. Prepare a quarterly merchandise purchases budget using the following format. All amounts are in dollars.

Big Apple Sporting Goods Merchandises Purchases Budget Year Ending December 31					
	Quarter				Year
	1	2	3	4	
Budgeted costs of goods sold					
Add desired ending merchandise inventory					
Total merchandise inventory needed					
Deduct beginning merchandise inventory					
Merchandise to be purchased					

- n. Prepare a quarterly selling and administrative budget using the format shown in .
- o. Prepare a quarterly budgeted income statement using the format shown in . (Hint: cost of goods sold will be based on a percent of sales rather than a cost per unit.)
- p. Prepare a quarterly capital expenditure budget using the format shown in .
- q. Prepare a quarterly cash budget using the format shown in . (Hint: Merchandising companies have merchandise purchases rather than direct materials purchases. Merchandising companies do *not* have direct labor or manufacturing overhead.)
- r. Prepare a budgeted balance sheet at December 31 using the format shown in . (Hint: merchandising companies have merchandise inventory rather than raw materials inventory or finished goods inventory.)

One Step Further: Skill-Building Cases

44. Ethics in Budgeting. SportsMax sells sporting goods equipment at 100 stores throughout North America. Robert Manning is the manager of one SportsMax retail store in Chicago. The company is in the planning phase of establishing its operating budget for this coming year and has asked that all store managers submit their estimates of sales revenue, costs, and resulting profit. During the control phase, each store manager is evaluated by comparing budgeted profit with actual profit. Store managers who exceed budgeted profit are given a bonus equal to 10 percent of actual profit in excess of budgeted profit.

Required:

- a. Describe the ethical conflict that Robert Manning is facing.
- b. As the president and CEO of SportsMax, how might you motivate Robert Manning to provide an accurate operating budget?

Group Activity: Creating a Budget. Form groups of two to four students. Each group is to complete the following requirements.

Required:

- a. Assume you are a full-time student living in an apartment near your college campus. Create a personal budget that includes the typical monthly expenses you would expect to incur.
- b. Explain how the control phase of budgeting would be implemented for the personal budget created in requirement *a*.
- c. Discuss the findings of your group with the class. (Optional: your instructor may ask you to submit your findings in writing.)

Creating a Sales Budget and Production Budget Using Excel. Review the information for Templeton Corporation in Exercise 28. Prepare an Excel spreadsheet similar to and showing Templeton's sales budget and production budget.

Internet Project: Budgeting. Go to *The New York Times'* Web site (<http://www.nytimes.com>), or a similar reputable Internet source, and find an article about budgeting. Summarize the article in a one-page report, and indicate how the

budget described in the article is used for planning purposes. Submit a printed copy of the article with your report.

Comprehensive Cases

48. Comprehensive Master Budget. Creative Shirts, Inc., produces T-shirts. The company's fiscal year ends on December 31. Information to be used for the operating budget this coming year follows.

Sales and Production-Related Budget Information

- Average sales price for each T-shirt is estimated to be \$15. Unit sales for this coming year, ending December 31, are expected to be as follows:

First quarter	20,000
Second quarter	24,000
Third quarter	28,000
Fourth quarter	18,000

- Finished goods inventory is maintained at a level equal to 10 percent of the next quarter's sales. Finished goods inventory at the end of the fourth quarter budget period is estimated to be 2,000 units.
- Each unit of product requires 3 yards of direct materials, at a cost of \$2 per yard. Management prefers to maintain ending raw materials inventory equal to 20 percent of next quarter's materials needed in production. Raw materials inventory at the end of the fourth quarter budget period is estimated to be 12,200 yards.
- Each unit of product requires 0.1 direct labor hours at a cost of \$14 per hour.
- Variable manufacturing overhead costs are

Indirect materials	\$0.70 per unit
Indirect labor	\$0.90 per unit
Other	\$0.50 per unit

- Fixed manufacturing overhead costs per quarter are

Salaries	\$18,000
Other	\$20,000
Depreciation	\$11,950

Selling and Administrative Budget Information

- Management estimates all selling and administrative costs are fixed.
- Quarterly selling and administrative cost estimates for the coming year are

Salaries	\$15,000
Rent	\$ 5,000
Advertising	\$ 4,000
Depreciation	\$ 9,000
Other	\$10,000

Capital Expenditures and Cash Budget Information

- The company plans to pay cash for selling and administrative equipment totaling \$15,000 and production equipment totaling \$9,000. Both will be purchased at the end of the fourth quarter and will not affect depreciation expense for the coming year.
- All sales are made on credit. The company expects to collect 70 percent of sales in the quarter of sale and 30 percent the quarter following the sale.

Accounts receivable at the end of last year totaled \$80,000, all of which will be collected during the first quarter of this coming year.

- All direct materials purchases are on credit. The company expects to pay 80 percent of purchases in the quarter of purchase and 20 percent the following quarter. Accounts payable at the end of last year totaled \$25,000, all of which will be paid during the first quarter of this coming year.
- The cash balance at the beginning of this coming year is expected to be \$30,000.

Budgeted Balance Sheet Information

- Assume 30 percent of fourth quarter budgeted sales will be collected in full the following year (this represents accounts receivable at the end of the fourth quarter).

- Expected account balances at the end of the fourth quarter are

Property, plant, and equipment (net)	\$100,000
Common stock	\$250,000

- Actual retained earnings at the end of last year totaled \$42,720, and no cash dividends will be paid during the current budget period ending December 31.

Required:

p. Prepare the quarterly sales and production-related budgets using the figure formats referenced here:



Sales budget ()



Production budget ()



Direct materials purchases budget ()



Direct labor budget ()



Manufacturing overhead budget ()

- q. Prepare a quarterly selling and administrative budget using the format shown in .
- r. Prepare a quarterly budgeted income statement using the format shown in .
- s. Prepare a quarterly capital expenditures budget using the format shown in .
- t. Prepare a quarterly cash budget using the format shown in .
- u. Prepare a budgeted balance sheet at December 31 using the format shown in .
- v. Why does management at Creative Shirts, Inc., prepare a master budget? Explain.

Comprehensive Master Budget with Cash Flow Issues. Air Boats, Inc., produces small inflatable boats. The company's fiscal year ends on December 31. Information to be used for the operating budget this coming year follows.

Sales and Production-Related Budget Information

- o Average sales price for each boat is estimated to be \$150. Unit sales for this coming year, ending December 31, are expected to be as follows:

First quarter	100,000
Second quarter	110,000
Third quarter	125,000
Fourth quarter	90,000

- o Finished goods inventory is maintained at a level equal to 15 percent of the next quarter's sales. Finished goods inventory at the end of the fourth quarter budget period is estimated to be 13,000 units.
- o Each unit of product requires 4 pounds of direct materials, at a cost of \$5 per pound. The management prefers to maintain ending raw materials

inventory equal to 8 percent of next quarter's materials needed in production. Raw materials inventory at the end of the fourth quarter budget period is estimated to be 30,000 pounds.

- Each unit of product requires 0.5 direct labor hours at a cost of \$15 per hour.

- Variable manufacturing overhead costs are

Indirect materials	\$2.10 per unit
Indirect labor	\$1.10 per unit
Other	\$1.70 per unit

- Fixed manufacturing overhead costs per quarter are

Salaries	\$250,000
Other	\$300,000
Depreciation	\$613,250

Selling and Administrative Budget Information

- Management estimates all selling and administrative costs are fixed.

- Quarterly selling and administrative cost estimates for the coming year are

Salaries	\$3,000,000
Rent	\$1,000,000
Advertising	\$ 900,000
Depreciation	\$1,200,000
Other	\$1,600,000

Capital Expenditures and Cash Budget Information

- The company plans to pay cash for selling and administrative equipment totaling \$5,000,000 and production equipment totaling \$20,000,000 (management plans to fully automate production with new machinery). Both will be purchased at the end of the fourth quarter and will not affect depreciation expense for the coming year.
- All sales are made on credit. The company expects to collect 90 percent of sales in the quarter of sale and 10 percent the quarter following the sale. Accounts receivable at the end of last year totaled \$1,400,000, all of which will be collected during the first quarter of this coming year.
- All direct materials purchases are on credit. The company expects to pay 80 percent of purchases in the quarter of purchase and 20 percent the following quarter. Accounts payable at the end of last year totaled \$400,000, all of which will be paid during the first quarter of this coming year.
- The cash balance at the beginning of this coming year is expected to be \$75,000.

Budgeted Balance Sheet Information

- Assume 10 percent of fourth quarter budgeted sales will be collected in full the following year (this represents accounts receivable at the end of the fourth quarter).

- Expected account balances at the end of the fourth quarter are

Property, plant, and equipment (net)	\$32,000,000
Common stock	\$13,500,000

- Actual retained earnings at the end of last year totaled \$2,641,400, and no cash dividends will be paid during the current budget period ending December 31.

Required:

p. Prepare the quarterly sales and production-related budgets using the figure formats referenced here:



Sales budget ()



Production budget ()



Direct materials purchases budget ()



Direct labor budget ()



Manufacturing overhead budget ()

- q. Prepare a quarterly selling and administrative budget using the format shown in .
- r. Prepare a quarterly budgeted income statement using the format shown in .
- s. Prepare a quarterly capital expenditures budget using the format shown in .
- t. Prepare a quarterly cash budget using the format shown in .
- u. Prepare a budgeted balance sheet at December 31 using the format shown in . (Hint: cash will have a negative balance.)
- v. Review the cash budget for Air Boats, Inc. What issue is facing the treasurer, and how might this issue be resolved?

Ethics in Budgeting. Carol Chadwick is the manager of the toys division at Matteler, Inc. Carol is in the process of establishing the budgeted income statement for this coming year, which will be submitted to the company president for approval. The division's current year actual results were slightly higher than the 5 percent growth Carol had anticipated. These results are shown as follows.

Sales revenue	\$ 50,000,000
Costs of goods sold	30,000,000
Gross profit	<u>\$ 20,000,000</u>
Selling and administrative expenses	15,000,000
Net income	<u><u>\$ 5,000,000</u></u>

Division managers receive a 20 percent bonus for actual net income in excess of budgeted net income. Carol believes growth in sales this year will be approximately 12 percent. She is considering submitting a budget showing an increase of 5 percent, which will increase her chances of receiving a significant bonus at the end of this coming year. Assume cost of goods sold are variable costs and will increase in proportion with sales revenue. That is, cost of goods sold will always be 60 percent of sales revenue. Assume selling and administrative expenses are fixed costs.

Required:

- Prepare a budgeted income statement for the toys division assuming sales revenue will increase 5 percent.
- Prepare a budgeted income statement for the toys division assuming sales revenue will increase 12 percent.
- How much will Carol potentially have to gain in bonus compensation by submitting a budget showing a 5 percent increase in sales revenue if actual growth turns out to be 12 percent?
- As the president and CEO of Matteler, how might you motivate Carol Chadwick to provide an accurate budgeted income statement?

Chapter 10

How Do Managers Evaluate Performance Using Cost Variance Analysis?

Jerry Feltz, president and owner of Jerry's Ice Cream, is discussing the results of operations for the year with the company's management group: Tom, the sales manager; Lynn, the production manager; and Michelle, the treasurer and controller.

Jerry:	<i>Good work, everyone! It looks as if our sales this past year exceeded the budget! We were expecting to sell 200,000 gallons of ice cream, but it turns out we sold 210,000 gallons. Credit goes to our sales staff for their hard work!</i>
Tom:	<i>Thanks, Jerry. We have a great group of salespeople and a terrific product.</i>
Jerry:	<i>I agree. I am concerned, however, about our direct labor and direct materials costs. We expected a 5 percent increase in these costs over the original budget since sales were 5 percent higher than anticipated. However, our cost overruns far exceeded the 5 percent increase. We've got to get a handle on both of these costs.</i>
Lynn:	<i>This doesn't sound right. My production crew used fewer materials than was budgeted, and the average time it took to make each unit was also less than expected. This should cause materials and labor costs to be lower than expected, not higher.</i>
Jerry:	<i>Michelle, are you sure we have the right information here?</i>
Michelle:	<i>Absolutely. Total costs for direct labor and direct materials were higher than budgeted, even after considering the increase in sales.</i>
Jerry:	<i>Can you give me more detail as to how this happened? I want to know what caused the increase in costs and how to prevent this from taking place in the future.</i>
Michelle:	<i>Can I have a week to pull the information together?</i>

Jerry:	You've got it.
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Jerry is evaluating the performance of his company by comparing actual costs to budgeted costs. This is the *control* phase of budgeting. We covered the *planning* phase of budgeting in [Chapter 9 "How Are Operating Budgets Created?"](#) by showing how Jerry's Ice Cream prepared a master budget. The focus of this chapter is on the control phase and how to calculate and analyze cost variances.

10.1 Flexible Budgets

LEARNING OBJECTIVE

1. Understand how flexible budgets are used to evaluate performance.

Question: The master budget in Chapter 9 "How Are Operating Budgets Created?" was prepared for only one level of activity (activity was measured by the number of units sold, which was budgeted at 200,000 units). Although this works well in the planning phase of budgeting, it is not appropriate for the control phase. Actual sales rarely match budgeted sales. When actual sales differ from budgeted sales, it is inappropriate and perhaps unfair to evaluate employee performance by comparing actual results to the master budget. If actual sales volume is higher than the master budget, variable costs should be higher than the master budget. The opposite is true as well. How do organizations modify the master budget to adjust for actual sales?

Answer: Organizations use a modified budget called a flexible budget. A flexible budget is simply a revised master budget based on the actual activity level. It represents what costs should be given a certain level of activity. The master budget at Jerry's Ice Cream was based on sales of 200,000 units and production of 200,400 units. Because actual sales totaled 210,000 units, the flexible budget should be based on 210,000 units of activity. (It should be noted that in Chapter 9 "How Are Operating Budgets Created?", we presented an example with budgeted sales of 200,000 units and budgeted production of 200,400 units resulting from differing beginning and ending finished goods inventory amounts. In this chapter, we assume beginning and ending finished goods inventory are the same, and therefore units produced and sold will be the same. Thus we assume actual sales and actual production total 210,000 units.)

Question: Imagine being the production manager at Jerry's Ice Cream, and you are evaluated based on the quantity of direct materials used in production. Would it be fair to compare the materials used to produce 210,000 units with the master budget showing the materials that should have been used to produce 200,400 units?

Answer: Probably not. The budget should be adjusted upward to reflect the actual number of units produced before a comparison is made, thus the term flexible budget. As we develop the process of cost variance analysis, we will use flexible budget information. That is, we will revise the master budget for direct materials, direct labor, and variable manufacturing overhead to reflect actual sales volume of 210,000 units. However, we must first describe the concept of standard cost.

KEY TAKEAWAY

- A flexible budget is a revised master budget that represents expected costs given actual sales. Costs in the flexible budget are compared to actual costs to evaluate performance.

REVIEW PROBLEM 10.1

What is a flexible budget, and why do companies use a flexible budget to evaluate production managers?

Solution to Review Problem 10.1

A flexible budget is a revised master budget based on the actual activity level achieved for a period. The master budget is established before the period begins for planning purposes, and the flexible budget is established after the period ends for control and evaluation purposes. Production managers are evaluated using the flexible budget because the usage of direct materials, direct labor, and manufacturing overhead will depend on the actual number of units produced.

10.2 Standard Costs

LEARNING OBJECTIVE

1. Explain how standard costs are established.

Question: Companies often use standard costs for planning and control purposes. What are standard costs?

Answer: Standard costs are costs that management expects to incur to provide a good or service. They serve as the “standard” by which performance will be evaluated. For example, fast-food restaurants have a standard for the length of time it should take to serve a drive-through-window customer. Phone directory operators have a standard length of time it should take to provide a phone number to a customer. Manufacturing companies have a standard quantity of direct materials to be used to produce one unit of product.

The Difference between Standard Costs and Budgeted Costs

Question: What is the difference between standard costs and budgeted costs?

Answer: The term standard cost refers to a specific cost per unit. Budgeted cost refers to costs in total given a certain level of activity. Standard variable production costs at Jerry’s Ice Cream are shown in .

Figure 10.1 Standard Costs at Jerry’s Ice Cream

	Standard Cost Per Unit
Direct materials (2 pounds per unit at \$1 per pound)*	\$2.00
Direct labor (0.10 hours at \$13 per hour)**	1.30
Variable overhead (0.10 direct labor hours** at \$5 per hour)†	0.50
Standard variable production cost per unit	<u>\$3.80</u>

*Direct materials standards come from the direct materials purchases budget presented in .

**Direct labor standards come from the direct labor budget presented in .

† Variable overhead costs are applied to products based on direct labor hours. Variable overhead cost per direct labor hour is calculated by dividing total variable overhead costs of \$100,200 (from the manufacturing overhead budget in) by 20,040 total direct labor hours (from the direct labor budget in), which results in a standard variable overhead rate of \$5 per direct labor hour.

These standard costs can then be used to establish a flexible budget based on a given level of activity. For example, let's use Jerry's actual sales of 210,000 units. The variable production costs expected to produce these units are shown in the flexible budget in .

Figure 10.2 Flexible Budget for Variable Production Costs at Jerry's Ice Cream

	Flexible Budget at 210,000 Units
Direct materials (\$2.00 per unit × 210,000 units)	\$420,000
Direct labor (\$1.30 per unit × 210,000 units)	273,000
Variable overhead (\$0.50 per unit × 210,000 units)	105,000
Total budgeted variable production costs at 210,000 units	<u>\$798,000</u>

The standard cost presented in shows the variable production costs expected to produce one unit. The flexible budget in uses the standard cost information to show the variable production costs expected in total given a certain level of activity (210,000 units in this example). Later in the chapter, we compare the flexible budget presented in to actual results and analyze the difference. The flexible budget graph presented in shows that direct materials have the highest variable production cost at \$420,000, followed by direct labor at \$273,000 and variable overhead at \$105,000.

Figure 10.3 Flexible Budget



Establishing Standard Cost

Question: What are the components needed to establish a standard cost for direct materials, direct labor, and variable manufacturing overhead?

Answer: Notice in that direct materials has two separate standards necessary to calculate the standard cost: standard quantity to produce 1 unit of product (2 pounds) and standard price (\$1 per pound). Direct labor has two separate standards as well: standard hours to produce 1 unit of product (0.10 hours) and standard rate (\$13 per hour). Variable manufacturing overhead also has 2 separate standards: standard hours to produce 1 unit of product (0.10 direct labor hours) and standard rate (\$5 per hour). Thus there are two separate standards necessary to establish each standard cost or six standards in total to establish a standard cost for direct materials, direct labor, and variable manufacturing overhead.

As we explain next, there are many approaches to establishing these six standards for direct materials, direct labor, and variable manufacturing overhead (we discuss fixed manufacturing overhead at the end of this chapter).

Direct Materials Standard Quantity and Standard Price

Question: How do organizations determine the standard quantity and standard price for direct materials?

Answer: The standard quantity for direct materials represents the materials required to complete one good unit of product (i.e., a product with no defects), and it includes an allowance for waste and spoilage. For Jerry's Ice Cream, the standard quantity of materials needed for each gallon of product is given in the recipe. Jerry's adds a certain amount to the recipe quantity for waste and spoilage. Similar to this approach, companies might find the standard quantity in the product specifications outlined by product engineers. Some companies review historical production information to determine quantities used in the past and use this information to set standard quantities for the future.

The standard price for direct materials represents the final delivered cost of the materials and includes items such as shipping and insurance. The standard price for materials at Jerry's comes from the purchase contract negotiated with the company's supplier. As an alternative to this approach, companies might use historical data or look at price trends in the marketplace.

As shown in , for Jerry's Ice Cream, the standard quantity of direct materials is 2 pounds per unit, and the standard price is \$1 per pound. Thus the standard cost per unit for direct materials is \$2, calculated as follows:

$$\$2 \text{ standard cost per unit} = 2 \text{ pounds per unit} \times \$1 \text{ per pound}$$

Direct Labor Standard Hours and Standard Rate

Question: How do organizations determine the standard hours and standard rate for direct labor?

Answer: The standard hours for direct labor represents the direct labor time required to complete one good unit of product and includes an allowance for breaks and production inefficiencies such as machine downtime. Jerry's Ice Cream established this standard using historical information. In addition to this approach, companies might use time and motion studies performed by engineers who observe production workers and analyze the time required to perform production activities.

The standard rate for direct labor represents the average cost of wages and benefits for each hour of direct labor work performed. Jerry's Ice Cream looked at past payroll records to determine

this standard. Companies also review labor contracts to estimate the costs associated with direct labor.

As shown in , for Jerry's Ice Cream, the standard hours for direct labor is 0.10, and the standard rate is \$13 per hour. Thus the standard cost per unit for direct labor is \$1.30, calculated as follows:

$$\$1.30 \text{ standard cost per unit} = 0.10 \text{ direct labor hours per unit} \times \$13 \text{ per hour}$$

Variable Manufacturing Overhead Standard Quantity and Standard Rate

Question: How do organizations determine the standard quantity and standard rate for variable manufacturing overhead?

Answer: The standard quantity for variable manufacturing overhead represents the time required to complete one unit of product. This time is often measured in direct labor hours or machine hours, depending on how the company chooses to allocate overhead (recall that we covered the choice of allocation base at length in). Jerry's Ice Cream uses direct labor hours to allocate variable manufacturing overhead, so we apply the same standard quantity used for direct labor.

The standard rate for variable manufacturing overhead represents the variable portion of the predetermined overhead rate used to allocate overhead costs to products (see for further discussion of predetermined overhead rates).

As shown in , for Jerry's Ice Cream, the standard quantity of direct labor hours is 0.10, and the standard rate (predetermined overhead rate) is \$5 per direct labor hour. Thus the standard cost per unit for variable manufacturing overhead is \$0.50, calculated as follows:

$$\$0.50 \text{ standard cost per unit} = 0.10 \text{ direct labor hours per unit} \times \$5 \text{ per hour}$$

Ideal Standards and Attainable Standards

Question: In the process of establishing standards, managers must decide between using ideal standards or attainable standards. What is the difference between these two standards?

Answer: Ideal standards are set assuming production conditions are perfect. For example, ideal standards assume machines never break down, employees are never ill, and materials are never wasted. Although ideal standards may provide motivation for workers to strive for excellence, these standards can also have a negative impact because they may be impossible to achieve.

As an alternative to ideal standards, most managers use attainable standards. Attainable standards take into consideration the likelihood of encountering problems in production such as machine downtime, electricity outages, materials waste, and employee illnesses. Most managers feel attainable standards have a positive behavioral impact on workers because the standards are reasonable and attainable under normal production conditions. We assume the use of attainable standards throughout this chapter.

Controlling Operations through Standards

Question: How are standards used to control operations?

Answer: Companies typically use standards to analyze the difference between budgeted costs and actual costs. The process of analyzing differences between standard costs and actual costs is called variance analysis. Managerial accountants perform variance analysis for costs including direct materials, direct labor, and manufacturing overhead.

Standard costs are also used to determine product costs. Companies using standard costing systems are able to estimate product costs without having to wait for actual product cost data, and they often record transactions using standard cost information. The appendix shows how this process works using journal entries.



Source: Photo courtesy of Keith

Allison, <http://www.flickr.com/photos/keithallison/2310444991/>.

Controlling Costs in the NBA

The **National Basketball Association (NBA)** imposes a “salary cap” that dictates a maximum dollar amount each team can pay its players collectively in one season. The salary cap is based on a percentage of basketball-related income and was set at \$57,700,000 per team for the 2009–10 season. This serves as the cost budget for player payroll. However, “salary exceptions” allow many teams to exceed the salary cap. Annual salaries for some of the highest paid players for the 2009–10 season are shown as follows:

- Kevin Garnett, Boston: \$24,800,000
- Jason Kidd, Dallas: \$21,400,000
- Kobe Bryant, Los Angeles: \$21,300,000
- Shaquille O’Neal, Phoenix: \$21,000,000
- Tim Duncan, San Antonio: \$20,600,000
- Ray Allen, Boston: \$18,400,000

Imagine being the manager of the Boston Celtics and having to pay one player almost half of your entire budget! Clearly, controlling costs in this type of business environment is a challenge, and budgeting is a crucial element in achieving financial success.

Source: InsideHoops.com, “Home Page,” <http://www.insidehoops.com>.

KEY TAKEAWAY

- Standard costs are costs management expects to incur to provide a good or service. Manufacturing companies often establish standard costs for direct labor, direct materials, and manufacturing overhead. Standard cost information comes from a number of sources such as historical data, product specifications outlined by product engineers, contracts with suppliers, and labor union contracts.

REVIEW PROBLEM 10.2

Recall from the review problems in that Carol’s Cookies produces cookies for resale at grocery stores throughout North America. We established a master budget indicating Carol expects to use 1.5 pounds of direct materials for each unit produced at a cost of \$2 per pound (1 unit = 1 batch of cookies). Each unit produced will require 0.20 direct labor hours at a cost of \$12 per hour. Variable manufacturing overhead is applied

based on direct labor hours at a rate of \$3.50 per hour. Last year's sales were expected to total 400,000 units.

Carol just received last year's actual results showing sales of 390,000 units.

1. Calculate the standard cost per unit for direct materials, direct labor, and variable manufacturing overhead using the format shown in .
2. Prepare a flexible budget based on actual sales for direct materials, direct labor, and variable manufacturing overhead using the format shown in .

Solution to Review Problem 10.2

1.

	Standard Cost per Unit
Direct materials (1.5 pounds per unit at \$2.00 per pound)	\$3.00
Direct labor (0.20 hours at \$12.00 per hour)	2.40
Variable overhead (0.20 direct labor hours at \$3.50 per hour)	0.70
Standard variable production cost per unit	<u>\$6.10</u>

2.

	Flexible Budget at 390,000 Units
Direct materials (\$3.00 per unit × 390,000 units)	\$1,170,000
Direct labor (\$2.40 per unit × 390,000 units)	936,000
Variable overhead (\$0.70 per unit × 390,000 units)	273,000
Total budgeted variable production costs at 390,000 units	<u>\$2,379,000</u>

10.3 Direct Materials Variance Analysis

LEARNING OBJECTIVE

1. Calculate and analyze direct materials variances.

Question: In the dialogue at the beginning of the chapter, the president of Jerry's Ice Cream was concerned about significant cost overruns for direct materials. We cannot simply explain these costs by saying that "we paid too much for materials" or "too many materials were used in production." Variances must be calculated to identify the exact cause of the cost overrun. What variances are used to analyze the difference between actual direct material costs and standard direct material costs?

Answer: The difference between actual costs and standard (or budgeted) costs is typically explained by two separate variances: the materials price variance and materials quantity variance. The materials price variance is the difference between actual costs for materials purchased and budgeted costs based on the standards.

The materials quantity variance is the difference between the actual quantity of materials used in production and budgeted materials that should have been used in production based on the standards.

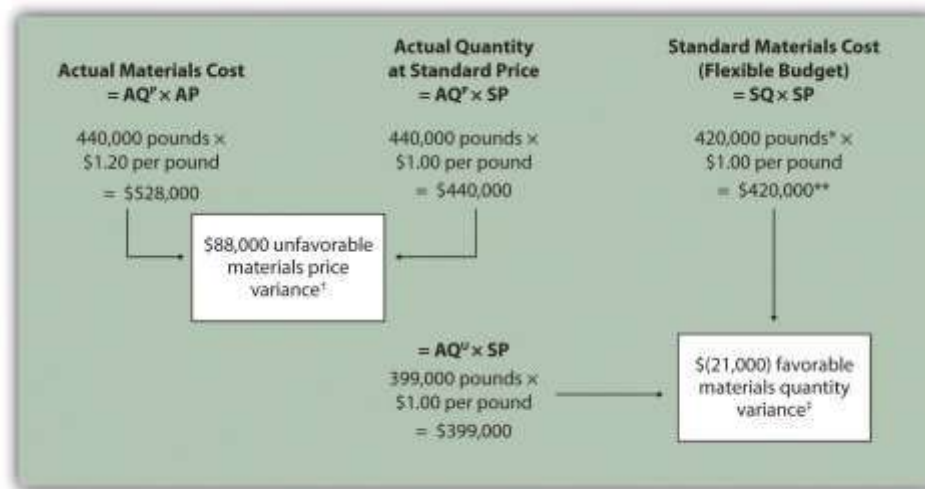
To this point, we have provided the data for Jerry's Ice Cream necessary to calculate standard costs. However, you must also have the actual materials cost and materials quantity data to calculate the variances described previously. The actual data for the year are as follows:

Sales volume	210,000 units
Direct materials purchased	440,000 pounds
Cost of direct materials purchased	\$1.20 per pound
Direct materials used in production	399,000 pounds

Recall from that the direct materials standard price for Jerry's is \$1 per pound, and the standard quantity of direct materials is 2 pounds per unit. shows how to calculate the materials price and

quantity variances given the actual results and standards information. Review this figure carefully before moving on to the next section where these calculations are explained in detail.

Figure 10.4 Direct Materials Variance Analysis for Jerry's Ice Cream



Note: AQP = Actual quantity of materials purchased. AP = Actual price of materials. AQU = Actual quantity of materials used in production. SP = Standard price of materials. SQ = Standard quantity of materials for actual level of activity.

*Standard quantity of 420,000 pounds = Standard of 2 pounds per unit \times 210,000 actual units produced and sold.

**\$420,000 standard direct materials cost matches the flexible budget presented in .

† \$88,000 unfavorable materials price variance = \$528,000 – \$440,000. Variance is unfavorable because the actual price of \$1.20 is higher than the expected (budgeted) price of \$1.

‡ \$(21,000) favorable materials quantity variance = \$399,000 – \$420,000. Variance is favorable because the actual quantity of materials used in production of 399,000 pounds is lower than the expected (budgeted) quantity of 420,000 pounds.

Direct Materials Price Variance Calculation

Question: The materials price variance answers the question, did we spend more or less on direct materials than expected? If the variance is unfavorable, we spent more than expected. If the variance is favorable, we spent less than expected. How is the materials price variance calculated?

Answer: As shown in , the materials price variance is the difference between the actual quantity of materials purchased at the actual price and the actual quantity of materials purchased at the standard price:

Key Equation

$$\text{Materials price variance} = (AQ^P \times AP) - (AQ^P \times SP)$$

Materials price variance = $(AQ^P \times AP) - (AQ^P \times SP) = (440,000 \times \$1.20) - (440,000 \times \$1.00) = \$88,000$ unfavorable

Alternative Calculation. Since we are holding the actual quantity constant and evaluating the difference between actual price and standard price, the materials price variance calculation can be simplified as follows:

Key Equation

$$\text{Materials price variance} = (AP - SP) \times AQ^P$$

Materials price variance = $(AP - SP) \times AQ^P = (\$1.20 - \$1.00) \times 440,000 = \$88,000$ unfavorable

Note that both approaches—the direct materials price variance calculation and the alternative calculation—yield the same result.

When labeling the variances calculated in this chapter, notice that all positive variances are unfavorable and all negative variances are favorable (i.e., unfavorable cost variances *increase* expected costs and favorable cost variances *decrease* expected costs). As you calculate variances, you should think through the variance to confirm whether it is favorable or unfavorable. For example, the materials price variance calculation

presented previously shows the actual price paid for materials was \$1.20 per pound and the standard price was \$1. Clearly, this is unfavorable because the actual price was higher than the expected (budgeted) price.

Direct Materials Quantity Variance Calculation

Question: The materials quantity variance answers the question, did we use more or fewer direct materials in production than expected? If the variance is unfavorable, we used more than expected. If the variance is favorable, we used fewer than expected. How is the materials quantity variance calculated?

Answer: As shown in , the materials quantity variance is the difference between the actual quantity of materials used in production at the standard price and the standard quantity of materials allowed at the standard price:

Key Equation

$$\text{Materials quantity variance} = (AQ^U \times SP) - (SQ \times SP)$$

$$\text{Materials quantity variance} = (AQ^U \times SP) - (SQ \times SP) = (399,000 \times \$1.00) - (420,000 \times \$1.00) = (\$21,000) \text{ favorable}$$

The standard quantity of 420,000 pounds is the quantity of materials allowed given actual production. For Jerry's Ice Cream, the standard quantity of materials per unit of production is 2 pounds per unit. Thus the standard quantity (SQ) of 420,000 pounds is 2 pounds per unit \times 210,000 units produced and sold.

Alternative Calculation. Since we are holding the standard price constant and evaluating the difference between actual quantity used and standard quantity, the materials quantity variance calculation can be simplified as follows:

Key Equation

$$\text{Materials quantity variance} = (AQ^U - SQ) \times SP$$

$$\text{Materials quantity variance} = (AQ^U - SQ) \times SP = (399,000 - 420,000) \times \$1.00 = (\$21,000) \text{ favorable}$$

Note that both approaches—the direct materials quantity variance calculation and the alternative calculation—yield the same result.

The materials quantity variance calculation presented previously shows the actual quantity used in production of 399,000 pounds is lower than the expected (budgeted) quantity of 420,000 pounds. Clearly, this is *favorable* because the actual quantity used was lower than the expected (budgeted) quantity.

Possible Causes of Direct Materials Variances

Question: The managerial accountant at Jerry's Ice Cream will likely investigate the cause of the unfavorable materials price variance of \$88,000. This will lead to discussions with the purchasing department. What might have caused the \$88,000 unfavorable materials price variance?

Answer: The left panel of contains some possible explanations for this variance.

Figure 10.5 Possible Causes of Direct Materials Variances for Jerry's Ice Cream

Unfavorable Materials Price Variance	Favorable Materials Quantity Variance
<ul style="list-style-type: none">• High demand for materials caused a supplier to raise prices.• The shutdown of a key supplier caused materials shortages and higher prices.• The purchasing agent was ineffective in negotiating the lowest price.• Higher-quality materials were purchased at a higher price.	<ul style="list-style-type: none">• Higher-quality materials reduced waste and spoilage.• An employee training program improved the efficient use of materials.• New production techniques promoted more efficient use of materials.• Improved maintenance of production equipment reduced waste of materials.

Whatever the cause of this unfavorable variance, Jerry's Ice Cream will likely take action to improve the cost problem identified in the materials price variance analysis. This is why we use the term control phase of budgeting to describe variance analysis. Through variance analysis,

companies are able to identify problem areas (material costs for Jerry's) and consider alternatives to controlling costs in the future.

Question: Jerry's Ice Cream might also choose to investigate the \$21,000 favorable materials quantity variance. Although this could be viewed as good news for the company, management may want to know why this favorable variance occurred. What might have caused the \$21,000 favorable materials quantity variance?

Answer: The right panel of contains some possible explanations for this variance.

Notice how the cause of one variance might influence another variance. For example, the unfavorable price variance at Jerry's Ice Cream might have been a result of purchasing high-quality materials, which in turn led to less waste in production and a favorable quantity variance. This also might have a positive impact on direct labor, as less time will be spent dealing with materials waste.

Illustrates just how important it is to track direct materials variances accurately.

Business in Action 10.2

The Effect of Rising Materials Costs on Auto Suppliers

In the first six months of 2004, steel prices increased 76 percent, from \$350 a ton to \$617 a ton. For auto suppliers that use hundreds of tons of steel each year, this had the unexpected effect of increasing expenses and reducing profits. For example, a major producer of automotive wheels had to reduce its annual earnings forecast by \$10,000,000 to \$15,000,000 as a result of the increase in steel prices.

Most auto part suppliers operate with very small margins. **GR Spring and Stamping, Inc.**, a supplier of stampings to automotive companies, was generating pretax profit margins of about 3 percent prior to the increase in steel prices. Profit margins have been cut in half since steel prices began rising.

These thin margins are the reason auto suppliers examine direct materials variances so carefully. Any unexpected increase in steel prices will likely cause significant unfavorable materials price variances, which will lead to lower profits. Auto part

suppliers that rely on steel will continue to scrutinize materials price variances and materials quantity variances to control costs, particularly in a period of rising steel prices.

Source: Brett Clanton, "Steel Costs Slam Auto Suppliers," *The Detroit News*, June 29, 2004, <http://www.detnews.com>.

Clarification of Favorable Versus Unfavorable

Question: Why are variances labeled favorable or unfavorable?

Answer: The terms favorable and unfavorable relate to the impact the variance has on budgeted operating profit. A favorable variance has a positive impact on operating profit.

An unfavorable variance has a negative impact on operating profit. Companies using a standard cost system ultimately credit favorable variances and debit unfavorable variances to income statement accounts. The appendix to this chapter describes this process in further detail.

KEY TAKEAWAY

- Standard costs are used to establish the flexible budget for direct materials. The flexible budget is compared to actual costs, and the difference is shown in the form of two variances. The *materials price variance* focuses on the price paid for materials, and it is defined as the difference between the actual quantity of materials purchased at the actual price and the actual quantity of materials purchased at the standard price. The *materials quantity variance* focuses on the quantity of materials used in production. It is defined as the difference between the actual quantity of materials used in production and budgeted materials that should have been used in production based on the standards.

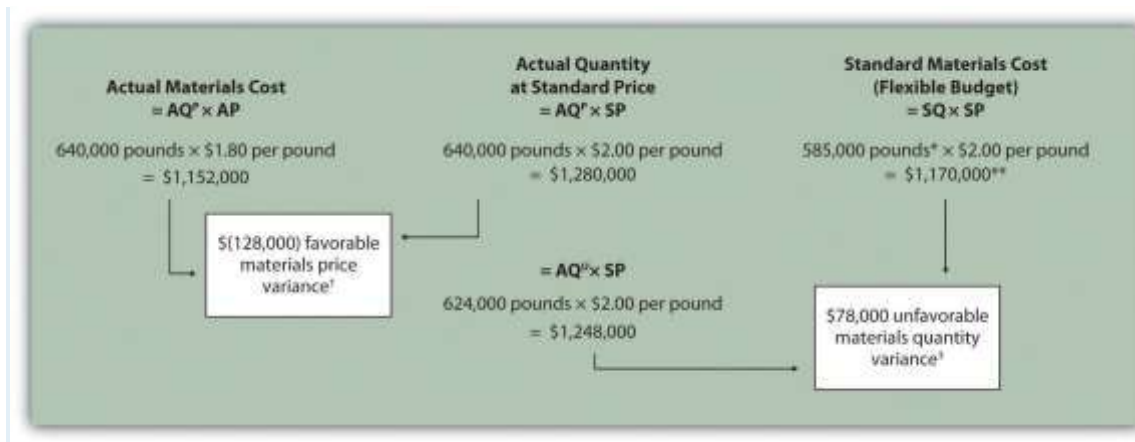
REVIEW PROBLEM 10.3

Carol's Cookies expected to use 1.5 pounds of direct materials to produce 1 unit (batch) of product at a cost of \$2 per pound. Actual results are in for last year, which indicates 390,000 batches of cookies were sold. The company purchased 640,000 pounds of materials at \$1.80 per pound and used 624,000 pounds in production.

1. Calculate the materials price and quantity variances using the format shown in .
2. Use the alternative approach to calculating the materials price and quantity variances, and compare the result to the result in part 1. (Hint: the variances should match.)
3. Suggest several possible reasons for the materials price and quantity variances.

Solution to Review Problem 10.3

1. As shown in the following, the materials price variance is \$(128,000) favorable, and the materials quantity variance is \$78,000 unfavorable.



Note: AQ^P = Actual quantity of materials purchased. AP = Actual price of materials. AQ^U = Actual quantity of materials used in production. SP = Standard price of materials. SQ = Standard quantity of materials for actual level of activity.

*Standard quantity of 585,000 pounds = Standard of 1.5 pounds per unit \times 390,000 actual units produced and sold.

**\$1,170,000 standard direct materials cost matches the flexible budget presented in , part 2.

[†] $\$(128,000)$ favorable materials price variance = $\$1,152,000 - \$1,280,000$.

Variance is favorable because the actual price of \$1.80 is lower than the expected (budgeted) price of \$2

[‡] $\$78,000$ unfavorable materials quantity variance = $\$1,248,000 - \$1,170,000$. Variance is unfavorable because the actual quantity of materials used in production of 624,000 pounds is higher than the expected (budgeted) quantity of 585,000 pounds.

2. Alternative direct materials variance calculations:

Materials price variance = $(AP - SP) \times AQP = (\$1.80 - \$2.00) \times 640,000 = \$(128,000)$ favorable (same as part 1)

Materials quantity variance = $(AQU - SQ) \times SP = (624,000 - 585,000) \times \$2.00 = \$78,000$ unfavorable (same as part 1)

3. Possible causes of favorable materials price variance are

1. The supplier had excess materials on hand and lowered prices to sell off inventory;
2. New suppliers entered the market, which resulted in an excess supply of materials and lower prices;
3. Carol's Cookies' purchasing agent is a strong negotiator and was able to negotiate lower prices than anticipated;
4. Lower-quality materials were purchased at a lower price.

Possible causes of unfavorable materials quantity variance are

1. Lower-quality materials resulted in more waste and spoilage;
2. New, inexperienced employees were hired, resulting in more waste;
3. Old equipment breaking down caused an increased amount of waste.

10.4 Direct Labor Variance Analysis

LEARNING OBJECTIVE

1. Calculate and analyze direct labor variances.

Question: In addition to investigating the causes of cost overruns for direct materials, the president of Jerry's Ice Cream wants to know why there were cost overruns for direct labor. What variances are used to analyze these types of direct labor cost overruns?

Answer: Similar to direct materials variances, direct labor variance analysis involves two separate variances: the labor rate variance and labor efficiency variance.

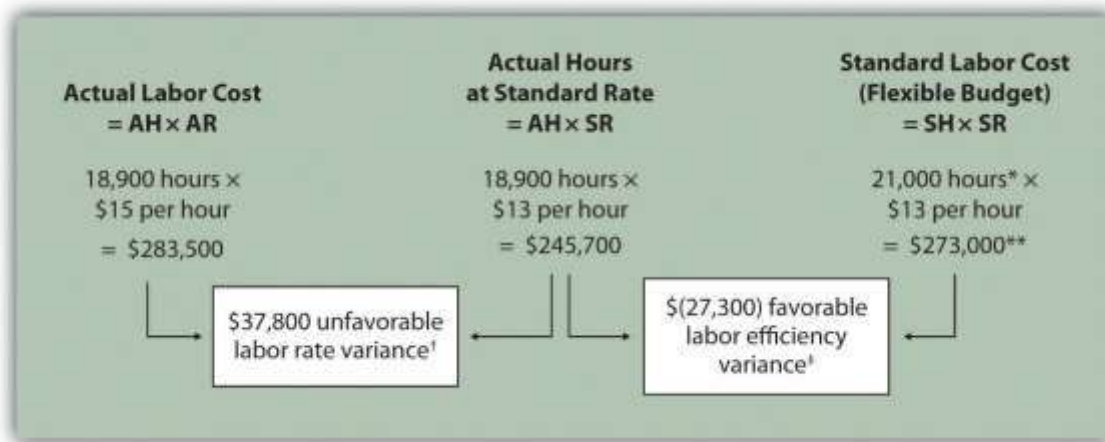
The labor rate variance is the difference between actual costs for direct labor and budgeted costs based on the standards. The labor efficiency variance is the difference between the actual number of direct labor hours worked and budgeted direct labor hours that should have been worked based on the standards.

At Jerry's Ice Cream, the actual data for the year are as follows:

Sales volume	210,000 units
Direct labor hours worked	18,900 hours
Cost of direct labor	\$15 per hour

Recall from that the standard rate for Jerry's is \$13 per direct labor hour and the standard direct labor hours is 0.10 per unit. shows how to calculate the labor rate and efficiency variances given the actual results and standards information. Review this figure carefully before moving on to the next section where these calculations are explained in detail.

Figure 10.6 Direct Labor Variance Analysis for Jerry's Ice Cream



Note: AH = Actual hours of direct labor. AR = Actual rate incurred for direct labor. SR = Standard rate for direct labor. SH = Standard hours of direct labor for actual level of activity.

*Standard hours of 21,000 = Standard of 0.10 hours per unit × 210,000 actual units produced and sold.

**\$273,000 standard direct labor cost matches the flexible budget presented in .

† \$37,800 unfavorable labor rate variance = \$283,500 – \$245,700. Variance is unfavorable because the actual rate of \$15 is higher than the expected (budgeted) rate of \$13.

‡ \$(27,300) favorable labor efficiency variance = \$245,700 – \$273,000. Variance is favorable because the actual hours of 18,900 are lower than the expected (budgeted) hours of 21,000.

Direct Labor Rate Variance Calculation

Question: The direct labor rate variance answers the question, did we spend more or less on direct labor than expected? If the variance is unfavorable, we spent more than expected. If the variance is favorable, we spent less than expected. How is the labor rate variance calculated?

Answer: As shown in , the labor rate variance is the difference between the actual hours worked at the actual rate and the actual hours worked at the standard rate:

Key Equation

$$\text{Labor rate variance} = (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR})$$

$$\text{Labor rate variance} = (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR}) = (18,900 \times \$15) - (18,900 \times \$13) = \$37,800 \text{ unfavorable}$$

Alternative Calculation. Because we are holding the actual hours constant and evaluating the difference between actual rate and standard rate, the labor rate variance calculation can be simplified as follows:

Key Equation

$$\text{Labor rate variance} = (\text{AR} - \text{SR}) \times \text{AH}$$

$$\text{Labor rate variance} = (\text{AR} - \text{SR}) \times \text{AH} = (\$15 - \$13) \times 18,900 = \$37,800 \text{ unfavorable}$$

Note that both approaches—direct labor rate variance calculation and the alternative calculation—yield the same result.

As with direct materials variances, all positive variances are unfavorable, and all negative variances are favorable. The labor rate variance calculation presented previously shows the actual rate paid for labor was \$15 per hour and the standard rate was \$13. This results in an unfavorable variance since the actual rate was higher than the expected (budgeted) rate.

Direct Labor Efficiency Variance Calculation

Question: The direct labor efficiency variance answers the question, did we use more or less direct labor hours in production than expected? If the variance is unfavorable, we used more than expected. If the variance is favorable, we used less than expected. How is the labor efficiency variance calculated?

Answer: As shown in , the labor efficiency variance is the difference between the actual hours worked at the standard rate and the standard hours at the standard rate:

Key Equation

$$\text{Labor efficiency variance} = (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR})$$

$$\text{Labor efficiency variance} = (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR}) = (18,900 \times \$13) - (21,000 \times \$13) = (\$27,300) \text{ favorable}$$

The 21,000 standard hours are the hours allowed given actual production. For Jerry's Ice Cream, the standard allows for 0.10 labor hours per unit of production. Thus the 21,000 standard hours (SH) is 0.10 hours per unit \times 210,000 units produced.

Alternative Calculation. Because we are holding the standard rate constant and evaluating the difference between actual hours worked and standard hours, the labor efficiency variance calculation can be simplified as follows:

Key Equation

$$\text{Labor efficiency variance} = (\text{AH} - \text{SH}) \times \text{SR}$$

$$\text{Labor efficiency variance} = (\text{AH} - \text{SH}) \times \text{SR} = (18,900 - 21,000) \times \$13 = (\$27,300) \text{ favorable}$$

Note that both approaches—the direct labor efficiency variance calculation and the alternative calculation—yield the same result.

The labor efficiency variance calculation presented previously shows that 18,900 in actual hours worked is lower than the 21,000 budgeted hours. Clearly, this is favorable since the actual hours worked was lower than the expected (budgeted) hours.

Possible Causes of Direct Labor Variances

Question: The managerial accountant at Jerry's Ice Cream is interested in finding the cause of the unfavorable labor rate variance of \$37,800. Jerry's Ice Cream might also choose to investigate the \$27,300 favorable labor efficiency variance. Although this could be viewed as good news for the company, management may want to know why this favorable variance occurred. What might have caused the \$37,800 unfavorable labor rate variance and \$27,300 favorable labor efficiency variance?

Answer: contains some possible explanations for the labor rate variance (left panel) and labor efficiency variance (right panel).

Figure 10.7 Possible Causes of Direct Labor Variances for Jerry's Ice Cream

Unfavorable Labor Rate Variance	Favorable Labor Efficiency Variance
<ul style="list-style-type: none">• Higher mix of skilled workers caused hourly rates to be higher than expected.• An unexpected increase in demand caused the direct labor workforce to work overtime, requiring the company to pay overtime wages.• A new labor contract increased wages for the direct labor workforce.	<ul style="list-style-type: none">• A higher mix of skilled workers made more efficient use of labor hours.• An employee training program improved the efficient use of time.• New production techniques promoted more efficient use of time.• High-quality materials resulted in less time spent working with materials waste.

As mentioned earlier, the cause of one variance might influence another variance. For example, many of the explanations shown in might also apply to the favorable materials quantity variance.

We have demonstrated how important it is for managers to be aware not only of the cost of labor, but also of the differences between budgeted labor costs and actual labor costs. This awareness helps managers make decisions that protect the financial health of their companies.

Business in Action 10.3

Labor Costs in the Airline Industry

United Airlines asked a bankruptcy court to allow a one-time 4 percent pay cut for pilots, flight attendants, mechanics, flight controllers, and ticket agents. The pay cut was proposed to last as long as the company remained in bankruptcy and was expected to provide savings of approximately \$620,000,000. How would this unforeseen pay cut affect **United's** direct labor rate variance? The direct labor rate variance would likely be favorable, perhaps totaling close to \$620,000,000, depending on how much of these savings management anticipated when the budget was first established.

After filing for Chapter 11 bankruptcy in December 2002, **United** cut close to \$5,000,000,000 in annual expenditures. As a result of these cost cuts, United was able to emerge from bankruptcy in 2006.

Source: Associated Press, "United May Seek End to Union Contracts," *USA Today*, November 25, 2004.

Follow-Up Meeting at Jerry's Ice Cream

Jerry (president and owner), Tom (sales manager), Lynn (production manager), and Michelle (treasurer and controller) were at the meeting described at the opening of this chapter. Michelle was asked to find out why direct labor and direct materials costs were higher than budgeted, even after factoring in the 5 percent increase in sales over the initial budget. Lynn was surprised to learn that direct labor and direct materials costs were so high, particularly since actual materials used and actual direct labor hours worked were below budget.

The group met again a week later to discuss the issue.

<i>Jerry:</i>	<i>Michelle, what do you have for us?</i>
<i>Michelle:</i>	<i>My staff has been working hard to identify why direct materials and direct labor costs were higher than expected. First, I would like to confirm that these costs were indeed higher than anticipated.</i>

Lynn:	<i>I still don't see how this can be. My production crew was as efficient with their time and materials as they've ever been.</i>
Michelle:	<i>You're right, Lynn. Our variance analysis shows a favorable direct materials quantity variance, which relates directly to the amount of materials used, and a favorable direct labor efficiency variance, which relates directly to the efficiency of our production workers. Both variances are good news.</i>
Jerry:	<i>Then why are our direct labor and direct materials costs so high?</i>
Michelle:	<i>The answer relates directly to the price we paid for materials, and the hourly rates we paid for labor. Both were higher than expected. We expected to pay \$1 per pound for direct materials, but actually paid \$1.20 per pound. In addition, we expected to pay \$13 an hour for direct labor when in fact we actually paid \$15 an hour. This means we paid 20 percent more than expected for direct materials, which is \$0.20 divided by \$1, and 15 percent more than expected for direct labor, which is \$2 divided by \$13.</i>
Lynn:	<i>I do recall Tony over in purchasing telling me he obtained some premium materials for our ice cream, and I know we hired some relatively experienced workers who were paid a bit more than the normal starting rate.</i>
Tom:	<i>This might explain why our customers were thrilled about our product. The materials were high quality and the production workers really knew their stuff!</i>
Jerry:	<i>While I like the end result of a higher-quality product and increased sales, we must do a better job of controlling costs. Perhaps Tony can negotiate a better price for materials. I don't mind paying our employees a higher wage based on their experience, but let's make sure we get some efficiency savings in the process to help offset the higher wages. Michelle, can we continue to monitor material and labor costs?</i>
Michelle:	<i>Yes. I'll have my staff analyze material and labor variances monthly, and I'll</i>

	<i>have a report ready at the end of each month for you and Lynn.</i>
<i>Jerry:</i>	<i>Excellent! Lynn, let our production crew know they are doing a fine job, and continue to encourage them to find ways to improve the efficiency of production. I'll talk with Tony about the possibility of getting a better deal on materials.</i>

As stated earlier, variance analysis is the control phase of budgeting. Using variance analysis for direct materials and direct labor, Jerry's Ice Cream was able to identify strong points in its operations (quantity of materials used and efficiency of direct labor workforce), and perhaps more important, Jerry's was able to identify problem areas (price paid for materials and wages paid to employees). This information gives the management a way to monitor and control production costs. Next, we calculate and analyze variable manufacturing overhead cost variances.

KEY TAKEAWAY

- Standard costs are used to establish the flexible budget for direct labor. The flexible budget is compared to actual costs, and the difference is shown in the form of two variances. The *labor rate variance* focuses on the wages paid for labor and is defined as the difference between actual costs for direct labor and budgeted costs based on the standards. The *labor efficiency variance* focuses on the quantity of labor hours used in production. It is defined as the difference between the actual number of direct labor hours worked and budgeted direct labor hours that should have been worked based on the standards.

REVIEW PROBLEM 10.4

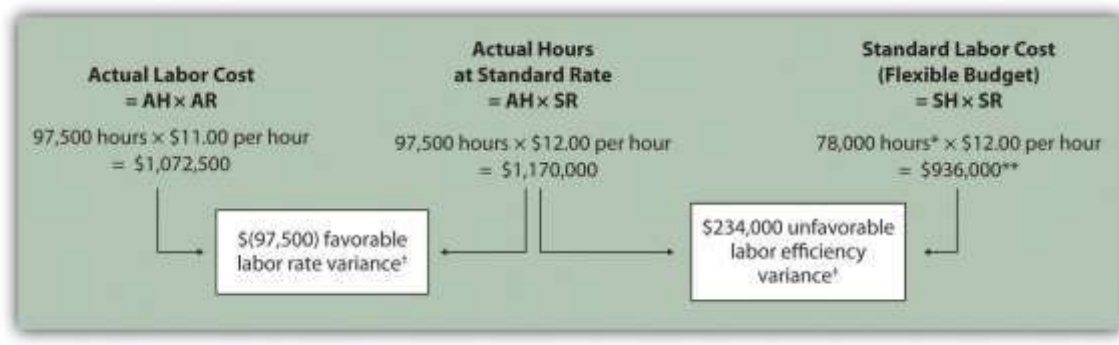
Carol's Cookies expected to use 0.20 direct labor hours to produce 1 unit (batch) of product at a cost of \$12 per hour. Actual results are in for last year, which indicates 390,000 batches of cookies were sold. The company's direct labor workforce worked 97,500 hours at \$11 per hour.

1. Calculate the labor rate and efficiency variances using the format shown in .

2. Use the alternative approach to calculating the labor rate and efficiency variances, and compare the result to the result in part 1. (Hint: the variances should match.)
3. Suggest several possible reasons for the labor rate and efficiency variances.

Solution to Review Problem 10.4

1. As shown in the following, the labor rate variance is \$(97,500) favorable, and the labor efficiency variance is \$234,000 unfavorable.



Note: AH = Actual hours of direct labor. AR = Actual rate incurred for direct labor. SR = Standard rate for direct labor. SH = Standard hours of direct labor for actual level of activity.

**Standard hours of 78,000 = Standard of 0.20 hours per unit × 390,000 actual units produced and sold.*

***\$936,000 standard direct labor cost matches the flexible budget presented in , part 2.*

[†] \$(97,500) favorable labor rate variance = \$1,072,500 – \$1,170,000.

Variance is favorable because the actual rate of \$11 is lower than the expected (budgeted) rate of \$12.

[‡] \$234,000 unfavorable labor efficiency variance = \$1,170,000 – \$936,000.

Variance is unfavorable because the actual hours of 97,500 are higher than the expected (budgeted) hours of 78,000.

2. The following are alternative direct labor variance calculations:

Labor rate variance= $(AR-SR) \times AH = (\$11-\$12) \times 97,500 = (\$97,500)$ favorable (same as part 1)

Labor efficiency variance= $(AH-SH) \times SR = (97,500-78,000) \times \$12 = \$234,000$ unfavorable (same as part 1)

3. Possible causes of favorable labor rate variance are

1. A higher mix of newly hired and unskilled workers caused hourly rates to be lower than anticipated;
2. Product demand was lower than expected, thereby reducing the amount of overtime initially anticipated;
3. A new labor contract was negotiated at lower pay rates than anticipated.

Possible causes of unfavorable labor efficiency variance are

1. A higher mix of unskilled workers than anticipated caused inefficiencies;
2. Cutbacks in training reduced the expected efficiency of direct labor workers;
3. Old equipment breaking down caused workers to waste time waiting for repairs.

10.5 Variable Manufacturing Overhead Variance Analysis

LEARNING OBJECTIVE

1. Calculate and analyze variable manufacturing overhead variances.

Question: Similar to direct materials and direct labor variances, variable manufacturing overhead variance analysis involves two separate variances. What are the two variances used to analyze the difference between actual variable overhead costs and standard variable overhead costs?

Answer: The two variances used to analyze this difference are the spending variance and efficiency variance. The variable overhead spending variance is the difference

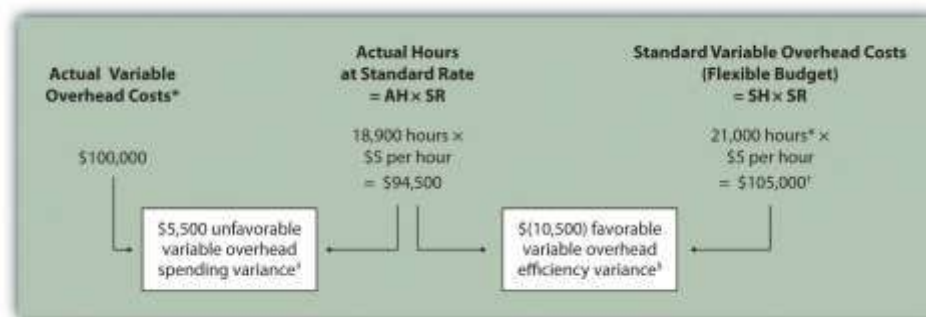
between actual costs for variable overhead and budgeted costs based on the standards. For a company that allocates variable manufacturing overhead to products based on direct labor hours, the variable overhead efficiency variance is the difference between the number of direct labor hours actually worked and what should have been worked based on the standards.

At Jerry's Ice Cream, the actual data for the year are as follows:

Sales volume	210,000 units
Direct labor hours worked	18,900 hours
Total cost of variable overhead	\$100,000

Recall from that the variable overhead standard rate for Jerry's is \$5 per direct labor hour and the standard direct labor hours is 0.10 per unit. shows how to calculate the variable overhead spending and efficiency variances given the actual results and standards information. Review this figure carefully before moving on to the next section where these calculations are explained in detail.

Figure 10.8 Variable Manufacturing Overhead Variance Analysis for Jerry's Ice Cream



Note: AH = Actual hours of direct labor. (This measure will depend on the allocation base that the company uses. Jerry's uses direct labor hours to allocate variable manufacturing overhead, so AH refers to actual direct labor hours.) SR = Standard variable manufacturing overhead rate per direct labor hour. SH = Standard hours of direct labor for actual level of activity.

*Since variable overhead is not purchased per direct labor hour, the actual rate (AR) is not used in this calculation. Simply use the total cost of variable manufacturing overhead instead.

**Standard hours of 21,000 = Standard of 0.10 hours per unit \times 210,000 actual units produced and sold.

† \$105,000 standard variable overhead costs matches the flexible budget presented in .

‡ \$5,500 unfavorable variable overhead spending variance = \$100,000 – \$94,500. Variance is unfavorable because the actual variable overhead costs are higher than the expected costs given actual hours of 18,900.

§ \$(10,500) favorable variable overhead efficiency variance = \$94,500 – \$105,000. Variance is favorable because the actual hours of 18,900 are lower than the expected (budgeted) hours of 21,000.

Variable Overhead Spending Variance Calculation

Question: How is the variable overhead spending variance calculated?

Answer: As shown in , the variable overhead spending variance is the difference between what is actually paid for variable overhead and what should have been paid according to the standards:

Key Equation

$$\text{Variable overhead spending variance} = \text{Actual costs} - (\text{AH} \times \text{SR})$$

$$\text{Variable overhead spending variance} = \text{Actual costs} - (\text{AH} \times \text{SR}) = \$100,000 - (18,900 \times \$5) = \$5,500 \text{ unfavorable}$$

As with direct materials and direct labor variances, all positive variances are unfavorable, and all negative variances are favorable. Note that there is no alternative calculation for the variable overhead spending variance because variable overhead costs are not purchased per direct labor hour. Thus actual rate (AR) is not used for this variance.

This variance is unfavorable for Jerry's Ice Cream because actual costs of \$100,000 are higher than expected costs of \$94,500.

Variable Overhead Efficiency Variance Calculation

Question: How is the variable overhead efficiency variance calculated?

Answer: As shown in , the variable overhead efficiency variance is the difference between the actual hours worked at the standard rate and the standard hours at the standard rate:

Key Equation

$$\text{Variable overhead efficiency variance} = (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR})$$

$$\text{Variable overhead efficiency variance} = (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR}) = (18,900 \times \$5) - (21,000 \times \$5) = (\$10,500) \text{ favorable}$$

The 21,000 standard hours are the hours allowed given actual production (= 0.10 standard hours allowed per unit \times 210,000 units produced). Since actual direct labor hours worked total 18,900, the variable manufacturing overhead costs should be lower than initially anticipated at 21,000 standard hours. (This assumes variable overhead costs are truly driven by direct labor hours!) This results in a favorable variable overhead efficiency variance.

Alternative Calculation. Since we are holding the standard rate constant and evaluating the difference between actual hours worked and standard hours, the variable overhead efficiency variance calculation can be simplified as follows:

Key Equation

$$\text{Variable overhead efficiency variance} = (\text{AH} - \text{SH}) \times \text{SR}$$

$$\text{Variable overhead efficiency variance} = (\text{AH} - \text{SH}) \times \text{SR} = (18,900 - 21,000) \times \$5 = (\$10,500) \text{ favorable}$$

Note that both approaches—the variable overhead efficiency variance calculation and the alternative calculation—yield the same result.

The variable overhead efficiency variance calculation presented previously shows that 18,900 in actual hours worked is lower than the 21,000 budgeted hours. Again, this variance is favorable because working fewer hours than expected should result in lower variable manufacturing overhead costs.

Possible Causes of Variable Manufacturing Overhead Variances

Question: The managerial accountant at Jerry's Ice Cream is interested in finding the cause of the unfavorable variable overhead spending variance of \$5,500. The spending variance can result from variances in the cost of variable overhead items and the usage of these items. What might have caused the \$5,500 unfavorable variable overhead spending variance?

Answer: The left panel of contains some possible explanations for Jerry's unfavorable overhead spending variance.

Figure 10.9 Possible Causes of Variable Manufacturing Overhead Variances for Jerry's Ice Cream

Unfavorable Variable Overhead Spending Variance	Favorable Variable Overhead Efficiency Variance
<ul style="list-style-type: none"> • A higher mix of skilled indirect labor workers increased hourly rates above expected rates. • A national oil shortage increased factory utility costs above expected costs. • A shutdown of a key supplier increased indirect materials costs. 	<ul style="list-style-type: none"> • A higher mix of skilled direct labor workers made more efficient use of labor hours. • An employee training program improved the efficient use of time. • New production techniques promoted more efficient use of time. • High-quality materials resulted in fewer defective products and more efficient use of time.

Question: Jerry's Ice Cream might also choose to investigate the \$10,500 favorable variable overhead efficiency variance. What might have caused the \$10,500 favorable variable overhead efficiency variance?

Answer: The focus here is on the activity base used to allocate overhead. Since Jerry's uses direct labor hours as the activity base, the possible explanations for this variance are linked to efficiencies or inefficiencies in the use of direct labor. The right panel of contains some possible explanations for this variance.

Again, this analysis is appropriate assuming direct labor hours truly drives the use of variable overhead activities. That is, we assume that an increase in direct labor hours will increase variable overhead costs and that a decrease in direct labor hours will decrease variable overhead costs.

Business in Action 10.4

Hiding Fraud in Overhead Accounts

The controller of a small, closely held manufacturing company embezzled close to \$1,000,000 over a 3-year period. With annual revenues of \$30,000,000 and less than 100 employees, the company certainly felt the impact of losing \$1,000,000.

The forensic accountant who investigated the fraud identified several suspicious transactions, all of which were charged to the manufacturing overhead account. To prevent this type of fraud in the future, the forensic accountant recommended that "significant manufacturing overhead variances be analyzed both within and across time periods to identify anomalies." Apparently, the company was not closely monitoring manufacturing overhead variances when the fraud occurred.

Source: John B. MacArthur, Bobby E. Waldrup, and Gary R. Fane, "Caution: Fraud Overhead," *Strategic Finance*, October 2004, 28–32.

KEY TAKEAWAY

- Standard costs are used to establish the flexible budget for variable manufacturing overhead. The flexible budget is compared to actual costs, and the difference is shown in the form of two variances. The *variable overhead spending variance* represents the difference between actual costs for variable overhead and budgeted costs based on the standards. The *variable overhead efficiency variance* is the difference between the actual activity level in the allocation base (often direct

labor hours or machine hours) and the budgeted activity level in the allocation base according to the standards.

REVIEW PROBLEM 10.5

Carol's Cookies expected to use 0.20 direct labor hours to produce 1 unit (batch) of product, and the variable overhead rate is \$3.50 per hour. Actual results are in for last year, which indicates 390,000 batches of cookies were produced and sold. The company's direct labor workforce worked 97,500 hours, and variable overhead costs totaled \$360,000.

1. Calculate the variable overhead spending and efficiency variances using the format shown in .
2. Suggest several possible reasons for the variable overhead spending and efficiency variances.

Solution to Review Problem 10.5

1. As shown in the following, the variable overhead spending variance is \$18,750 unfavorable, and the variable overhead efficiency variance is \$68,250 unfavorable.



AH = Actual hours of direct labor. SR = Standard variable manufacturing overhead rate per direct labor hour. SH = Standard hours of direct labor for actual level of activity.

**Since variable overhead is not purchased per direct labor hour, the actual rate (AR) is not used in this calculation. Simply use the total cost of variable manufacturing overhead instead.*

***Standard hours of 78,000 = Standard of 0.20 hours per unit × 390,000 actual units produced and sold.*

[†] \$273,000 standard variable overhead costs match the flexible budget presented in , part 2.

[‡] \$18,750 unfavorable variable overhead spending variance = \$360,000 – \$341,250. Variance is unfavorable because the actual variable overhead costs are higher than the expected costs given actual hours of 97,500.

[§] \$68,250 unfavorable variable overhead efficiency variance = \$341,250 – \$273,000. Variance is unfavorable because the actual hours of 97,500 are higher than the expected (budgeted) hours of 78,000.

2. Possible causes of unfavorable variable overhead spending variance are

- 1 . A higher mix of skilled indirect labor workers caused hourly rates to be higher than anticipated;*
- 2 . Utility costs to run the machines were higher than anticipated due to a nationwide increase in energy costs;*
- 3 . A shortage in available indirect materials caused costs to increase unexpectedly.*

Possible causes of unfavorable variable overhead efficiency variance are

- 1. A higher mix of unskilled workers than anticipated caused inefficiencies;*
- 2. Cutbacks in training reduced the expected efficiency of direct labor workers;*
- 3. Old equipment breaking down caused workers to waste time waiting for repairs.*

10.6 Determining Which Cost Variances to Investigate

LEARNING OBJECTIVE

1. Determine which variances to investigate.

Question: Companies rarely investigate all variances because there is a cost associated with identifying the causes of variances. This cost involves employees who spend time talking with personnel from areas including purchasing and production to determine why variances occurred and how to control costs in the future. What can managers do to reduce the cost of investigating variances?

Answer: Managers typically establish criteria to determine which variances to focus on rather than simply investigating all variances. This is called management by exception. Management by exception describes managers who focus solely on variances that are significant.

Question: summarizes the cost variances calculated for Jerry's Ice Cream. If you were in charge of investigating variances at Jerry's Ice Cream, how would you determine which variances to focus on and which to ignore?

Figure 10.10 Summary of Cost Variances at Jerry's Ice Cream

Cost Variances for the Year		
Direct materials price variance*	\$88,000	Unfavorable
Direct materials quantity variance*	(21,000)	Favorable
Direct labor rate variance**	37,800	Unfavorable
Direct labor efficiency variance**	(27,300)	Favorable
Variable overhead spending variance†	5,500	Unfavorable
Variable overhead efficiency variance†	(10,500)	Favorable
Total variable production cost variance	<u>\$72,500</u>	Unfavorable

*From .

**From .

† From .

Answer: Some managers might review all unfavorable variances. However, the variable overhead spending variance of \$5,500 is not very significant relative to the other variances and may not be worth investigating. Also, by focusing solely on unfavorable variances, managers might overlook problems that may result from favorable variances.

Another approach might be to investigate all favorable and unfavorable variances above a certain minimum level, calculated as a percent of the flexible budget amount. For example, management could establish a policy to investigate all variances at or above 10 percent of the flexible budget amount for each cost. At Jerry's Ice Cream, this would mean investigating all variances at or above \$42,000 for direct materials ($= 10 \text{ percent} \times \$420,000$), \$27,300 for direct labor ($= 10 \text{ percent} \times \$273,000$), and \$10,500 for variable overhead ($= 10 \text{ percent} \times \$105,000$). Based on this policy, the following variances would be investigated:

- Unfavorable direct materials price variance of \$88,000 ($\geq \$42,000$ minimum)
- Unfavorable direct labor rate variance of \$37,800 ($\geq \$27,300$ minimum)
- Favorable direct labor efficiency variance of \$(27,300) ($\geq \$27,300$ minimum)
- Favorable variable overhead efficiency variance of \$(10,500) ($\geq \$10,500$ minimum)

Many companies calculate and investigate variances weekly, monthly, or quarterly and focus on trends. In this case, they may only investigate variances that are unfavorable and increasing over time.

Whatever the approach, managers understand that investigating variances requires resources. Thus managers must establish an efficient and cost-effective approach to analyzing variances by weighing the benefits derived from investigating variances against the costs incurred to perform the analysis.

Business in Action 10.5

Using Cost Variances to Detect Fraud

Variance analysis is not only an effective way to control costs; some companies, including **The Dow Chemical Company**, have found that investigating variances can

also help them detect fraudulent activities. **Dow**, which provides chemical, plastic, and agricultural products to customers in 180 countries, has annual sales of \$33,000,000,000 and approximately 46,000 employees. In 1998, the company created a department called Fraud Investigative Services (FIS) whose mission is to “deter and prevent incidents of fraud and financial abuse through detection, investigation, and education.”

The most common types of fraud allegations reviewed by **Dow’s** FIS include expense report fraud, kickback schemes, and embezzlement. Paul Zikmund, the director of FIS, states that “unexplainable cost variances between budget and actual amounts” are among the warning signs he looks for in identifying fraud.

For example, suppose the actual cost for direct materials is significantly higher than the budgeted cost. The cost accountant at **Dow** would begin investigating the cause of the variance by talking with the company’s purchasing agent. The purchasing agent might be unable (or unwilling) to explain why actual costs are so high. Further investigation might indicate that the purchasing agent was intentionally overbilling the vendor and receiving a kickback from the vendor.

Zikmund states that for every \$1 that **Dow** spends on investigating fraud, the company recovers nearly \$4. He also notes that **Dow’s** loss per employee is far below the industry average of \$9 per employee per day. For a company with 46,000 employees, every dollar in savings per employee adds up to a significant amount.

Sources: Paul Zikmund, “Ferretting out Fraud,” *Strategic Finance*, April 2003, 1–4; Dow Chemical Company, “Home Page,” <http://www.dow.com>.

KEY TAKEAWAY

- Companies often establish criteria to use in determining which variances to investigate. Some might investigate all variances above a certain dollar amount. Others might investigate variances that are above a certain percentage of the flexible budget. Or management might combine the two and investigate variances above a certain dollar amount and above a certain percentage of the flexible budget.

REVIEW PROBLEM 10.6

Use the solutions to , , and to complete the following:

1. Calculate the total variable production cost variance for Carol's Cookies using the format shown in .
2. Assume management investigates all variances at or above 15 percent of the flexible budget amount (e.g., all direct materials variances at or above 15 percent of the direct materials flexible budget are investigated). Identify which of the six variances calculated for direct materials, direct labor, and variable manufacturing overhead management should investigate.

Solution to Review Problem 10.6

1. See the following figure.

Cost Variances for the Year		
Direct materials price variance*	\$ (128,000)	Favorable
Direct materials quantity variance*	78,000	Unfavorable
Direct labor rate variance**	(97,500)	Favorable
Direct labor efficiency variance**	234,000	Unfavorable
Variable overhead spending variance†	18,750	Unfavorable
Variable overhead efficiency variance†	68,250	Unfavorable
Total variable production cost variance	<u>\$ 173,500</u>	Unfavorable

*From .

**From .

† From .

2. Based on this policy, the following variances would be investigated:

1. **Direct Materials.** Neither variance would be investigated as both variances fall below \$175,500 (= 15 percent of \$1,170,000 standard cost).
2. **Direct Labor.** The unfavorable direct labor efficiency variance of \$234,000 would be investigated because it falls above \$140,400 (= 15 percent of \$936,000 standard cost).

3. **Variable Overhead.** The unfavorable variable overhead efficiency variance of \$68,250 would be investigated because it falls above \$40,950 (= 15 percent of \$273,000 standard cost).

10.7 Using Variance Analysis with Activity-Based Costing

LEARNING OBJECTIVE

1. Explain how to use cost variance analysis with activity-based costing.

Question: As discussed in , activity-based costing focuses on identifying activities required to make a product, forming cost pools for each activity, and allocating overhead costs to products based on the products' use of each activity. Rather than establishing one standard variable overhead rate and standard quantity based on one cost driver, activity-based costing establishes several standard variable overhead rates and quantities, each having its own cost driver. How would variance analysis be implemented for a company that uses activity-based costing?

Answer: Regardless of whether a company uses the traditional costing approach or an activity-based costing approach, the process of performing variance analysis is the same. Similar to the traditional costing approach, the variable overhead spending variance for activity-based costing is calculated for each activity as follows:

Key Equation

$$\text{Variable overhead spending variance} = \text{Actual cost} - (\text{AQ} \times \text{SR})$$

The variable overhead efficiency variance is calculated for each activity using activity-based costing as follows:

Key Equation

$$\text{Variable overhead efficiency variance} = (\text{AQ} \times \text{SR}) - (\text{SQ} \times \text{SR})$$

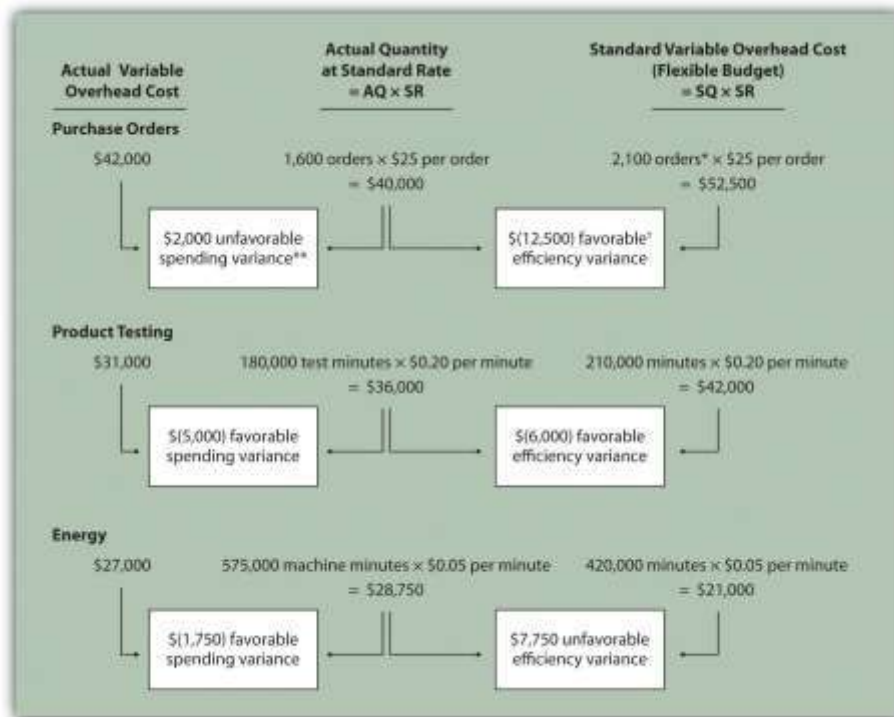
Instead of using AH and SH to represent actual hours and standard hours as we did earlier in the chapter, we use AQ and SQ to represent actual quantity and standard quantity for various activities used in activity-based costing.

Let's work through an example of variance analysis using activity-based costing. Suppose Jerry's Ice Cream identified three significant activities and established three standard rates to allocate variable manufacturing overhead instead of one rate based on direct labor hours. Information for the three activities for last year is:

Activity	Standard Rate	Standard Quantity per Unit Produced	Actual Costs	Actual Quantity
Purchase orders	\$25 per purchase order	0.01 orders per unit	\$42,000	1,600 purchase orders
Product testing	\$0.20 per test minute	1 minute per unit	\$31,000	180,000 test minutes
Energy	\$0.05 per minute of machine time	2 minutes per unit	\$27,000	575,000 minutes of machine time

Recall that Jerry's produced 210,000 units for the year. shows the resulting variable overhead variance analysis. Notice that the format for is the same as for . The variance calculations are also the same except variances are calculated for three activities rather than one. Note that total actual variable overhead costs remain at \$100,000, but they are simply broken out into 3 activities (\$100,000 = \$42,000 for purchase orders + \$31,000 for product testing + \$27,000 for energy costs). Also, the flexible budget presented in , totaling \$115,500, differs from the flexible budget presented earlier since Jerry's is using a different cost system in this example, which often results in different budgeted amounts (\$115,500 = \$52,500 purchase orders + \$42,000 product testing + \$21,000 energy).

Figure 10.11 Variable Overhead Variance Analysis for Jerry's Ice Cream Using Activity-Based Costing



Note: AQ = Actual quantity of activity. SR = Standard variable manufacturing overhead rate per unit of activity. SQ = Standard quantity of activity given actual production of 210,000 units.

*Standard quantity of 2,100 purchase orders = Standard of 0.01 purchase orders per unit \times 210,000 actual units produced.

**\$2,000 unfavorable variable overhead spending variance = \$42,000 – \$40,000. Variance is unfavorable because the actual variable overhead cost is higher than the expected cost given actual quantity of 1,600 purchase orders.

† \$(12,500) favorable variable overhead efficiency variance = \$40,000 – \$52,500. Variance is favorable because the 1,600 actual purchase orders are lower than the 2,100 expected (budgeted) purchase orders.

This type of costing system and resulting variance analysis provides management with further information regarding variable overhead costs and variances. As discussed earlier, management often establishes criteria to decide which variances to investigate. Assume that management of Jerry's Ice Cream chooses to investigate the \$7,750 unfavorable efficiency variance associated

with energy. The management would like to know why 575,000 minutes of actual machine time were used instead of the expected 420,000 minutes. Perhaps the machines were operating poorly due to cutbacks in maintenance, or maybe new employees were not as efficient using the machines. Whatever the cause, Jerry's has identified the issue by integrating its activity-based costing system with the cost variance analysis concepts discussed in this chapter.

KEY TAKEAWAY

- Using cost variance analysis with activity-based costing is much like using cost variance analysis with traditional costing. Both utilize a spending variance and an efficiency variance. However, activity-based costing requires calculating a spending and efficiency variance for each activity rather than only one activity base typically used in traditional costing.

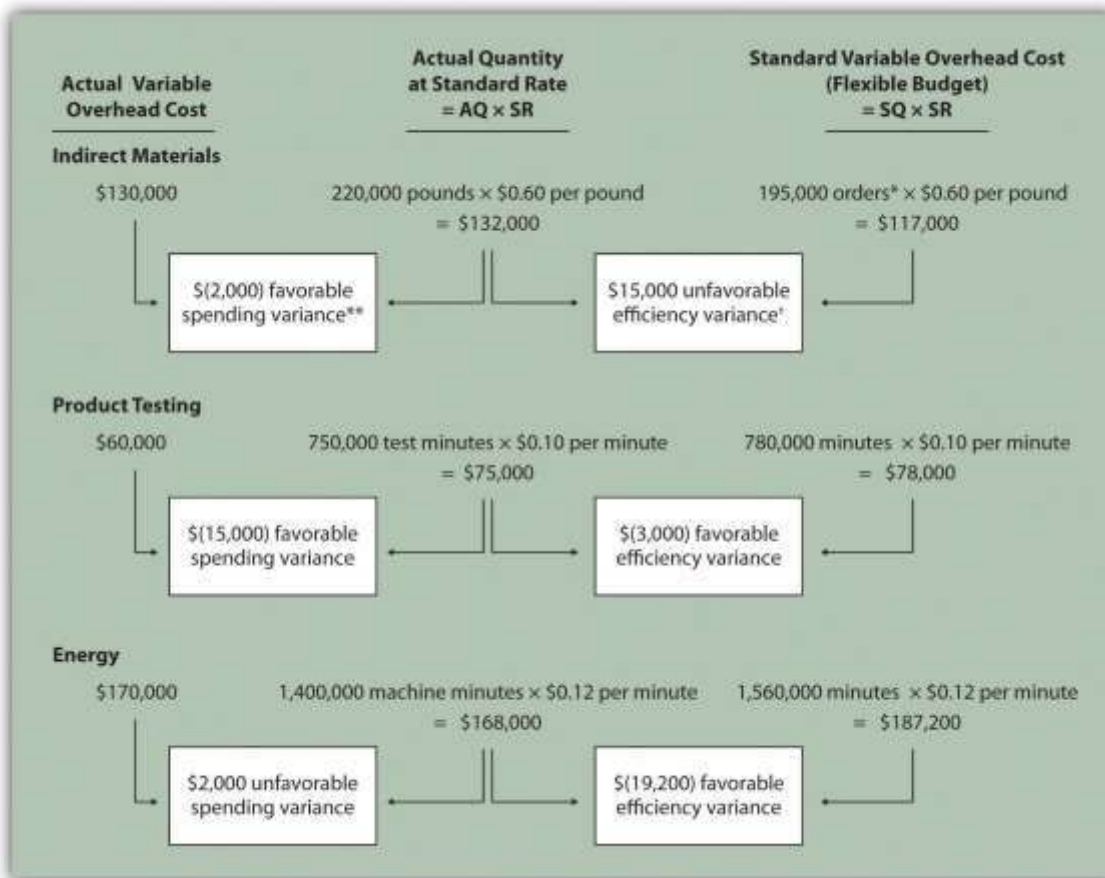
REVIEW PROBLEM 10.7

Assume Carol's Cookies uses activity-based costing to allocate variable manufacturing overhead costs instead of one rate based on direct labor hours. Carol identified three activities with the following information for last year.

Activity	Standard Rate	Standard Quantity per Unit Produced	Actual Costs	Actual Quantity
Indirect materials	\$0.60 per pound	0.5 pounds per unit	\$130,000	220,000 pounds
Product testing	\$0.10 per test minute	2 minutes per unit	\$ 60,000	750,000 test minutes
Energy	\$0.12 per minute of machine time	4 minutes per unit	\$170,000	1,400,000 minutes of machine time

Recall that Carol's Cookies produced and sold 390,000 units for the year. Prepare a variance analysis for Carol's Cookies using the format shown in.

Solution to Review Problem 10.7



Note: AQ = Actual quantity of activity. SR = Standard variable manufacturing overhead rate per unit of activity. SQ = Standard quantity of activity given actual production of 210,000 units.

*Standard quantity of 195,000 pounds = Standard of 0.5 pounds per unit × 390,000 actual units produced.

**\$ (2,000) favorable variable overhead spending variance = \$130,000 – \$132,000. Variance is favorable because the actual variable overhead cost is lower than the expected cost given actual quantity of 220,000 pounds.

† \$15,000 unfavorable variable overhead efficiency variance = \$132,000 – \$117,000. Variance is unfavorable because the 220,000 actual pounds is higher than the 195,000 expected (budgeted) pounds.

10.8 Fixed Manufacturing Overhead Variance Analysis

LEARNING OBJECTIVE

1. Calculate and analyze fixed manufacturing overhead variances.

Question: Many organizations also analyze fixed manufacturing overhead variances. Recall from earlier chapters that manufacturing companies are required to assign fixed manufacturing overhead costs to products for financial reporting purposes (this is called absorption costing). It is common for companies such as Jerry's Ice Cream to apply fixed manufacturing overhead costs to products based on direct labor hours, machine hours, or some other activity. Companies using a standard costing system apply fixed overhead based on a standard dollar amount per unit produced (this calculation is shown in the footnote to). Assume Jerry's uses direct labor hours to assign fixed overhead costs to products shown in . How is this information used to perform fixed overhead cost variance analysis?

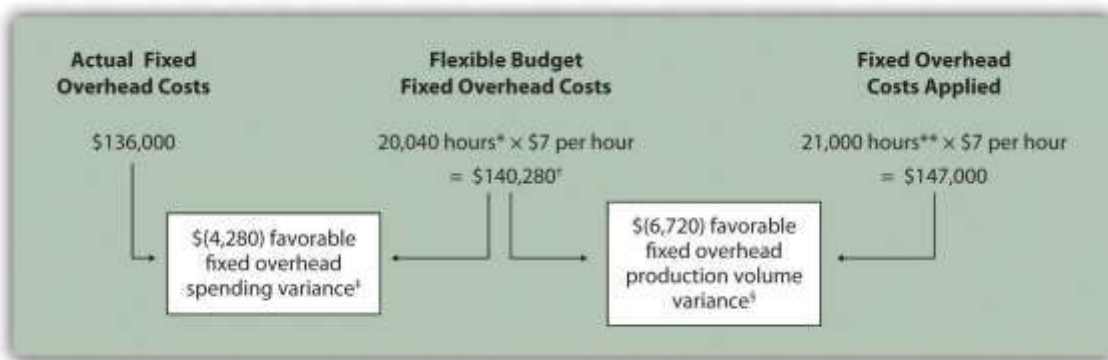
Answer: It is important to start by noting that fixed overhead in the master budget is the same as fixed overhead in the flexible budget because, by definition, fixed costs do not change with changes in units produced. Thus budgeted fixed overhead costs of \$140,280 shown in will remain the same even though Jerry's actually produced 210,000 units instead of the master budget expectation of 200,400 units.

Figure 10.12 Fixed Manufacturing Overhead Information for Jerry's Ice Cream

Budgeted fixed overhead costs	\$140,280
Budgeted direct labor hours	÷ 20,040 hours
Standard cost per direct labor hours*	<u>\$ 7 per hour</u>
Standard direct labor hours per unit	0.10 hours
Actual production	210,000 units
Actual fixed overhead costs	\$136,000
*Standard fixed manufacturing overhead cost can also be stated on a per unit basis as follows:	
Standard cost per direct labor hour	\$ 7.00
Standard direct labor hours per unit	× 0.10
Standard fixed overhead cost per unit	<u>\$ 0.70</u>

Fixed manufacturing overhead variance analysis involves two separate variances: the spending variance and the production volume variance. We show both variances in , and provide further detail following the figure.

Figure 10.13 Fixed Manufacturing Overhead Variance Analysis for Jerry's Ice Cream



*From , the direct labor budget is 20,040 budgeted direct labor hours = 200,400 units budgeted to be produced × 0.10 direct labor hours per unit.

**Standard hours of 21,000 = 210,000 actual units produced and sold × Standard of 0.10 hours per unit.

† \$140,280 is the original budget presented in the manufacturing overhead budget shown in . The flexible budget amount for fixed overhead does not change with changes in production, so this amount remains the same regardless of actual production.

‡ \$(4,280) favorable fixed overhead spending variance = \$136,000 – \$140,280. Variance is favorable because the actual fixed overhead costs are lower than the budgeted costs.

§ \$(6,720) favorable fixed overhead volume variance = \$140,280 – \$147,000. Variance is favorable because the volume of goods produced and sold was higher than expected.

Fixed Overhead Spending Variance Calculation

Question: How is the fixed overhead spending variance calculated?

Answer: The fixed overhead spending variance is the difference between actual and budgeted fixed overhead costs. As shown in , Jerry's Ice Cream incurred \$136,000 in fixed overhead costs for the year. Budgeted fixed overhead costs totaled \$140,280. Thus the spending variance is calculated as follows:

Key Equation

Fixed overhead spending variance = Actual costs – Budgeted costs

Fixed overhead spending variance=Actual costs – Budgeted costs=\$136,000–\$140,280=(\$4,280)
favorable

Because fixed overhead costs are not typically driven by activity, Jerry's cannot attribute any part of this variance to the efficient (or inefficient) use of labor. In fact, there is no efficiency variance for fixed overhead. Instead, Jerry's must review the detail of actual and budgeted costs to determine why the favorable variance occurred. For example, factory rent, supervisor salaries, or factory insurance may have been lower than anticipated. Further investigation of detailed costs is necessary to determine the exact cause of the fixed overhead spending variance.

Fixed Overhead Production Volume Variance Calculation

Question: How is the fixed overhead production volume variance calculated?

Answer: Before discussing the production volume variance, a word of caution: do not equate the fixed overhead production volume variance with the variable overhead efficiency variance. There is no efficiency variance for fixed manufacturing overhead because, by definition, fixed costs do not change with changes in the activity base. The fixed overhead volume variance is solely a result of the difference in budgeted production and actual production. The fixed overhead production volume variance is the difference between the budgeted and applied fixed overhead costs. As shown in , Jerry's Ice Cream budgeted \$140,280 in fixed overhead costs for the year. Fixed overhead costs applied totaled \$147,000. Thus the production volume variance is calculated as follows:

Key Equation

Fixed overhead production volume variance = Budgeted costs – Applied costs

Fixed overhead production volume variance = Budgeted costs – Applied costs = \$140,280 – \$147,000 = (\$6,720) favorable

The fixed overhead production volume variance is a direct result of the difference in volume (units) between budgeted production and actual production. All other variables are held constant including standard direct labor hours per unit (0.10) and standard rate per direct labor hour (\$7). Thus an alternative approach to this calculation can be used assuming the standard fixed overhead cost per unit is \$0.70 (= 0.10 direct labor hours per unit × \$7 per direct labor hour):

Key Equation

Fixed overhead production volume variance = Standard fixed overhead cost per unit × (Budgeted units produced – Actual units produced)

Fixed overhead production volume variance (\$6,720) favorable = Standard fixed overhead cost per unit = \$0.70 × (Budgeted units produced (200,400 budgeted units) – Actual units produced (210,000 actual units))

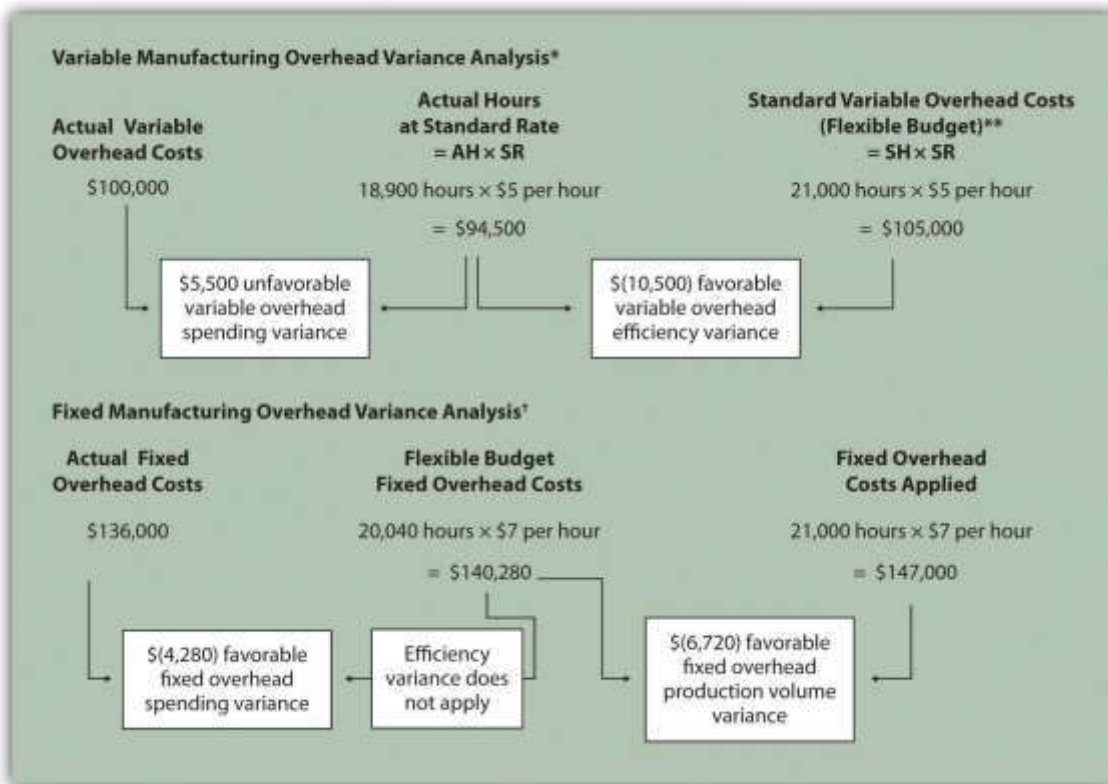
The fixed overhead production volume variance is favorable because the company produced and sold more units than anticipated.

Comparison of Fixed and Variable Overhead Variances

Question: What are the similarities and differences between the fixed and variable overhead variances?

Answer: summarizes the similarities and differences between variable and fixed overhead variances. Notice that the efficiency variance is not applicable to the fixed overhead variance analysis.

Figure 10.14 Comparison of Variable and Fixed Manufacturing Overhead Variance Analysis for Jerry's Ice Cream



*Information is from .

**For variable manufacturing overhead, the flexible budget is the same as variable overhead applied to production.

† Information is from .

KEY TAKEAWAY

- Two variances are calculated and analyzed when evaluating fixed manufacturing overhead. The *fixed overhead spending variance* is the difference between actual and budgeted fixed overhead costs. The *fixed overhead production volume variance* is the difference between budgeted and applied fixed overhead costs. There is no efficiency variance for fixed manufacturing overhead.

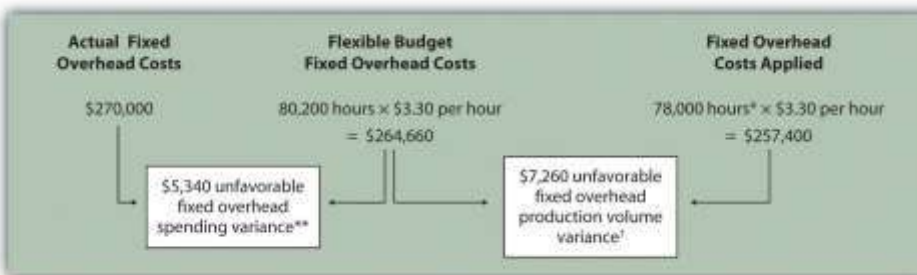
REVIEW PROBLEM 10.8

This review problem is based on the budget information presented in review problems and variance analysis information presented in review problems. The following information is for Carol's Cookies:

Budgeted fixed overhead costs	\$264,660
Budgeted direct labor hours	÷ 80,200
Standard cost per direct labor hours	<u>\$ 3.30</u>
Standard direct labor hours per unit	0.20
Actual production	390,000 units
Actual fixed overhead costs	\$270,000

Calculate the fixed overhead spending and production volume variances using the format shown in .

Solution to Review Problem 10.8



*Standard hours of 78,000 = 390,000 actual units produced and sold × standard of 0.20 hours per unit.

**\$5,340 unfavorable fixed overhead spending variance = \$270,000 – \$264,660.

Variance is unfavorable because the actual fixed overhead costs are higher than the budgeted costs.

† \$7,260 unfavorable fixed overhead volume variance = \$264,660 – \$257,400.

Variance is unfavorable because the volume of goods produced and sold was lower than expected.

10.9 Appendix: Recording Standard Costs and Variances

LEARNING OBJECTIVE

1. Explain how to record standard costs and variances using journal entries.

This chapter has focused on performing variance analysis to evaluate and control operations. Standard costing systems assist in this process and often involve recording transactions using standard cost information. When accountants use a standard costing system to record transactions, companies are able to quickly identify variances. In addition, inventory and related cost of goods sold are valued using standard cost information, which simplifies the bookkeeping process.

Recording Direct Materials Transactions

Question: In Figure 10.4 "Direct Materials Variance Analysis for Jerry's Ice Cream", we calculated two variances for direct materials at Jerry's Ice Cream: materials price variance and materials quantity variance. How are these variances recorded for transactions related to direct materials?

Answer: Two journal entries are needed to record direct materials transactions that include these variances. An example of each is shown next. (Typically, many more journal entries would be made throughout the year for direct materials. For the purposes of this example, we will make one journal entry for each variance to summarize the activity for the year.)

Materials Price Variance

The entry to record the *purchase* of direct materials and related price variance shown in [Figure 10.4 "Direct Materials Variance Analysis for Jerry's Ice Cream"](#) is

Dr. raw materials inventory (440,000 pounds × \$1.00 per pound)	440,000	
Dr. materials price variance (\$88,000 unfavorable)	88,000	
Cr. accounts payable (440,000 pounds × \$1.20 per pound)		528,000

Notice that the raw materials inventory account contains the actual quantity of direct materials purchased at the standard price. Accounts payable reflects the actual cost, and the materials price variance account shows the unfavorable variance. Unfavorable variances are recorded as debits and favorable variances are recorded as credits. Variance accounts are temporary accounts that are closed out at the end of the financial reporting period. We show the process of closing out variance accounts at the end of this appendix.

Materials Quantity Variance

The entry to record the use of direct materials in production and related quantity variance shown in Figure 10.4 "Direct Materials Variance Analysis for Jerry's Ice Cream" is

Dr. work in process inventory (420,000 pounds × \$1.00 per pound)	420,000	
Cr. materials quantity variance (\$21,000 favorable)		21,000
Cr. raw materials inventory (399,000 pounds × \$1.00 per pound)		399,000

Work-in-process inventory reflects the standard quantity of direct materials allowed at the standard price. The reduction in raw materials inventory reflects the actual quantity used at the standard price, and the materials quantity variance account shows the favorable variance.

Recording Direct Labor Transactions

Question: In Figure 10.6 "Direct Labor Variance Analysis for Jerry's Ice Cream", we calculated two variances for direct labor at Jerry's Ice Cream: labor rate variance and labor efficiency variance. How are these variances recorded for transactions related to direct labor?

Answer: Because labor is not inventoried for later use like materials, only one journal entry is needed to record direct labor transactions that include these variances. (Again, many more journal entries would typically be made throughout the year for direct labor. For the purposes of this example, we will make one journal entry to summarize the activity for the year.)

Labor Rate and Efficiency Variances

The entry to record the cost of direct labor and related variances shown in Figure 10.6 "Direct Labor Variance Analysis for Jerry's Ice Cream" is

Dr. work in process inventory (21,000 hours × \$13 per hour)	273,000	
Dr. labor rate variance (\$37,800 unfavorable)	37,800	
Cr. labor efficiency variance (\$27,300 favorable)		27,300
Cr. wages payable (18,900 hours × \$15 per hour)		283,500

Work-in-process inventory reflects the standard hours of direct labor allowed at the standard rate. The labor rate and efficiency variances represent the difference between work-in-process inventory (at the standard cost) and actual costs recorded in wages payable.

Recording Manufacturing Overhead Transactions

Question: As discussed in Chapter 2 "How Is Job Costing Used to Track Production Costs?", the manufacturing overhead account is debited for all actual overhead expenditures and credited when overhead is applied to products. At the end of the period, the balance in manufacturing overhead, representing overapplied or underapplied overhead, is closed out to cost of goods sold. This overapplied or underapplied balance can be explained by combining the four overhead variances summarized in this chapter in Figure 10.14 "Comparison of Variable and Fixed Manufacturing Overhead Variance Analysis for Jerry's Ice Cream". How are these variances recorded for transactions related to manufacturing overhead?

Answer: Based on the information at the left side of Figure 10.14 "Comparison of Variable and Fixed Manufacturing Overhead Variance Analysis for Jerry's Ice Cream", the entry to record actual overhead expenditures is

Dr. manufacturing overhead (\$100,000 variable + \$136,000 fixed)	236,000	
Cr. various accounts		236,000

The credit goes to several different accounts depending on the nature of the expenditure. For example, if the expenditure is for indirect materials, the credit goes to accounts payable. If the expenditure is for indirect labor, the credit goes to wages payable.

The next entry reflects overhead applied to products. This information comes from the right side of Figure 10.14 "Comparison of Variable and Fixed Manufacturing Overhead Variance Analysis for Jerry's Ice Cream".

Dr. work in process inventory (\$105,000 variable + \$147,000 fixed) Cr. manufacturing overhead	252,000	252,000
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At this point, manufacturing overhead has a \$16,000 credit balance, which represents overapplied overhead (\$16,000 = \$252,000 applied overhead – \$236,000 actual overhead). The following summary of fixed and variable overhead variances shown in Figure 10.14 "Comparison of Variable and Fixed Manufacturing Overhead Variance Analysis for Jerry's Ice Cream" explains the overapplied amount of \$16,000:

Variable overhead spending variance	\$ 5,500	Unfavorable
Variable overhead efficiency variance	(10,500)	Favorable
Fixed overhead spending variance	(4,280)	Favorable
Fixed overhead production volume variance	(6,720)	Favorable
Total overapplied overhead	<u>\$ (16,000)</u>	Favorable

Recording Finished Goods Transactions

Question: Review all the debits to work-in-process inventory throughout this appendix and you will see the following costs (all recorded at standard cost):

Raw materials	\$420,000
Direct labor	273,000
Manufacturing overhead	252,000
Total	<u>\$945,000</u>

How are these costs transferred from work-in-process inventory to finished good inventory when the goods are completed?

Answer: When the 210,000 units are completed, the following entry is made to transfer the costs out of work-in-process inventory and into finished goods inventory.

Dr. finished goods inventory Cr. work in process inventory	945,000	945,000
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Note that the standard cost per unit was established at \$4.50, which includes variable manufacturing costs of \$3.80 (see Figure 10.1 "Standard Costs at Jerry's Ice Cream") and fixed manufacturing costs of \$0.70 (see footnote to Figure 10.12 "Fixed Manufacturing Overhead Information for Jerry's Ice Cream"). Total production of 210,000 units \times Standard cost of \$4.50 per unit equals \$945,000; the same amount you see in the entry presented previously.

Recording Cost of Goods Sold Transactions

Question: How do we record the costs associated with products that are sold?

Answer: When finished product is sold, the following entry is made:

Dr. costs of goods sold Cr. finished goods inventory	945,000	945,000
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Note that the entry shown previously uses standard costs, which means cost of goods sold is stated at standard cost until the next entry is made.

Closing Manufacturing Overhead and Variance Accounts

Question: At the end of the period, Jerry's Ice Cream has balances remaining in manufacturing overhead along with all the variance accounts. These accounts must be closed out at the end of the period. How is this accomplished?

Answer: These accounts are closed out to cost of goods sold, after which point cost of goods sold will reflect actual manufacturing costs for the products sold during the period. The following entry is made to accomplish this goal:

Dr. cost of goods sold	61,500*	
Dr. materials quantity variance	21,000	
Dr. labor efficiency variance	27,300	
Dr. manufacturing overhead	16,000	
Cr. materials price variance		88,000
Cr. labor rate variance		37,800

*\$61,500 = \$88,000 + \$37,800 - \$21,000 - \$27,300 - \$16,000.

KEY TAKEAWAY

- In a standard costing system, all inventory accounts reflect standard cost information. The difference between standard and actual data are recorded in the variance accounts and the manufacturing overhead account, which are ultimately closed out to cost of goods sold at the end of the period.

REVIEW PROBLEM 10.9

1. Using the solution to [Note 10.30 "Review Problem 10.3"](#), prepare a journal entry to record the purchase of raw materials.
2. Using the solution to [Note 10.30 "Review Problem 10.3"](#), prepare a journal entry to record the use of raw materials.
3. Using the solution to [Note 10.40 "Review Problem 10.4"](#), prepare a journal entry to record direct labor costs.

4. Using the solutions to [Note 10.49 "Review Problem 10.5"](#) and [Note 10.67 "Review Problem 10.8"](#), prepare a journal entry to record actual variable and fixed manufacturing overhead expenditures.
5. Using the solutions to [Note 10.49 "Review Problem 10.5"](#) and [Note 10.67 "Review Problem 10.8"](#), prepare a journal entry to record variable and fixed manufacturing overhead applied to products.
6. Based on the entries shown in items **1** through **5**, prepare a journal entry to transfer all work-in-process inventory costs to finished goods inventory.
7. Assume all finished goods are sold during the period. Prepare a journal entry to transfer all finished goods inventory costs to cost of goods sold.
8. Based on the entries shown in items **1** through **7**, close manufacturing overhead and all variance accounts to cost of goods sold.

Solution to Review Problem 10.9

1. The following is a journal entry to record purchase of raw materials:

Dr. raw materials inventory (640,000 pounds × \$2.00 per pound)	1,280,000	
Cr. materials price variance (\$128,000 favorable)		128,000
Cr. accounts payable (640,000 pounds × \$1.80 per pound)		1,152,000

2. The following is a journal entry to record usage of raw materials:

Dr. work in process inventory (585,000 pounds × \$2 per pound)	1,170,000	
Dr. materials quantity variance (\$78,000 unfavorable)	78,000	
Cr. raw materials inventory (624,000 pounds × \$2 per pound)		1,248,000

3. The following is a journal entry to record direct labor costs:

Dr. work in process inventory (78,000 hours × \$12 per hour)	936,000	
Dr. labor efficiency variance (\$234,000 unfavorable)	234,000	
Cr. labor rate variance (\$97,500 favorable)		97,500
Cr. wages payable (97,500 hours × \$11 per hour)		1,072,500

4. The following is a journal entry to record actual overhead expenditures:

Dr. manufacturing overhead (\$360,000 variable + \$270,000 fixed)	630,000	
Cr. various accounts		630,000

5. The following is a journal entry to record overhead applied to production:

Dr. work in process inventory (\$273,000 variable + \$257,400 fixed)	530,400	
Cr. manufacturing overhead		530,400

6. The product cost data recorded in work-in-process inventory for the period is as follows:

Raw materials	\$1,170,000 (from entry 2)
Direct labor	936,000 (from entry 3)
Manufacturing overhead	530,400 (from entry 5)
Total	<u>\$2,636,400</u>

Thus the journal entry to transfer these production costs from work in process to finished goods is:

Dr. finished goods inventory	2,636,400	
Cr. work in process inventory		2,636,400

7. The following is a journal entry to record transfer of finished goods to cost of goods sold:

Dr. costs of goods sold	2,636,400	
Cr. finished goods inventory		2,636,400

8. The following is a journal entry to close out manufacturing overhead and all variance accounts:

Dr. cost of goods sold	186,100*	
Dr. materials price variance	128,000	
Dr. labor rate variance	97,500	
Cr. materials quantity variance		78,000
Cr. labor efficiency variance		234,000
Cr. manufacturing overhead		99,600**

*\$186,100 = \$78,000 + \$234,000 + \$99,600 – \$128,000 – \$97,500.

**\$99,600 underapplied overhead = \$630,000 actual overhead costs – \$530,400 applied overhead. Because this represents a debit balance in manufacturing overhead, the account must be credited to close it. To further prove this is accurate, the sum of all overhead variances must equal \$99,600 unfavorable as shown in the following:

Variable overhead spending variance	\$18,750 unfavorable (from Note 10.49 "Review Problem 10.5")
Variable overhead efficiency variance	\$68,250 unfavorable (from Note 10.49 "Review Problem 10.5")
Fixed overhead spending variance	\$5,340 unfavorable (from Note 10.67 "Review Problem 10.8")
Fixed overhead production volume	\$7,260 unfavorable (from Note 10.67 "Review Problem 10.8")

variance	Problem 10.8")
Total manufacturing overhead variance	\$99,600 unfavorable

END-OF-CHAPTER EXERCISES

Questions

1. Explain how a flexible budget differs from a master budget.
2. Assume you are the production manager for a manufacturing company that anticipated selling 40,000 units of product for the master budget and actually sold 50,000 units. Why would you prefer to be evaluated using a flexible budget for direct labor rather than the master budget?
3. What is a standard cost, and how does it differ from a budgeted cost?
4. How are standards established for direct materials, direct labor, and variable manufacturing overhead?
5. Explain what management is trying to evaluate in reviewing the materials price variance and materials quantity variance. Be sure to include the formula for each variance in your explanation.
6. Explain what management is trying to evaluate in reviewing the labor rate variance and labor efficiency variance. Be sure to include the formula for each variance in your explanation.
7. Explain how an unfavorable labor rate variance might cause a favorable labor efficiency variance and favorable materials quantity variance.
8. The production manager just received a report indicating an unfavorable labor rate variance. Further investigation reveals that the sales department accepted a large rush order. Who should be held responsible for the unfavorable variance? Explain.
9. Refer to [Note 10.38 "Business in Action 10.3"](#) Why is direct labor variance analysis particularly important for **United Airlines**?
10. Are favorable variances always a result of good management decisions? Explain.
11. Do most companies investigate all variances? Explain.

12. How is variable overhead variance analysis similar for companies using activity-based costing and companies using traditional costing?
13. What causes the fixed overhead production volume variance?
14. **(Appendix).** Why are direct materials and direct labor variance accounts needed in a standard costing system? What happens to these accounts at the end of the period?

Brief Exercises

15. **Analyzing Costs at Jerry's Ice Cream.** Refer to the dialogue at Jerry's Ice Cream presented at the beginning of the chapter. What happened with direct labor and direct materials costs at Jerry's Ice Cream? What did Jerry, the owner, ask Michelle to do?
16. **Direct Materials Standard Cost and Flexible Budget.** Manhattan Company produces high-quality chairs. Each chair requires a standard quantity of 10 board feet of wood at \$5 per board foot. Production for July totaled 3,000 units. Calculate (a) standard cost per unit for direct materials and (b) flexible budget amount for direct materials for the month of July.
17. **Direct Labor Standard Cost and Flexible Budget.** Manhattan Company produces high-quality chairs. Each chair requires a standard quantity of 8 direct labor hours at \$15 per hour. Production for July totaled 3,000 units. Calculate (a) standard cost per unit for direct labor and (b) flexible budget amount for direct labor for the month of July.
18. **Variable Overhead Standard Cost and Flexible Budget.** Manhattan Company produces high-quality chairs. Variable manufacturing overhead is applied at a standard rate of \$10 per machine hour. Each chair requires a standard quantity of three machine hours. Production for July totaled 3,000 units. Calculate (a) standard cost per unit for variable overhead and (b) flexible budget amount for variable overhead for the month of July.
19. **Materials Price Variance.** Sweets Company produces boxes of chocolate. The company expects to pay \$5 a pound for chocolate. Sweets purchased 4,000 pounds of chocolate during the month of April for \$4.80 per pound. Calculate the materials price variance for the month of April.



20. **Materials Quantity Variance.** Sweets Company produces boxes of chocolate. A standard of 2 pounds of material is expected to be used for each box produced, at a cost of \$5 per pound. Sweets produced 1,000 boxes of chocolate during the month of April and used 2,200 pounds of chocolate. Calculate the materials quantity variance for the month of April.
21. **Labor Rate Variance.** Tech Company produces computer servers. The company's standards show an expected direct labor rate of \$20 per hour. Tech's direct labor workforce worked 3,200 hours to produce 300 units during the month of August and was paid \$22 per direct labor hour. Calculate the labor rate variance for the month of August.
22. **Labor Efficiency Variance.** Tech Company produces computer servers. The company's standards show that each server will require 10 hours of direct labor at \$20 per hour. Tech produced 300 units during the month of August and direct labor hours totaled 3,200 for the month. Calculate the labor efficiency variance for the month of August.
23. **Variable Overhead Spending Variance.** Tech Company produces computer servers. Variable overhead is allocated to each server based on a standard of \$100 per machine hour. A total of 850 machine hours were used during the month of August and variable overhead costs totaled \$96,000. Calculate the variable overhead spending variance for the month of August.
24. **Variable Overhead Efficiency Variance.** Tech Company produces computer servers. Variable overhead is allocated to each server based on a standard of \$100 per machine hour and 3 machine hours per server. A total of 850 machine hours were used during the month of August to produce 300 servers. Calculate the variable overhead efficiency variance for the month of August.
25. **Investigating Variances.** Fiber Optic, Inc., investigates all variances above 10 percent of the flexible budget. The flexible budget for direct materials is \$50,000. The direct materials price variance is \$4,000 unfavorable and the direct materials quantity variance is \$(6,000) favorable. Which variances should be investigated according to company policy? Show calculations to support your answer.

- 26. Spending Variance Using Activity-Based Costing.** Albany, Inc., uses activity-based costing to allocate variable manufacturing overhead costs to products. One of the activities used to allocate these costs is product testing. The standard rate is \$15 per test hour. The cost for this activity during June totaled \$2,000, and actual test time during June totaled 120 hours. Calculate the spending variance for this activity for the month of June, and clearly label whether the variance is favorable or unfavorable.
- 27. Fixed Overhead Spending Variance.** Sampson Company applies fixed manufacturing overhead costs to products based on direct labor hours. Budgeted direct labor hours for the month of January totaled 30,000 hours, with a standard cost per direct labor hour of \$12. Actual fixed overhead costs totaled \$350,000 for January. Calculate the fixed overhead spending variance for January, and clearly label whether the variance is favorable or unfavorable.
- 28. (Appendix) Journalizing the Purchase of Raw Materials.** Mill Company purchased 40,000 pounds of raw materials on account for \$3.40 per pound. The standard price is \$3 per pound. Prepare a journal entry to record this transaction assuming the company uses a standard costing system.

Exercises: Set A

- 29. Standard Cost and Flexible Budget.** Hal's Heating produces furnaces for commercial buildings. The company's master budget shows the following standards information.

Expected production for January	300 furnaces
Direct materials	3 heating elements at \$40 per element
Direct labor	35 hours per furnace at \$18 per hour
Variable manufacturing overhead	35 direct labor hours per furnace at \$15 per hour

- 30. Required:**

- a. Calculate the standard cost per unit for direct materials, direct labor, and variable manufacturing overhead using the format shown in [Figure 10.1 "Standard Costs at Jerry's Ice Cream"](#).
- b. Assume Hal's Heating produced 320 furnaces during January. Prepare a flexible budget for direct materials, direct labor, and variable manufacturing overhead using the format shown in [Figure 10.2 "Flexible Budget for Variable Production Costs at Jerry's Ice Cream"](#).

Materials and Labor Variances. Hal's Heating produces furnaces for commercial buildings. (This is the same company as the previous exercise. This exercise can be assigned independently.)

For direct materials, the standard price for a heating element part is \$40. A standard quantity of 3 heating elements is expected to be used in each furnace produced. During January, Hal's Heating purchased 1,000 heating elements for \$38,000 and used 980 heating elements to produce 320 furnaces.

For direct labor, Hal's Heating established a standard number of direct labor hours at 35 hours per furnace. The standard rate is \$18 per hour. A total of 10,000 direct labor hours were worked during January, at a cost of \$190,000, to produce 320 furnaces.

Required:

- a. Calculate the materials price variance and materials quantity variance using the format shown in [Figure 10.4 "Direct Materials Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.
- b. Calculate the labor rate variance and labor efficiency variance using the format shown in [Figure 10.6 "Direct Labor Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.

Variable Overhead Variances. Hal's Heating produces furnaces for commercial buildings. (This is the same company as the previous exercises. This exercise can be assigned independently.) The company applies variable manufacturing overhead at a standard rate of \$15 per direct labor hour. The standard quantity of direct labor is 35 hours per unit. Variable overhead costs totaled \$190,000 for the month of January. A total of 10,000 direct labor hours were worked during January to produce 320 furnaces.

Required:

Calculate the variable overhead spending variance and variable overhead efficiency variance using the format shown in [Figure 10.8 "Variable Manufacturing Overhead Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.

Fixed Overhead Variance Analysis. Hal's Heating produces furnaces for commercial buildings. (This is the same company as the previous exercises. This exercise can be assigned independently.) The company applies fixed manufacturing overhead costs to products based on direct labor hours. Information for the month of January appears as follows. Hal's expected to produce and sell 300 units for the month.

Budgeted fixed overhead costs	\$ 231,000
Budgeted direct labor hours	÷ 10,500
Standard cost per direct labor hour	<u>\$ 22</u>
Standard direct labor hours per unit	35
Actual production	320 units
Actual fixed overhead costs	\$ 217,000

Required:

Calculate the fixed overhead spending variance and production volume variance using the format shown in [Figure 10.13 "Fixed Manufacturing Overhead Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.

Journalizing Direct Materials and Direct Labor Transactions

(Appendix). Hal's Heating produces furnaces for commercial buildings. (This is the same company as the previous exercises. This exercise can be assigned independently.)

Direct materials and direct labor variances for the month of January are shown as follows.

Materials price variance	\$(2,000) favorable
Materials quantity variance	\$ 800 unfavorable
Labor rate variance	\$ 10,000 unfavorable
Labor efficiency variance	\$(21,600) favorable

Required:

- The company purchased 1,000 elements during the month for \$38 each. Assuming a standard price of \$40 per element, prepare a journal entry to record the purchase of raw materials for the month.
- The company used 980 elements in production for the month, and the flexible budget shows the company expected to use 960 elements. Assuming a standard price of \$40 per element, prepare a journal entry to record the usage of raw materials in production for the month.
- The company used 10,000 direct labor hours during the month with an actual rate of \$19 per hour. The flexible budget shows the company expected to use 11,200 direct labor hours at a standard rate of \$18 per hour. Prepare a journal entry to record direct labor costs for the month.

Investigating Variances. Quality Tables, Inc., produces high-end coffee tables. Standard cost information for each table is presented as follows.

Direct materials	\$350
Direct labor	250
Variable overhead	100
Total	<u>\$700</u>

Quality Tables produced and sold 2,000 tables for the year and encountered the following production variances:

Direct materials price variance	\$ (79,000)	Favorable
Direct materials quantity variance	40,000	Unfavorable
Direct labor rate variance	97,500	Unfavorable
Direct labor efficiency variance	(35,000)	Favorable
Variable overhead spending variance	16,250	Unfavorable
Variable overhead efficiency variance	(19,000)	Favorable
Total variable production cost variance	<u>\$ 20,750</u>	Unfavorable

Required:

Company policy is to investigate all unfavorable variances above 10 percent of the flexible budget amount for direct materials, direct labor, and variable overhead.

- Identify the variances that should be investigated according to company policy. Show calculations to support your answer.
- What potential weakness exists in the company's current policy?

Variance Analysis with Activity-Based Costing. Assume Mammoth Company uses activity-based costing to allocate variable manufacturing overhead costs to products. The company identified three activities with the following information for last quarter.

Activity	Standard Rate	Standard Quantity per Unit Produced	Actual Costs	Actual Quantity
Indirect materials	\$2.40 per yard	7 yards per unit	\$691,650	265,000 yards

Product testing	\$1.50 per test minute	5 minutes per unit	\$301,000	215,000 test minutes
Indirect labor	\$4.50 per direct labor hour	4 hours per unit	\$930,000	180,000 direct labor hours

Required:

Assume Mammoth Company produced 40,000 units last quarter.

Prepare a variance analysis using the format shown in [Figure 10.11](#)

"[Variable Overhead Variance Analysis for Jerry's Ice Cream Using Activity-Based Costing](#)". Clearly label each variance as favorable or unfavorable.

Closing Variance and Overhead Accounts (Appendix). Gonzaga

Products had the following balances at the end of its fiscal year.

	Debit	Credit
Materials price variance	\$10,000	
Materials quantity variance		\$8,000
Labor rate variance		6,000
Labor efficiency variance	5,000	
Manufacturing overhead	14,000	

Required:

- Prepare a journal entry to close the variance and manufacturing overhead accounts. Assume the balances are not significant and thus are closed to cost of goods sold.
- Assume all products were sold and the company has no ending inventories. After making the entry in requirement **a**, does the balance of cost of goods sold on the income statement reflect standard costs or actual costs? Explain.

Exercises: Set B

37. Standard Cost and Flexible Budget. Outdoor Products, Inc., produces extreme-weather sleeping bags. The company's master budget shows the following standards information.

Expected production for September	5,000 units
Direct materials	8 yards per unit at \$5 per yard
Direct labor	3 hours per unit at \$16 per hour
Variable manufacturing overhead	3 direct labor hours per unit at \$2 per hour

38. Required:

- Calculate the standard cost per unit for direct materials, direct labor, and variable manufacturing overhead using the format shown in [Figure 10.1 "Standard Costs at Jerry's Ice Cream"](#).
- Assume Outdoor Products produced 5,100 sleeping bags during the month of September. Prepare a flexible budget for direct materials, direct labor, and variable manufacturing overhead using the format shown in [Figure 10.2 "Flexible Budget for Variable Production Costs at Jerry's Ice Cream"](#).

Materials and Labor Variances. Outdoor Products, Inc., produces extreme-weather sleeping bags. (This is the same company as the previous exercise. This exercise can be assigned independently.)

For direct materials, the standard price for 1 yard of material is \$5 per yard. A standard quantity of 8 yards of material is expected to be used for each sleeping bag produced. During September, Outdoor Products, Inc., purchased 45,000 yards of material for \$238,500 and used 39,000 yards to produce 5,100 sleeping bags.

For direct labor, Outdoor Products, Inc., established a standard number of direct labor hours at three hours per sleeping bag. The standard rate is \$16

per hour. A total of 14,700 direct labor hours were worked during September, at a cost of \$238,140, to produce 5,100 sleeping bags.

Required:

- a. Calculate the materials price variance and materials quantity variance using the format shown in [Figure 10.4 "Direct Materials Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.
- b. Calculate the labor rate variance and labor efficiency variance using the format shown in [Figure 10.6 "Direct Labor Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.

Variable Overhead Variances. Outdoor Products, Inc., produces extreme-weather sleeping bags. (This is the same company as the previous exercises. This exercise can be assigned independently.) The company applies variable manufacturing overhead at a standard rate of \$2 per direct labor hour. The standard quantity of direct labor is three hours per unit. Variable overhead costs totaled \$32,000 for the month of September. A total of 14,700 direct labor hours were worked during September to produce 5,100 sleeping bags.

Required:

Calculate the variable overhead spending variance and variable overhead efficiency variance using the format shown in [Figure 10.8 "Variable Manufacturing Overhead Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.

Fixed Overhead Variance Analysis. Outdoor Products, Inc., produces extreme-weather sleeping bags. (This is the same company as the previous exercises. This exercise can be assigned independently.) The company applies fixed manufacturing overhead costs to products based on direct labor hours. Information for the month of September appears as follows. Outdoor Products expected to produce and sell 5,000 units for the month.

Budgeted fixed overhead costs	\$135,000
Budgeted direct labor hours	÷ 15,000
Standard cost per direct labor hour	<u>\$ 9</u>
Standard direct labor hours per unit	3
Actual production	5,100 units
Actual fixed overhead costs	\$128,000

Required:

Calculate the fixed overhead spending variance and production volume variance using the format shown in [Figure 10.13 "Fixed Manufacturing Overhead Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.

Journalizing Direct Materials and Direct Labor Transactions

(Appendix). Outdoor Products, Inc., produces extreme-weather sleeping bags. (This is the same company as the previous exercises. This exercise can be assigned independently.)

Direct materials and direct labor variances for the month of September are shown as follows.

Materials price variance	\$13,500 unfavorable
Materials quantity variance	\$(9,000) favorable
Labor rate variance	\$ 2,940 unfavorable
Labor efficiency variance	\$(9,600) favorable

Required:

- The company purchased 45,000 yards of material during the month for \$5.30 per yard. Assuming a standard price of \$5 per yard, prepare a journal entry to record the purchase of raw materials for the month.
- The company used 39,000 yards of material in production for the month, and the flexible budget shows the company expected to use 40,800 yards.

Assuming a standard price of \$5 per yard, prepare a journal entry to record the usage of raw materials in production for the month.

- c. The company used 14,700 direct labor hours during the month with an actual rate of \$16.20 per hour. The flexible budget shows the company expected to use 15,300 direct labor hours at a standard rate of \$16 per hour. Prepare a journal entry to record direct labor costs for the month.

Investigating Variances. Tool Box, Inc., produces tool boxes sold at a variety of retail stores throughout the world. Standard cost information for each toolbox is presented as follows.

Direct materials	\$ 50
Direct labor	30
Variable overhead	40
Total	<u>\$ 120</u>

Tool Box produced and sold 100,000 toolboxes for the year and encountered the following production variances:

Direct materials price variance	\$ (300,000)	Favorable
Direct materials quantity variance	240,000	Unfavorable
Direct labor rate variance	(160,000)	Favorable
Direct labor efficiency variance	(180,000)	Favorable
Variable overhead spending variance	150,000	Unfavorable
Variable overhead efficiency variance	(210,000)	Favorable
Total variable production cost variance	<u>\$ (460,000)</u>	Favorable

Required:

Company policy is to investigate all unfavorable variances above 5 percent of the flexible budget amount for direct materials, direct labor, and variable overhead.

- Identify the variances that should be investigated according to company policy. Show calculations to support your answer.
- What recommendations would you make for the company's current policy?

Variance Analysis with Activity-Based Costing. Assume Hillside Hats, LLC, uses activity-based costing to allocate variable manufacturing overhead costs to products. The company identified three activities with the following information for last month.

Activity	Standard Rate	Standard Quantity per Unit Produced	Actual Costs	Actual Quantity
Purchase orders	\$50 per order	0.10 order per unit	\$65,000	1,600 orders
Product testing	\$2 per test minute	0.50 minutes per unit	\$17,000	8,000 test minutes
Indirect labor	\$3 per direct labor hour	1 hour per unit	\$43,000	13,000 direct labor hours

Required:

Assume Hillside Hats produced 15,000 units last month. Prepare a variance analysis using the format shown in [Figure 10.11 "Variable Overhead Variance Analysis for Jerry's Ice Cream Using Activity-Based Costing"](#). Clearly label each variance as favorable or unfavorable.

Closing Variance and Overhead Accounts (Appendix). Shasta Company had the following balances at the end of its fiscal year.

	Debit	Credit
Materials price variance		\$8,000
Materials quantity variance		2,000
Labor rate variance	\$12,000	
Labor efficiency variance		5,000

Manufacturing overhead		4,000
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Required:

- a. Prepare a journal entry to close the variance and manufacturing overhead accounts. Assume the balances are not significant and thus are closed to cost of goods sold.
- b. Assume all products were sold and the company has no ending inventories. After making the entry in requirement a, does the balance of cost of goods sold on the income statement reflect standard costs or actual costs? Explain.

Problems

45. Variance Analysis for Direct Materials, Direct Labor, and Variable

Overhead. Rain Gear, Inc., produces rain jackets. The master budget shows the following standards information and indicates the company expected to produce and sell 28,000 units for the year.

Direct materials	4 yards per unit at \$3 per yard
Direct labor	2 hours per unit at \$10 per hour
Variable manufacturing overhead	2 direct labor hours per unit at \$4 per hour

46. Rain Gear actually produced and sold 30,000 units for the year. During the year, the company purchased 130,000 yards of material for \$429,000 and used 118,000 yards in production. A total of 65,000 labor hours were worked during the year at a cost of \$637,000. Variable overhead costs totaled \$231,000 for the year.

47. *Required:*

- a. Calculate the materials price variance and materials quantity variance using the format shown in [Figure 10.4 "Direct Materials Variance Analysis"](#)

for Jerry's Ice Cream". Clearly label each variance as favorable or unfavorable.

- b. Calculate the labor rate variance and labor efficiency variance using the format shown in Figure 10.6 "Direct Labor Variance Analysis for Jerry's Ice Cream". Clearly label each variance as favorable or unfavorable.
- c. Calculate the variable overhead spending variance and variable overhead efficiency variance using the format shown in Figure 10.8 "Variable Manufacturing Overhead Variance Analysis for Jerry's Ice Cream". Clearly label each variance as favorable or unfavorable.
- d. Company policy is to investigate all variances greater than 10 percent of the flexible budget amount for each of the three variable production costs: direct materials, direct labor, and variable overhead. Identify which of the six variances calculated in requirements a through c should be investigated.
- e. Provide two possible explanations for each variance identified in requirement d.

Fixed Overhead Variance Analysis. (This problem is a continuation of the previous problem but can also be worked independently.) Rain Gear, Inc., produces rain jackets and applies fixed manufacturing overhead costs to products based on direct labor hours. Information for the year appears as follows. Rain Gear expected to produce and sell 28,000 units for the year.

Budgeted fixed overhead costs	\$280,000
Budgeted direct labor hours	÷ 56,000
Standard cost per direct labor hour	<u>\$5</u>
Standard direct labor hours per unit	2
Actual production	30,000 units
Actual fixed overhead costs	\$295,000

Required:

- a. Calculate the fixed overhead spending variance and production volume variance using the format shown in Figure 10.13 "Fixed

Manufacturing Overhead Variance Analysis for Jerry's Ice Cream". Clearly label each variance as favorable or unfavorable.

- b. Company policy is to investigate all variances greater than 5 percent of the flexible budget amount. Identify whether either of the two fixed overhead variances calculated in requirement **a** should be investigated.
- c. Provide one possible explanation for variance(s) identified in requirement **b**.

Journalizing Direct Materials, Direct Labor, and Overhead

Transactions (Appendix). Complete the following requirements for Rain Gear, Inc., using your solutions to the previous two problems.

Required:

- a. Prepare a journal entry to record the purchase of raw materials.
- b. Prepare a journal entry to record the use of raw materials.
- c. Prepare a journal entry to record direct labor costs.
- d. Prepare a journal entry to record actual variable and fixed manufacturing overhead expenditures.
- e. Prepare a journal entry to record variable and fixed manufacturing overhead applied to products.
- f. Based on the entries shown in requirements **a** through **e**, prepare a journal entry to transfer all work-in-process inventory costs to finished goods inventory.
- g. Assume all finished goods are sold during the period. Prepare a journal entry to transfer all finished goods inventory costs to cost of goods sold.
- h. Based on the entries shown in requirements **a** through **g**, close manufacturing overhead and all variance accounts to cost of goods sold.

Variance Analysis for Direct Materials, Direct Labor, and Variable Overhead; Journalizing Direct Materials and Direct Labor Transactions (Includes Appendix). Prefab Pools Company produces large prefabricated in-ground swimming pools made of a specialized plastic material. The

master budget shows the following standards information and indicates the company expected to produce and sell 600 units for the month of April.

Direct materials	500 pounds per unit at \$7 per pound
Direct labor	46 hours per unit at \$12 per hour
Variable manufacturing overhead	46 direct labor hours per unit at \$30 per hour

Prefab Pools actually produced and sold 580 units for the month. During the month, the company purchased 330,000 pounds of material for \$2,277,000 and used 295,800 pounds in production. A total of 25,520 labor hours were worked during the month at a cost of \$313,896. Variable overhead costs totaled \$790,000 for the month.

Required:

- Calculate the materials price variance and materials quantity variance using the format shown in [Figure 10.4 "Direct Materials Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.
- Calculate the labor rate variance and labor efficiency variance using the format shown in [Figure 10.6 "Direct Labor Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.
- Calculate the variable overhead spending variance and variable overhead efficiency variance using the format shown in [Figure 10.8 "Variable Manufacturing Overhead Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.
- Company policy is to investigate all variances at or above 2 percent of the flexible budget for direct materials and 4 percent for direct labor and variable overhead. Identify which of the six variances calculated in requirements a through c should be investigated.

- e. Provide two possible explanations for each variance identified in requirement **d**.
- f. Based on your answer to requirement **a**, prepare a journal entry to record the purchase of raw materials.
- g. Based on your answer to requirement **a**, prepare a journal entry to record the usage of raw materials.
- h. Based on your answer to requirement **b**, prepare a journal entry to record direct labor costs.

Fixed Overhead Variance Analysis. (This problem is a continuation of the previous problem but can be worked independently.) Prefab Pools Company produces prefabricated in-ground swimming pools and applies fixed manufacturing overhead costs to products based on direct labor hours. Information for the month of April appears as follows. Prefab Pools expected to produce and sell 600 units for the month.

Budgeted fixed overhead costs	\$966,000
Budgeted direct labor hours	+ 27,600
Standard cost per direct labor hour	<u>\$ 35</u>
Standard direct labor hours per unit	46
Actual production	580 units
Actual fixed overhead costs	\$910,000

Required:

- a. Calculate the fixed overhead spending variance and production volume variance using the format shown in [Figure 10.13 "Fixed Manufacturing Overhead Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.
- b. Company management has asked you to investigate the cause of the fixed overhead spending variance calculated in requirement **a**. Provide one possible explanation for this variance.

Variance Analysis for Direct Materials, Direct Labor, Variable Overhead, and Fixed Overhead. Equipment Products, Inc., produces large

ladders made of a specialized metal material. The master budget shows the following standards information and indicates the company expected to produce and sell 4,000 units for the month of May.

Direct materials	60 pounds per unit at \$3 per pound
Direct labor	8 hours per unit at \$14 per hour
Variable manufacturing overhead	8 direct labor hours per unit at \$6 per hour

Equipment Products actually produced and sold 4,400 units for the month. During the month, the company purchased 300,000 pounds of material for \$960,000 and used 286,000 pounds in production. A total of 30,800 labor hours were worked during the month at a cost of \$462,000. Variable overhead costs totaled \$195,000 for the month.

With regards to fixed manufacturing overhead, the company also applies these overhead costs to products based on direct labor hours. Fixed manufacturing overhead information for the month of May appears as follows.

Budgeted fixed overhead costs	\$ 864,000
Budgeted direct labor hours	÷ 32,000
Standard cost per direct labor hour	<u>\$ 27</u>
Actual fixed overhead costs for May	<u>\$ 990,000</u>

Required:

- Calculate the materials price variance and materials quantity variance using the format shown in [Figure 10.4 "Direct Materials Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.
- Calculate the labor rate variance and labor efficiency variance using the format shown in [Figure 10.6 "Direct Labor Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.

- c. Calculate the variable overhead spending variance and variable overhead efficiency variance using the format shown in [Figure 10.8 "Variable Manufacturing Overhead Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.
- d. Company policy is to investigate all variances greater than 10 percent of the flexible budget amount for each of the 3 variable production costs: direct materials, direct labor, and variable overhead. Identify which of the six variances calculated in requirements **a** through **c** should be investigated.
- e. Provide two possible explanations for each variance identified in requirement **d**.
- f. Calculate the fixed overhead spending variance and production volume variance using the format shown in [Figure 10.13 "Fixed Manufacturing Overhead Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.

Journalizing Direct Labor and Overhead Transactions

(Appendix). Complete the following requirements for Equipment Products, Inc., using your solutions to the previous problem.

Required:

- a. Prepare a journal entry to record direct labor costs.
- b. Prepare a journal entry to record actual variable and fixed manufacturing overhead expenditures.
- c. Prepare a journal entry to record variable and fixed manufacturing overhead applied to products.

Variance Analysis with Activity-Based Costing. Assume Spindle Company uses activity-based costing to allocate variable manufacturing overhead costs to products. The company identified three activities with the following information for last quarter.

Activity	Standard Rate	Standard Quantity per Unit Produced	Actual Costs	Actual Quantity
----------	---------------	-------------------------------------	--------------	-----------------

Indirect materials	\$5 per yard	14 yards per unit	\$4,850,000	990,000 yards
Product testing	\$3 per test minute	10 minutes per unit	\$2,000,000	650,000 test minutes
Indirect labor	\$9 per direct labor hour	6 hours per unit	\$3,800,000	410,000 direct labor hours

Required:

- a. Assume Spindle Company produced 70,000 units last quarter. Prepare a variance analysis using the format shown in [Figure 10.11 "Variable Overhead Variance Analysis for Jerry's Ice Cream Using Activity-Based Costing"](#). Clearly label each variance as favorable or unfavorable.
- b. Company policy is to investigate all variances above 5 percent of the flexible budget amount for each activity. Identify the variances that should be investigated according to company policy. Show calculations to support your answer.

One Step Further: Skill-Building Cases

53. **Variance Analysis and Fraud.** Refer to [Note 10.47 "Business in Action 10.4"](#) and to [Note 10.52 "Business in Action 10.5"](#) Explain how cost variance analysis might help detect fraud.

54. **Group Activity: Setting Standards.** Form groups of two to four students.

Each group is to complete the following requirements.

Required:

- a. Define and discuss the differences between ideal standards and attainable standards.
- b. Assume your group works for a company that produces wood desks and you are in the process of creating attainable direct material and direct labor standards. Provide specific examples of the items that might be included in

- (1) the standard quantity and standard price for direct materials and (2) the standard hours and standard rate for direct labor. Explain where this information might be obtained, and identify specific production inefficiencies your group included in creating these standards that would not be included in ideal standards.
- c. Discuss the findings of your group with the class. (Optional: your instructor may ask you to submit your findings in writing.)

Internet Project: Standard Costs and Cost Variances. Systems Applications and Products (SAP) is the world's largest business software company with 38,000 customers worldwide. Go to the **SAP** Web site at <http://www.sap.com> and find the search feature. Type in "standard costing" or "cost variance" and find an article that discusses standard costs and/or cost variances (there are several articles to choose from). Summarize the article in a one-page report, and submit a printed copy of the article with your report.

Ethics and Setting Standards. Wilkes Golf, Inc., produces golf carts that are sold throughout the world. The company's management is in the process of establishing the standard hours of direct labor required to complete one golf cart. Assume you are the production supervisor, and you receive a bonus for each quarter that shows a favorable labor efficiency variance. That is, you receive a bonus for each quarter showing actual direct labor hours that are fewer than budgeted direct labor hours.

The management has asked for your input in establishing the standard number of direct labor hours required to complete one golf cart.

Required:

- a. As the production supervisor, describe the ethical conflict you face when asked to help with establishing direct labor hour standards.
- b. How might the management of Wilkes Golf, Inc., avoid this conflict and still achieve the goal of obtaining reliable direct labor hour information?

Using Excel to Perform Budget Versus Actual Analysis. The management of Home Products, Inc., prepared the following budgeted income statement for the year ending December 31, 2012.

	A	B	C
1	Home Products, Inc.		
2	Budgeted Income Statement		
3	Year Ending December 31, 2012		
4			
5		Budget	
6	Sales	\$ 3,600,000	
7	Variable cost of goods sold	1,600,000	
8	Variable selling and administrative expenses	480,000	
9	Contribution margin	\$ 1,520,000	
10	Fixed cost of goods sold	1,160,000	
11	Fixed selling and administrative expenses	240,000	
12	Net profit	\$ 120,000	
13			

At the end of 2012, the company prepared the following income statement showing actual results:

	A	B	C
1	Home Products, Inc.		
2	Income Statement		
3	Year Ending December 31, 2012		
4			
5		Actual Results	
6	Sales	\$ 3,610,000	
7	Variable cost of goods sold	1,736,000	
8	Variable selling and administrative expenses	500,000	
9	Contribution margin	\$ 1,374,000	
10	Fixed cost of goods sold	990,000	
11	Fixed selling and administrative expenses	255,000	
12	Net profit	\$ 129,000	
13			

Required:

Prepare an Excel spreadsheet comparing the actual results to budgeted amounts using the format shown as follows, and comment on the results.

Home Products, Inc. Income Statement Variance Analysis Year Ending December 31, 2012				
	Actual	Budget	Variance	(Favorable) Unfavorable
Sales				
Variable cost of goods sold				
Variable selling and administrative expenses				
Contribution margin				
Fixed cost of goods sold				
Fixed selling and administrative expenses				
Net profit				

Comprehensive Cases

58. Variable Production Cost Variance Analysis. Iron Products, Inc., produces prefabricated iron fencing used in commercial construction. Variable overhead is applied to products based on direct labor hours. The company uses a just-in-time production system and thus has insignificant inventory levels at the end of each month. The income statement for the month of November comparing actual results with the flexible budget based on actual sales of 2,000 units is shown as follows.

Iron Products, Inc. Income Statement (budget versus actual)				
	Actual	Budget	Variance	
Sales	\$ 1,805,000	\$ 1,800,000	\$ (5,000)	Favorable
Variable cost of goods sold	867,400	800,000	67,400	Unfavorable
Variable selling and administrative expenses	250,000	240,000	10,000	Unfavorable
Contribution margin	687,600	760,000	72,400	Unfavorable
Fixed cost of goods sold	575,000	580,000	(5,000)	Favorable
Fixed selling and administrative expenses	117,000	120,000	(3,000)	Favorable
Net profit	\$ (4,400)	\$ 60,000	\$ 64,000	Unfavorable

Iron Products is disappointed with the actual results and has hired you as a consultant to provide further information as to why the company has been

struggling to meet budgeted net profit. Your review of the previously presented budget versus actual analysis identifies variable cost of goods sold as the main culprit. The unfavorable variance for this line item is \$67,400.

After further research, you are able to track down the following standard cost information for variable production costs:

	Standard Cost per Unit
Direct materials (50 pounds per unit at \$5 per pound)	\$250
Direct labor (3 hours at \$20 per hour)	60
Variable overhead (3 direct labor hours at \$30 per hour)	90
Standard variable production cost per unit	<u>\$400</u>

Actual production information related to variable cost of goods sold for the month of November is as follows:

- 2,000 units were produced and sold.
- 110,000 pounds of material were purchased and used at a total cost of \$528,000.
- 5,600 direct labor hours were used during the month at a total cost of \$134,400.
- Variable overhead costs totaled \$205,000.

Required:

- e. Calculate the materials price variance and materials quantity variance using the format shown in [Figure 10.4 "Direct Materials Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.
- f. Calculate the labor rate variance and labor efficiency variance using the format shown in [Figure 10.6 "Direct Labor Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.

- g. Calculate the variable overhead spending variance and variable overhead efficiency variance using the format shown in [Figure 10.8 "Variable Manufacturing Overhead Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.
- h. List each of the six variances calculated in requirements **a**, **b**, and **c**, and total the variances to show one net variance. Clearly label the net variance as favorable or unfavorable. Explain how this net variance relates to variable cost of goods sold on the income statement.
- i. Identify the highest favorable variance and highest unfavorable variance from the six listed in requirement **d**, and provide one possible cause of each variance.

Variable Production Cost Variance Analysis and Performance

Evaluation. Fast Sleds, Inc., produces snow sleds used for winter recreation. Variable overhead is applied to products based on machine hours. The company uses a just-in-time production system, and thus has insignificant inventory levels at the end of each month. The income statement for the month of January comparing actual results with the flexible budget is shown in the following based on actual sales of 10,000 units.

Fast Sleds, Inc. Income Statement (budget versus actual)				
	Actual	Budget	Variance	
Sales	\$ 305,000	\$ 300,000	\$ (5,000)	Favorable
Variable cost of goods sold	108,700	100,000	8,700	Unfavorable
Variable selling and administrative expenses	76,000	70,000	6,000	Unfavorable
Contribution margin	120,300	130,000	9,700	Unfavorable
Fixed cost of goods sold	53,000	55,000	(2,000)	Favorable
Fixed selling and administrative expenses	38,000	35,000	3,000	Unfavorable
Net profit	\$ 29,300	\$ 40,000	\$ 10,700	Unfavorable

Fast Sleds is disappointed with the actual results and has hired you as a consultant to provide further information as to why the company has been struggling to meet budgeted net income. Your review of the budget presented previously versus actual analysis identifies variable cost of goods sold as the main culprit. The unfavorable variance for this line item is \$8,700.

After further research, you are able to track down the standard cost information for variable production costs:

	Standard Cost per Unit
Direct materials (12 pounds per unit at \$0.50 per pound)	\$ 6
Direct labor (0.20 hours at \$15 per hour)	3
Variable overhead (0.10 direct labor hours at \$10 per hour)	1
Standard variable production cost per unit	<u>\$ 10</u>

Actual production information related to variable cost of goods sold for the month of January is as follows:

- 10,000 units were produced and sold.
- 150,000 pounds of material was purchased and used at a total cost of \$67,500.
- 1,900 direct labor hours were used during the month at a total cost of \$30,400.
- 1,200 machine hours were used during the month.
- Variable overhead costs totaled \$10,800.

Required:

- f. Calculate the materials price variance and materials quantity variance using the format shown in [Figure 10.4 "Direct Materials Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.

- g. Calculate the labor rate variance and labor efficiency variance using the format shown in [Figure 10.6 "Direct Labor Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.
 - h. Calculate the variable overhead spending variance and variable overhead efficiency variance using the format shown in [Figure 10.8 "Variable Manufacturing Overhead Variance Analysis for Jerry's Ice Cream"](#). Clearly label each variance as favorable or unfavorable.
 - i. List each of the six variances calculated in requirements **a**, **b**, and **c**, and total the variances to show one net variance. Clearly label the net variance as favorable or unfavorable. Explain how this net variance relates to variable cost of goods sold on the income statement.
 - j. Identify the highest favorable variance and highest unfavorable variance from the six listed in requirement **d**, and provide one possible cause of each variance.
 - k. Sue Mays, the manager at Fast Sleds, Inc., reviewed the company's variance analysis report for the month of January. The materials price variance of \$(7,500) was the most significant favorable variance for the month, and the materials quantity variance of \$15,000 was the most significant unfavorable variance. Sue would like to reward the company's purchasing agent for achieving such substantial savings by giving him a \$2,000 bonus while not providing any bonus for the production manager.
12. Do you agree with Sue's approach to awarding bonuses? Explain.
 13. What circumstances might lead to the conclusion that the purchasing agent should not receive a bonus for the month of January?

Chapter 11

How Do Managers Evaluate Performance in Decentralized Organizations?

Mandy Dwyer is the president and CEO of Game Products, Inc., a producer of games and sporting goods sold to a variety of retail stores. Game Products, Inc., has three divisions: Sporting Goods, Board Games, and Computer Games. Each division is relatively autonomous with a separate manager, who independently oversees each division. Mandy Dwyer is reviewing the results of the most recent fiscal year with Larry Meske, the company's CFO:

Mandy:	<i>In reviewing our segmented income statement, it looks like the Board Games division had a terrific year. Profits increased substantially over last year, more than either of the other two divisions, and overall profit for this division is well above the other two. Carla Klesko, the Board Games division manager, is to be commended for her fine work! We should consider revising her compensation plan to increase her annual bonus based on these results.</i>
Larry:	<i>Not so quick, Mandy. I agree that the Board Games division has successfully increased profits, but we must consider more than just the bottom line (profits) in determining how substantial the increase is in comparison to the other divisions.</i>
Mandy:	<i>What do you have in mind?</i>
Larry:	<i>For starters, we should consider what resources were invested in the Board Games division, and determine the return produced from these resources. As you recall, Carla made a significant investment in her division, whereas the other division managers did not. So naturally, we would expect Board Games division profits to increase by more than the other divisions.</i>
Mandy:	<i>I've always focused on the bottom line for each division. What performance measures do you propose we use?</i>
Larry:	<i>We have several options. Return on investment (ROI), residual income (RI), and economic value added (EVA) are three commonly used measures. Perhaps we can</i>

	<i>discuss this further next month once I've had a chance to pull some information together.</i>
<i>Mandy:</i>	<i>Excellent idea. I look forward to getting your ideas on this issue next month.</i>

Mandy and Larry are looking for ways to evaluate the performance of the company's three division managers. Since each division is responsible for more than just the cost of production, as was the case in [Chapter 10 "How Do Managers Evaluate Performance Using Cost Variance Analysis?"](#), top management must evaluate how productively each division manager is using assets to produce profits. The focus of this chapter is on how to evaluate the performance of division managers within a decentralized organization.

11.1 Using Decentralized Organizations to Control Operations

LEARNING OBJECTIVE

1. Define the term decentralized organization and explain advantages and disadvantages of decentralizing.

Question: Many types of organizations decentralize operations to better manage each segment of the organization. What does it mean to decentralize operations?

Answer: The term used to describe this type of organizational structure is decentralized organizations. Decentralized organizations delegate decision-making and operational responsibilities to the managers of each segment of the organization. (Segments are often called divisions or subunits.) For example, universities are often segmented by discipline with one manager, or dean, responsible for each discipline (physical education, social sciences, business, etc.). Retail companies are often segmented by region, with one manager responsible for each region. Service companies are often segmented by service category, with one manager responsible for each category (e.g., an accounting firm divided into audit and tax). Decentralization is not limited to a particular type of organization, and most organizations that have grown in size and complexity decentralize to some extent.

Reasons to Decentralize

Question: Why do organizations decentralize operations?

Answer: Organizations often decentralize out of necessity as they expand. The responsibility of one manager, or group of managers, to run the entire organization can become overwhelming as the number of products offered increases.

For example, Game Products, Inc., began by selling two board games to several retail stores in the northeast United States. The company did not need to decentralize at that point because it offered only two products and the geographic region in which it sold those products was limited.

A few years later, Game Products expanded sales to Canada and the southeast United States, while also venturing into the computer games industry by purchasing a small maker of computer games. Although operations were not decentralized at this time—all decisions were still made at headquarters—top management was beginning to feel the strain of trying to manage two segments of the company. The decision-making process was cumbersome and slow, and the company began to miss market opportunities that would have increased sales and profits.

Two years later, Game Products decided to enter the sporting goods market, and top management and the board of directors agreed that decentralization was critical to the future success of the company. As a result, they assigned a manager to run each division. This change allowed top management to concentrate on high-level issues, such as long-range strategic planning, and it placed the decision making in the hands of managers who were intimately familiar with the operations of their individual divisions.

Although Game Products ultimately decided to decentralize operations, there are advantages and disadvantages to decentralizing. illustrates how operations would look at Game Products, Inc., if operations were decentralized or if they remained centralized.

Figure 11.1 Decentralized Versus Centralized Organizations

Advantages of Decentralizing Operations

Question: What are the advantages of decentralizing operations for companies like Game Products, Inc.?

Answer: Organizations like Game Products tend to decentralize as their operations grow and become more complex. The advantages of decentralizing are as follows:

- **Increased Expertise.** Rather than having one manager, or a group of managers, trying to make decisions for a wide range of products, decentralized organizations delegate decision-making authority to local managers who have expertise in specific products.
- **Quicker Decisions.** By having increased expertise and decision-making authority, local managers are able to make decisions quickly without having to wait for the approval of the organization's top management.
- **Refocus of Top Management Responsibilities.** With local managers focusing on issues important to the specific segment, top management is able to delegate the day-to-day decision-making responsibilities and focus on broader companywide issues, such as long-range strategic planning.
- **Motivation of Local Managers.** Managers who are given more responsibility, and the control necessary to manage their responsibility, tend to be more motivated than those who simply follow the orders issued by top management. In addition, a decentralized structure provides a means to train local managers for promotion to the next level of management.

Provides a real-life example of an organization that benefitted from decentralizing.

Business in Action 11.1

Advantages of Decentralizing at a Community College

Sierra College is located in one of the fastest growing counties in California. Student enrollment has increased from 5 percent to 10 percent per year over the last decade. Prior to this rapid growth, the college held each division dean responsible for most administrative duties. For example, the dean of business and technology was

responsible for administrative duties, such as hiring faculty members and developing the schedule of classes to be offered each semester.

As student enrollment increased, course offerings expanded, and faculty headcount grew into the hundreds, the administrative duties became overwhelming for each division dean. As a result, management decided to decentralize further by creating department chair positions to help with the administrative duties related directly to each department. This change gave each department (business, music, computer science, etc.) more control over day-to-day activities, and it allowed the deans to focus on larger college issues, such as strategic planning and community relations. It also allowed for quicker responses to issues, such as faculty teaching assignments and classroom space utilization.

Source: Based on the author's experience.

Disadvantages of Decentralizing Operations

Question: What are the disadvantages of decentralizing operations for organizations, such as Game Products?

Answer: The results of decentralizing operations are not always positive. Three disadvantages of decentralizing are as follows:

- **Duplication of Services.** Organizations that decentralize often duplicate administrative services, such as accounting and computer support. That is, each segment may have its own accounting department and computer support department when these services might be provided more efficiently through one companywide department.
- **Conflict of Interest.** Managers who are evaluated solely with respect to their divisions have no incentive to make a decision that benefits the organization as a whole at the expense of the manager's division. For example, a local manager may decide to purchase raw materials from an outside supplier even though another division within the company can produce the same materials at a lower cost. (To make matters worse, the other division's manager may refuse to sell the materials at a reduced price because she is

evaluated based on her division's profits!) The appendix to this chapter discusses this issue in greater detail.

- **Loss of Control.** Perhaps one of the most difficult decisions facing small, fast-growing organizations is whether to continue to expand and decentralize or to limit growth and remain highly centralized. Decentralization will lead to a loss of control at top management levels, which can have negative consequences for the organization's reputation if local managers struggle to maintain the level of quality that customers expect. Decentralized organizations are only as good as the local managers who are given decision-making authority.

Business in Action 11.2

Disadvantage of Decentralizing an Accounting Firm

Arthur Andersen was a large, decentralized accounting firm with offices located throughout the world. One or more partners operated each office independently. In 2002, **Arthur Andersen** had 85,000 employees worldwide. The firm was indicted in March 2002, and later found guilty, for obstructing justice by shredding tons of documents related to its audit work for **Enron Corporation**. As a result, **Arthur Andersen** agreed to cease its accounting practice in the United States in August 2002. By 2005, only 200 employees remained at **Arthur Andersen** to wrap up the dissolution of the firm.

Although the entire firm was indicted and found guilty of obstruction of justice, the decision to shred documents was made at the Houston office, where the bulk of the shredding took place. This serves as an extreme example of the disadvantage of decentralizing an organization. Decisions left to the division managers ("partners" in this case) can have a negative effect on the entire organization.

Note that the U.S. Supreme Court overturned the guilty verdict of the U.S. District Court in June 2005, but the damage was done and the firm did not survive.

Source: Charles Lane, "Justices Overturn Andersen Conviction," *Washington Post*, June 1, 2005, <http://www.washingtonpost.com>.

KEY TAKEAWAY

- Decentralized organizations delegate decision-making and operational responsibilities to the managers of each segment, or division, of the organization. Advantages of decentralized organizations include increased expertise at each division, quicker decisions, better use of time at top management levels, and increased motivation of division managers. Disadvantages include duplication of services, such as accounting and computer support; potential increase in conflicts between division manager goals and companywide goals; and loss of control at the top management level.

REVIEW PROBLEM 11.1

Landscaping Services, Inc., founded and operated by Ed Barnes, has seen revenues double each year for the past three years. Although Ed has hired several laborers to ease the workload, he is still working seven days a week, 10 hours a day. Ed would like to hire a manager to assist in managing landscaping projects and has asked for your advice.

1. What concerns might you have about Ed's plan to decentralize operations?
2. How might decentralizing operations benefit Landscaping Services, Inc.?

Solution to Review Problem 11.1

1. There are several potential disadvantages to decentralizing. Two examples follow:
 1. For a relatively small company, such as Landscaping Services, Inc., the biggest concern is losing control over quality. Presumably Ed is successful because he provides excellent service. He must instill the importance of maintaining quality to the new manager.
 2. Ed must establish a compensation system that encourages the new manager to make decisions in the best interest of the organization. For example, if the new manager encounters an opportunity to pick up a new customer, there must be an incentive to pursue this opportunity. If the new

manager is simply given a monthly salary, there is no incentive to increase the workload! One approach is to offer part ownership in the company and therefore rights to a percentage of the company's profits.

2. There are several potential advantages to decentralizing. A few examples follow:
 1. Ed can hire a manager with expertise in an area outside of Ed's expertise, which can lead to additional business and a higher level of quality.
 2. Clients will no longer have to wait for Ed to arrive before a decision is made on how to proceed with the work.
 3. Ed can put more time into obtaining new customers.

11.2 Maintaining Control over Decentralized Organizations

LEARNING OBJECTIVE

1. Define three types of responsibility centers.

Question: To evaluate performance, organizations often divide operations into segments. Segments responsible for revenues, costs, and investments in assets are called responsibility centers. Responsibility centers can be based on such attributes as sales regions, product lines, or services offered. Why do organizations establish responsibility centers?

Answer: The purpose of establishing responsibility centers within organizations is to hold managers responsible for only the assets, revenues, and costs they can control. For example, a factory manager typically has control over production costs, but not sales. This manager's responsibility center would only include production costs. A retail store manager typically has control over sales prices and costs. This manager's responsibility center would only include revenues and costs. The level of control a manager has over a segment's assets, revenues, and costs will help determine the type of responsibility center used for each manager.

Figure 11.2 "Three Types of Responsibility Centers" illustrates the three types of responsibility centers commonly used to evaluate segments: cost centers, profit centers, and investment centers. Each type is described in the following sections.

Figure 11.2 Three Types of Responsibility Centers

Cost Center

Question: What is a cost center, and what measures are used to evaluate this type of responsibility center?

Answer: A cost center is an organizational segment that is responsible for costs, but not revenue or investments in assets. Service departments, such as accounting, marketing, computer support, and human resources, are cost centers. Managers of these departments are evaluated based on providing a certain level of services for the company at a reasonable cost.

Production departments within a manufacturing firm are also treated as cost centers. Production managers are evaluated based on meeting cost budgets for producing a certain level of goods. Chapter 10 "How Do Managers Evaluate Performance Using Cost Variance Analysis?" describes the use of cost variance analysis to evaluate cost centers within a manufacturing firm.

Profit Center

Question: What is a profit center, and what measures are used to evaluate this type of responsibility center?

Answer: A profit center is an organizational segment that is responsible for costs and revenues (and therefore, profit), but not investments in assets. Retail stores for companies, such as Macy's or Kmart, are treated as profit centers. Individual fast food restaurants for McDonald's or Kentucky Fried Chicken are also examples of profit centers. Managers of profit centers are responsible for revenues, costs, and resulting profits. (Some individual retail stores and fast food restaurants may be considered investment centers if the store manager is also responsible for large investment decisions, such as enlarging the building and purchasing more equipment to accommodate additional customers. Profit center determination must be made on a case-by-case basis, and it depends on the level of responsibility assigned to the store manager.)

Methods of performance evaluation for profit centers vary. Some organizations compare actual profit to budgeted profit. Others compare one profit center to another. Also, some organizations use segmented income statement ratios, such as gross margin or operating profit, to compare current profit center performance to prior periods and to other profit centers. Chapter 13 "How Do Managers Use Financial and Nonfinancial Performance Measures?" explains how companies can use financial ratios to evaluate profit center performance.

Investment Center

Question: What is an investment center, and what measures are used to evaluate this type of responsibility center?

Answer: An investment center is an organizational segment that is responsible for costs, revenues, and investments in assets. Investment center managers have control over asset investment decisions. In many cases, investment centers are treated as stand-alone businesses. Examples of investment centers include the Chevrolet division of General Motors and the printer division of Hewlett Packard.

Several measures can be used to evaluate the performance of investment center managers, including segmented net income, ROI, RI, and economic value added (EVA). The remainder of this chapter will focus on these measures using Game Products, Inc., as the example company. Before turning to these topics, however, look at Note 11.12 "Business in Action 11.3" which indicates the challenges that accountants and managers at Hewlett-Packard face when preparing the company's annual report.

Business in Action 11.3

Segment Reporting at **Hewlett-Packard Company**

Hewlett-Packard Company provides financial information for seven segments in its annual report. Examples of segments and related revenues (in millions) include HP Services (\$15,617), Personal Systems Group (\$29,166), and Imaging and Printing Group (\$26,786). These segments are likely treated as investment centers where segment managers are responsible for costs, revenues, and investments in assets.

Source: Hewlett-Packard Company, "2006 Annual Report," <http://www.hp.com>.

KEY TAKEAWAY

- Responsibility centers are categorized depending on the level of control over revenues, costs, or investments. A segment responsible only for costs is called a cost center. A segment responsible for costs and revenues is called a profit center. A segment responsible for costs, revenues, and investment in assets is called an investment center. Performance measures used to evaluate managers depend on the type of responsibility center being managed.

REVIEW PROBLEM 11.2

For each of the organizational segments listed, determine whether it is a cost center, profit center, or investment center. Explain your answer.

- Individual retail store at **Home Depot**
- Accounting department at **Ford Motor Company**
- Saturn division of **General Motors**
- Human resources department at **IBM**
- Production department at **Sony**
- Jet engine division of **General Electric**
- Computer support department at **Nike**

Solution to Review Problem 11.2

- Profit center. The manager is responsible for costs and revenues, but not investments in assets. (A case might be made that if the manager has control over significant purchases of assets for the store, this would be an investment center.)
- Cost center. The manager is responsible for costs only, not revenues or investments in assets.
- Investment center. The manager is responsible for costs, revenues, and investment decisions.
- Cost center. The manager is responsible for costs only, not revenues or investments in assets.

- e. Cost center. The manager is responsible for costs only, not revenues or investments in assets.
- f. Investment center. The manager is responsible for costs, revenues, and investment decisions.
- g. Cost center. The manager is responsible for costs only, not revenues or investments in assets.

11.3 Comparing Segmented Income for Investment Centers

LEARNING OBJECTIVE

1. Calculate and interpret segmented net income to evaluate performance.

Question: Now that we know an investment center is an organizational segment responsible for costs, revenues, and investments in assets, where do we start in trying to evaluate the performance of investment centers?

Answer: The starting point for evaluating investment centers is typically with reviewing segmented income for each investment center (or division). Segmented income is segment revenues minus segment expenses. Top management is interested in the level of profit that each division generates, and segmented income gives them this information.

Revisiting Game Products, Inc.

Question: In the dialogue at the beginning of the chapter, Mandy Dwyer, president and CEO, said she would like to increase the annual bonus for Carla Klesko, manager of the Board Games division, based on the division's level of profit relative to the other divisions. How does the Board Games division profits compare with the other divisions?

Answer: Profit for the Board Games division is higher than either of the other two, as shown in Figure 11.3 "Segmented Income Statements (Game Products, Inc.)".

Figure 11.3 Segmented Income Statements (Game Products, Inc.)

Game Products, Inc.
Segmented Income Statements
for the Current Fiscal Year Ended December 31
(dollar amounts are in thousands)

	Sporting Goods Division	Board Games Division	Computer Games Division
Sales	\$ 20,000	\$ 34,000	\$ 29,000
Cost of goods sold	<u>6,000</u>	<u>11,000</u>	<u>10,000</u>
Gross margin	\$ 14,000	\$ 23,000	\$ 19,000
Allocated overhead (from corporate)	1,205	2,048	1,747
Selling and administrative expenses	<u>9,500</u>	<u>16,000</u>	<u>15,000</u>
Operating income	\$ 3,295	\$ 4,925	\$ 2,253
Income tax expense (30% rate)	<u>989</u>	<u>1,486</u>	<u>676</u>
Net income	<u>\$ 2,306</u>	<u>\$ 3,466</u>	<u>\$ 1,577</u>
Profit margin ratio	11.53%	10.19%	5.44%

Although this income statement looks much like a financial accounting income statement prepared for outside users, it is for internal use and therefore, need not comply with U.S. Generally Accepted Accounting Principles (U.S. GAAP). In fact, organizations can define income or profit many different ways when evaluating performance. For example, some might only look at operating income, others might exclude allocated overhead from operating income. Another alternative is to focus on gross margin. The point is that managerial accountants must be flexible in designing reports that best meet the needs of managers.

The president of Game Products, Inc., referred to net income when she indicated that the Board Games division performed very well for the year. Solely based on this measure, Mandy's statement is accurate as the Board Games division has net income of \$3,466,000 versus \$2,306,000 for the Sporting Goods division and \$1,577,000 for the Computer Games division.

Limitations of Using Segmented Income to Measure Performance

Question: Although using net income for each division as a performance measure is relatively simple, there are two significant weaknesses. What are these weaknesses?

Answer: First, not all divisions are of equal size. Naturally, larger divisions should produce larger profits. It is unfair to compare net income for a smaller division with net income for a larger division for the purpose of evaluating division manager performance. With \$34,000,000 in sales, the Board Games division should be expected to have higher net income than the other divisions, each of which has sales of less than \$30,000,000.

One solution is to compare profit margin ratios for each division ($\text{net income} \div \text{sales}$). As shown at the bottom of Figure 11.3 "Segmented Income Statements (Game Products, Inc.)", the Sporting Goods division has the highest profit margin ratio at 11.53 percent, compared to 10.19 percent for Board Games, and 5.44 percent for Computer Games. (Chapter 13 "How Do Managers Use Financial and Nonfinancial Performance Measures?" presents several additional financial ratios used to evaluate performance.)

Because each division manager has control over revenues, costs, and investments in assets, each division is considered an investment center. Thus a second weakness in using segmented net income information to evaluate division manager performance is that net income as the sole measure of performance ignores the assets used to produce net income.

For example, suppose the Sporting Goods division only invested approximately \$29,000,000 in assets to produce \$2,306,000 in income, while the Board Games division invested \$55,000,000 in assets to produce \$3,466,000 in income. Which division had the best performance? We need a measure to evaluate how well each division performed relative to the investments made. We discuss three such measures next.

KEY TAKEAWAY

- Investment center managers are often evaluated using segment net income, which is segment revenues minus segment expenses. However, two weaknesses are that this measure does not consider the revenues required to produce segment net income, and this measure ignores the assets used to produce segment net income.

REVIEW PROBLEM 11.3

Kitchen Appliances has two divisions—a Southern division and a Northern division. The following segmented financial information is for the most recent fiscal year ended December 31 (dollar amounts are in thousands).

	Southern Division	Northern Division
Sales	\$5,000	\$30,000
Cost of goods sold	1,500	13,000
Allocated overhead	286	1,714
Selling and administrative expenses	2,100	12,000

Assume the tax rate is 30 percent.

1. Prepare a segmented income statement using the format presented in [Figure 11.3 "Segmented Income Statements \(Game Products, Inc.\)"](#).
2. Using net income as the measure, which division is most profitable? Explain why this conclusion might be misleading.
3. Calculate the profit margin ratio and explain why organizations often use this ratio rather than simply using net income?

Solution to Review Problem 11.3

1. The segmented income statements are shown as follows.

Kitchen Appliances
Segmented Income Statements
for the Current Fiscal Year Ended December 31
(dollar amounts are in thousands)

	Southern Division	Northern Division
Sales	\$5,000	\$30,000
Cost of goods sold	<u>1,500</u>	<u>13,000</u>
Gross margin	\$3,500	\$17,000
Allocated overhead (from corporate)	286	1,714
Selling and administrative expenses	<u>2,100</u>	<u>12,000</u>
Operating income	\$1,114	\$ 3,286
Income tax expense (30% rate)	<u>334</u>	<u>986</u>
Net income	<u>\$ 780</u>	<u>\$ 2,300</u>

2. The Northern division is most profitable with net income of \$2,300,000 versus net income of \$780,000 in the Southern division. Using net income to evaluate which division is most profitable can be misleading because it does not consider the amount of assets needed to produce income. For example, the Northern division may have invested considerably less in assets to produce net income of \$780,000.

Another reason this may be misleading is no consideration is given to the dollar amount of sales required to produce the net income for each division. Clearly the Northern division has significantly higher sales (\$30,000,000 versus \$5,000,000 for the Southern division) and therefore should have significantly higher net income.

3. The profit margin ratio for the Southern division is 15.60 percent ($= \$780,000 \text{ net income} \div \$5,000,000 \text{ sales}$), and the profit margin ratio for the Northern division is 7.67 percent ($= \$2,300,000 \text{ net income} \div \$30,000,000$). This shows that each dollar in sales at the Southern division generates more net income (15.60 cents) than at the Northern division (7.67 cents).

Organizations prefer to use the profit margin ratio when comparing segments because it serves as an equalizer in comparing divisions with significantly different levels of sales revenue.

11.4 Using Return on Investment (ROI) to Evaluate Performance

LEARNING OBJECTIVE

1. Calculate and interpret return on investment (ROI) to evaluate performance.

Question: Perhaps the most common measure of performance for managers responsible for investment centers is return on investment (ROI). What is ROI, and how is it used to evaluate investment centers?

Answer: ROI is defined as operating income divided by average operating assets:

Key Equation

$$\text{Return on investment} = \frac{\text{Operating income}}{\text{Average operating assets}}$$

Note that different organizations use different measures to calculate ROI. Our goal in this discussion is to introduce one common approach, but keep in mind that organizations often make adjustments to this formula to better suit their needs.

The advantage of ROI as a performance measure is that it includes the use of assets. For example, assume 2 divisions have \$10,000 in operating income. Both divisions appear to have performed equally well based on operating income. However, further review shows that Division 1 invested \$200,000 in average operating assets to produce this income while Division 2 invested \$400,000. Clearly, the division that invested half the amount in assets to produce the same amount of income had the best performance of the two. Comparing the ROI for each division proves this:

$$\text{ROI for Division 1} = \frac{\$10,000}{\$200,000} = 5\% \quad \text{ROI for Division 2} = \frac{\$10,000}{\$400,000} = 2.5\%$$

Let's take a closer look at the components of the ROI calculation, operating income and average operating assets.

Operating Income and Average Operating Assets

Question: What is operating income, and how does it differ from net income?

Answer: Operating income is the income produced by the division from its daily activities. It excludes items used in the calculation of net income, such as income tax expense, interest income, interest expense, and any unusual gains or losses. The focus is on how well the division performed relative to its core business operations, which does not include one-time gains or losses from the sale of property, plant, and equipment for example.

Question: What are average operating assets, and how is this amount calculated?

Answer: Average operating assets are the assets that the division has in place to run the daily operations of the business, and this value is calculated by adding beginning period balances and ending period balances and dividing by two. Examples of operating assets include cash, accounts receivable, prepaid assets, buildings, and equipment. As long as the division uses the assets to produce operating income, they are included in the operating assets category. Examples of nonoperating assets—assets not included in this calculation—include land held for investment purposes and office buildings leased to other companies.

An average of operating assets is taken over the period being evaluated for two reasons. First, operating assets are often purchased and sold during an accounting period, and simply taking the ending balance might produce distorted, if not inaccurate, results. Second, operating income represents information for a period of time (income statements always present information for a period of time), while operating assets are presented at a point in time (balance sheets always present information for a point in time). If both of these items are to be included in one ratio (ROI), it is best to use average balance information for balance sheet items. In fact, if the information is readily available, it would be best to take an average of daily operating asset balances for the period being evaluated.

Computing ROI at Game Products, Inc.

Question: Using ROI as the measure, how do the divisions at Game Products, Inc., compare with each other?

Answer: Figure 11.3 "Segmented Income Statements (Game Products, Inc.)" shows segmented income statement information for each of Game Products' three divisions. The operating income line of this income statement provides information needed for the numerator of the ROI calculation. Figure 11.4 "Segmented Balance Sheets (Game Products, Inc.)" presents the segmented balance sheets for each division needed to calculate average operating assets.

Figure 11.4 Segmented Balance Sheets (Game Products, Inc.)

Game Products, Inc. Segmented Balance Sheets December 31 (dollar amounts are in thousands)						
	Sporting Goods Division		Board Games Division		Computer Games Division	
	Ending Balance	Beginning Balance	Ending Balance	Beginning Balance	Ending Balance	Beginning Balance
Assets						
Cash	\$ 3,700	\$ 3,500	\$ 6,400	\$ 5,200	\$ 4,400	\$ 4,200
Accounts receivable	3,200	3,000	8,000	6,600	5,000	4,700
Inventory	3,000	2,900	7,400	6,300	3,900	3,800
Total current assets	\$ 9,900	\$ 9,400	\$21,800	\$18,100	\$13,300	\$12,700
Property, plant and equipment (net)	20,600	18,800	39,000	32,000	21,200	19,600
Total assets	\$30,500	\$28,200	\$60,800	\$50,100	\$34,500	\$32,300
Liabilities and owners' equity						
Accounts payable	\$ 2,400	\$ 2,200	\$ 3,700	\$ 3,100	\$ 2,600	\$ 2,400
Other current liabilities	1,000	1,200	1,400	800	1,100	900
Total current liabilities	\$ 3,400	\$ 3,400	\$ 5,100	\$ 3,900	\$ 3,700	\$ 3,300
Long-term liabilities	0	0	0	0	0	0
Total liabilities	3,400	3,400	5,100	3,900	3,700	3,300
Total owners' equity	27,100	28,800	55,700	46,200	30,800	29,000
Total liabilities and owners' equity	\$30,500	\$28,200	\$60,800	\$50,100	\$34,500	\$32,300

Let's see how each division ranks using ROI. Assume all assets at Game Products, Inc., are operating assets. We use the information in Figure 11.3 "Segmented Income Statements (Game Products, Inc.)" and Figure 11.4 "Segmented Balance Sheets (Game Products, Inc.)" to calculate the ROI for each division in Figure 11.5 "ROI Calculations (Game Products, Inc.)".

Figure 11.5 ROI Calculations (Game Products, Inc.)

Game Products, Inc. Return on Investment for the Current Fiscal Year Ended December 31 (dollar amounts are in thousands)			
	Sporting Goods Division	Board Games Division	Computer Games Division
Operating income*	\$ 3,295	\$ 4,952	\$ 2,253
Average operating assets**	+ \$29,350	+ \$55,450	+ \$33,400
Return on investment^	11.23%	8.93%	6.75%

*Operating income amount is from segmented income statements presented in Figure 11.3 "Segmented Income Statements (Game Products, Inc.)".

**Average operating assets are calculated using the balance sheet information in Figure 11.4 "Segmented Balance Sheets (Game Products, Inc.)". Since all assets at Game Products, Inc., are operating assets, total asset amounts are used in this calculation. The calculation of average operating assets for each division is (Beginning balance of total assets + Ending balance of total assets) ÷ 2. Average operating assets for the Sporting Goods division is \$29,350 (= [\$30,500 + \$28,200] ÷ 2).

^ROI = Operating income ÷ Average operating assets. For Sporting Goods division, 11.23 percent = \$3,295 ÷ \$29,350.

The ROI measures presented in Figure 11.5 "ROI Calculations (Game Products, Inc.)" show that although the Board Games division has the highest operating income, its ROI ranks in the middle of the three divisions. The Sporting Goods division has the highest ROI at 11.23 percent, Board Games is second at 8.93 percent, and Computer Games is the lowest at 6.75 percent. Since managers of each division are responsible for maximizing profit based on investments they make in assets, ROI is a reasonable approach to evaluating each manager. The Sporting Goods division manager appears to be outperforming the other two managers based on this measure.

Issues with ROI as a Performance Measure

Like most financial measures of performance, ROI can be calculated in several different ways. The components of this calculation often vary from one organization to the next. These variations are discussed next.

Operating Income Calculation—A Closer Look

Question: For the purposes of the Game Products, Inc., example, we use the same definition of operating income that is used for financial reporting purposes in accordance with U.S. GAAP. However, organizations often create their own unique calculation of operating income for internal evaluation purposes. How might the internal calculation of operating income vary from U.S. GAAP?

Answer: There are several variations that organizations use when calculating operating income. Two of the more common variations are discussed next.

Excluding Allocated Overhead

The segmented income statements for Game Products, Inc., are presented again in Figure 11.6 "Segmented Income Statements (Game Products, Inc.)" (these are the same segmented income statements as in Figure 11.3 "Segmented Income Statements (Game Products, Inc.)"). Notice the expense line item labeled allocated overhead (from corporate). Although we include this expense in calculating operating income, many organizations do not, particularly if division managers have no control over allocated overhead. Excluding allocated overhead has the effect of increasing ROI for each division manager and holds each division manager responsible only for expense amounts that are controllable.

Figure 11.6 Segmented Income Statements (Game Products, Inc.)

Game Products, Inc. Segmented Income Statements for the Current Fiscal Year Ended December 31 (dollar amounts are in thousands.)				
	Sporting Goods Division	Board Games Division	Computer Games Division	
Sales	\$20,000	\$34,000	\$29,000	
Cost of goods sold	6,000	11,000	10,000	
Gross margin	\$14,000	\$23,000	\$19,000	
Allocated overhead (from corporate)	1,205	2,048	1,747	
Selling and administrative expenses	9,500	16,000	15,000	
Operating income	\$ 3,295	\$ 4,925	\$ 2,253	
Income tax expense (30% rate)	989	1,486	676	
Net income	\$ 2,306	\$ 3,466	\$ 1,577	

Including Income Tax Expense

Review Figure 11.6 "Segmented Income Statements (Game Products, Inc.)" and notice the line item labeled income tax expense. Although we do not include income tax expense in the operating income calculation, some organizations prefer to include this item. Including after-tax expense reduces ROI for each division manager (assuming each division is profitable).

The point here is that the needs of management determine how to define operating income. We will use the U.S. GAAP definition, presented as operating income in Figure 11.6 "Segmented Income Statements (Game Products, Inc.)", throughout this chapter unless indicated otherwise.

Average Operating Assets Calculation—A Closer Look

Question: For Game Products, Inc., we assume all assets are operating assets. That is, all assets are used in the daily operations of the business. As discussed earlier, assets that are not used in the daily operations of the business, such as land held for investment or buildings sublet to other companies, are not included in this calculation. The average is found by taking the beginning balance plus ending balance and dividing by two. The issue in this calculation focuses on long-term assets that are depreciated over time. What options exist in valuing long-term assets for the purpose of calculating ROI?

Answer: There are two common approaches to valuing long-term assets when calculating ROI. Each approach is discussed next.

Using Net Book Value to Calculate ROI

In the Game Products, Inc., example, we use the net book value of long-term assets to calculate operating assets. That is, accumulated depreciation is subtracted from the original cost on the segmented balance sheet in accordance with U.S. GAAP. The balance sheet presented in Figure 11.4 "Segmented Balance Sheets (Game Products, Inc.)" shows this in the line item labeled property, plant, and equipment, net. The advantage of using net book value is that the information is easily obtained from the financial records.

The problem with this approach is division managers with older assets that have been substantially depreciated have an advantage over division managers with newer assets that have not been significantly depreciated. Older assets have a lower net book value (cost – accumulated depreciation) than newer assets, which reduces average operating assets in the denominator and increases ROI.

For example, assume two divisions have identical operating income for the year and identical assets. However, Division 1 has been in operation for many more years than Division 2 and thus has far more accumulated depreciation on long-term assets. This results in a lower net book value on long-term assets for Division 1 as shown in the following:

	Division 1 (older)	Division 2 (newer)
Property, plant and equipment	\$1,000,000	\$1,000,000
Less accumulated depreciation	800,000	100,000
Net book value	<u>\$ 200,000</u>	<u>\$ 900,000</u>

The net book value approach to calculating ROI includes net book value of long-term assets in the denominator (shown here).

Assuming all other assets are identical, and both divisions have identical operating income, Division 1 will have a higher ROI simply because long-term assets are older and have more accumulated depreciation, thereby reducing average operating assets in the denominator. (Reducing the denominator increases the ratio.)

An additional weakness in using net book value to calculate average operating assets is the disincentive it creates for division managers to replace old and inefficient long-term assets, such as equipment and machinery. Although new equipment purchases may be needed to improve efficiency and to remain competitive, the short-term impact is to reduce ROI. (Older equipment will have a lower net book value than identical newer equipment. Thus replacing old equipment will decrease ROI.)

If division managers are evaluated based on ROI, using net book value tends to discourage investments in long-term assets, often at the expense of the organization's long-term profitability.

Using Gross Book Value to Calculate ROI

An alternative approach in calculating ROI is to use gross book value in the average operating assets calculation. Gross book value simply refers to the original cost of long-term assets and ignores accumulated depreciation.

In our example of two divisions with identical assets and identical operating income, the same original cost amount is used in calculating average operating assets. Division 2 is not penalized in the denominator for having newer assets and less accumulated depreciation.

	Division 1 (older)	Division 2 (newer)
Property, plant and equipment	\$1,000,000	\$1,000,000
Less accumulated depreciation	800,000	100,000
Net book value	\$ 200,000	\$ 900,000

The gross book value approach to calculating ROI uses the original cost of long-term assets in the denominator (shown here).

Although both net book value and gross book value are used in practice, we will use net book value throughout this chapter unless indicated otherwise. “Key Equation: Variations of ROI Calculation” summarizes the issues surrounding the calculation of ROI.

Key Equation

Variations of ROI Calculation

$$\text{Return on investment} = \text{Operating income} \div \text{Average operating assets}^{**}$$

*The U.S. GAAP definition of operating income is used for the numerator. However, organizations often calculate operating income differently. Some exclude allocated overhead while others may include income tax expense to get after-tax operating income.

**Average operating assets includes only those assets used in the daily operations of the business. Long-term assets are valued at net book value. However, valuation of long-term assets varies from one organization to the next. Some use *gross* book value rather than *net* book value.

Business in Action 11.4



Source: Photo courtesy of Rod

Ramsey, <http://www.flickr.com/photos/rdrcollection/2078536386/>

Internal Performance Measures at **General Electric**

General Electric Company provides financial information for six segments in its annual report. Segments include Infrastructure, Commercial Finance, GE Money, Healthcare, NBC Universal, and Industrial. The company's annual report indicates that "segment profit is determined based on internal performance measures used by the Chief Executive Officer to assess the performance of each business in a given period. Segment profit excludes or includes interest and other financial charges and segment income taxes according to how a particular segment's management is measured."

This statement reaffirms the point that companies tailor performance measures to meet the needs of each individual segment. For example, **General Electric** *excludes* interest and other financial charges in measuring segment net income for some segments, such as Healthcare, NBC Universal, and Industrial, while *including* interest and financial charges for other segments, such as Commercial Finance and GE Money.

Source: General Electric, "2006 Annual Report," <http://www.ge.com>.

REVIEW PROBLEM 11.4

This is a continuation of [Note 11.18 "Review Problem 11.3"](#) for Kitchen Appliances. Recall that Kitchen Appliances has two divisions broken out by region—a Southern division and a Northern division. The following segmented income statement is for the most recent fiscal year ended December 31 (you were asked to prepare this income statement in [Note 11.18 "Review Problem 11.3"](#)).

Kitchen Appliances
Segmented Income Statements
for the Current Fiscal Year Ended December 31
(dollar amounts are in thousands)

	Southern Division	Northern Division
Sales	\$ 5,000	\$ 30,000
Cost of goods sold	<u>1,500</u>	<u>13,000</u>
Gross margin	\$ 3,500	\$ 17,000
Allocated overhead (from corporate)	286	1,714
Selling and administrative expenses	<u>2,100</u>	<u>12,000</u>
Operating income	\$ 1,114	\$ 3,286
Income tax expense (30% rate)	<u>334</u>	<u>986</u>
Net income	<u>\$ 780</u>	<u>\$ 2,300</u>

Segmented balance sheets for Kitchen Appliances appear as follows.

Kitchen Appliances
Segmented Balance Statements
December 31
(dollar amounts are in thousands)

	Southern Division		Northern Division	
	Ending Balance	Beginning Balance	Ending Balance	Beginning Balance
Assets				
Cash	\$ 1,100	\$ 1,050	\$ 4,400	\$ 3,800
Accounts receivable	800	850	3,100	3,150
Inventory	<u>2,000</u>	<u>2,100</u>	<u>7,500</u>	<u>7,650</u>
Total current assets	\$ 3,900	\$ 4,000	\$ 14,600	\$ 14,600
Property, plant and equipment (net)	5,500	5,800	26,000	28,000
Land (held for sale)	<u>1,000</u>	<u>1,000</u>	<u>2,500</u>	<u>2,500</u>
Total assets	<u>\$ 10,400</u>	<u>\$ 10,800</u>	<u>\$ 43,100</u>	<u>\$ 45,100</u>
Liabilities and owners' equity				
Accounts payable	\$ 1,200	\$ 1,150	\$ 3,700	\$ 3,300
Other current liabilities	300	350	1,250	1,200
Total current liabilities	\$ 1,500	\$ 1,500	\$ 4,950	\$ 4,500
Long-term liabilities	0	0	0	0
Total liabilities	\$ 1,500	\$ 1,500	\$ 4,950	\$ 4,500
Total owners' equity	8,900	9,300	38,150	40,600
Total liabilities and owners' equity	<u>\$ 10,400</u>	<u>\$ 10,800</u>	<u>\$ 43,100</u>	<u>\$ 45,100</u>

1. Calculate *average operating assets* for each division. (Hint: land held for sale is *not* an operating asset.)

2. Calculate *ROI* for each division.
3. What does the ROI tell you about each division at Kitchen Appliances?

Solution to Review Problem 11.4

(All dollar amounts are in thousands.)

1. Average operating assets are calculated in the following. Note that land held for sale is not an operating asset and thus must be deducted from total assets to find operating assets.

	Southern Division		Northern Division	
	Ending Balance	Beginning Balance	Ending Balance	Beginning Balance
Total assets	\$10,400	\$10,800	\$43,100	\$45,100
Less land held for sale	(1,000)	(1,000)	(2,500)	(2,500)
Total operating assets	\$ 9,400	\$ 9,800	\$40,600	\$42,600
Average operating assets	\$9,600*		\$41,600**	

*\$9,600 = (\$9,400 ending balance + \$9,800 beginning balance) ÷ 2.

**\$41,600 = (\$40,600 ending balance + \$42,600 beginning balance) ÷ 2.

2. ROI is calculated as follows:

Kitchen Appliances Return on Investment for the Current Fiscal Year Ended December 31 (dollar amounts are in thousands)		
	Southern Division	Northern Division
Operating income*	\$1,114	\$3,286
Average operating assets**	÷ \$9,600	÷ \$41,600
Return on investment ^Δ	11.60%	7.90%

*Operating income is provided in the segmented income statement.

**Average operating assets is calculated in requirement 1.

$ROI = \text{Operating income} \div \text{Average operating assets}$. For Southern division,
 $11.60 \text{ percent} = \$1,114 \div \$9,600$.

3. The Southern division of Kitchen Appliances has the highest ROI at 11.60 percent. The Northern division's ROI is 7.90 percent. This measure indicates the Southern division is making more profitable use of its assets than the Northern division.

Further Analysis of ROI

Question: How does breaking ROI down into two separate measures help division managers improve their division's ROI?

Answer: Many companies break ROI down into two ratios; operating profit margin and asset turnover. Each of these measures can be used to evaluate strengths and weaknesses of ROI within each division.

Key Equation

$$\text{Operating profit margin} = \frac{\text{Operating income}}{\text{Sales}}$$

Key Equation

$$\text{Asset turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$

Operating profit margin is the ratio of operating income to sales. It provides information about how much operating profit is being produced for each dollar of sales. Asset turnover is the ratio of sales to average operating assets. It provides information about how much revenue each dollar invested in average operating assets produces.

These two ratios can be multiplied by each other to find the ROI as follows:

Key Equation

$$\text{Return on Investment} = ROI = \frac{\text{Operating income}}{\text{Average operating assets}} = \frac{\text{Operating profit margin}}{\text{Operating income}} \times \frac{\text{Sales}}{\text{Average operating assets}} = \text{Operating profit margin} \times \text{Asset turnover}$$

Breaking out ROI into these two ratios provides information that helps division managers identify areas for improvement. ROI can be improved by increasing the operating profit margin, which focuses solely on income statement information. ROI can also be improved by increasing asset turnover, which focuses on the division's use of operating assets to produce sales.

Question: How are these ratios used to evaluate the three divisions at Game Products, Inc.?

Answer: Operating profit margin, asset turnover, and ROI calculations for Game Products, Inc., are shown in Figure 11.7 "Operating Profit Margin, Asset Turnover, and ROI for Game Products, Inc.". Notice the resulting ROI for each division is the same as the ROI shown in Figure 11.5 "ROI Calculations (Game Products, Inc.)" except for slight differences attributed to rounding.

Figure 11.7 Operating Profit Margin, Asset Turnover, and ROI for Game Products, Inc.

	Sporting Goods Division	Board Games Division	Computer Games Division
Operating profit margin = $\frac{\text{Operating income}^*}{\text{Sales}^*}$	$\frac{\$3,295}{\$20,000}$ 16.48%	$\frac{\$4,952}{\$34,000}$ 14.56%	$\frac{\$2,253}{\$29,000}$ 7.77%
Asset turnover = $\frac{\text{Sales}^*}{\text{Average operating assets}^{**}}$	$\frac{\$20,000}{\$29,350}$ 0.68	$\frac{\$34,000}{\$55,450}$ 0.61	$\frac{\$29,000}{\$33,400}$ 0.87
ROI = $\frac{\text{Operating profit margin}}{\text{Asset turnover}}$	$16.48\% \times 0.68$ 11.21%	$14.56\% \times 0.61$ 8.88%	$7.77\% \times 0.87$ 6.76%

*From Figure 11.3 "Segmented Income Statements (Game Products, Inc.)".

**From Figure 11.5 "ROI Calculations (Game Products, Inc.)".

Figure 11.7 "Operating Profit Margin, Asset Turnover, and ROI for Game Products, Inc." shows that Sporting Goods has the highest operating profit margin at 16.48 percent compared to Board Games (14.56 percent) and Computer Games (7.77 percent). However, Computer Games has the highest asset turnover at 0.87 compared to Sporting Goods (0.68) and Board Games (0.61).

This information helps each division manager identify strengths and weaknesses. For example, the Computer Games division has excellent asset turnover relative to other divisions, but has a very low profit margin. The manager of this division must look for ways to improve the profit margin for its products (e.g., increase prices, reduce operating expenses, or both).

Another example is the Sporting Goods division, which has an excellent profit margin, but relatively low asset turnover. The manager of this division must look at ways to improve the utilization of assets to increase turnover.

KEY TAKEAWAY

- ROI is defined as operating income divided by average operating assets as shown in the following equation:

$$\text{Return on investment} = \frac{\text{Operating income}}{\text{Average operating assets}}$$

This measure provides an assessment of how effectively each division is using operating assets to produce operating income. ROI can also be broken into two separate ratios, operating profit margin and asset turnover, which are multiplied together to get ROI as follows:

$$\text{Return on Investment} = \frac{\text{Operating income}}{\text{Average operating assets}} = \frac{\text{Operating profit margin}}{\text{Operating income}} \times \frac{\text{Asset turnover}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Average operating assets}}$$

Many variations of the ROI calculation are used in practice depending on the nature of the organization.

REVIEW PROBLEM 11.5

Use the information in [Note 11.26 "Review Problem 11.4"](#) for Kitchen Appliances to complete the following requirements.

1. Calculate the operating profit margin, asset turnover, and ROI.
2. Which division has the highest ROI? Explain how the two ratios—operating profit margin and asset turnover—influenced the ROI for each division.

Solution to Review Problem 11.5

(All dollar amounts are in thousands.)

1.

	Southern Division	Northern Division
Operating profit margin = $\frac{\text{Operating income}^*}{\text{Sales}^*}$	$\frac{\$1,114}{\$5,000} = 22.28\%$	$\frac{\$3,286}{\$30,000} = 10.95\%$
Asset turnover = $\frac{\text{Sales}^*}{\text{Average operating assets}^{**}}$	$\frac{\$5,000}{\$9,600} = 0.52$	$\frac{\$30,000}{\$41,600} = 0.72$
ROI = $\text{Operating profit margin} \times \text{Asset turnover}$	$22.28\% \times 0.52 = 11.59\%^{\wedge}$	$10.95\% \times 0.72 = 7.88\%^{\wedge}$

*From Note 11.26 "Review Problem 11.4" data.

**From Note 11.26 "Review Problem 11.4" solutions, part 1.

[^]Due to rounding, ROI percent is slightly different than when computed in Note 11.26 "Review Problem 11.4".

2. The Southern division has the highest ROI (11.59 percent versus 7.88 percent at the Northern division), largely attributed to the high operating profit margin (22.28 percent versus 10.95 percent at the Northern division). However, the Southern division has the lowest asset turnover at 0.52 compared to 0.72 at the Northern division. The manager of the Northern division must look for ways to improve the profit margin for its products (e.g., increasing prices and/or reducing operating expenses). Conversely, the manager of the Southern division must look at ways to improve the utilization of assets to increase turnover.

11.5 Using Residual Income (RI) to Evaluate Performance

LEARNING OBJECTIVE

1. Calculate and interpret residual income (RI) to evaluate performance.

Question: Although ROI is commonly used as a divisional performance measure, some division managers dislike this measure. Why do some division managers prefer not to use ROI as a performance measure?

Answer: Some managers dislike ROI because it can lead to decisions that benefit the division but hurt the organization as a whole. Division managers have an incentive to turn down investments that exceed the company's minimum required rate of return but are below the division's current ROI, mainly because ROI trends are often used to evaluate managers. For example, assume the manager of a division is evaluated based on ROI, and the division currently has an ROI of 20 percent:

$$\text{ROI before new investment} = \frac{\text{Operating income}}{\text{Average operating assets}} = \frac{\$20,000}{\$100,000} = 20\%$$

The company's minimum required rate of return is 10 percent, and the division manager is presented with an investment opportunity expected to yield an ROI of 15 percent. This investment totals \$70,000 and annual operating profit will be \$10,500 (15 percent ROI = \$10,500 ÷ \$70,000). Although this investment is well above the company's minimum required rate of return, the division manager will likely not make the investment since the division's overall ROI will decline from 20 percent to 17.9 percent:

$$\text{ROI after new investment} = \frac{\$20,000 + \$10,500}{\$100,000 + \$70,000} = \frac{\$30,500}{\$170,000} = 17.9\%$$

If evaluated solely based on ROI, the division manager would prefer to invest only in projects that increase the division's ROI above 20 percent. In fact, the division manager has an incentive to shed all investments yielding less than 20 percent, even if the investments are producing a return above the company's minimum requirement of 10 percent. An alternative measure to ROI, called residual income (RI), helps to mitigate this apparent conflict.

Calculating RI

Question: What is RI, and how does it help to prevent the conflict associated with ROI?

Answer: RI is the dollar amount of division operating profit in excess of the division's cost of acquiring capital to purchase operating assets. The calculation is as follows:

Key Equation

$$\text{Residual income} = \text{Operating income} - (\text{Percent cost of capital} \times \text{Average operating assets})$$

Rather than using a ratio to evaluate performance, RI uses a dollar amount. As long as an investment yields operating profit higher than the division's cost of acquiring capital, managers evaluated with RI have an incentive to accept the investment. The manager's goal is to increase RI from one period to the next.

Notice that operating income and average operating assets used here to calculate RI are the same measures used in the ROI calculation presented earlier. The one new item, percent cost of capital, is the company's percentage cost to obtain investment funds (often called capital). For example, a company that raises funds by issuing bonds would use the interest rate associated with the bonds in establishing its percent cost of capital. We will always provide the percent cost of capital in this chapter, leaving detailed discussions of its calculation to more advanced courses. Note that several sources provide cost of capital information by industry. One source is the Leonard N. Stern School of Business at New York University (http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/wacc.htm).

Let's take another look at the division that rejected an investment yielding an ROI higher than the company's minimum required rate of return of 10 percent but lower than the division's current ROI of 20 percent. Assume the company's percent cost of capital is the same as its minimum required rate of return of 10 percent. Three RI calculations are provided as follows, (1) RI before the new investment, (2) RI from the new investment, and (3) RI after the new investment. (Note that some organizations make adjustments to the cost of capital to determine the minimum required rate of return. Throughout this chapter, assume percent cost of capital is the same as minimum required rate of return unless stated otherwise.)

$$\text{Residual income before new investment} = \$20,000 - (10\% \times \$100,000) = \$20,000 - \$10,000 = \$10,000$$

$$\text{Residual income from new investment} = \$10,500 - (10\% \times \$70,000) = \$10,500 - \$7,000 = \$3,500$$



Residual income after new investment= $\$30,500 - (10\% \times \$170,000) = \$30,500 - \$17,000 = \$13,500$

Since the manager's goal is to continually increase RI, the proposed investment would be accepted resulting in an increase of \$3,500 in RI ($= \$13,500 - \$10,000$). As shown in this example, using RI as a performance measure is an effective way to minimize the conflict between company goals and division goals that arise using ROI. Rather than maximizing ROI, division managers focus on increasing RI. Managers are more likely to accept investment proposals that have a return greater than the company's minimum required rate of return, regardless of the impact on the division's ROI.

Limitation of RI

Question: Although RI resolves some of the problems of using ROI as a performance measure, it does not provide an efficient means for comparing divisions. What is the problem with using RI to compare divisions?

Answer: Similar to the problem encountered with using segmented net income to compare divisions, RI is stated in dollars (or some other currency) rather than as a ratio. One division may have high RI simply because it has a larger asset base, which produces higher revenues. Thus division managers should be evaluated based on how effectively they increase RI from one period to the next, perhaps in percentage growth, and not on how their RI compares to other divisions.

Most organizations that use RI also use ROI. Using both measures has the benefit of comparing one division to another by using ROI and minimizes the conflict between company goals and division goals by using RI.

Computing RI at Game Products, Inc.

Question: Let's revisit Game Products, Inc., and calculate RI for each of the three divisions. How did the three divisions perform using RI as the measure?

Answer: Figure 11.8 "RI Calculations (Game Products, Inc.)" shows the RI calculation for each division at Game Products, Inc., assuming a cost of capital of 8 percent. Notice that Sporting Goods and Board Games have positive RI, which indicates both divisions are producing operating income above and beyond the minimum required rate of return. Since the Computer Games division has negative RI, this division is not producing enough operating income to achieve the minimum required rate of return.

Having positive RI is reasonable for Sporting Goods and Board Games since both divisions have an ROI above the 8 percent minimum required rate of return (as shown back in Figure 11.7 "Operating Profit Margin, Asset Turnover, and ROI for Game Products, Inc."). It is also reasonable that Computer Games has negative RI since the division's ROI is less than 8 percent.

Figure 11.8 RI Calculations (Game Products, Inc.)



*From Figure 11.3 "Segmented Income Statements (Game Products, Inc.)".

**From Figure 11.5 "ROI Calculations (Game Products, Inc.)".

KEY TAKEAWAY

- RI is the dollar amount of division operating profit in excess of the division's cost of acquiring capital to purchase its operating assets. The calculation is as follows:

$$\text{Residual income} = \text{Operating income} - (\text{Percent cost of capital} \times \text{Average operating assets})$$

Operating income and average operating assets used to calculate ROI are also used here to calculate RI. The percent cost of capital is new and represents the company's percentage cost to obtain investment funds. The goal is for each division manager to increase RI over time.

REVIEW PROBLEM 11.6

This is a continuation of the Kitchen Appliances example presented in [Note 11.18](#) "Review Problem 11.3", [Note 11.26](#) "Review Problem 11.4", and [Note 11.33](#) "Review Problem 11.5". Financial information for Kitchen Appliances is provided again as follows. Assume the cost of capital rate is 6 percent.

Kitchen Appliances Segmented Income Statements for the Current Fiscal Year Ended December 31 (dollar amounts are in thousands)		
	Southern Division	Northern Division
Sales	\$ 5,000	\$30,000
Cost of goods sold	1,500	13,000
Gross margin	\$ 3,500	\$17,000
Allocated overhead (from corporate)	286	1,714
Selling and administrative expenses	2,100	12,000
Operating income	\$ 1,114	\$ 3,286
Income tax expense (30% rate)	334	986
Net income	\$ 780	\$ 2,300

Kitchen Appliances
Segmented Balance Sheets
December 31
(dollar amounts are in thousands)

	Southern Division		Northern Division	
	Ending Balance	Beginning Balance	Ending Balance	Beginning Balance
Assets				
Cash	\$ 1,100	\$ 1,050	\$ 4,000	\$ 3,800
Accounts receivable	800	850	3,100	3,150
Inventory	2,000	2,100	7,500	7,650
Total current assets	\$ 3,900	\$ 4,000	\$14,600	\$14,600
Property, plant and equipment (net)	5,500	5,800	26,000	28,000
Land (held for sale)	1,000	1,000	2,500	2,500
Total assets	\$10,400	\$10,800	\$43,100	\$45,100
Liabilities and owners' equity				
Accounts payable	\$ 1,200	\$ 1,150	\$ 3,700	\$ 3,300
Other current liabilities	300	350	1,250	1,200
Total current liabilities	\$ 1,500	\$ 1,500	\$ 4,950	\$ 4,500
Long-term liabilities	0	0	0	0
Total liabilities	\$ 1,500	\$ 1,500	\$ 4,950	\$ 4,500
Total owners' equity	8,900	9,300	38,150	40,600
Total liabilities and owners' equity	\$10,400	\$10,800	\$43,100	\$45,100

1. Calculate *RI* for each division.
2. How should this information be used to evaluate each division manager?

Solution to Review Problem 11.6

1. All dollar amounts are in thousands.

$$\text{Residual Income} = \text{Operating Income} - \left(\text{Percent Cost of Capital} \times \text{Average Operating Assets} \right)$$

Southern Division (dollar amounts are in thousands):

$$\begin{aligned} \text{Residual income} &= \$1,114^* - (6\% \times \$9,600^{**}) \\ &= \$1,114 - \$576 \\ &= \underline{\underline{\$538}} \end{aligned}$$

Northern Division (dollar amounts are in thousands):

$$\begin{aligned} \text{Residual income} &= \$3,286^* - (6\% \times \$41,600^{**}) \\ &= \$3,286 - \$2,496 \\ &= \underline{\underline{\$790}} \end{aligned}$$

*From Note 11.26 "Review Problem 11.4" data.

**From Note 11.26 "Review Problem 11.4" solutions, part 1.

2. Although the Northern division has higher RI (\$790,000) than the Southern division (\$538,000), it is not enough to simply conclude that the Northern division manager is performing better than the Southern division manager. The goal for each manager is to continually increase RI over time. Thus Kitchen Appliances should compare RI for each division to prior periods and reward division managers for significant increases from one period to the next.

11.6 Using Economic Value Added (EVA) to Evaluate Performance

LEARNING OBJECTIVE

1. Calculate and interpret economic value added (EVA) to evaluate performance.

Question: Another measure of performance similar to residual income (RI) is called economic value added. What is economic value added, and how is it used to evaluate divisions?

Answer: Economic value added (EVA) was created and trademarked by **Stern Stewart & Company**, a management consulting firm, and is defined as follows (additional information can be found at **Stern Stewart & Company's** Web site: <http://www.sternstewart.com>).

Key Equation

$$\text{Economic value added} = \text{Net operating profit after taxes adjusted} - (\text{Percent cost of capital} \times \text{Average operating assets adjusted})$$

Although the calculation is similar to RI, adjustments are made to the financial information to better reflect the economic results of the division. **Stern Stewart & Company** created EVA to provide financial information without the “anomalies” that result from following U.S. GAAP. One example of an anomaly is the expensing of research and development (R&D) costs even though R&D breakthroughs often benefit companies in future years.

There are two distinct differences in calculating EVA compared to RI. First, operating profit is calculated net of income taxes. Finding operating income *after taxes* simply requires deducting income taxes from operating income. Second, adjustments are made to operating income and average operating assets. Although more than 150 possible adjustments can be made, most firms limit adjustments to 15 or less.

Three examples of adjustments to be considered when using EVA are related to research and development (R&D), advertising, and noninterest bearing current liabilities.

- **Research and development.** U.S. GAAP requires that R&D costs be expensed as incurred. However, R&D work typically benefits the company in future periods. EVA capitalizes R&D costs (that is, records these costs as a long-term asset) and amortizes these costs over the estimated useful life of R&D activities.
- **Advertising.** U.S. GAAP also requires that advertising costs be expensed as incurred. Since marketing efforts typically benefit the company in future periods, EVA capitalizes these costs and amortizes them over a period of time.
- **Noninterest bearing current liabilities.** EVA requires deducting noninterest bearing current liabilities from average operating assets. This is because current liabilities that do not require an interest payment are a free source of capital. For example, a company purchasing large amounts of inventory (an asset) on account has a free source of capital, which is presented as a noninterest bearing current liability on the balance sheet.

These three items are provided as examples of adjustments proposed by EVA advocates. However, the adjustments made depend on the organization since EVA calculations are modified to fit the needs of the organization.

Computing EVA for Game Products, Inc.

Question: How is EVA calculated for the divisions at Game Products, Inc.?

Answer: provides the segmented income statements and segmented balance sheet information for each division. These amounts were used earlier in the chapter to calculate segmented net income, ROI, and RI. Notice that research and development

costs are now shown as a separate line item on the income statement, and average balances are shown on the balance sheet rather than beginning and ending balances. (Average balances are simply beginning balances plus ending balances divided by two.) To simplify our analysis, we make only two adjustments—one for research and development and one for noninterest bearing current liabilities. The management believes research and development activities benefit future periods and would like to capitalize R&D costs and amortize these costs over several years. In addition, all current liabilities are noninterest bearing liabilities and as such will be deducted from average operating assets.

The impact of these two adjustments that must be made to the financial information presented in , described as follows, is shown in .

- **Adjustment 1.** On the balance sheet, capitalized R&D costs will increase average operating assets by the unamortized amount of \$400,000 for Sporting Goods, \$1,200,000 for Board Games, and \$2,400,000 for Computer Games. On the income statement, R&D expense for the year shown in is added back to operating income; R&D amortization expense for one year will be deducted as an expense. R&D amortization expense for the year is \$100,000 for Sporting Goods, \$300,000 for Board Games, and \$600,000 for Computer Games. (Note for the purposes of this chapter, amortization expense amounts will be given. Detailed calculations are left to more advanced cost accounting textbooks.)

Since net operating profit after taxes (NOPAT) is used in the EVA calculation, we must remember to calculate NOPAT after making the R&D adjustments. Also, assume this is the first year calculating EVA. Thus Game Products has decided *not* to make any adjustments related to previous years' R&D expenditures.

- **Adjustment 2.** All current liabilities are noninterest bearing and thus are deducted from average operating assets. (Recall that all assets are considered operating assets at Game Products, Inc.)

Figure 11.9 *Income Statement and Balance Sheet Information (Game Products, Inc.)*

Game Products, Inc. Segmented Income Statements for the Current Fiscal Year Ended December 31 (dollar amounts are in thousands)			
	Sporting Goods Division	Board Games Division	Computer Games Division
Sales	\$20,000	\$34,000	\$29,000
Cost of goods sold	6,000	11,000	10,000
Gross margin	\$14,000	\$23,000	\$19,000
Allocated overhead (from corporate)	1,205	2,048	1,747
Research and development expenses	500	1,500	3,000
Selling and administrative expenses	9,000	14,500	12,000
Operating income	\$ 3,295	\$ 4,925	\$ 2,253
Income tax expense (30% rate)	989	1,486	676
Net income	\$ 2,306	\$ 3,466	\$ 1,577

Game Products, Inc. Segmented Balance Sheets Average Balances December 31 (dollar amounts are in thousands)			
	Sporting Goods Division	Board Games Division	Computer Games Division
Assets	Average Balance	Average Balance	Average Balance
Cash	\$ 3,600	\$ 5,800	\$ 4,300
Accounts receivable	3,100	7,300	4,850
Inventory	2,950	6,850	3,850
Total current assets	\$ 9,650	\$19,950	\$13,000
Property, plant and equipment (net)	19,700	35,500	20,400
Total assets	\$29,350	\$55,450	\$33,400
Liabilities and owners' equity			
Accounts payable	\$ 2,300	\$ 3,400	\$ 2,500
Other current liabilities	1,100	1,100	1,000
Total current liabilities	3,400	4,500	3,500
Long-term liabilities	0	0	0
Total liabilities	\$ 3,400	\$ 4,500	\$ 3,500
Total owners' equity	25,950	50,950	29,900
Total liabilities and owners' equity	\$29,350	\$55,450	\$33,400

shows the adjustments, and the resulting EVA calculation for each division. Assume the company's cost of capital rate is 8 percent. This is the same rate that was used for calculating RI.

Figure 11.10 EVA Calculations (Game Products, Inc.)

Game Products, Inc. (dollar amounts are in thousands.)			
	Sporting Goods Division	Board Games Division	Computer Games Division
EVA adjustments to operating income			
Operating income*	\$ 3,295	\$ 4,952	\$ 2,253
Adjustment 1: Add back R&D expenses*	500	1,500	3,000
Adjustment 1: Deduct R&D amortization (amount is given)	(100)	(300)	(600)
Adjusted operating income before tax	\$ 3,695	\$ 6,152	\$ 4,653
Income tax expenses (30% rate)	(1,109)	(1,846)	(1,396)
Net operating profit after tax (adjusted)	\$ 2,586	\$ 4,306	\$ 3,257
EVA adjustments to average operating assets			
Average operating assets*	\$29,350	\$55,450	\$33,400
Adjustment 1: Add unamortized R&D (amount is given)	400	1,200	2,400
Adjustment 1: Deduct non-interest bearing current liabilities	(3,400)	(4,500)	(3,500)
Average operating assets (adjusted)	\$26,350	\$52,150	\$32,300

EVA Calculations			
Economic Value Added	=	Net Operating Profit After Taxes_{adjusted}	- (Percent Cost of Capital × Average Operating Assets_{adjusted})
Sporting Goods EVA	=	\$2,586 - (8% × \$26,350)	
	=	\$2,586 - \$2,108	
	=	<u>\$478</u>	
Board Games EVA	=	\$4,306 - (8% × \$52,150)	
	=	\$4,306 - \$4,172	
	=	<u>\$134</u>	
Computer Games EVA	=	\$3,257 - (8% × \$32,300)	
	=	\$3,257 - \$2,584	
	=	<u>\$673</u>	

*From .

Question: How did each of the three divisions perform using EVA as the measure?

Answer: As shown at the bottom of , all three divisions have positive EVA amounts, which indicates all three have NOPAT (adjusted) in excess of each division's cost of investment funds (adjusted).

Recall from the example in that Computer Games was the only division with negative RI. This negative amount turns to a positive amount using EVA mainly because research and development costs are capitalized and amortized over future years rather than expensed as incurred. Because the Computer Games division had significant research and development costs, and these costs were backed out and recorded as an asset using EVA, NOPAT (adjusted) increased significantly. This caused the EVA amount for Computer Games to become positive.

Weaknesses with EVA

Question: While EVA is no doubt a popular method for evaluating investment centers, and companies as a whole, there are weaknesses in its approach. What are these weaknesses?

Answer: As stated earlier, EVA is similar to RI except adjustments are made to operating income and average operating assets to offset accounting anomalies created by U.S. GAAP. Critics of EVA argue that U.S. GAAP was established for a variety of reasons, one of which was to provide a set of reasonable and objective accounting rules to be followed when recording economic events. Modifying U.S. GAAP to calculate EVA strays from the objectivity provided by U.S. GAAP.

For example, U.S. GAAP requires R&D and advertising costs to be expensed in the period incurred because it is very difficult and subjective to estimate the future benefit these activities may provide. EVA adjustments described earlier for R&D and advertising costs depart from U.S. GAAP. EVA recommends that these costs be capitalized and amortized over the useful life of the activity. This leads to different interpretations of what the useful life should be. Managers now have an incentive to stretch useful lives out as far as possible to minimize amortization expense taken each period.

As with any performance measure, EVA has advantages and disadvantages. The key is to develop a measure that promotes behavior desired by top management and to provide consistency in evaluating managers.

KEY TAKEAWAY

- EVA is simply an extension of RI. Adjustments are made to operating income and average operating assets. EVA is calculated as follows:

$$\text{Economic value added} = \text{Net operating profit after taxes adjusted} - (\text{Percent cost of capital} \times \text{Average operating assets adjusted})$$

REVIEW PROBLEM 11.7

This is a continuation of the Kitchen Appliances example used in previous review problems. Top management of Kitchen Appliances has decided to use EVA as a performance measure for its division managers. The cost of capital rate is 6 percent.

Assume management will make three adjustments to calculate EVA as follows:

- **Adjustment 1.** Marketing costs will be capitalized and amortized over several years. On the balance sheet, average operating assets will increase by the unamortized amount of \$70,000 for the Southern division and \$2,800,000 for the Northern division. On the income statement, marketing expense for the year will be added back to operating income; marketing amortization expense for one year will be deducted. Assume marketing amortization expense for the year is \$30,000 for the Southern division and \$1,200,000 for the Northern division. No adjustments will be made for previous years' marketing expenditures.
- **Adjustment 2.** Land held for sale is not an operating asset and thus is deducted from average operating assets.
- **Adjustment 3.** All current liabilities are noninterest bearing and thus are deducted from average operating assets.

Segmented income statements and balance sheet average amounts are presented next.

Kitchen Appliances
Segmented Income Statements
For the Current Fiscal Year Ended December 31
(dollar amounts are in thousands)

	Southern Division	Northern Division
Sales	\$ 5,000	\$ 30,000
Cost of goods sold	1,500	13,000
Gross margin	<u>\$ 3,500</u>	<u>\$ 17,000</u>
Allocated overhead (from corporate)	286	1,714
Marketing expenses	100	4,000
Administrative expenses	2,000	8,000
Operating income	<u>\$ 1,114</u>	<u>\$ 3,286</u>
Income tax expense (30% rate)	334	986
Net income	<u>\$ 780</u>	<u>\$ 2,300</u>

Kitchen Appliances
Segmented Balance Sheets Average Balances
December 31
(dollar amounts are in thousands)

	Southern Division	Northern Division
	Average Balance	Average Balance
Assets		
Cash	\$ 1,075	\$ 3,900
Accounts receivable	825	3,125
Inventory	2,050	7,575
Total current assets	<u>\$ 3,950</u>	<u>\$ 14,600</u>
Property, plant and equipment (net)	5,650	27,000
Land (held for sale)	1,000	2,500
Total assets	<u>\$ 10,600</u>	<u>\$ 44,100</u>
Liabilities and owners' equity		
Accounts payable	\$ 1,175	\$ 3,500
Other current liabilities	325	1,225
Total current liabilities	<u>\$ 1,500</u>	<u>\$ 4,725</u>
Long-term liabilities	0	0
Total liabilities	<u>\$ 1,500</u>	<u>\$ 4,725</u>
Total owners' equity	9,100	39,375
Total liabilities and owners' equity	<u>\$ 10,600</u>	<u>\$ 44,100</u>

1. Calculate EVA for each division.
2. What does the EVA show for each division?

Solution to Review Problem 11.7

1. The EVA calculation is as follows:

Kitchen Appliances (dollar amounts are in thousands.)			
	Southern Division	Northern Division	
Used for residual income and ROI			
EVA adjustment to operating income			
Operating income (from income statement)	\$ 1,114	\$ 3,286	
Adjustment 1: Add back R&D expenses (from income statement)	100	4,000	
Adjustment 1: Deduct R&D amortization (given)	(30)	(1,200)	
Income tax expenses (30% rate)	\$ 1,184	\$ 6,086	
Net operating profit after tax (adjusted)	(355)	(1,826)	
	<u>\$ 829</u>	<u>\$ 4,260</u>	
EVA adjustment to average operating assets			
Average operating assets (from balance sheet)	9,600	41,600	
Adjustment 1: Add unamortized R&D (amount is given)	70	2,800	
Adjustment 2: Deduct land held for sale	(1,000)	(3,500)	
Adjustment 3: Deduct non-interest bearing current liabilities	(1,500)	(4,725)	
Average operating assets (adjusted)	<u>\$ 52,150</u>	<u>\$ 39,675</u>	
Used for EVA			
<p>EVA Calculations</p> $\text{Economic Value Added} = \text{Net Operating Profit After Taxes}_{\text{adjusted}} - \left(\text{Percent Cost of Capital} \times \text{Average Operating Asset}_{\text{adjusted}} \right)$ <p>Southern Division EVA = \$829 – (6% × \$8,170) = \$829 – \$490 = <u>\$339</u></p> <p>Northern Division EVA = \$4,260 – (6% × \$39,675) = \$4,260 – \$2,381 = <u>\$1,893</u></p>			

- Both divisions have positive EVA amounts, indicating both have NOPAT (adjusted) above and beyond the cost of investment funds (adjusted). It is interesting to note that when compared to RI amounts calculated in , EVA results in a significantly higher amount for the Northern division. This can be attributed to the large amount of marketing expenditures at the Northern division that were expensed using RI, but capitalized and amortized using EVA. Deferring significant amounts of marketing expenses to future years has the impact of increasing NOPAT in the year of the expenditure, thereby increasing EVA.

11.7 Wrap-Up of Game Products, Inc.

Question: At the meeting described at the beginning of the chapter between Mandy Dwyer (president and CEO) and Larry Meske (CFO), Mandy wanted to revise the compensation plan for the manager of the Board Games division to increase her bonus because profits had increased significantly compared to prior years. Larry suggested using measures other than segmented net income to evaluate each division and asked for time to gather additional information. What information did Larry gather, and how does this additional information help Mandy evaluate each division?

Answer: Larry assembled the information using the five methods of evaluating investment centers presented in this chapter: (1) segmented net income, (2) profit margin ratio, (3) return on investment (ROI), (4) residual income (RI), and (5) economic value added (EVA). These five measures have been calculated for each division of Game Products, Inc., and are summarized in Figure 11.11 "Five Performance Measures at Game Products, Inc.".

Figure 11.11 Five Performance Measures at Game Products, Inc.

Game Products, Inc. Performance Evaluation Measures for the Current Fiscal Year Ended December 31 (dollar amounts are in thousands.)			
	Sporting Goods Division	Board Games Division	Computer Games Division
1. Segmented net income	\$2,306.00	\$3,466.00	\$1,577.00
2. Profit margin ratio	11.53%	10.19%	5.44%
3. Return on investment	11.23%	8.93%	6.75%
4. Residual income	\$ 947.00	\$ 516.00	\$ (419.00)
5. Economic value added	\$ 478.00	\$ 134.00	\$ 673.00

Figure 11.12 "Comparison of Income Performance Measures for Each Division at Game Products, Inc." shows a comparison of the three divisions for segmented income, RI, and economic value added. Figure 11.13 "Comparison of Profit Margin Ratio and Return Investment for Each Division at Game Products, Inc." shows a comparison of the three divisions for the profit margin ratio and ROI.

Figure 11.12 Comparison of Income Performance Measures for Each Division at Game Products, Inc.

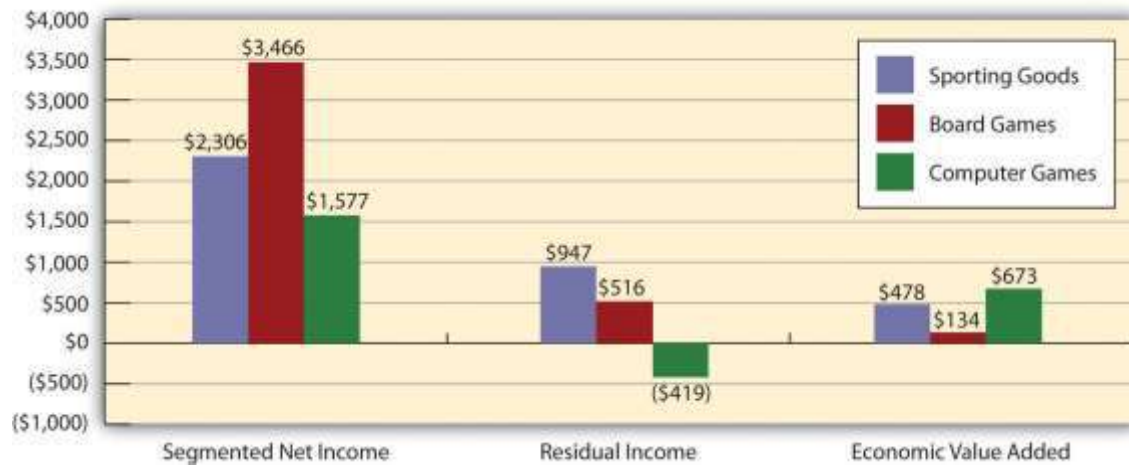
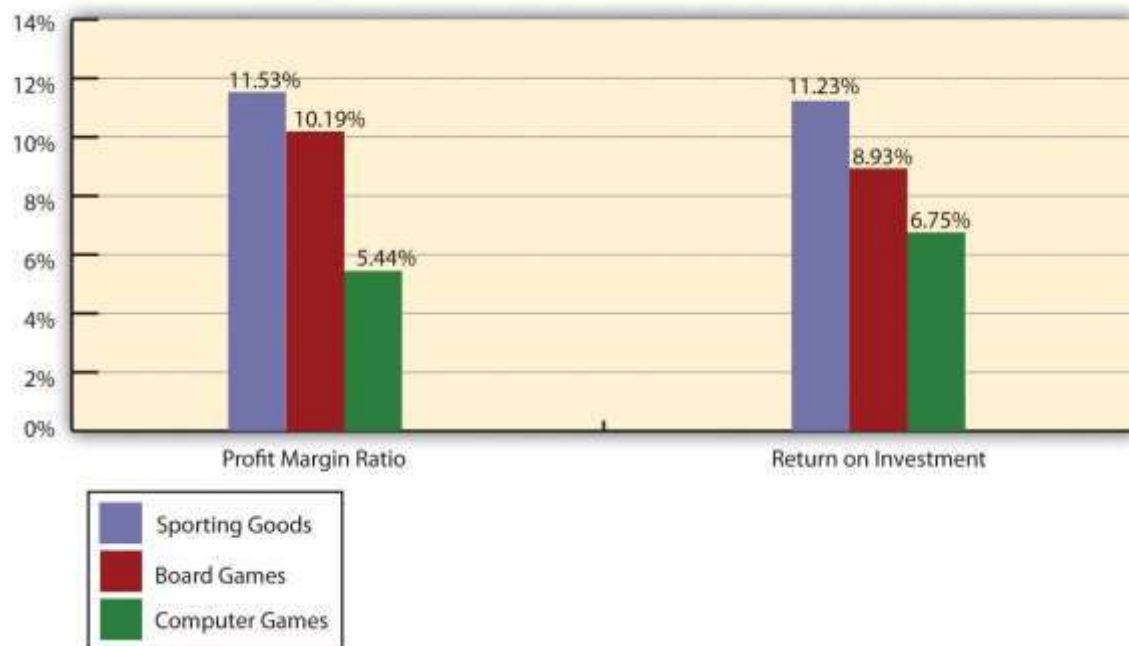


Figure 11.13 Comparison of Profit Margin Ratio and Return Investment for Each Division at Game Products, Inc.



When Mandy and Larry meet again a month later, Larry has the difficult task of explaining the information to Mandy and recommending a course of action.

Mandy (president and CEO):	Larry, let's begin where we left off at our last meeting. What do you have for me with regard to performance evaluation measures we might use for our division managers?
Larry (CFO):	Here is a summary of five measures I think can be useful if used correctly (see Figure 11.11 "Five Performance Measures at Game Products, Inc."). As you suggested, Mandy, the starting point is segmented net income, which is shown on line one. The Board Games division has the highest net income and looks to be a strong performer in this regard.
Mandy:	What is the ratio shown on line two?
Larry:	This is the profit margin ratio. It is a much better measure to evaluate the profitability of each division relative to sales. This measure shows the Sporting Goods division produced the highest profit for each dollar in sales with a ratio of 11.53 percent. Board Games is second at 10.19 percent and Computer Games is last at 5.44 percent.
Mandy:	I see. What about the use of assets? Each division is responsible for investments in assets and we would like to know how effective each division is in producing income with these assets. Is this where ROI comes in?
Larry:	Yes. As shown on line three, the Sporting Goods division is making the best use of its operating assets with an ROI of 11.23 percent. Board Games is second at 8.93 percent, and Computer Games is last at 6.75 percent.
Mandy:	So you're telling me Sporting Goods is doing better than the other two divisions, even though Board Games has the highest net income?
Larry:	Yes, Sporting Goods is the most effective at using assets to produce profit.
Mandy:	What are the last two measures you show here?
Larry:	Both of these last two measures also consider asset use in the calculation.

	<i>As shown on line four, Sporting Goods had the best performance by producing \$947,000 in RI compared to \$516,000 at Board Games and \$(419,000) at Computer Games.</i>
<i>Mandy:</i>	<i>Computer Games has negative RI?</i>
<i>Larry:</i>	<i>Yes. However, you will notice that EVA shown on line five presents a different picture.</i>
<i>Mandy:</i>	<i>Why?</i>
<i>Larry:</i>	<i>Computer Games has high research and development costs each year—it's the nature of the industry. U.S. GAAP requires these costs to be expensed when incurred. EVA suggests recording R&D costs as an asset and amortizing the costs over the useful life of R&D activities. Since Computer Games has much higher R&D costs than the other divisions, the numbers changed dramatically relative to the other divisions. Also, after-tax income is used rather than operating income, and average assets are adjusted as well.</i>
<i>Mandy:</i>	<i>Seems as if there is an awful lot of subjectivity in using EVA.</i>
<i>Larry:</i>	<i>Yes, there is. If we choose to use EVA as one of our measures, management must meet to discuss and agree upon the adjustments to be made.</i>
<i>Mandy:</i>	<i>Larry, thanks for your analysis. I'm beginning to understand the importance of including asset use in our performance measures. Where do we go from here?</i>
<i>Larry:</i>	<i>I like the first three measures—net income, profit margin ratio, and ROI. They are widely used in industry, and managers tend to understand the nature of these measures. The last two measures are also useful and should not be overlooked. My recommendation is to meet with the division managers to develop a comprehensive incentive compensation plan. The key</i>

	<i>is to develop a plan that motivates our managers to achieve company goals.</i>
<i>Mandy:</i>	<i>I like the idea! Let's meet next week.</i>

11.8 Appendix: Transfer Prices between Divisions

LEARNING OBJECTIVE

1. Explain how transfer pricing can affect performance evaluation measures.

Question: Many companies have independent divisions that transfer goods or services from one division to another. If division managers are evaluated based only on division results using measures, such as segmented net income, profit margin ratio, or return on investment (ROI), conflicts can arise causing managers to take a course of action that benefits the division but hurts the company as a whole. For example, a division manager may decide to purchase raw materials from an outside supplier even though the same materials can be produced at a lower cost by another division within the company (the other division's manager refuses to sell the materials at a reduced price because she is evaluated based on her division's profits!). How should a company establish transfer pricing to avoid this kind of conflict?

Answer: The price used to value the transfer of goods or services between divisions within the same company is called a transfer price. Several different approaches can be used to establish transfer prices between divisions. The goal is to establish a transfer pricing policy that encourages managers to do what is in the best interest of the company while also doing what is in the best interest of the division manager (this is called goal congruence). Several common approaches are presented next.

Using the General Economic Transfer Pricing Rule

Question: How does the general economic transfer pricing rule help organizations to establish an appropriate transfer price?

Answer: The general economic transfer pricing rule attempts to establish guidelines for divisions to maximize overall company profit. This rule states the transfer price should be set at differential cost to the selling division (normally variable cost), plus the opportunity cost of

making the sale internally (none if the seller has idle capacity or selling price minus differential cost if the seller is at capacity). This rule is summarized in “Key Equation: Economic Transfer Pricing Rule.”

Key Equation

Economic Transfer Pricing Rule

Transfer price = Differential cost to selling division + Opportunity cost of selling internally

Let’s look at an example illustrating how to establish a reasonable transfer price using the economic transfer pricing rule. Umbrellas, Inc., has two divisions—Assembly and Marketing. In the past, all transfers of umbrellas from Assembly to Marketing were valued at the variable cost of \$6 each. However, the Assembly division manager would like to raise the price to \$9 per unit.

Which transfer price should be used to maximize company profit, \$6 or \$9? The answer depends on whether the selling division (Assembly) is below capacity or at capacity.

Transfer Pricing When Selling Division Is below Capacity

Question: Assume Assembly is below capacity. This means there is no opportunity cost of selling internally since no outside sales are forgone as a result of the transaction. What is the appropriate transfer price in this scenario?

Answer: Given this set of circumstances, the Assembly division should set the transfer price at its variable cost of \$6 per unit as shown in “Key Equation: Transfer Pricing When below Capacity (Umbrellas, Inc.).” This ensures Marketing does not purchase the umbrellas from another supplier at an amount greater than Umbrella, Inc.’s variable cost.

Key Equation

Transfer Pricing When below Capacity (Umbrellas, Inc.)

Transfer price = Differential cost to selling division + Opportunity cost of selling internally
 $\$6 + \$0 = \$6$

*This is the variable cost for Assembly to produce each umbrella.

****Opportunity cost is zero since no outside sales are forgone as a result of making this internal sale.**

If Assembly sets the transfer price higher than \$6 per unit (\$9 for example), thereby violating the economic transfer pricing rule, the risk is that Marketing might find another company willing to provide the umbrellas for an amount less than \$9 and higher than \$6. If Marketing chooses to buy umbrellas from an outside supplier for \$7, for example, profit declines at Umbrella, Inc., because the company paid \$1 more than necessary for each umbrella ($\$1 = \$7 \text{ outside supplier price} - \$6 \text{ Umbrella, Inc.'s variable cost}$). Although Marketing looks better as an investment center buying from the outside for \$7 because the cost is \$2 less than the internal transfer price, the overall company is worse off because the \$7 cost is \$1 higher than if the umbrellas were produced internally.

Transfer Pricing When Selling Division Is at Capacity

Question: Now assume Assembly is at capacity. This creates an opportunity cost of selling internally, since outside sales must be forgone as a result of the transaction. What is the appropriate transfer price in this scenario?

Answer: Given this new set of circumstances for Umbrellas, Inc., the Assembly division should set the transfer price at its variable cost of \$6 per unit plus the opportunity cost of selling internally. Assume the Assembly division sells the umbrellas to outside customers for \$10 each. The opportunity cost of selling internally is \$4 ($= \$10 \text{ market price} - \6 variable cost). Thus the transfer price that maximizes company profit is \$10 as shown in “Key Equation: Transfer Pricing When at Capacity (Umbrellas, Inc.)” Assembly is indifferent whether it sells internally for \$10 or to outside customers for \$10.

Key Equation

Transfer Pricing When at Capacity (Umbrellas, Inc.)

Transfer price = Differential cost to selling division + Opportunity cost of selling internally
 $\$10 = \$6 + \$4$

*This is the variable cost for Assembly to produce each umbrella.

**Opportunity cost is the revenue forgone of \$4 by selling internally. Revenue forgone of \$4 = \$10 market price – \$6 variable cost.

The economic transfer pricing rule works well when outside market prices are available (see). However, not all goods or services transferred from one division to another have a readily available outside market price. Thus other methods of establishing transfer pricing must be considered.

Business in Action 11.5

Transfer Pricing at **General Electric**

A review of the notes to **General Electric's** annual report reveals the amount of “intersegment revenues” recorded for each of the company’s six segments. This is referring to revenue derived from transferring goods and services between divisions. The note also states that “sales from one component (segment) to another generally are priced at equivalent commercial selling prices.” It appears from this note that **General Electric** uses market price to establish transfer prices.

Source: General Electric, “2006 Annual Report,” <http://www.ge.com>.

Using Cost to Set Transfer Price

Question: Another approach to establishing a transfer price is to use the cost of the goods or services being transferred. How are these costs determined?

Answer: Transfer prices can be based on variable cost, full absorption cost, or cost-plus. Each approach is described next.

Variable Cost

Some companies simply use the selling division’s variable cost as the transfer price. However, the weakness in this approach is the selling division will not be able to mark up its products or

services, and as a result, will not be able to generate a profit. This is not a problem for selling divisions treated as cost centers, but profit center and investment center managers will not be satisfied with such an approach.

Full Absorption Cost

Companies sometimes set the transfer price at the selling division's full absorption cost. The selling division manager prefers to cover all costs rather than only variable costs, and using full-absorption cost accomplishes this goal. However, the company's concern is the buying division might choose to purchase from an outside provider at a higher price than the differential cost plus opportunity cost but lower than the selling division's full absorption cost. The result is a decision that does not maximize company profit.

Cost-Plus

Companies often add a markup to the selling division's variable cost or full absorption cost to set the transfer price. This enables the selling division to earn a profit on internal transfers. Again, the risk is that the buying division might buy from an outside supplier at a higher price than differential cost plus opportunity cost, resulting in lower company profit.

Negotiating Transfer Prices

Question: If the general economic transfer pricing rule is not used, and the cost approach is not used, another alternative is to simply negotiate the transfer price. What are the potential weaknesses in negotiating a transfer price?

Answer: Investment center division managers are often expected to act independent of each other. In fact, many companies treat investment centers as separate businesses. To promote the autonomy of each division manager, companies often require the buying and selling divisions to negotiate a transfer price. This sounds reasonable in concept, but the same weakness exists here as with using costs to set a transfer price. The buying division may choose to purchase the goods or services from an outside supplier if negotiations break down, which may lead to a suboptimal decision for the company as a whole.

An additional weakness is the time required to negotiate a transfer price. Managers can spend significant amounts of time in negotiations when the time might be better spent more productively elsewhere in the division.

Choosing the Best Approach to Establish a Transfer Price

Question: Which transfer pricing approach is best?

Answer: There is no one “best” approach to establishing transfer prices. No two companies are identical, and the choice of a transfer pricing policy depends largely on the nature of the company. The most common approaches used in industry are presented in this appendix. The goal is to establish a transfer pricing policy that encourages managers to do what is in the best interest of the company while also serving the best interest of the division manager.

KEY TAKEAWAY

- The price used to value the transfer of goods or services between divisions within the same company is called a transfer price. Although there are different approaches for establishing a transfer price, the general economic transfer pricing rule states the transfer price should be set at differential cost to the selling division (normally variable cost) plus the opportunity cost of making the sale internally (none if the seller has idle capacity or selling price minus variable cost if the seller is at capacity). The goal is to establish a transfer pricing policy that encourages managers to do what is in the best interest of the company while also doing what is in the best interest of the division manager.

REVIEW PROBLEM 11.8

Maine Products, LLP, has two divisions—Chocolate and Mint. The Chocolate division typically sells its chocolate to the Mint division for \$3 per pound, which covers variable costs. The Chocolate division sells to outside customers for \$5 per pound.

Use the general economic transfer pricing rule to address the following requirements:

1. Calculate the optimal transfer price assuming the Chocolate division is below capacity.

2. Calculate the optimal transfer price assuming the Chocolate division is at capacity.

Solution to Review Problem 11.8

1. Because the Chocolate division is *below capacity*, no outside customer sales are forgone as a result of selling internally. Thus the opportunity cost of selling internally is zero. The optimal transfer price is \$3, calculated as follows:

$$\text{Transfer price} \$3 = \text{Differential cost to selling division} \$3 + \text{Opportunity cost of selling internally} \$0^{**}$$

*This is the variable cost per pound.

**Opportunity cost is zero since no outside sales are forgone as a result of selling internally.

2. Since the Chocolate division is *at capacity*, outside customer sales are forgone as a result of selling internally. Thus there is an opportunity cost of selling internally. The optimal transfer price is \$5, calculated as follows:

$$\text{Transfer price} \$5 = \text{Differential cost to selling division} \$3 + \text{Opportunity cost of selling internally} \$2^{**}$$

*This is the variable cost per pound.

**Opportunity cost is the revenue forgone of \$2 by selling internally (= \$5 market price – \$3 variable cost).

END-OF-CHAPTER EXERCISES

Questions

1. What is meant by the term *decentralized organization*?
2. What are the advantages and disadvantages of decentralizing operations?

3. Refer to Why would a growing college, such as **Sierra College**, decentralize operations?
4. Refer to How did decentralization at **Arthur Andersen** contribute to the company's downfall?
5. Describe the three types of responsibility centers presented in the chapter.
6. Describe at least three measures used to evaluate performance of investment center division managers.
7. What are the two weaknesses of using segmented net income to evaluate managers of investment centers? What performance measures would you use to overcome these weaknesses?
8. What is the primary advantage of using ROI rather than segmented net income or profit margin ratio to evaluate investment center managers?
9. Describe *operating profit margin* and *asset turnover*, and explain how each of these ratios can be used to help division managers improve ROI.
10. Describe the potential conflict that can occur between division manager goals and overall company goals when evaluating divisions using ROI.
11. Refer to How did **General Electric** modify net income to evaluate each segment?
12. Describe residual income (RI), and explain how RI can resolve the conflict between division manager goals and company goals often created by using ROI.
13. Explain the difference between RI and economic value added.
14. Refer to the Game Products, Inc., performance measures presented in. Identify which measures you would recommend to the CEO of Game Products, and explain the reasoning behind your recommendation.
15. **Appendix.** Describe the general economic transfer pricing rule.

Brief Exercises

16. **Evaluating Division Managers at Game Products, Inc.** Refer to the dialogue at Game Products, Inc., presented at the beginning of the chapter. Why does the president want to give Carla Klesko, the Board Games division manager, a bonus? Does the CFO agree that Carla deserves a larger bonus than the other division managers? What

performance measures would the CFO like to consider before awarding Carla a larger bonus?

17. Decentralizing Operations. Burton Electronics produces radios, computers, and navigation systems. Although all high level decisions are made at company headquarters by top management, rapid expansion and increasingly specialized products have caused the company to consider decentralizing into three divisions. Each division manager would be responsible for costs, revenues, and investments in assets.

Required:

- a. How should the company classify each division, as a cost center, profit center, or investment center? Explain.
- b. What are the potential advantages of decentralizing?
- c. What are the potential disadvantages of decentralizing?

Responsibility Centers. Aviation Products, Inc., operates primarily in the United States and has several segments:

1. Accounting and finance: responsible for recording financial information and preparing financial reports.
2. Human resources: responsible for hiring employees and maintaining personnel records.
3. Retail stores: responsible for sales prices and all costs within each store.
4. Advertising: responsible for promotional materials.
5. Production: responsible for manufacturing company products.
6. International operations: acts as an independent segment responsible for all facets of the business outside of the United States.

Required:

For each of the preceding segments, identify whether it is a cost center, profit center, or investment center. Explain your answer.

Segmented Net Income. Franklin Bikes has two divisions—Road Bikes and Mountain Bikes. Using the segmented income statements presented in the following, determine the profit margin ratio for each division.

Franklin Bikes Segmented Income Statements for the Current Fiscal Year Ended December 31 (dollar amounts are in thousands)		
	Road Bikes Division	Mountain Bikes Division
Sales	\$1,500,000	\$500,000
Cost of goods sold	800,000	215,000
Gross margin	\$ 700,000	\$285,000
Allocated overhead	150,000	115,000
Selling and administrative expenses	100,000	75,000
Operating income	\$ 450,000	\$ 95,000
Income tax expense (30% rate)	135,000	28,500
Net income	\$ 315,000	\$ 66,500

Return on Investment (ROI). The segmented income statements presented as follows are for the two divisions of Franklin Bikes. (This is the same company as the previous exercise. This exercise can be assigned independently.) Assume the Road Bikes division had average operating assets totaling \$4,500,000 for the year, and the Mountain Bikes division had average operating assets of \$800,000. Calculate ROI for each division.

Franklin Bikes
Segmented Income Statements
for the Current Fiscal Year Ended December 31
(dollar amounts are in thousands)

	Road Bikes Division	Mountain Bikes Division
Sales	\$ 1,500,000	\$ 500,000
Cost of goods sold	800,000	215,000
Gross margin	\$ 700,000	\$ 285,000
Allocated overhead	150,000	115,000
Selling and administrative expenses	100,000	75,000
Operating income	\$ 450,000	\$ 95,000
Income tax expense (30% rate)	135,000	28,500
Net income	\$ 315,000	\$ 66,500

Residual Income (RI). The segmented income statements presented as follows are for the two divisions of Franklin Bikes. (This is the same company as the previous exercises. This exercise can be assigned independently.) Assume the Road Bikes division had average operating assets totaling \$4,500,000 for the year, and the Mountain Bikes division had average operating assets of \$800,000. The company's cost of capital rate is 8 percent. Calculate RI for each division.

Franklin Bikes
Segmented Income Statements
for the Current Fiscal Year Ended December 31
(dollar amounts are in thousands)

	Road Bikes Division	Mountain Bikes Division
Sales	\$ 1,500,000	\$ 500,000
Cost of goods sold	800,000	215,000
Gross margin	\$ 700,000	\$ 285,000
Allocated overhead	150,000	115,000
Selling and administrative expenses	100,000	75,000
Operating income	\$ 450,000	\$ 95,000
Income tax expense (30% rate)	135,000	28,500
Net income	\$ 315,000	\$ 66,500

Economic Value Added (EVA). Computer Tech Company has two divisions—Hardware and Software. Adjustments have already been made to *net operating profit after taxes (NOPAT)* and *average operating assets* for the purposes of calculating EVA for each division. This adjusted information is shown as follows. Assume the company's cost of capital is 12 percent. Calculate EVA for each division.

	Hardware Division	Software Division
NOPAT—adjusted	\$ 810,000	\$ 980,000
Average operating assets—adjusted	3,500,000	3,200,000

(Appendix). What is the primary goal for an organization establishing a transfer pricing policy?

Exercises: Set A

24. Segmented Net Income. Pool Accessories, Inc., has two divisions—Furniture and Supplies. The following segmented financial information is for the most recent fiscal year ended December 31.

	Furniture Division	Supplies Division
Sales	\$3,000,000	\$1,000,000
Cost of goods sold	1,600,000	430,000
Allocated overhead	375,000	125,000
Selling and administrative expenses	250,000	200,000

25. Assume the tax *rate* is 30 percent.

26. *Required:*

- a. Prepare a segmented income statement using the format presented in . Include the profit margin ratio for each division at the bottom of the segmented income statement.
- b. Using net income as the measure, which division is most profitable? Explain why this conclusion might be misleading.
- c. What does the profit margin ratio tell us about each division? Why do organizations often use profit margin ratio to evaluate division performance rather than simply using net income?

ROI. Pool Accessories, Inc., has two divisions—Furniture and Supplies. (This is the same company as the previous exercise. This exercise can be assigned independently.) Segmented income statement information for the most recent fiscal year ended December 31 is shown as follows. Assume the Furniture division had average operating assets totaling \$6,500,000 for the year, and the Supplies division had average operating assets of \$1,750,000.

Pool Accessories, Inc.
Segmented Income Statements
for the Current Fiscal Year Ended December 31
(dollar amounts are in thousands)

	Furniture Division	Supplies Division
Sales	\$ 3,000,000	\$ 1,000,000
Cost of goods sold	<u>1,600,000</u>	<u>430,000</u>
Gross margin	\$ 1,400,000	\$ 570,000
Allocated overhead	375,000	125,000
Selling and administrative expenses	<u>250,000</u>	<u>200,000</u>
Operating income	\$ 775,000	\$ 245,000
Income tax expense (30% rate)	<u>232,500</u>	<u>73,500</u>
Net income	<u>\$ 542,500</u>	<u>\$ 171,500</u>

Required:

- a. Calculate ROI for each division.
- b. What does ROI tell us about each division? Indicate why this measure is useful in evaluating investment centers.

ROI Using Operating Profit Margin and Asset Turnover. Pool

Accessories, Inc., has two divisions—Furniture and Supplies. (This is the same company as the previous exercises. This exercise can be assigned independently.) Segmented income statement information for the most recent fiscal year ended December 31 is shown as follows. Assume the Furniture division had average operating assets totaling \$6,500,000 for the year, and the Supplies division had average operating assets of \$1,750,000.

Pool Accessories, Inc.
Segmented Income Statements
for the Current Fiscal Year Ended December 31
(dollar amounts are in thousands)

	Furniture Division	Supplies Division
Sales	\$ 3,000,000	\$ 1,000,000
Cost of goods sold	1,600,000	430,000
Gross margin	\$ 1,400,000	\$ 570,000
Allocated overhead	375,000	125,000
Selling and administrative expenses	250,000	200,000
Operating income	\$ 775,000	\$ 245,000
Income tax expense (30% rate)	232,500	73,500
Net income	\$ 542,500	\$ 171,500

Required:

- a. For each division, calculate operating profit margin, asset turnover, and resulting ROI.
- b. Which division has the highest ROI? For the division that has the lowest ROI, what can be done to improve this ratio?

RI. Pool Accessories, Inc., has two divisions—Furniture and Supplies. (This is the same company as the previous exercises. This exercise can be assigned independently.) Segmented income statement information for the most recent fiscal year ended December 31 is shown as follows. Assume the Furniture division had average operating assets totaling \$6,500,000 for the year, and the Supplies division had average operating assets of \$1,750,000. Assume the cost of capital rate is 10 percent.

Pool Accessories, Inc.
Segmented Income Statements
for the Current Fiscal Year Ended December 31
(dollar amounts are in thousands)

	Furniture Division	Supplies Division
Sales	\$ 3,000,000	\$ 1,000,000
Cost of goods sold	1,600,000	430,000
Gross margin	\$ 1,400,000	\$ 570,000
Allocated overhead	375,000	125,000
Selling and administrative expenses	250,000	200,000
Operating income	\$ 775,000	\$ 245,000
Income tax expense (30% rate)	232,500	73,500
Net income	\$ 542,500	\$ 171,500

Required:

- a. Calculate RI for each division.
- b. What does RI tell us about each division?

Solving Unknowns for ROI. The following information is for two divisions at Kayak Company.

	Lake Division	Ocean Division
Sales	?	\$900,000
Operating income	?	\$108,000
Operating profit margin	8.0 percent	?
Average operating assets	\$150,000	\$600,000
Asset turnover	1.7	?
ROI	?	?

Required:

Find the missing information for each division.

EVA. Links Company produces golf clubs and other sporting goods accessories. The following information is for each division at Links for the most recent fiscal year.

	Golf Division	Sporting Goods Division
Income statement:		
Sales	\$ 5,000,000	\$ 12,000,000
Cost of goods sold	2,400,000	5,000,000
Gross margin	\$ 2,600,000	\$ 7,000,000
Allocated overhead (from corporate)	1,470,588	3,529,412
R&D expenses	500,000	800,000
Administrative expenses	250,000	550,000
Operating income	\$ 379,412	\$ 2,120,588
Income tax expense (30% rate)	113,824	636,176
Net income	\$ 265,588	\$ 1,484,412
Balance sheet information:		
Average operating assets	\$ 3,400,000	\$ 14,500,000
Non-interest bearing current liabilities	770,000	2,100,000
Percent cost of capital	11%	11%

To calculate EVA, the management requires adjustments for R&D and noninterest bearing current liabilities as outlined in the following.

Research and development will be capitalized and amortized over several years resulting in an increase to average operating assets of \$400,000 for the Golf division and \$650,000 for the Sporting Goods division. On the income statement, R&D expense for the year will be added back to operating income; then R&D amortization expense for one year will be deducted. The current year amortization expense will total \$100,000 for the Golf division and \$150,000 for the Sporting Goods division.

Noninterest bearing liabilities will be deducted from average operating assets.

Required:

Calculate EVA for each division and comment on your results.

(Appendix) Transfer Pricing. Creative Colors, Inc., a producer of paint, has two divisions—Paint division and Can division. Each division manager is evaluated based on profit produced by each division.

The Can division sells its cans to the Paint division for \$2 per case to cover variable costs. The Can division also sells to outside customers for \$3 per case.

Required:

- a. Using the general economic transfer pricing rule, calculate the optimal transfer price assuming the Can division is *below capacity*.
- b. Using the general economic transfer pricing rule, calculate the optimal transfer price assuming the Can division is *at capacity*.

Exercises: Set B

31. Segmented Net Income. Photo Products, Inc., has three divisions—Digital, Film, and Video. The following segmented financial information is for the most recent fiscal year ended December 31.

	Digital Division	Film Division	Video Division
Sales	\$22,000,000	\$8,000,000	\$18,000,000
Cost of goods sold	10,000,000	2,000,000	7,000,000
Allocated overhead	4,125,000	1,500,000	3,375,000
Selling and administrative expenses	5,000,000	3,200,000	5,000,000

32. Assume the tax rate is 35 percent.

33. Required:

- a. Prepare a segmented income statement using the format presented in . Include the profit margin ratio for each division at the bottom of the segmented income statement.

- b. Using net income as the measure, which division is most profitable? Explain why this conclusion might be misleading.
- c. What does the profit margin ratio tell us about each division? Why do organizations often use profit margin ratio to evaluate division performance rather than simply using net income?

ROI. Photo Products, Inc., has three divisions—Digital, Film, and Video. (This is the same company as the previous exercise. This exercise can be assigned independently.) Segmented income statement information for the most recent fiscal year ended December 31 is shown as follows. Assume average operating assets totaled \$15,000,000 for the Digital division, \$6,500,000 for the Film division, and \$17,500,000 for the Video division.

Photo Products, Inc. Segmented Income Statements for the Current Fiscal Year Ended December 31 (dollar amounts are in thousands)			
	Digital Division	Film Division	Video Division
Sales	\$ 22,000,000	\$ 8,000,000	\$ 18,000,000
Cost of goods sold	10,000,000	2,000,000	7,000,000
Gross margin	\$ 12,000,000	\$ 6,000,000	\$ 11,000,000
Allocated overhead	4,125,000	1,500,000	3,375,000
Selling and administrative expenses	5,000,000	3,200,000	5,000,000
Operating income	\$ 2,875,000	\$ 1,300,000	\$ 2,625,000
Income tax expense (35% rate)	1,006,250	455,000	918,750
Net income	\$ 1,868,750	\$ 845,000	\$ 1,706,250

Required:

- a. Calculate ROI for each division.
- b. What does ROI tell us about each division? Indicate why this measure is useful in evaluating investment centers.

ROI Using Operating Profit Margin and Asset Turnover. Photo Products, Inc., has three divisions—Digital, Film, and Video. (This is the same company as the previous exercises. This exercise can be assigned independently.) Segmented income statement information for the most

recent fiscal year ended December 31 is shown as follows. Assume average operating assets totaled \$15,000,000 for the Digital division, \$6,500,000 for the Film division, and \$17,500,000 for the Video division.

Photo Products, Inc. Segmented Income Statements for the Current Fiscal Year Ended December 31 (dollar amounts are in thousands)			
	Digital Division	Film Division	Video Division
Sales	\$ 22,000,000	\$ 8,000,000	\$ 18,000,000
Cost of goods sold	10,000,000	2,000,000	7,000,000
Gross margin	\$ 12,000,000	\$ 6,000,000	\$ 11,000,000
Allocated overhead	4,125,000	1,500,000	3,375,000
Selling and administrative expenses	5,000,000	3,200,000	5,000,000
Operating income	\$ 2,875,000	\$ 1,300,000	\$ 2,625,000
Income tax expense (35% rate)	1,006,250	455,000	918,750
Net income	\$ 1,868,750	\$ 845,000	\$ 1,706,250

Required:

- For each division, calculate operating profit margin, asset turnover, and resulting ROI.
- Which division has the highest ROI? For the division that has the lowest ROI, what can be done to improve this ratio?

RI. Photo Products, Inc., has three divisions—Digital, Film, and Video. (This is the same company as the previous exercises. This exercise can be assigned independently.) Segmented income statement information for the most recent fiscal year ended December 31 is shown as follows. Assume average operating assets totaled \$15,000,000 for the Digital division, \$6,500,000 for the Film division, and \$17,500,000 for the Video division. Assume the cost of capital rate is 16 percent.

Photo Products, Inc.
Segmented Income Statements
for the Current Fiscal Year Ended December 31
(dollar amounts are in thousands)

	<u>Digital Division</u>	<u>Film Division</u>	<u>Video Division</u>
Sales	\$ 22,000,000	\$ 8,000,000	\$ 18,000,000
Cost of goods sold	10,000,000	2,000,000	7,000,000
Gross margin	\$ 12,000,000	\$ 6,000,000	\$ 11,000,000
Allocated overhead	4,125,000	1,500,000	3,375,000
Selling and administrative expenses	5,000,000	3,200,000	5,000,000
Operating income	\$ 2,875,000	\$ 1,300,000	\$ 2,625,000
Income tax expense (35% rate)	1,006,250	455,000	918,750
Net income	<u>\$ 1,868,750</u>	<u>\$ 845,000</u>	<u>\$ 1,706,250</u>

Required:

- Calculate RI for each division.
- What does RI tell us about each division?

Solving Unknowns for ROI. The following information is for two divisions at Arrowhead, Inc.

	North Division	South Division
Sales	\$1,200,000	\$400,000
Operating income	\$ 132,000	\$ 40,000
Operating profit margin	?	?
Average operating assets	\$1,000,000	?
Asset turnover	?	?
ROI	?	8.0 percent

Required:

Find the missing information for each division.

EVA. Sailboats, Inc., sells sailboat parts and accessories and provides rigging services. The following information is for each division at Sailboats, Inc., for the most recent fiscal year.

	Sales Division	Services Division
Income statement:		
Sales	\$ 900,000	\$ 700,000
Cost of sales	490,000	390,000
Gross margin	\$ 410,000	\$ 310,000
Allocated overhead (from corporate)	84,375	65,625
Marketing expenses	130,000	80,000
Administrative expenses	90,000	70,000
Operating income	\$ 105,625	\$ 94,375
Income tax expense (30% rate)	31,688	28,313
Net income	\$ 73,937	\$ 66,062
Balance sheet information:		
Average operating assets	\$ 800,000	\$ 500,000
Non-interest bearing current liabilities	180,000	60,000
Percent cost of capital	10%	10%

To calculate EVA, management requires adjustments for marketing and noninterest bearing current liabilities as outlined in the following.

Marketing will be capitalized and amortized over several years resulting in an increase to average operating assets of \$100,000 for the Sales division and \$65,000 for the Services division. On the income statement, marketing expense for the year will be added back to operating income; marketing amortization expense for one year will be deducted. The current year amortization expense will total \$30,000 for the Sales division and \$15,000 for the Services division.

Noninterest bearing liabilities will be deducted from average operating assets.

Required:

Calculate EVA for each division and comment on your results.

(Appendix) Transfer Pricing. Gail's Gardening has two divisions—

Retail and Nursery. The Retail division sells plants and supplies. The Nursery division takes tree seedlings and grows them to healthy young plants before selling the trees internally to the Retail division and to outside customers. Each division manager is evaluated based on profit produced by each division.

The Nursery division sells its trees to the Retail division for \$4 per tree to cover its variable costs. The Nursery division also sells to outside customers for \$6 per tree.

Required:

- a. Using the general economic transfer pricing rule, calculate the optimal transfer price assuming the Nursery division is *below capacity*.
- b. Using the general economic transfer pricing rule, calculate the optimal transfer price assuming the Nursery division is *at capacity*.

Problems

38. Segmented Net Income, ROI, and RI. Custom Auto Company has two divisions—East and West. The following segmented financial information is for the most recent fiscal year:

	East Division	West Division
Sales	\$2,000,000	\$4,000,000
Cost of goods sold	800,000	2,040,000
Allocated overhead	600,000	1,200,000
Selling and administrative expenses	360,000	380,000

39. The East division had average operating assets totaling \$1,800,000 for the year, and the West division had average operating assets of \$2,600,000.

Assume the cost of capital rate is 8 percent, and the company's tax rate is 30 percent. Division managers are responsible for sales, costs, and investments in assets.

40. *Required:*

- a. What type of responsibility center is each division at Custom Auto Company? Explain.
- b. Prepare a segmented income statement using the format presented in . Include the profit margin ratio for each division at the bottom of the segmented income statement.
- c. Calculate ROI for each division.
- d. Calculate RI for each division.
- e. Summarize the answers to parts *a*, *b*, and *c* using the format presented in . What does this information tell us about each division?

Investment Decisions Using ROI and RI. (Note: the previous problem must be completed before working this problem.) Assume each division of Custom Auto Company is considering separate investment opportunities expected to yield a return of 10 percent, well above the company's minimum required rate of return of 8 percent. Each investment opportunity will require \$1,000,000 in average operating assets and yield operating income of \$100,000.

Required:

- a. Using the information presented in the previous problem, and the new investment proposal information presented previously, calculate each division's overall *ROI* assuming the new investment is accepted.
- b. Compare your results in part *a* to each division's ROI prior to the new investment (calculated in the previous problem). Which division(s) will likely accept the proposal and which will likely reject the proposal using ROI as the measure? Explain.

- c. Using the information presented in the previous problem, and the new investment proposal information presented previously, calculate each division's overall *RI* assuming the new investment is accepted.
- d. Compare your results in part c to each division's *RI* prior to the new investment (calculated in the previous problem). Which division(s) will likely accept the proposal and which will likely reject the proposal using *RI* as the measure? Explain.
- e. Assume the goal is to maximize company profit. Which measure do you think is best in deciding whether to accept a new investment proposal, *ROI* or *RI*? Explain.

Segmented Net Income, *ROI*, and *RI*; Making Investment

Decisions. Quality Cycles, Inc., has two divisions—Cruisers and Racers. The following segmented financial information is for the most recent fiscal year:

	Cruisers Division	Racers Division
Sales	\$6,000,000	\$10,000,000
Cost of goods sold	2,500,000	4,000,000
Allocated overhead	375,000	625,000
Selling and administrative expenses	2,100,000	3,950,000

The Cruisers division had average operating assets totaling \$5,700,000 for the year, and the Racers division had average operating assets of \$9,600,000. Assume the cost of capital rate is 10 percent, and the company's tax rate is 30 percent.

Required:

- a. Prepare a segmented income statement using the format presented in . Include the profit margin ratio for each division at the bottom of the segmented income statement.

- b. Calculate ROI for each division.
 - c. Calculate RI for each division.
 - d. Summarize the answers to parts *a*, *b*, and *c* using the format presented in . What does this information tell us about each division?
 - e. Assume each division of Quality Cycles, Inc., is considering separate investment opportunities expected to yield a return of 16 percent, well above the company's minimum required rate of return of 10 percent. Each investment opportunity will require \$4,000,000 in average operating assets and yield operating income of \$640,000.
6. Using the information presented at the beginning of this problem, and the new investment proposal information presented previously, calculate each division's overall ROI assuming the new investment is accepted.
 7. Compare your results in requirement **e.1** to each division's ROI prior to the new investment (calculated in requirement **b**). Which division(s) will likely accept the proposal and which will likely reject the proposal using ROI as the measure? Explain.
 8. Using the information presented at the beginning of this problem, and the new investment proposal information presented previously, calculate each division's overall RI assuming the new investment is accepted.
 9. Compare your results in requirement **e.3** to each division's RI prior to the new investment (calculated in requirement *c*). Which division(s) will likely accept the proposal and which will likely reject the proposal using RI as the measure? Explain.
 10. Assume the goal is to maximize company profit. Which measure do you think is best in deciding whether to accept a new investment proposal, ROI or RI? Explain.

Operating Profit Margin, Asset Turnover, and ROI. Financial information for Computer Systems, Inc., for the most recent fiscal year appears as follows. All dollar amounts are in thousands.

**Computer Systems, Inc.
Segmented Income Statements
for the Current Fiscal Year**
(dollar amounts are in thousands)

	Server Division	PC Division
Sales	\$10,000	\$30,000
Cost of goods sold	3,200	11,000
Gross margin	\$ 6,800	\$19,000
Allocated overhead (from corporate)	1,500	4,500
Selling and administrative expenses	4,000	11,000
Operating income	\$ 1,300	\$ 3,500
Income tax expense (30% rate)	390	1,050
Net income	\$ 910	\$ 2,450

**Computer Systems, Inc.
Segmented Balance Sheets Average Balances
at End of Most Recent Fiscal Year**
(dollar amounts are in thousands)

	Server Division		PC Division	
	Ending Balance	Beginning Balance	Ending Balance	Beginning Balance
Assets				
Cash	\$ 950	\$ 1,020	\$ 3,200	\$ 2,900
Accounts receivable	700	750	1,850	1,600
Inventory	\$ 1,700	\$ 1,650	\$ 2,800	\$ 2,500
Total current assets	3,350	3,420	7,850	7,000
Property, plant and equipment (net)	4,000	3,850	17,500	16,600
Land (held for sale)	2,000	2,000	3,150	3,150
Total assets	\$ 9,350	\$ 9,270	\$28,500	\$26,750
Liabilities and owners' equity				
Accounts payable	1,200	1,150	3,400	3,100
Other current liabilities	360	290	1,350	1,100
Total current liabilities	\$ 1,560	\$ 1,440	\$ 4,750	\$ 4,200
Long-term liabilities	0	0	0	0
Total liabilities	\$ 1,560	\$ 1,440	\$ 4,750	\$ 4,200
Total owners' equity	7,790	7,830	23,750	22,550
Total liabilities and owners' equity	\$ 9,350	\$ 9,270	\$28,500	\$26,750

Required:

- Calculate average operating assets for each division. (Hint: land held for sale is *not* an operating asset.)
- Calculate operating profit margin, asset turnover, and ROI for each division.
- What does this information tell us about each division?

Operating Profit Margin, Asset Turnover, ROI, and RI. Financial information for Web Design, LLP, for the most recent fiscal year appears as follows. All dollar amounts are in thousands.

Web Design, LLP
Segmented Income Statements
for the Current Fiscal Year
(dollar amounts are in thousands)

	Design Division	Maintenance Division
Sales	\$ 8,000	\$ 9,000
Cost of goods sold	2,300	2,700
Gross margin	\$ 3,700	\$ 6,300
Allocated overhead (from corporate)	1,200	1,800
Selling and administrative expenses	1,850	3,350
Operating income	\$ 650	\$ 1,150
Income tax expense (30% rate)	195	345
Net income	\$ 455	\$ 805

Web Design, LLP
Segmented Balance Sheets
at End of Most Recent Fiscal Year
(dollar amounts are in thousands)

	Design Division		Maintenance Division	
	Ending Balance	Beginning Balance	Ending Balance	Beginning Balance
Assets				
Cash	\$ 400	\$ 390	\$ 1,100	\$ 1,150
Accounts receivable	300	310	600	620
Inventory	800	730	950	900
Total current assets	\$ 1,500	\$ 1,430	\$ 2,650	\$ 2,670
Property, plant and equipment (net)	2,000	1,800	6,100	6,020
Investment in Global, Inc.			1,500	1,500
Land (held for sale)	2,100	2,100	0	0
Total assets	\$ 3,600	\$ 5,330	\$10,250	\$10,190
Liabilities and owners' equity				
Accounts payable	590	610	1,150	950
Other current liabilities	160	145	420	300
Total current liabilities	\$ 750	\$ 755	\$ 1,570	\$ 1,280
Long-term liabilities	0	0	0	0
Total liabilities	\$ 750	\$ 755	\$ 1,570	\$ 1,280
Total owners' equity	4,850	4,575	8,680	8,910
Total liabilities and owners' equity	\$ 3,600	\$ 5,330	\$10,250	\$10,190

Required:

- Calculate average operating assets for each division. (Hint: *land held for sale* and *investments in Global, Inc.*, are not operating assets.)
- Calculate operating profit margin, asset turnover, and ROI for each division.
- Calculate RI for each division assuming a cost of capital rate of 12 percent.
- What does the information from requirements **b** and **c** tell us about each division?

EVA. Conner, Inc., produces brass and woodwind music instruments. The following information is for each division at Conner for the most recent fiscal year.

	Brass Division	Woodwind Division
Income statement:		
Sales	\$ 1,500,000	\$ 2,250,000
Cost of goods sold	1,000,000	1,600,000
Gross margin	\$ 500,000	\$ 650,000
Allocated overhead (from corporate)	120,000	180,000
R&D expenses	60,000	110,000
Marketing expenses	40,000	50,000
Administrative expenses	85,000	130,000
Operating income	\$ 195,000	\$ 180,000
Income tax expense (30% rate)	58,500	54,000
Net income	\$ 136,500	\$ 126,000
Balance sheet information:		
Average operating assets	\$1,850,000	\$2,400,000
Non-interest bearing current liabilities	450,000	530,000
Percent cost of capital	10%	10%

To calculate EVA, management requires adjustments for R&D expenses, marketing expenses, and noninterest bearing current liabilities as outlined in the following.

Research and development will be capitalized and amortized over several years resulting in an increase to average operating assets of \$40,000 for the Brass division and \$80,000 for the Woodwind division. On the income statement, R&D expenses for the year will be added back to operating income; R&D amortization expense for one year will be deducted. The current year amortization expense will total \$20,000 for the Brass division and \$30,000 for the Woodwind division.

Marketing will be capitalized and amortized over several years resulting in an increase to average operating assets of \$30,000 for the Brass division and \$38,000 for the Woodwind division. On the income statement, marketing expenses for the year will be added back to operating income; marketing amortization expense for one year will be deducted. The current

year amortization expense will total \$10,000 for the Brass division and \$12,000 for the Woodward division.

Noninterest bearing current liabilities will be deducted from average operating assets.

Required:

- a. Calculate EVA for each division. What do the results show us for each division?
- b. Why does EVA typically require adjustments to operating income and average operating assets?

(Appendix) Transfer Pricing, Service Company. Kathy Kraven is the CEO and president of Legal Solutions, Inc. She oversees the company's two divisions—Human Resources and Litigation. The Human Resources division provides legal services to personnel departments at various clients who need help creating personnel policies and manuals. The Litigation division provides legal services to support clients in litigation. Litigation often asks for help from Human Resources when faced with issues surrounding personnel policies but also has the option of seeking help outside the firm. Currently, Human Resources is below capacity and uses variable cost as its price for providing services to Litigation.

Since each division is evaluated by how much profit it generates, Human Resources would like to increase the price charged to Litigation. Litigation is steadfast against any such change. Kathy Kraven has stepped in and established the following policy: *effective immediately, Human Resources will charge Litigation variable costs plus 20 percent for any services rendered internally.*

Required:

- a. Why is the Human Resources division manager concerned about the price it charges to Litigation?

- b. Why is the Litigation division manager concerned about an increase in price charged by the Human Resources division?
- c. Do you think Kathy's plan is effective? Explain.
- d. What other options are available for establishing transfer pricing?

(Appendix) Transfer Pricing, Retail Company. Fred's Fishing Supplies has two divisions, Lake and Deep Sea. Each division manager is evaluated based on profit produced by each division. The Lake division often sells a certain graphite fishing rod internally to the Deep Sea division for \$50 per rod to cover variable costs. The Lake division also sells the same graphite rod to outside customers for \$60 per rod. The Deep Sea division manager has the option of purchasing a similar rod from an outside supplier for \$56.

Required:

- a. Using the general economic transfer pricing rule, calculate the optimal transfer price assuming the Lake division is *below capacity*.
- b. Using the general economic transfer pricing rule, calculate the optimal transfer price assuming the Lake division is *at capacity*.
- c. The company's CEO recently established the following policy: *all internal transfers will be made at variable cost plus 20 percent*. Assume the Lake division is operating below capacity. As the Deep Sea division manager, what would you do: purchase internally or purchase from an outside supplier? Why? How will your decision impact overall company profit?

One Step Further: Skill-Building Cases

- 46. **Segments at Hewlett-Packard.** Refer to Why do you think **Hewlett-Packard** separates its operations into seven segments?
- 47. **Transfer Pricing at General Electric (Appendix).** Refer to How does **General Electric** establish transfer prices? What does this approach imply with regards to the products and services being provided?
- 48. **Group Activity—Decentralizing Operations.** Each of the following scenarios is being considered at two separate companies.

1. Walker Wood Products manufactures custom garage doors and custom furniture. The company recently experienced significant growth and top management would like to separate the company into two divisions—Garage and Furniture.
2. Iron Manufacturing produces iron fencing for residential and commercial properties. The company recently experienced significant growth and top management would like to separate the company into two divisions—Residential and Commercial.

Required:

Form groups of two to four students. Each group is to perform the following requirements for the scenario assigned:

- c. Identify the potential *advantages* and *disadvantages* of decentralizing into two divisions and allowing the manager of each division to have complete control over operations.
- d. Discuss the findings of your group with the class.

Internet Project—Economic Value Added. Stern Stewart & Company is a global consulting firm that pioneered the development of the EVA concept. Go to the **Stern Stewart & Company** Web site at <http://www.sternstewart.com>. Review the information provided at this Web site and write a one-page report summarizing the information you found to be most interesting. Also submit a printed copy of the information from the Web site with your report.

Creating a Segmented Income Statement Using Excel. Pool

Accessories, Inc., has two divisions—Furniture and Supplies. The following segmented financial information is for the most recent fiscal year ended December 31.

	Furniture Division	Supplies Division
Sales	\$3,000,000	\$1,000,000

Cost of goods sold	1,600,000	430,000
Allocated overhead	375,000	125,000
Selling and administrative expenses	250,000	200,000

Assume the tax rate is 30 percent.

Required:

- a. Prepare an Excel spreadsheet similar to showing Pool Accessories' segmented income statement and profit margin ratio for each division.

Comprehensive Case

51. Ethics and ROI. Computer chip makers incur significant costs for research and development. Some research and development projects result in technologies used in new computer chips. Other research and development projects do *not* result in a useable technology. Because of the unpredictable nature of R&D activities, U.S. GAAP require that R&D costs be expensed in the period incurred.

Integrated Circuits, Inc. (ICI), produces computer chips and invests heavily in R&D. The firm has been struggling in recent years, and as a result, the board of directors hired a new top management group with the clear purpose of improving profitability. The board proposed a compensation package providing top managers with an annual bonus if the company's operating income this coming year (year 2) increases 10 percent compared to year 1 and ROI remains above the 11 percent level achieved in year 1. The new top management group is willing to accept this proposal, but only if costs related to *successful* R&D activities are capitalized and amortized over five years for internal reporting purposes. Their argument is most R&D activities benefit future years, and U.S. GAAP unfairly requires all R&D costs to be expensed in the period incurred, regardless of whether the activities

are successful. This treatment by U.S. GAAP provides a disincentive for managers to invest in R&D projects that are vital to the company's future survival. The board of directors agrees with this assertion and grants the new management group their request to capitalize costs for successful R&D activities over five years.

One year has passed with the new management group in place, and their financial results are presented as follows (for year two), along with last year's information (year one). The entire \$10,000,000 spent on R&D in year 2 was for unsuccessful projects since management decided to go a different direction with the company's technology at the end of year 2. Nevertheless, top management capitalized the entire \$10,000,000 and amortized these costs over 5 years as reflected in the year 2 financial results. (Note: of this amount, \$2,000,000 is included in *depreciation and amortization expense* for year 2, and \$8,000,000 is included in *average operating assets* for year 2.)

	Year 2	Year 1
Income statement:		
Sales	\$54,000,000	\$45,000,000
Cost of goods sold	29,950,000	22,500,000
Gross margin	\$24,050,000	\$22,500,000
R&D expenses	0	8,750,000
Depreciation and amortization expenses	\$ 8,900,000	\$ 6,500,000
Other selling and administrative expenses	990,000	936,000
Operating income	<u>\$14,160,000</u>	<u>\$ 6,314,000</u>
Balance sheet information:		
Average operating assets	<u>\$74,900,000</u>	<u>\$57,400,000</u>

Required:

- Based on the financial data presented, calculate ROI for each year and the percent change in operating income from year 1 to year 2. Does the new management group qualify for the bonus?
- Prepare revised financial information in the same format as presented previously assuming *none* of the \$10,000,000 in year 2 R&D costs are

capitalized and amortized. (Hint: Amounts for year 1 will remain the same. Income statement and balance sheet amounts for year 2 will change.)

Calculate the revised ROI for year two, and the revised percent change in operating income from year one to year two. Based on your results, would the new management group qualify for the bonus?

- c. Is the new management group's treatment of R&D costs for year 2 ethical?
- d. How should the board of directors respond to the new management group's assertion that \$10,000,000 in R&D costs should be capitalized in year 2?

Performance Evaluation Methods. Casey Fashions, Inc., sells clothing throughout North America. The company's compensation committee, made up of five members from the board of directors, is meeting to discuss the CEO's contract, which expires next month. The committee is currently reviewing financial information for the three most recent fiscal years: year 3 (most recent), year 2, and year 1 (shown as follows).

The income statement indicates sales increased 30 percent from year 1 to year 2 and 35 percent from year 2 to year 3. Net income increased 14 percent from year 1 to year 2, and 18 percent from year 2 to year 3. One member on the committee, Chris Carson, would like to offer the CEO a multiyear extension with a significant bump in salary and thousands of shares of stock options. When questioned why, Chris pointed to the positive results reflected on the income statement.

Another committee member, Mary Nichols, agrees with Chris that income statement trends look great, but she would like to review other measures of performance as well. Mary has asked you to come up with two measures of performance that go beyond simply looking at the income statement.

Casey Fashions, Inc.
Income Statement
(dollar amounts are in thousands)

	Year 3	Year 2	Year 1
Sales	\$ 96,525	\$ 71,500	\$ 55,000
Cost of goods sold	28,958	21,450	16,500
Gross margin	\$ 67,567	\$ 50,050	\$ 38,500
Selling and administrative expenses	60,200	43,800	33,000
Operating income	\$ 7,367	\$ 6,250	\$ 5,500
Income tax expense (30% rate)	2,210	1,875	1,650
Net income	\$ 5,157	\$ 4,375	\$ 3,850

Casey Fashions, Inc.
Balance Sheet Average Balance
(dollar amounts are in thousands)

	Year 3	Year 2	Year 1
Assets	Average Balance	Average Balance	Average Balance
Cash	\$ 10,752	\$ 6,720	\$ 4,200
Accounts receivable	11,776	7,360	4,600
Inventory	13,312	8,320	5,200
Total current assets	\$ 35,840	\$ 22,400	\$ 14,000
Property, plant and equipment (net)	38,400	24,000	15,000
Land (held for sale)	3,500	3,500	3,500
Total assets	\$ 77,740	\$ 49,900	\$ 32,500
Liabilities and owners' equity			
Accounts payable	9,216	5,760	3,600
Other current liabilities	5,632	3,520	2,200
Total current liabilities	\$ 14,848	\$ 9,280	\$ 5,800
Long-term liabilities	0	0	0
Total liabilities	\$ 14,848	\$ 9,280	\$ 5,800
Total owners' equity	62,892	40,620	26,700
Total liabilities and owners' equity	\$ 77,740	\$ 49,900	\$ 32,500

Required:

- Calculate ROI for each of the three years. Note that balance sheet amounts presented for each year are already average balances (i.e., no need to calculate average balances). Assume land held for sale is *not* an operating asset.
- Calculate RI for each of the 3 years assuming the company's cost of capital rate is 12 percent.

- c. Prepare a written report to the compensation committee summarizing and explaining your findings in part **a** and **b**.



Chapter 12

How Is the Statement of Cash Flows Prepared and Used?

John Huston, CEO and founder of Home Store, Inc., has reviewed the company's income statement and balance sheet for the most recent fiscal year ended December 31, 2012. Home Store has grown rapidly this past year, with sales and net income showing significant gains compared to 2011. Although John is satisfied with the increase in profitability, he notices a significant decline in cash. John decides to pursue this with Linda Nash (CFO) and Steve Bauer (treasurer) in their weekly meeting:

John:	<i>I just received the income statement and balance sheet for 2012. Profits look great, but our cash position seems to have deteriorated. We had \$130,000 in cash to start the year and ended with only \$32,000. I noticed cash was declining throughout the year when I reviewed our monthly financial statements, but I'm concerned about how far our cash balance has dropped.</i>
Steve:	<i>You're right, John. We encountered cash flow problems several times throughout the year in spite of increased sales and profits. On several occasions, I had to delay payments to creditors because of cash flow issues.</i>
John:	<i>Seems to me we shouldn't have this problem. Where is our cash going?</i>
Linda:	<i>Good question. Let me round up our cash flow information for the year. I'll have something for you by next week.</i>
John:	<i>Great! I'd like to start next week's meeting by discussing how much cash we generated in 2012 from our daily operations. I realize net income is shown on an accrual basis, but I'd like to know how much net income was received in the form of cash.</i>
Linda:	<i>No problem. I'll have it for you next week.</i>

Home Store, Inc., has cash flow problems that are common to many fast growing companies. Although the income statement and balance sheet provide important information concerning

financial performance and financial condition, neither statement provides information regarding cash activity for a period of time. The focus of this chapter is on preparing a statement that provides cash flow information. This statement is appropriately called the statement of cash flows.

12.1 Purpose of the Statement of Cash Flows

LEARNING OBJECTIVE

1. Define the purpose of the statement of cash flows.

Question: Most organizations prepare four financial statements for external reporting purposes: income statement, balance sheet, statement of owners' equity, and statement of cash flows.

Financial accounting courses cover the first three statements in detail and often provide an overview of the statement of cash flows. This chapter will focus on preparing the statement of cash flows and on using the resulting cash flow information for analytical purposes. What information is provided in the statement of cash flows?

Answer: The statement of cash flows provides cash receipt and cash payment information and reconciles the change in cash for a period of time. Cash receipts and cash payments are summarized and categorized as operating, investing, or financing activities. Simply put, the statement of cash flows indicates where cash came from and where cash went for a period of time.

Assume you keep track of your individual cash transactions for an entire year in a check register (e.g., checks written and paycheck deposits) and suppose you have hundreds of transactions for the year. Rather than showing every single transaction in a formal report, the statement of cash flows summarizes these transactions. For example, all cash receipts from paychecks are added together and shown as one line item, all cash payments for rent are added together and shown as one line item, all cash payments for food are added together and shown as one line item, and so on. The goal is to start with the beginning of the year cash balance, add all cash receipts for the year, subtract all cash payments for the year, and find the resulting end-of-year cash balance. Although the formal statement of cash flows is not quite this simple, the concept is the same.

Question: Why did the Financial Accounting Standards Board (FASB) create the statement of cash flows in 1987?

Answer: The statement of cash flows was created due to a lack of cash flow information on the income statement, balance sheet, and statement of owners' equity. The income statement shows revenues and expenses using the accrual basis of accounting, but it does not indicate how much cash was received for revenues or paid for expenses. The balance sheet shows assets, liabilities, and owners' equity at a point in time, but it does not show how much cash was received or paid for these items. The only cash information provided on these statements is the change in cash from the end of last period to the end of the current period derived from the cash line item on the balance sheet (often called cash and cash equivalents).

Owners, creditors, and managers wanted more cash flow information. They often asked such questions as: Why did cash go down? How much cash was received related to net income? How much cash was paid for the purchase of equipment? How much cash was received from issuing bonds? As a result of the demand for more cash flow information, the FASB formally created the statement of cash flows in 1987 (Statement of Financial Accounting Standard No. 95, which can be found at <http://www.fasb.org>). Most companies are now required to prepare the statement of cash flows along with the other three statements. We begin the process of explaining how to prepare this statement in the next section.

Business in Action 12.1

Cash Flows at **Southwest Airlines**

Southwest Airlines was in the enviable position of generating \$1,600,000,000 in cash from operating activities for the year ended December 31, 2010. However, cash on the balance sheet only increased \$147,000,000 for the same period. Why did total cash go up by such a small amount compared to the \$1,600,000,000 increase in cash from operating activities? The statement of cash flows provides the information necessary to answer this question. **Southwest** spent \$493,000,000 on property and equipment

(planes, parts, etc.) and \$155,000,000 to pay off long-term debt. **Southwest** also purchased \$772,000,000 in short-term investments.

Source: **Southwest Airlines**, “2010 Annual Report,” <http://www.southwest.com>.

KEY TAKEAWAY

- The statement of cash flows provides cash receipt and cash payment information and reconciles the change in cash for a period of time. The primary purpose of the statement is to show what caused the change in cash from the beginning of the period to the end of the period.

REVIEW PROBLEM 12.1

1. Describe the purpose of the statement of cash flows.
2. Why did the FASB create the statement of cash flows?

Solution to Review Problem 12.1

1. The purpose of the statement of cash flows is to provide a summary of cash receipt and cash payment information for a period of time and to reconcile the difference between beginning and ending cash balances shown on the balance sheet. The statement of cash flows clarifies how cash was generated and how cash was used for a period of time.
2. The FASB created the statement of cash flows because owners, creditors, managers, and other stakeholders wanted more information regarding cash receipts and cash expenditures. Although the balance sheet shows cash balances at the end of each period, no further information is provided on the balance sheet, income statement, or statement of owners' equity regarding cash flow activities. The statement of cash flows takes care of this problem.

12.2 Three Types of Cash Flow Activities

LEARNING OBJECTIVE

1. Describe the three categories of cash flows.

Question: What are the three types of cash flows presented on the statement of cash flows?

Answer: Cash flows are classified as operating, investing, or financing activities on the statement of cash flows, depending on the nature of the transaction. Each of these three classifications is defined as follows.

- Operating activities include cash activities related to net income. For example, cash generated from the sale of goods (revenue) and cash paid for merchandise (expense) are operating activities because revenues and expenses are included in net income.
- Investing activities include cash activities related to noncurrent assets. Noncurrent assets include (1) long-term investments; (2) property, plant, and equipment; and (3) the principal amount of loans made to other entities. For example, cash generated from the sale of land and cash paid for an investment in another company are included in this category. (Note that interest received from loans is included in operating activities.)
- Financing activities include cash activities related to noncurrent liabilities and owners' equity. Noncurrent liabilities and owners' equity items include (1) the principal amount of long-term debt, (2) stock sales and repurchases, and (3) dividend payments. (Note that interest paid on long-term debt is included in operating activities.)

Shows examples of cash flow activities that generate cash or require cash outflows within a period. presents a more comprehensive list of examples of items typically included in operating, investing, and financing sections of the statement of cash flows.

Figure 12.2 Examples of Cash Flow Activity by Category

Operating Activities
(activities related to net income)

Cash receipts from the following:
Sales of goods or services
Interest received from loans
Dividends received from investments
Cash payments for the following:
Merchandise purchased from suppliers
Materials used to manufacture products
Employee payroll
Interest paid to lenders
Income taxes
Other operating expenses

Investing Activities
(activities related to noncurrent assets)

Cash receipts from the following:
Sale of long-term investments (e.g., bonds and stocks of other companies)*
Sale of property, plant, and equipment
Collection of principal for loans made to other entities*
Cash payments for the following:
Purchase of long-term investments (e.g., bonds and stocks of other companies)
Purchase of property, plant, and equipment
Loans made to other entities

Financing Activities
(activities related to noncurrent liabilities and owners' equity)

Cash receipts from the following:
Issuance of notes (e.g., a loan with a bank)
Issuance of bonds
Issuance of common stock
Cash payments for the following:
Principal amount of loans*
Principal amount of bonds*
Repurchase of common stock (treasury stock)
Cash dividends

*Receipts of cash for dividends from investments and for interest on loans made to other entities are included in operating activities since both items relate to net income. Likewise, payments of cash for interest on loans with a bank or on bonds issued are also included in operating activities because these items also relate to net income.

Question: Which section of the statement of cash flows is regarded by most financial experts to be most important?

Answer: The operating activities section of the statement of cash flows is generally regarded as the most important section since it provides cash flow information related to the daily operations of the business. This section answers the question, “how much cash did we generate from the daily activities of our core business?” Owners, creditors, and managers are most interested in cash flow generated from daily activities rather than from a one-time issuance of stock or a one-time sale of land. The operating activities section allows stakeholders to assess the ongoing viability of the company. We discuss how to use cash flow information to evaluate organizations later in the chapter.

Business in Action 12.2

Cash Activity at **Home Depot** and **Lowe’s**

The Home Depot, Inc., and **Lowe’s Companies, Inc.**, are large home improvement retail companies with stores throughout North America. A review of the statements of cash flows for both companies reveals the following cash activity. Positive amounts are cash inflows, and negative amounts are cash outflows.

	The Home Depot, Inc.	Lowe’s Companies, Inc.
Operating activities	\$ 4,585	\$ 3,852
Investing activities	(1,012)	(2,184)
Financing activities	(4,451)	(1,651)
Net change in cash	\$ (878)	\$ 17

Amounts are in millions.

This information shows both companies generated significant amounts of cash from daily *operating* activities; \$4,600,000,000 for **The Home Depot** and \$3,900,000,000 for **Lowe’s**. It is interesting to note both companies spent significant amounts of cash to acquire property and equipment and long-term investments as reflected in the negative *investing* activities amounts. For both companies, a significant amount of cash outflows from *financing* activities were for the repurchase of common

stock. Apparently, both companies chose to return cash to owners by repurchasing stock.

Source: The Home Depot Inc., “2010 Annual Report,” <http://www.homedepot.com>; Lowe’s Companies Inc., “2010 Annual Report,” <http://www.lowes.com>.

KEY TAKEAWAY

- The three categories of cash flows are operating activities, investing activities, and financing activities. Operating activities include cash activities related to net income. Investing activities include cash activities related to noncurrent assets. Financing activities include cash activities related to noncurrent liabilities and owners’ equity.

REVIEW PROBLEM 12.2

Identify whether each of the following items would appear in the operating, investing, or financing activities section of the statement of cash flows. Explain your answer for each item.

- Cash payments for purchases of merchandise
- Cash receipts from sale of common stock
- Cash payments for equipment
- Cash receipts from sales of goods
- Cash dividends paid to shareholders
- Cash payments to employees
- Cash payments to lenders for interest on loans
- Cash receipts from collection of principal for loans made to other entities
- Cash receipts from issuance of bonds
- Cash receipts from collection of interest on loans made to other entities

Solution to Review Problem 12.2

- It would appear as **operating activity** because merchandise activity impacts net income as an expense (merchandise costs ultimately flow through cost of goods sold on the income statement).

- b. It would appear as **financing activity** because sale of common stock impacts owners' equity.
- c. It would appear as **investing activity** because purchase of equipment impacts noncurrent assets.
- d. It would appear as **operating activity** because sales activity impacts net income as revenue.
- e. It would appear as **financing activity** because dividend payments impact owners' equity.
- f. It would appear as **operating activity** because employee payroll activity impacts net income as an expense.
- g. It would appear as **operating activity** because interest payments impact net income as an expense.
- h. It would appear as **investing activity** because principal collections impact noncurrent assets.
- i. It would appear as **financing activity** because bond issuance activity impacts noncurrent liabilities.
- j. It would appear as **operating activity** because interest received impacts net income as revenue.

12.3 Four Key Steps to Preparing the Statement of Cash Flows

LEARNING OBJECTIVE

1. Describe the four steps used to prepare the statement of cash flows.

Question: Recall from your financial accounting course that the accrual basis of accounting recognizes revenue when earned and expenses when incurred, regardless of when cash is exchanged. Conversely, the cash basis of accounting recognizes revenue when cash is received and expenses when cash is paid, regardless of when goods or services are exchanged. The income statement, balance sheet, and statement of owners' equity are all created using the accrual basis of accounting. However, the statement of cash flows is based on cash flows only,

and thus adjustments must be made to convert accrual basis information to a cash basis. What information is necessary to make these adjustments?

Answer: Several pieces of information are required to make these adjustments in preparing the statement of cash flows:

- Balance sheets for the end of last year and end of the current year are needed to calculate the amount of change in each balance sheet account. These changes in balance sheet accounts are needed to prepare certain parts of the statement of cash flows.
- Income statement information for the current year is needed as the starting point for converting net income from an accrual basis to a cash basis, which is shown in the operating activities section of the statement of cash flows.
- Other information is needed to complete the statement of cash flows, such as cash dividends paid and the original cost of long-term investments sold.

Question: With this information in hand, four steps are required to prepare the statement of cash flows. What are these four steps?

Answer: The four steps required to prepare the statement of cash flows are described as follows:

Step 1. Prepare the operating activities section by converting net income from an accrual basis to a cash basis.

This step can be done using one of two methods—the direct method or the indirect method. Because more than 98 percent of companies surveyed use the indirect method (see), we will use the indirect method throughout this chapter. The appendix describes the direct method.

The indirect method begins with net income from the income statement and makes several adjustments related to changes in current assets, current liabilities, and other items to arrive at cash provided by operating activities (or used by operating activities if the result is a cash

outflow). Cash provided by operating activities represents net income on a cash basis. It tells the reader how much cash was received from the daily operations of the business.

Step 2. Prepare the investing activities section by presenting cash activity for noncurrent assets.

This step focuses on the effect changes in noncurrent assets have on cash. Noncurrent asset balances found on the balance sheet, coupled with other information (e.g., cash proceeds from sale of equipment) are used to perform this step.

Step 3. Prepare the financing activities section by presenting cash activity for noncurrent liabilities and owners' equity.

This step focuses on the effect changes in noncurrent liabilities and owners' equity have on cash. Noncurrent liabilities and owners' equity balances found on the balance sheet, coupled with other information (e.g., cash dividends paid) are used to perform this step.

Step 4. Reconcile the change in cash.

Each section of the statement of cash flows described in steps 1, 2, and 3, will show the total cash provided by (increase) or used by (decrease) the activity. Step 4 simply confirms that the net of these changes equates to the change in cash on the balance sheet.

For example, assume the balance sheet shows cash totaled \$100 at the end of last year and \$140 at the end of the current year. Thus cash increased \$40 over the course of the current year. Step 4 reconciles this change with the changes shown in the three sections of the statement of cash flows. Suppose operating activities provided cash of \$170, investing activities used cash of \$160, and financing activities provided cash of \$30. These 3 amounts netted together reconcile to the \$40 increase in cash shown on the balance sheet ($= \$170 - \$160 + \$30$).

Business in Action 12.3

Indirect Method Is Most Popular

Most companies prefer to use the indirect method to prepare the operating activities section of the statement of cash flows. A survey taken in 2001 showed more than 98 percent of the 600 companies surveyed used the indirect method. Reasons for this preference vary, but several possibilities are as follows:

- The indirect method links net income to cash flows from operating activities by reconciling the two amounts.
- Accounting systems do not easily generate information needed to use the direct method.
- Those using the direct method are also required to provide a supplemental schedule using the indirect method. It is less costly to simply prepare the statement using the indirect method.

Source: American Institute of Certified Accountants, *Accounting Trends and Techniques* (Washington, D.C.: American Institute of Certified Public Accountants, 2001).

KEY TAKEAWAY

- The four steps required to prepare the statement of cash flows are described as follows:

Step 1. Prepare the operating activities section by converting net income from an accrual basis to a cash basis.

Step 2. Prepare the investing activities section by presenting cash activities for noncurrent assets.

Step 3. Prepare the financing activities section by presenting cash activities for noncurrent liabilities and owners' equity.

Step 4. Reconcile the change in cash from the beginning of the period to the end of the period.

REVIEW PROBLEM 12.3

Describe the four steps necessary to prepare the statement of cash flows.

Solution to Review Problem 12.3

The four steps required to prepare the statement of cash flows are as follows:

Step 1. Prepare the *operating activities* section by converting net income from an accrual basis to a cash basis.

This step starts with net income on an accrual basis (from the income statement) and makes adjustments related to changes in current assets, current liabilities, and other items to find net income on a cash basis. The resulting cash basis net income is called *cash provided by operating activities*.

Step 2. Prepare the *investing activities* section by presenting cash activity for noncurrent assets.

This step focuses on the effect changes in noncurrent assets have on cash.

Step 3. Prepare the *financing activities* section by presenting cash activity for noncurrent liabilities and owners' equity.

This step focuses on the effect changes in noncurrent liabilities and owners' equity have on cash.

Step 4. Reconcile the change in cash.

Each section of the statement of cash flows described in steps 1, 2, and 3 will show the total cash provided by or used by each activity. Step 4 confirms that the net of these changes equates to the change in cash derived from the balance sheet.

12.4 Using the Indirect Method to Prepare the Statement of Cash Flows

LEARNING OBJECTIVE

1. Prepare a statement of cash flows using the indirect method.

Question: Now that you are familiar with the four key steps, let's take a look at the statement of cash flows for Home Store, Inc. Where do we start in preparing Home Store, Inc.'s statement of cash flows?

Answer: As stated earlier, the information needed to prepare the statement of cash flows includes the balance sheet, income statement, and other selected data. This information is presented in .

Other pertinent data for 2012 are as follows:

- Sold equipment with a book value of \$11,000 ($= \$21,000 \text{ cost} - \$10,000 \text{ accumulated depreciation}$) for \$5,000 cash
- Purchased equipment for \$67,000 cash
- Long-term investments were purchased for \$12,000 cash. There were no sales of long-term investments
- Bonds were paid with a principal amount of \$18,000
- Issued common stock for \$4,000 cash
- Declared and paid \$32,000 in cash dividends

With these data and the information provided in , we can start preparing the statement of cash flows. It is important to note that all positive amounts shown in the statement of cash flows denote an increase in cash, and all negative amounts denote a decrease in cash.

Figure 12.3 Balance Sheet and Income Statement for Home Store, Inc.

**Home Store, Inc.
Balance Sheet
December 31, 2012 and
December 31, 2011**

	2012	2011	Changes in Assets, Liabilities, and Equity from 2011 to 2012 Increase (decrease)
Assets			
Current assets			
Cash	\$ 32,000	\$ 130,000	\$ (98,000)
Accounts receivable	85,000	25,000	60,000
Merchandise inventory	126,000	60,000	66,000
Prepaid expenses	18,000	20,000	(2,000)
Noncurrent assets			
Property, plant, and equipment	956,000	910,000	46,000
Accumulated depreciation	(299,000)	(285,000)	(14,000)
Long-term investments	70,000	58,000	12,000
Total assets	\$ 988,000	\$ 918,000	
Liabilities and owners' equity			
Current liabilities			
Accounts payable	\$ 16,000	\$ 15,000	\$ 1,000
Income tax payable	39,000	48,000	(9,000)
Noncurrent liabilities			
Bonds payable	87,000	105,000	(18,000)
Owners' equity			
Common stock	414,000	410,000	4,000
Retained earnings	432,000	340,000	92,000
Total liabilities and owners' equity	\$ 988,000	\$ 918,000	

The end goal of the statement of cash flows is to explain this change in cash.

This contra-asset account increased from 2011 to 2012 thereby decreasing assets.

**Home Store, Inc.
Income Statement
For the Year Ended December 31, 2012**

Sales	\$ 900,000
Cost of goods sold	546,000
Gross margin	\$ 354,000
Selling and administrative expenses	120,000
Depreciation expense	24,000
Operating income	\$ 210,000
Interest expense	15,000
Loss on sale of equipment	6,000
Income before taxes	\$ 189,000
Income tax expense	65,000
Net income	\$ 124,000

Step 1: Prepare the Operating Activities Section

Question: We will be using the indirect method to prepare the operating activities section. (The direct method is covered in the appendix.) The starting point using the indirect method is net income. Home Store, Inc., had net income of \$124,000 in 2012. This amount comes from the

income statement, which was prepared using the accrual basis of accounting. How do we convert this amount to a cash basis?

Answer: Several adjustments are necessary to convert this amount to a cash basis and to provide an amount related only to daily operating activities of the business. If the resulting adjusted amount is a cash inflow, it is called cash provided by operating activities; if it is a cash outflow, it is called cash used by operating activities.

Three general types of adjustments are necessary to convert net income to cash provided by operating activities. These three types of adjustments are shown in , which also displays the format used for the operating activities section of the statement of cash flows. Examine this figure carefully.

Figure 12.4 Operating Activities Format and Adjustments

Cash flows from operating activities	
Net income (from income statement)	\$ XXX,XXX
Adjustments (to convert net income to cash provided by operating activities)	
1. Add back expenses that do not impact cash such as depreciation and amortization expense	XXX,XXX
2. Add back losses and deduct gains related to investing activities	XXX,XXX
3. Add and subtract changes in current assets (except cash) and current liabilities using the adjustment rules	XXX,XXX
Cash provided by (used by) operating activities	<u>\$ XXX,XXX</u>

Adjustment One: Adding Back Noncash Expenses

Question: What is the first type of adjustment necessary to convert net income to a cash basis?

Answer: The first adjustment to net income involves adding back expenses that do not affect cash (often called noncash expenses). For example, the accrual basis of accounting deducts depreciation expense in calculating net income, even though depreciation expense does not involve cash. (Recall the financial accounting entry to record depreciation expense: debit depreciation expense and credit accumulated depreciation. Notice cash is not involved.) Thus to convert net income to a cash basis, depreciation expense is added back to net income. In effect,

we are reversing depreciation expense because it is not an expense using the cash basis of accounting. The end result is as though depreciation expense was never deducted as an expense.

Next, we show how the first adjustment to net income appears in the operating activities section of the statement of cash flows for Home Store, Inc. (net income and depreciation expense come from the income statement shown in):

Cash flows from operating activities	
Net income	\$ 124,000
Adjustments (to convert net income to cash provided by operating activities)	
1. Add back depreciation expense	24,000
2. Add back losses and deduct gains related to investing activities	XXX,XXX
3. Add and subtract changes in current assets (except cash) and current liabilities using the adjustment rules	XXX,XXX
Cash provided by (used by) operating activities	<u>\$XXX,XXX</u>

The income statement for Home Store, Inc., shows \$24,000 in depreciation expense for the year. As shown previously, this amount is added back to the net income of \$124,000.

Adjustment Two: Adding Back Losses and Deducting Gains Related to Investing Activities

Question: What is the second type of adjustment necessary to convert net income to a cash basis?

Answer: The second adjustment to net income involves adding back losses and deducting gains related to investing activities. For example, Home Store, Inc., realized a \$6,000 loss on the sale of equipment. This loss is shown on the income statement as a deduction in calculating net income (see). However, this loss is not related to the daily operations of the business. That is, Home Store, Inc., is not in the business of buying and selling equipment daily. Remember, we are trying to find the cash provided by operating activities in this section of the statement of cash flows.

Since equipment is a noncurrent asset, cash activity related to the disposal of equipment should be included in the investment activities section of the statement of cash flows. Thus the \$6,000 loss shown as a deduction on the income statement is added back to net income, and it will be

included later in the investing activities section as part of the proceeds from the sale of equipment. In effect, we are reversing the \$6,000 loss because it is not an operating expense.

Here's how the second adjustment to net income appears in the operating activities section of the statement of cash flows for Home Store, Inc.:

Cash flows from operating activities	
Net income	\$ 124,000
Adjustments (to convert net income to cash provided by operating activities)	
1. Add back depreciation expense	24,000
2. Add back loss on sale of equipment	6,000
3. Add and subtract changes in current assets (except cash) and current liabilities using the adjustment rules	XXX,XXX
Cash provided by (used by) operating activities	\$ XXX,XXX

Adjustment Three: Adding and Subtracting Changes in Current Assets and Current Liabilities

Question: What is the third type of adjustment necessary to convert net income to a cash basis?

Answer: The third type of adjustment to net income involves analyzing the changes in all current assets (except cash) and current liabilities from the beginning of the period to the end of the period. These changes are already shown in the far right column of the balance sheet portion of . Two important rules must be followed to determine how the change is reflected as an adjustment to net income. Study these two rules carefully:

1. Current assets. Increases in current assets are deducted from net income; decreases in current assets are added to net income. (There is an inverse relationship between the change in a current asset account and how it is shown as an adjustment.)
2. Current liabilities. Increases in current liabilities are added to net income; decreases in current liabilities are deducted from net income. (There is a direct relationship between the change in a current liability account and how it is shown as an adjustment.)

Now let's work through each current asset and current liability line item shown in the balance sheet () and use these rules to determine how each item fits into the operating activities section as an adjustment to net income.

The first current asset line item, cash, shows the change in cash from the beginning of the year to the end of year. Cash decreased by \$98,000. The goal of the statement of cash flows is to show what caused this \$98,000 decrease. This amount will appear in step 4 when we reconcile the beginning cash balance to the ending cash balance. The next line item is accounts receivable.

Accounts receivable (current asset) increased by \$60,000. The current asset rule states that increases in current assets are deducted from net income. Thus \$60,000 is deducted from net income in the operating activities section of the statement of cash flows. Here's why.

Assume all Home Store's sales shown on the income statement are credit sales (each sale required a debit to accounts receivable and a credit to sales). The beginning accounts receivable balance of \$25,000 is increased by \$900,000 for credit sales made during the year, resulting in \$925,000 in total receivables to be collected. Since \$85,000 in accounts receivable remains at the end of the year, \$840,000 in cash was collected ($= \$925,000 - \$85,000$). On a cash basis, Home Store, Inc., should show \$840,000 in revenue rather than \$900,000. Thus net income must be reduced by \$60,000 ($= \$900,000$ revenue using accrual basis $- \$840,000$ revenue using cash basis). The accounts receivable T-account shown in the following provides further clarification.

Accounts Receivable			
Beginning balance	25,000		
Sales on account	900,000	Cash receipt	840,000
Ending balance	85,000		

This is the revenue on the income statement using the accrual basis.

This cash basis revenue (\$840,000) is lower than accrual basis revenue (\$900,000). Thus net income must be decreased \$60,000 to convert from accrual basis to cash basis.

Here's how the accounts receivable adjustment to net income appears in the operating activities section of the statement of cash flows for Home Store, Inc.:

Cash flows from operating activities	
Net income	\$ 124,000
Adjustments (to convert net income to cash provided by operating activities)	
1. Add back depreciation expense	24,000
2. Add back loss on sale of equipment	6,000
3. Increase in accounts receivable	(60,000)
Cash provided by (used by) operating activities	<u>\$ XXX,XXX</u>

We will continue analyzing each current asset and current liability item in the balance sheet shown in and present the resulting adjustments and completed operating activities section at the end of our analysis in .

Merchandise inventory (current asset) increased by \$66,000. Because the current asset rule states that increases in current assets are deducted from net income, \$66,000 is deducted from net income in the operating activities section of the statement of cash flows. To explain why, let's assume Home Store, Inc., pays cash for all purchases of merchandise inventory. If the merchandise inventory account increases over time, more goods are purchased than are sold. Because merchandise inventory at Home Store, Inc., increased \$66,000 and cost of goods sold totaled \$546,000 (as shown in), the company must have purchased inventory with a cost of \$612,000 during the period ($= \$66,000 + \$546,000$). Thus more cash was paid for merchandise (\$612,000) than was reflected on the income statement as cost of goods sold (\$546,000). If expenses are higher using a cash basis, the adjustment must decrease net income. Therefore \$66,000 is deducted from net income in the operating activities section of the statement of cash flows. This information is summarized in the merchandise inventory T-account in the following.

Merchandise Inventory			
Beginning balance	60,000		
Cash payments for goods	612,000	Cost of goods sold	546,000
Ending balance	<u>126,000</u>		

This cash basis expense (\$612,000) is higher than accrual basis expense (\$546,000). Thus, net income must be decreased \$66,000 to convert from accrual basis to cash basis.

This is the expense on the income statement using the accrual basis.

Prepaid expenses (current asset) decreased by \$2,000. Because the current asset rule states that decreases in current assets are added to net income, \$2,000 is *added* to net

income in the operating activities section of the statement of cash flows. This is because cash paid for these expenses was lower than the expenses recognized on the income statement using the accrual basis. Since expenses are \$2,000 lower using the cash basis, net income must be increased by \$2,000.

Key Point

Important Current Asset Rule

When preparing the operating activities section of the statement of cash flows, *increases in current assets are deducted from net income; decreases in current assets are added to net income.*

Question: Now that we know how to handle the change in current assets when preparing the operating activities section of the statement of cash flows, what do we do with current liabilities?

Answer: The current liability rule is a bit different than the current asset rule as described next.

Accounts payable (current liability) increased by \$1,000. Because the current liability rule states that increases in current liabilities are added to net income, \$1,000 is added to net income in the operating activities section of the statement of cash flows. An increase in accounts payable signifies that Home Store, Inc., recorded more as an expense on the income statement (accrual basis) than the company paid in cash (cash basis). Since expenses are lower using the cash basis, net income must be increased by \$1,000.

Income tax payable (current liability) decreased by \$9,000. Because the current liability rule states that decreases in current liabilities are deducted from net income, \$9,000 is deducted from net income in the operating activities section of the statement of cash flows. A decrease in income tax payable signifies that Home Store, Inc., paid more for income taxes (cash basis) than the company recorded as an expense on the income statement (accrual basis). Since expenses are higher using the cash basis, net income must be decreased by \$9,000.

Key Point

Important Current Liability Rule

When preparing the operating activities section of the statement of cash flows, *increases in current liabilities are added to net income; decreases in current liabilities are deducted from net income.*

Question: What does the operating activities section of the statement of cash flows look like for Home Store, Inc.?

Answer: shows the completed operating activities section of the statement of cash flows for Home Store, Inc. The most important line is at the bottom, which shows cash of \$22,000 was generated during the year from daily operations of the business. Notice this amount is significantly lower than the net income amount of \$124,000 reported on the income statement. Studycarefully noting the three types of adjustments made to net income.

Figure 12.5 Operating Activities Section of Statement of Cash Flows (Home Store, Inc.)

Cash flows from operating activities	
Net income	\$124,000
Adjustments (to convert net income to cash provided by operating activities)	
1. Add back depreciation expense	24,000
2. Add back loss on sale of equipment	6,000
3. Increase in accounts receivable	(60,000)
3. Increase in merchandise inventory	(66,000)
3. Decrease in prepaid expenses	2,000
3. Increase in accounts payable	1,000
3. Decrease in income tax payable	(9,000)
Cash provided by operating activities	\$ 22,000

The company received \$22,000 in cash for the year related to daily operations of the business.

For current assets, the adjustment is in the opposite direction of the change in the account. For current liabilities, the adjustment is in the same direction as the change in the account.

REVIEW PROBLEM 12.4

through will use the data presented as follows for Phantom Books. Each review problem corresponds to the four steps required to prepare a statement of cash flows.

Phantom Books is a retail store that sells new and used books. Phantom's most recent balance sheet, income statement, and other important information for 2012 are presented in the following.

Phantom Books Balance Sheet December 31, 2012 and December 31, 2011			
	2012	2011	Change in Assets, Liabilities, and Equity from 2011 to 2012 Increase (decrease)
Assets			
Current assets			
Cash	\$ 45,000	\$ 24,000	\$ 21,000
Accounts receivable	15,000	21,000	(6,000)
Merchandise inventory	73,000	60,000	13,000
Prepaid expenses	12,000	16,000	(4,000)
Noncurrent assets			
Property, plant, and equipment	357,000	360,000	(3,000)
Accumulated depreciation	(122,000)	(115,000)	(7,000)
Long-term investments	30,000	16,000	14,000
Total assets	<u>\$ 410,000</u>	<u>\$ 382,000</u>	
Liabilities and owners' equity			
Current liabilities			
Accounts payable	\$ 7,000	\$ 8,000	(1,000)
Income tax payable	5,000	3,000	2,000
Noncurrent liabilities			
Notes payable	25,000	20,000	5,000
Owners' equity			
Common stock	87,000	103,000	(16,000)
Retained earnings	<u>286,000</u>	<u>248,000</u>	38,000
Total liabilities and owners' equity	<u>\$ 410,000</u>	<u>\$ 382,000</u>	

Phantom Books Income Statement for the Year Ended December 31, 2012	
Sales	\$ 750,000
Cost of goods sold	<u>546,000</u>
Gross margin	\$ 204,000
Selling and administrative expenses	79,000
Depreciation expense	29,000
Operating income	<u>\$ 96,000</u>
Interest expense	(11,000)
Gain on sale of equipment	4,000
Loss on sale of long-term investments	(8,000)
Income before taxes	<u>\$ 81,000</u>
Income tax expense	<u>30,000</u>
Net income	<u>\$ 51,000</u>

Additional data for 2012 include the following:

- Sold equipment with a book value of \$8,000 (= \$30,000 cost – \$22,000 accumulated depreciation) for \$12,000 cash
 - Purchased equipment for \$27,000 cash
 - Sold long-term investments with an original cost of \$11,000 for \$3,000 cash
 - Purchased long-term investments for \$25,000 cash
 - Signed a note with the bank for \$5,000 cash. No principal amounts were paid during the year
 - Repurchased common stock (treasury stock) for \$16,000 cash. No new common stock was issued
 - Declared and paid \$13,000 in cash dividends
1. Prepare the *operating activities* section of the statement of cash flows for Phantom Books using the indirect method. Follow the format presented in .
 2. How much cash did Phantom Books generate from operating activities for the year?

Solution to Review Problem 12.4

1. Start with net income from the income statement; make the appropriate adjustments for (1) noncash expenses, such as depreciation and amortization; (2) gains and losses related to investing activities; and (3) changes in current assets other than cash and current liabilities. The operating activities section of the statement of cash flows for Phantom Books appears as follows.

Cash flows from operating activities	
Net income	\$ 51,000
Adjustments (to convert net income to cash provided by operating activities)	
1. Add back depreciation expense	29,000
2. Deduct gain on sale of equipment	(4,000)
2. Add back loss on sale of long-term investments	8,000
3. Decrease in accounts receivable	6,000
3. Increase in merchandise inventory	(13,000)
3. Decrease in prepaid expenses	4,000
3. Decrease in accounts payable	(1,000)
3. Increase in income tax payable	2,000
Cash provided by operating activities	\$ 82,000

For current assets, the adjustment is in the *opposite* direction of the change in the account. For current liabilities, the adjustment is in the *same* direction as the change in the account.

- Cash totaling \$82,000 was generated from the company's operating activities during the year.

Before moving on to step 2, note that investing and financing activities sections always use the same format whether the operating activities section is presented using the direct method or indirect method.

Step 2: Prepare the Investing Activities Section

Question: Now that we have completed the operating activities section for Home Store, Inc., the next step is to prepare the investing activities section. What information is used for this section, and how is it prepared?

Answer: The investing activities section of the statement of cash flows focuses on cash activities related to noncurrent assets. Review the noncurrent asset section of Home Store, Inc.'s balance sheet presented in . Three noncurrent asset line items must be analyzed to determine how to present cash flow information in the investing activities section.

Property, plant, and equipment increased by \$46,000. The additional information provided for 2012 indicates two types of transactions caused this increase. First, the company purchased equipment for \$67,000 cash. Home Store, Inc., made the following journal entry for this transaction:

Dr. property, plant, and equipment	67,000	
Cr. cash		67,000

Second, the company sold equipment for \$5,000 cash (often called a disposal of equipment). This equipment was on the books at an original cost of \$21,000 with accumulated depreciation of \$10,000. Home Store, Inc., made the following journal entry for this transaction:

Dr. cash	5,000	
Dr. accumulated depreciation	10,000	
Dr. loss on sale of equipment	6,000	
Cr. property, plant, and equipment		21,000

Notice the two entries to property, plant, and equipment shown previously. The net effect of these 2 entries is an increase of \$46,000 ($= \$67,000 - \$21,000$). This is summarized in the following T-account:

Property, Plant, and Equipment			
Beginning balance	910,000		
Purchases	67,000	Disposals (original cost)	21,000
Ending balance	956,000		

Represents cash paid for equipment during the year.

Represents the original cost of equipment sold during the year.

Question: How is this property, plant, and equipment information used in the investing activities section of the statement of cash flows for Home Store, Inc.?

Answer: First, the purchase of equipment for \$67,000 cash is shown as a decrease in cash. Second, the sale of equipment for \$5,000 is shown as an increase in cash. It is not enough to simply show a cash outflow of \$62,000 in the investing activities section of the statement of cash flows ($= \$67,000 - \$5,000$). Instead, Home Store, Inc., must show the components of this cash outflow as separate line items in the statement of cash flows as required by U.S. GAAP. The formal presentation of this information in the investing activities section is shown later in .

Accumulated depreciation decreased noncurrent assets by \$14,000. This contra asset account is not typical of the other asset accounts shown on Home Store, Inc.'s balance sheet since contra asset accounts have the effect of reducing assets. Thus as this accumulated depreciation account increases, it further reduces overall assets. Terminology can get confusing, so here is a simple way to look at it. The higher the account goes; the more it reduces assets. This is why the change column shows this account as decreasing assets.

Two items caused the change in the accumulated depreciation account. First, the sale of equipment during the year caused the company to take \$10,000 in accumulated depreciation off the books. Second, \$24,000 in depreciation expense was recorded during the year (with a corresponding entry to accumulated depreciation). This information is summarized in the following T-account:

Accumulated Depreciation	
	Beginning balance 285,000
Disposal 10,000	Depreciation expense 24,000
	Ending balance 299,000

Accumulated depreciation taken off the books for equipment sold during the year.

Depreciation expense recorded for the year.

Question: How is accumulated depreciation information used in the statement of cash flows for Home Store, Inc.?

Answer: This information is already reflected in two places (the work has already been done!). First, depreciation expense is a noncash expense and is added back to net income in the operating activities section of the statement of cash flows (see). Second, \$10,000 of accumulated depreciation related to disposals is included as part of the \$5,000 proceeds from the sale of equipment in the investing activities section of the statement of cash flows (see). Here are the components of the equipment sale that support the \$5,000 in cash proceeds shown in the investing activities section:

Book value of equipment sold	\$11,000 (= \$21,000 cost – \$10,000 accumulated depreciation)
Loss on sale of equipment	(6,000)
Cash proceeds from sale of equipment	<u>\$ 5,000</u>

Long-term investments increased by \$12,000. The additional information provided for 2012 indicates there were no sales of long-term investments during the year. The increase of \$12,000 is solely from purchasing long-term investments with cash. Thus the purchase of long-term investments for \$12,000 is shown as a decrease in cash in the investing activities section.

Shows the three investing activities described previously: (1) a \$67,000 decrease in cash from the purchase of equipment, (2) a \$5,000 increase in cash from the sale of equipment, and (3) a \$12,000 decrease in cash from the purchase of long-term investments. Examine carefully noting the impact these three items have on cash and the resulting cash used by investing activities of \$74,000.

Figure 12.6 Investing Activities Section of Statement of Cash Flows (Home Store, Inc.)

Cash flows from investing activities	
Purchase of equipment	\$ (67,000)
Proceeds from sale of equipment	5,000
Purchase of long-term investments	(12,000)
Cash used by investing activities	<u>\$ (74,000)</u>

The company used \$74,000 in cash for investing activities.

REVIEW PROBLEM 12.5

Using the information presented in :

1. Prepare the *investing activities* section of the statement of cash flows for Phantom Books. Follow the format presented in .
2. How much cash did Phantom Books use for investing activities during the year?

Solution to Review Problem 12.5

1. Start by analyzing changes in noncurrent assets on the balance sheet. Then prepare the investing activities section of the statement of cash flows. The

cash flows related to each noncurrent asset account are underlined as follows.

Property, plant, and equipment decreased by \$3,000. Additional data provided indicate 2 items caused this change: (1) equipment was purchased for \$27,000 cash, causing a \$27,000 increase in the account; and (2) equipment with an original cost of \$30,000 was sold for \$12,000 cash, causing a \$30,000 decrease in the account. The net effect of these 2 items on the property, plant, and equipment account is a decrease of \$3,000 (= \$27,000 purchase – \$30,000 original cost of equipment sold). The impact these items have on cash is reflected in the investing activities section of the statement of cash flows by showing a \$27,000 cash outflow for the purchase of equipment and a \$12,000 cash inflow from the sale of equipment.

Accumulated depreciation decreased assets by \$7,000. Two items caused this change: (1) the sale of equipment caused the company to take \$22,000 in accumulated depreciation off the books—this was the accumulated depreciation on the books for the equipment sold, and (2) \$29,000 in depreciation expense was recorded during the year, with a corresponding entry to accumulated depreciation. Neither of these entries to accumulated depreciation impacts the investing activities section. However, \$29,000 in depreciation expense is a noncash expense and is added back to net income in the operating activities section (see solution to).

Long-term investments increased by \$14,000. Additional data provided indicate 2 items caused this change: (1) long-term investments with an original cost of \$11,000 were sold for \$3,000 cash, and (2) long-term investments were purchased for \$25,000 cash. The net effect of these 2 items on the long-term investments account is an increase of \$14,000 (= \$25,000 purchase – \$11,000 original cost of investments sold). The impact these items have on cash is reflected in the investing activities section of

the statement of cash flows by showing a \$25,000 cash outflow for the purchase of investments, and a \$3,000 cash inflow from the sale of investments.

The investing activities section of the statement of cash flows for Phantom Books is shown as follows:

Cash flows from investing activities	
Purchase of equipment	\$ (27,000)
Proceeds from sale of equipment	12,000
Purchase of long-term investments	(25,000)
Proceeds from sale of long-term investments	3,000
Cash used by investing activities	\$ (37,000)

The company used \$37,000 in cash for investing activities.

2. Cash totaling \$37,000 was used for investing activities during the year.

Step 3: Prepare the Financing Activities Section

Question: Now that we have completed the operating and investing activities sections for Home Store, Inc., the next step is to prepare the financing activities section. What information is used for this section, and how is it prepared?

Answer: The financing activities section of the statement of cash flows focuses on cash activities related to noncurrent liabilities and owners' equity (i.e., cash activities related to long-term company financing). Review the noncurrent liability and owners' equity sections of Home Store, Inc.'s balance sheet presented in . One noncurrent liability item (bonds payable) and two owners' equity items (common stock and retained earnings) must be analyzed to determine how to present cash flow information in the financing activities section. The formal presentation of this information in the financing activities section is shown later in .

Bonds payable decreased by \$18,000. The additional information provided for 2012 indicates Home Store, Inc., paid off bonds during the year with a principal amount of \$18,000. This is reflected in the financing activities section of the statement of cash flows as an \$18,000 decrease in cash.

Common stock increased by \$4,000. The additional information provided for 2012 indicates the company issued common stock for \$4,000 cash. This is reflected in the financing activities section of the statement of cash flows as \$4,000 increase in cash.

Retained earnings increased by \$92,000. Two items caused this increase: (1) net income of \$124,000 increased retained earnings, and (2) cash dividends paid totaling \$32,000 decreased retained earnings. The net effect of these two entries is an increase of \$92,000 (= \$124,000 net income – \$32,000 cash dividends).

Question: How is this information used in the statement of cash flows?

Answer: Net income is already included at the top of the operating activities section as shown in . Cash dividends are included in the financing activities section as a \$32,000 decrease in cash.

shows the three financing activities described previously: (1) an \$18,000 decrease in cash from paying off the principal amount of bonds, (2) a \$4,000 increase in cash from the issuance of common stock, and (3) a \$32,000 decrease in cash from the payment of cash dividends.

Examine carefully noting the impact these three items have on cash and the resulting cash used by financing activities of \$46,000.

Figure 12.7 Financing Activities Section of Statement of Cash Flows (Home Store, Inc.)

Cash flows from financing activities	
Principal payment on bonds	\$ (18,000)
Proceeds from issuance of common stock	4,000
Payment of cash dividends	(32,000)
Cash used by financing activities	\$ (46,000)

The company used \$46,000 in cash for financing activities.

Business in Action 12.4



Source: Photo courtesy of Rob

Enslin, <http://www.flickr.com/photos/doors/6086236471/>.

Dividend Payments at **Microsoft Corporation**

By fiscal year ended June 30, 2004, **Microsoft** was sitting on more than \$60,000,000,000 in cash and short-term investments. After reviewing its options, the company chose to give much of this cash back to shareholders in the form of cash dividends. A one-time increase in cash dividends resulted in \$33,500,000,000 paid to the owners of the company during the second quarter of fiscal year 2005 (three months ended December 31, 2004). This information is found in the financing activities section of **Microsoft's** statement of cash flows.

Source: Microsoft Corporation, "2004 Annual

Report," <http://www.microsoft.com>; **Microsoft Corporation**, "2005 Second Quarter Statement of Cash Flows," <http://www.microsoft.com>.

Significant Noncash Investing and Financing Activities

Question: Some organizations have noncash activities involving the exchange of one noncurrent or owners' equity balance sheet item for another (e.g., the issuance of common stock for a

building; or the issuance of common stock in exchange for bonds held by creditors). Do these types of transactions appear in the statement of cash flows?

Answer: These exchanges do not involve cash and thus do not appear directly on the statement of cash flows. However, if the amount is significant, this type of exchange must be disclosed as a separate note below the statement of cash flows or in the notes to the financial statements.

REVIEW PROBLEM 12.6

Using the information presented in do the following:

1. Prepare the *financing activities* section of the statement of cash flows for Phantom Books. Follow the format presented in .
2. How much cash did Phantom Books use for financing activities during the year?

Solution to Review Problem 12.6

1. Start by analyzing changes in noncurrent liabilities and owners' equity on the balance sheet. Then prepare the financing activities section of the statement of cash flows. The cash flows related to each noncurrent liability and owners' equity account are underlined as follows.

Note payable increased by \$5,000. Additional data provided indicate the company signed a note with the bank and received \$5,000 cash. This is reflected in the financing activities section as a *\$5,000 cash inflow*.

Common stock decreased by \$16,000. Additional data provided indicate the company repurchased common stock for \$16,000 cash. This is reflected in the financing activities section as a *\$16,000 cash outflow*.

Retained earnings increased by \$38,000. Two items caused this increase: (1) net income of \$51,000 increased retained earnings and (2) cash dividends paid totaling \$13,000 (provided as additional data) decreased retained earnings. The net effect of these 2 items is an increase of \$38,000 (= \$51,000 net income – \$13,000 cash dividends). Net income is already included at the top of the operating activities section as shown in the

solution to . Cash dividends are included in the financing activities section as a \$13,000 cash outflow.

The financing activities section of the statement of cash flows for Phantom Books is shown as follows:

Cash flows from financing activities	
Proceeds from note payable	\$ 5,000
Repurchase of common stock	(16,000)
Payment of cash dividends	(13,000)
Cash used by financing activities	\$ (24,000)

The company used \$24,000 in cash for financing activities.

2. Cash totaling \$24,000 was used for financing activities during the year.

Step 4: Reconcile the Change in Cash

Question: We're almost done with Home Store, Inc.'s statement of cash flows. What is the fourth and final step needed to complete the statement of cash flows?

Answer: The final step is to show that the change in cash on the statement of cash flows agrees with the change in cash on the balance sheet. As shown at the bottom of the completed statement of cash flows for Home Store, Inc., in , the net decrease in cash of \$98,000 shown on this statement (= \$22,000 increase from operating activities – \$74,000 decrease from investing activities – \$46,000 decrease from financing activities) agrees with the change in cash shown on the balance sheet (= \$32,000 ending cash balance – \$130,000 beginning balance).

Figure 12.8 Statement of Cash Flows (Home Store, Inc.)

Home Store, Inc.
Statement of Cash Flows
for the Year Ended December 31, 2012

Cash flows from operating activities^a		
Net income	\$ 124,000	
Adjustments (to convert net income to cash provided by operating activities)		
Add back depreciation expense	24,000	
Add back loss on sale of equipment	6,000	
Increase in accounts receivable	(60,000)	
Increase in merchandise inventory	(66,000)	
Decrease in prepaid expenses	2,000	
Increase in accounts payable	1,000	
Decrease in income tax payable	(9,000)	
Cash provided by operating activities		\$ 22,000
Cash flows from investing activities^b		
Purchase of equipment	(67,000)	
Proceeds from sale of equipment	5,000	
Purchase of long-term investments	(12,000)	
Cash used by investing activities		(74,000)
Cash flows from financing activities^c		
Principal payment on bonds	(18,000)	
Proceeds from issuance of common stock	4,000	
Payment of cash dividends	(32,000)	
Cash used by financing activities		(46,000)
Net decrease in cash		\$ (98,000)
Cash at beginning of year ^d		130,000
Cash at end of year ^d		<u>\$ 32,000</u>

Step 1

Step 2

Step 3

Step 4

a From .

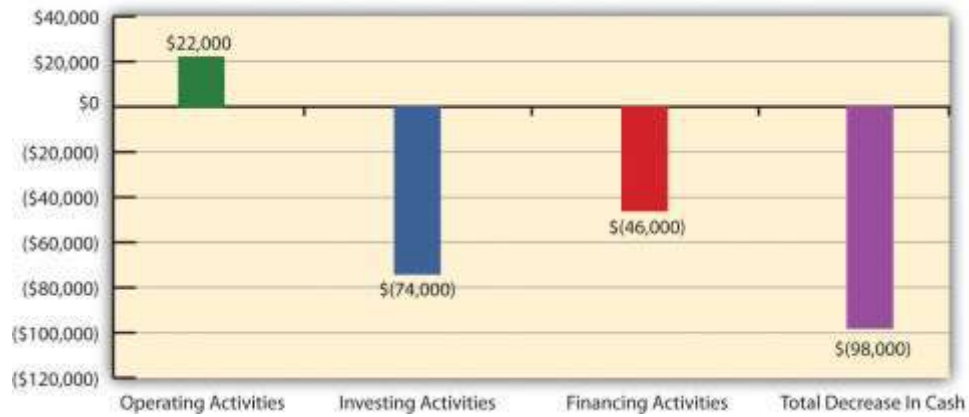
b From .

c From .

d From .

provides a summary of cash flows for operating activities, investing activities, and financing activities for Home Store, Inc., along with the resulting total decrease in cash of \$98,000.

Figure 12.9 Cash Flows at Home Store, Inc.



REVIEW PROBLEM 12.7

Using the information presented in and the solutions to , , and , prepare a complete statement of cash flows for Phantom Books. Follow the format presented in .

Solution to Review Problem 12.7

**Phantom Books
Statement of Cash Flows
for the Year Ended December 31, 2012**

Cash flows from operating activities^a		
Net income	\$ 51,000	
Adjustments (to convert net income to cash provided by operating activities)		
Add back depreciation expense	29,000	
Deduct gain on sale of equipment	(4,000)	
Add back loss on sale of long-term investment	8,000	
Decrease in accounts receivable	6,000	
Increase in merchandise inventory	(13,000)	
Decrease in prepaid expenses	4,000	
Decrease in accounts payable	(1,000)	
Increase in income tax payable	2,000	
Cash provided by operating activities		\$ 82,000
Cash flows from investing activities^b		
Purchase of equipment	(27,000)	
Proceeds from sale of equipment	12,000	
Purchase of long-term investments	(25,000)	
Proceeds from sale of long-term investments	3,000	
Cash used by investing activities		(37,000)
Cash flows from financing activities^c		
Proceeds from note payable	5,000	
Repurchase of common stock	(16,000)	
Payment of cash dividends	(13,000)	
Cash used by financing activities		(24,000)
Net increase in cash		\$ 21,000
Cash at beginning of year (from balance sheet)		24,000
Cash at end of year (from balance sheet)		\$ 45,000

Step 1

Step 2

Step 3

Step 4

^a From .

^b From .

^c From .

Home Store, Inc., Update

Recall the dialogue at Home Store, Inc., between John (CEO), Steve (treasurer), and Linda (CFO). John was concerned about the company's drop in cash from \$130,000 at the beginning of the year to \$32,000 at the end of the year. He asked Linda to investigate and wanted to know how much cash was generated from daily operations during the year. The group reconvened the following week. As you read the dialogue that follows, refer to ; it is the statement of cash flows that Linda prepared for the meeting.

<i>John (CEO):</i>	<i>Welcome, everyone. Linda, what information do you have for us regarding the company's cash flow?</i>
<i>Linda (CFO):</i>	<i>I've completed a statement of cash flows for the year—here are copies for your review (see). This statement tells us about the company's cash activities during the year and ultimately explains why cash decreased by \$98,000.</i>
<i>John:</i>	<i>How much cash did we generate from ongoing operations for the year?</i>
<i>Linda:</i>	<i>That can be found in the top portion of the statement under "cash flows from operating activities." We generated \$22,000 from operating activities.</i>
<i>Steve (Treasurer):</i>	<i>You're kidding! We had net income totaling \$124,000 but only generated \$22,000 in cash?</i>
<i>John:</i>	<i>That does seem like a huge disparity. Linda, are you sure this is correct?</i>
<i>Linda:</i>	<i>Yes! The reason cash from operating activities is so much lower than net income is that accounts receivable and merchandise inventory increased significantly from the beginning of the year to the end of the year. In fact, both accounts more than doubled.</i>
<i>Steve:</i>	<i>The cash tied up in these two areas is definitely hurting our cash flow. We really struggled to meet our cash budgets for accounts receivable collections and inventory purchases.</i>
<i>John:</i>	<i>Clearly, we've got to get a handle on receivables and inventory. But even with this huge difference between net income and cash flows from operating activities, we generated \$22,000 in cash. This does not explain why cash decreased by \$98,000.</i>
<i>Linda:</i>	<i>You're right, John. Operating activities produced positive cash flow in spite of these receivables and inventory issues. Let's look further down the</i>

	<i>statement. Notice we spent \$67,000 on equipment and purchased \$12,000 in long-term investments.</i>
<i>Steve:</i>	<i>Yes, I recall purchasing a new forklift—the old one was a safety hazard—and purchasing long-term investments at the beginning of the year when our cash balance was on the high side.</i>
<i>Linda:</i>	<i>Once we factor in the cash proceeds from the old equipment, you can see we spent \$74,000 in cash for equipment and investments.</i>
<i>John:</i>	<i>Looking back, we probably should have financed the equipment rather than having paid for it all at once. What else can you tell us, Linda?</i>
<i>Linda:</i>	<i>Bonds totaling \$18,000 came due during the year, as shown toward the bottom of the statement, and we paid \$32,000 in dividends.</i>
<i>Steve:</i>	<i>I realize the board felt cash levels were high enough during 2011 to warrant a large dividend payment in 2012, but we need to cut way back on these dividends in the future.</i>
<i>Linda:</i>	<i>I agree. To answer your question, John, the \$98,000 decrease in cash came primarily from the purchase of equipment and long-term investments and payments for bonds and cash dividends.</i>
<i>John:</i>	<i>Thank you, Linda. This provides the information we need to improve cash flow going forward.</i>

As you can see from this dialogue, the statement of cash flows is not only a reporting requirement for most companies, it is also a useful tool for analytical and planning purposes. Next, we will discuss how to use cash flow information to assess performance and help in planning for the future.

KEY TAKEAWAY

- The statement of cash flows is prepared using the four steps described in the previous segment. In step 1, the indirect method starts with net income in the operating activities section and makes three types of adjustments to convert net income to a cash basis. The first adjustment is adding back expenses that do not affect cash, such as depreciation. The second adjustment is adding back losses and deducting gains related to investing activities. The third adjustment is adding and subtracting changes in current assets (except cash) and current liabilities using the adjustment rules. Steps 2 and 3 are done by analyzing and presenting cash activities associated with noncurrent assets (investing activities) and noncurrent liabilities and owners' equity (financing activities). Step 4 shows that the change in cash on the statement of cash flows agrees with the change in cash on the balance sheet.

12.5 Analyzing Cash Flow Information

LEARNING OBJECTIVE

1. Analyze cash flow information.

Question: Companies and analysts tend to use income statement and balance sheet information to evaluate financial performance. In fact, financial results presented to the investing public typically focus on earnings per share (Chapter 13 "How Do Managers Use Financial and Nonfinancial Performance Measures?" discusses earnings per share in detail). However, analysis of cash flow information is becoming increasingly important to managers, auditors, and outside analysts. What measures are commonly used to evaluate performance related to cash flows?

Answer: Three common cash flow measures used to evaluate organizations are (1) operating cash flow ratio, (2) capital expenditure ratio, and (3) free cash flow. (Further coverage of these measures can be found in the following article: John R. Mills and Jeanne H. Yamamura, "The Power of Cash Flow Ratios," Journal of Accountancy, October 1998.) We will use two large home improvement retail companies, The Home Depot, Inc., and Lowe's Companies, Inc., to illustrate these measures.

Operating Cash Flow Ratio

Question: The operating cash flow ratio is cash provided by operating activities divided by current liabilities. What does this ratio tell us, and how is it calculated?

Answer: This ratio measures the company's ability to generate enough cash from daily operations over the course of a year to cover current obligations. Although similar to the commonly used current ratio, this ratio replaces current assets in the numerator with cash provided by operating activities. The operating cash flow ratio is as follows:

Key Equation

$$\text{Operating cash flow ratio} = \frac{\text{Cash provided by operating activities}}{\text{Current liabilities}}$$

The numerator, cash provided by operating activities, comes from the bottom of the operating activities section of the statement of cash flows. The denominator, current liabilities, comes from the liabilities section of the balance sheet. (Note that if current liabilities vary significantly from one period to the next, some analysts prefer to use average current liabilities. We will use ending current liabilities unless noted otherwise.)

As with most financial measures, the resulting ratio must be compared to similar companies in the industry to determine whether the ratio is reasonable. Some industries have a large operating cash flow relative to current liabilities (e.g., mature computer chip makers, such as Intel Corporation), while others do not (e.g., startup medical device companies).

The operating cash flow ratio is calculated for Home Depot and Lowe's in the following using information from each company's balance sheet and statement of cash flows.

Operating Cash Flow Ratio		=	Cash Provided by Operating Activities	÷	Current Liabilities
Home Depot	0.45	=	\$4,585,000,000	÷	\$10,122,000,000
Lowe's	0.54	=	\$3,852,000,000	÷	\$ 7,119,000,000

Home Depot and Lowe's are in the same industry and have comparable ratios, which is what we would expect for similar companies.

Capital Expenditure Ratio

Question: The capital expenditure ratio is cash provided by operating activities divided by capital expenditures. What does this ratio tell us, and how is it calculated?

Answer: This ratio measures the company's ability to generate enough cash from daily operations to cover capital expenditures. A ratio in excess of 1.0, for example, indicates the company was able to generate enough operating cash to cover investments in property, plant, and equipment. The capital expenditure ratio is as follows:

Key Equation

$$\text{Capital expenditure ratio} = \frac{\text{Cash provided by operating activities}}{\text{Capital expenditures}}$$

The numerator, cash provided by operating activities, comes from the bottom of the operating activities section of the statement of cash flows. The denominator, capital expenditures, comes from information within the investing activities section of the statement of cash flows.

The capital expenditure ratio is calculated for Home Depot and Lowe's in the following using information from each company's statement of cash flows.

	Capital Expenditure Ratio	=	Cash Provided by Operating Activities	÷	Capital Expenditures
Home Depot	4.18	=	\$4,585,000,000	÷	\$1,096,000,000
Lowe's	2.70	=	\$3,852,000,000	÷	\$1,426,000,000

Since the capital expenditure ratio for each company is above 1.0, both companies were able to generate enough cash from operating activities to cover investments in property, plant, and equipment (also called fixed assets).

Free Cash Flow

Question: Another measure used to evaluate organizations, called free cash flow, is simply a variation of the capital expenditure ratio described previously. What does this measure tell us, and how is it calculated?

Answer: Rather than using a ratio to determine whether the company generates enough cash from daily operations to cover capital expenditures, free cash flow is measured in dollars. Free cash flow is cash provided by operating activities minus capital expenditures. The idea is that companies must continue to invest in fixed assets to remain competitive. Free cash flow provides information regarding how much cash generated from daily operations is left over after investing in fixed assets. Many organizations, such as Amazon.com, consider this measure to be one of the most important in evaluating financial performance (see Note 12.34 "Business in Action 12.5"). The free cash flow formula is as follows:

Key Equation

Free cash flow = Cash provided by operating activities – Capital expenditures

The cash provided by operating activities comes from the bottom of the operating activities section of the statement of cash flows. The capital expenditures amount comes from information within the investing activities section of the statement of cash flows.

The free cash flow amount is calculated for Home Depot and Lowe's as follows using information from each company's statement of cash flows.

	Free Cash Flow	=	Cash Provided by Operating Activities	–	Current Liabilities
Home Depot	\$3,489,000,000	=	\$4,585,000,000	–	\$1,096,000,000
Lowe's	\$2,426,000,000	=	\$3,852,000,000	–	\$1,426,000,000

Because free cash flow for each company is above zero, both companies were able to generate enough cash from operating activities to cover investments in fixed assets and have some left over to invest elsewhere. This conclusion is consistent with the capital expenditure ratio analysis,

which uses the same information to assess the company's ability to cover fixed asset expenditures.

Formulas for the cash flow performance measures presented in this chapter are summarized in Table 12.1 "Summary of Cash Flow Performance Measures".

Table 12.1 Summary of Cash Flow Performance Measures

Operating cash flow ratio= Cash provided by operating activitiesCurrent liabilities
Capital expenditure ratio=Cash provided by operating activitiesCapital expenditures
Free cash flow=Cash provided by operating activities – Capital expenditures

Business in Action 12.5



Source: Photo courtesy of James Duncan

Davidson, <http://www.flickr.com/photos/oreilly/6629275/>

Free Cash Flow at **Amazon.com**

Amazon.com is an online retailer that began selling books in 1996 and has since expanded into other areas of retail sales. The founder and CEO (Jeff Bezos) believes free cash flow is so important, the annual report included a letter from Mr. Bezos to the shareholders, which began with this statement, “Our ultimate financial measure, and the one we want to drive over the long-term, is free cash flow per share.”

The company justifies this focus on free cash flow by making the point that earnings presented on the income statement do not translate into cash flows, and shares are valued based on the present value of future cash flows. This implies shareholders should be most interested in *free cash flow per share* rather than *earnings per share*. Mr. Bezos goes on to state, “Cash flow statements often don’t receive as much attention as they deserve. Discerning investors don’t stop with the income statement.”

Amazon.com’s free cash flow for 2010 totaled \$2,164,000,000, compared to \$2,880,000,000 in 2009. Net income for 2010 totaled \$1,152,000,000, compared to \$902,000,000 in 2009. It is interesting to note that free cash flow is significantly higher than net income for 2010 and 2009.

Source: **Amazon.com, Inc.**, “2010 Annual Report,” <http://www.amazon.com>.

KEY TAKEAWAY

- Three measures are often used to evaluate cash flow. *The operating cash flow ratio* measures the company’s ability to generate enough cash from daily operations over the course of a year to cover current obligations. The formula is as follows:

Operating cash flow ratio = $\frac{\text{Cash provided by operating activities}}{\text{Current liabilities}}$

The *capital expenditure ratio* measures the company’s ability to generate enough cash from daily operations to cover capital expenditures. The formula is as follows:

Capital expenditure ratio = $\frac{\text{Cash provided by operating activities}}{\text{Capital expenditures}}$

Free cash flow measures the company’s ability to generate enough cash from daily operations to cover capital expenditures and determines how much cash is remaining to invest elsewhere in the company. The formula is as follows:

Free cash flow = Cash provided by operating activities – Capital expenditures

REVIEW PROBLEM 12.8

The following financial information is for **PepsiCo Inc.** and **Coca-Cola Company** for fiscal year 2010.

Income Statement (in millions)		
	PepsiCo	Coca-Cola
Revenues	\$ 57,838	\$ 35,119
Expenses	51,500	17,115
Net income	<u>\$ 6,338</u>	<u>\$ 11,859</u>

Balance Sheet (in millions)		
	PepsiCo	Coca-Cola
Current assets	\$ 17,569	\$ 21,579
Noncurrent assets	50,584	51,342
Total assets	<u>\$ 68,153</u>	<u>\$ 72,921</u>
Current liabilities	15,892	18,508
Noncurrent liabilities	30,785	23,096
Owners' equity	21,476	31,317
Total liabilities and owners' equity	<u>\$ 68,153</u>	<u>\$ 72,921</u>

Statement of Cash Flows (in millions)		
	PepsiCo	Coca-Cola
Cash provided by operating activities	\$ 8,448	\$ 9,532
Cash used by investing activities	(7,668)	(4,405)
Cash provided (used) by financing activities	1,386	(3,465)
Net increase in cash	<u>\$ 2,166</u>	<u>\$ 1,662</u>
Fixed asset expenditures (included in investing activities)	<u>\$ 3,253</u>	<u>\$ 2,215</u>

For **PepsiCo** and **Coca-Cola**, calculate the following measures and comment on your results:

1. Operating cash flow ratio

2. Capital expenditure ratio (*Hint: fixed asset expenditures are the same as capital expenditures.*)
3. Free cash flow

Solution to Review Problem 12.8

All dollar amounts are in millions.

1. The formula for calculating the operating cash flow ratio is as follows:

Operating Cash Flow Ratio = $\frac{\text{Cash provided by operating activities}}{\text{Current liabilities}}$

PepsiCo operating cash flow ratio = $\$8,448 \div \$15,892 = 0.53$

Coca-Cola operating cash flow ratio = $\$9,532 \div \$18,508 = 0.52$

PepsiCo generated slightly more cash from operating activities to cover current liabilities than **Coca-Cola**.

2. The formula for calculating the capital expenditure ratio is as follows:

Capital Expenditure Ratio = $\frac{\text{Cash provided by operating activities}}{\text{Capital expenditures}}$

PepsiCo capital expenditure ratio = $\$8,448 \div \$3,253 = 2.60$

Coca-Cola capital expenditure ratio = $\$9,532 \div \$2,215 = 4.30$

Both companies generated more than enough cash from operating activities to cover capital expenditures.

3. The formula to calculate free cash flow is as follows:

Free cash flow = Cash provided by operating activities – Capital expenditures

PepsiCo free cash flow = $\$8,448 - \$3,253 = \$5,195$

Coca-Cola free cash flow = $\$9,532 - \$2,215 = \$7,317$

The conclusion reached in requirement two is confirmed here. Both companies generated more than enough cash from operating activities to

cover capital expenditures. In fact, **PepsiCo** had \$5,195,000,000 remaining from operating activities after investing in fixed assets, and **Coca-Cola** had \$7,317,000,000 remaining.

12.6 Appendix: Using the Direct Method to Prepare the Statement of Cash Flows

LEARNING OBJECTIVE

1. Prepare a statement of cash flows using the direct method.

Question: The same four steps apply to preparing a statement of cash flows using the direct method as with the indirect method. The only difference is how the operating activities section is presented in step 1; all other steps are the same as presented in the chapter. Although presentation of the operating activities section using the direct method differs from the indirect method, the end result is exactly the same. How does step 1 differ using the direct method?

Answer: Rather than adjusting net income from an accrual basis to a cash basis using the indirect method, the direct method simply presents the income statement on a cash basis. The format of the operating activities section using the direct method is presented in .

Figure 12.10 Operating Activities Format Using the Direct Method

Cash flows from operating activities	
Cash receipts from customers	\$ XXX,XXX
Cash payments to suppliers	(XXX,XXX)
Cash payments for operating expenses	(XXX,XXX)
Cash payments for interest expense	(XXX,XXX)
Cash payments for income taxes	(XXX,XXX)
Cash provided by (used by) operating activities	\$ XXX,XXX

The first item shown in , cash receipts from customers, is revenue (or sales) on a cash basis. The second item, cash payments to suppliers, is cost of goods sold on a cash basis. The third item, cash payments for operating expenses(also called selling and administrative expenses), is operating expenses on a cash basis. The fourth item, cash payments for interest expense, is interest expense on a cash basis. And the fifth item, cash payments for income taxes, is income tax expense on a cash basis. Cash receipts minus cash payments results in cash provided by operating activities.

Adjustments must be made to each income statement item to convert income statement information from an accrual basis to a cash basis. These adjustments will be described next using the same information for Home Store, Inc., presented earlier in the chapter. The income statement and balance sheet for Home Store, Inc., are presented again in . We will start at the top of the income statement with sales and work our way down item-by-item making adjustments to convert each item to a cash basis.



Figure 12.11 Income Statement and Balance Sheet (Home Store, Inc.)

Home Store, Inc. Income Statement for the Year Ended December 31, 2012			
Sales			\$ 900,000
Cost of goods sold			546,000
Gross margin			\$ 354,000
Selling and administrative expenses			120,000
Depreciation expense			24,000
Operating income			\$ 210,000
Interest expense			15,000
Loss on sale of equipment			6,000
Income before taxes			\$ 189,000
Income tax expense			65,000
Net income			\$ 124,000

Home Store, Inc. Balance Sheet December 31, 2011 and December 31, 2012			
	2012	2011	Change in Assets, Liabilities, and Equity from 2011 to 2012 Increase (decrease)
Assets			
Current assets			
Cash	\$ 32,000	\$130,000	\$ (98,000)
Accounts receivable	85,000	25,000	60,000
Merchandise inventory	126,000	60,000	66,000
Prepaid expenses	18,000	20,000	(2,000)
Noncurrent assets			
Property, plant, and equipment	956,000	910,000	46,000
Accumulated depreciation	(299,000)	(285,000)	(14,000)
Long-term investments	70,000	58,000	12,000
Total assets	\$988,000	\$918,000	
Liabilities and owners' equity			
Current liabilities			
Accounts payable	\$ 16,000	\$ 15,000	1,000
Income tax payable	39,000	48,000	(9,000)
Noncurrent liabilities			
Bonds payable	87,000	105,000	(18,000)
Owners' equity			
Common stock	414,000	410,000	4,000
Retained earnings	432,000	340,000	92,000
Total liabilities and owners' equity	\$988,000	\$918,000	

Converting Sales to Cash Receipts

Question: How are sales on an accrual basis converted to sales on a cash basis?

Answer: Sales of \$900,000 shown on the income statement do not represent cash collected from sales. The adjustment rule used to convert sales to cash receipts from customers is as follows: increases in accounts receivable are deducted from sales revenue, and conversely, decreases in accounts receivable are added to sales revenue. Since accounts receivable for Home Store, Inc., increased \$60,000, a deduction of \$60,000 from sales revenue must be taken to find cash receipts from customers. Thus cash receipts from customers totaled \$840,000 (= \$900,000 sales – \$60,000 increase in accounts receivable). The accounts receivable T-account shown in the following further clarifies this concept.

Accounts Receivable			
Beginning balance	25,000		
Sales on account	900,000	Cash receipts	840,000
Ending balance	<u>85,000</u>		

This is the revenue on the income statement using the accrual basis.

This cash basis revenue (\$840,000) is lower than accrual basis revenue (\$900,000). Thus, sales revenue must be decreased \$60,000 to convert from accrual basis to cash basis.

Here's how sales revenue on a cash basis appears in the operating activities section of the statement of cash flows for Home Store, Inc.:

Cash flows from operating activities	
Cash receipts from customers	\$ 840,000

Converting Cost of Goods Sold to a Cash Basis

Question: How is cost of goods sold on an accrual basis converted to cost of goods sold on a cash basis?

Answer: Two adjustments must be made to cost of goods sold to calculate cash paid to suppliers. First, increases in inventory are added to cost of goods sold, and conversely, decreases in inventory are deducted from cost of goods sold. Since inventory for Home Store, Inc., increased \$66,000, cost of goods sold is increased \$66,000. Second, increases in accounts payable are deducted from cost of goods sold, and conversely, decreases in accounts payable are added to cost of goods sold. Since accounts payable increased \$1,000, cost of goods sold is decreased \$1,000. These 2 adjustments result in cash paid to suppliers of \$611,000 (= \$546,000 cost of goods sold + \$66,000 increase in inventory – \$1,000 increase in accounts payable).

Here's how cost of goods sold on a cash basis appears in the operating activities section of the statement of cash flows for Home Store, Inc.:

Cash flows from operating activities	
Cash receipts from customers	\$840,000
Cash payments to suppliers	(611,000)

Converting Operating Expenses to a Cash Basis

Question: How are operating expenses on an accrual basis converted to operating expenses on a cash basis?

Answer: Two adjustments must be made to operating expenses (also called selling and administrative expenses) to calculate cash payments for operating expenses. First, increases in prepaid expenses are added to operating expenses, and conversely, decreases in prepaid expenses are deducted from operating expenses. Since prepaid expenses for Home Store, Inc., decreased \$2,000, operating expenses are decreased \$2,000. Second, increases in accrued liabilities are deducted from operating expenses, and conversely, decreases in accrued liabilities are added to operating expenses. Home Store, Inc., does not have any accrued liabilities and, therefore, no adjustment is necessary for accrued liabilities. The 1 adjustment to operating

expenses at Home Store, Inc., results in cash payments for operating expenses of \$118,000 (= \$120,000 selling and administrative expenses – \$2,000 decrease in prepaid expenses).

Here's how operating expenses on a cash basis appears in the operating activities section of the statement of cash flows for Home Store, Inc.:

Cash flows from operating activities	
Cash receipts from customers	\$840,000
Cash payments to suppliers	(611,000)
Cash payments for operating expenses	(118,000)

Depreciation Expense

Question: How is depreciation expense handled when using the direct method?

Answer: Since depreciation is a noncash expense, it is not included in the statement of cash flows using the direct method.

Converting Interest Expense to a Cash Basis

Question: How is interest expense on an accrual basis converted to interest expense on a cash basis?

Answer: Interest expense of \$15,000 shown on the income statement does not necessarily represent cash paid for interest expense. The adjustment rule used to convert interest expense to cash payments for interest expense is as follows: increases in interest payable are deducted from interest expense, and conversely, decreases in interest payable are added to interest expense. Since Home Store, Inc., had no interest payable this year or last year, no adjustment to interest expense is necessary.

Here's how interest expense on a cash basis appears in the operating activities section of the statement of cash flows for Home Store, Inc.:

Cash flows from operating activities	
Cash receipts from customers	\$840,000
Cash payments to suppliers	(611,000)
Cash payments for operating expenses	(118,000)
Cash payments for interest expense	(15,000)

Loss on Sale of Equipment

Question: How is the loss on sale of equipment handled when using the direct method?

Answer: Because the loss on sale of equipment is included as part of the proceeds from the sale of equipment in the investing activities section, this item is not included in the operating activities section. This holds true for both the direct and indirect methods.

Converting Income Tax Expense to a Cash Basis

Question: How is income tax expense on an accrual basis converted to income tax expense on a cash basis?

Answer: Income tax expense of \$65,000 shown on the income statement does not represent cash paid for income taxes. The adjustment rule used to convert income tax expense to cash payments for income taxes is: Increases in income taxes payable are *deducted* from income tax expense, and conversely, decreases in income taxes payable are *added* to income tax expense. (The same rules apply to companies that have *deferred income taxes*.) Since income taxes payable decreased \$9,000, income tax expense is increased \$9,000. Thus cash payments for income taxes totaled \$74,000 (= \$65,000 income tax expense + \$9,000 decrease in income taxes payable).

Here's how income tax expense on a cash basis appears in the operating activities section of the statement of cash flows for Home Store, Inc.:

Cash flows from operating activities	
Cash receipts from customers	\$840,000
Cash payments to suppliers	(611,000)
Cash payments for operating expenses	(118,000)
Cash payments for interest expense	(15,000)
Cash payments for income tax expense	(74,000)

Question: What does the completed operating activities section for Home Store, Inc., look like using the direct method?

Answer: The operating activities section for Home Store, Inc., is shown in . Notice that cash provided by operating activities of \$22,000 in (using the direct method) matches cash provided by operating activities in (using the indirect method). The direct and indirect methods of presenting the operating activities section of the statement of cash flows yield the exact same results. Also note that the investing and financing activities do not change using the direct method.

Figure 12.12 Operating Activities Section Using the Direct Method (Home Store, Inc.)

Cash flows from operating activities	
Cash receipts from customers	\$840,000
Cash payments to suppliers	(611,000)
Cash payments for operating expenses	(118,000)
Cash payments for interest expense	(15,000)
Cash payments for income tax expense	(74,000)
Cash provided by operating activities	<u>\$ 22,000</u>

The \$22,000 in cash provided by operating activities shown here using the direct method is identical to cash provided by operating activities using the indirect method.*

*As shown in .

Summarizes the rules used to convert income statement line items to a cash basis. Review these rules carefully before working .

Figure 12.13 Adjustment Rules for the Direct Method

<u>Income Statement Item</u>	<u>Adjustment Rule</u>
Sales revenue	Deduct increases in accounts receivable or Add decreases in accounts receivable
Cost of goods sold	Add increases in inventory or Deduct decreases in inventory and Deduct increases in accounts payable or Add decreases in accounts payable
Operating expenses	Add increases in prepaid expenses or Deduct decreases in prepaid expenses and Deduct increases in accrued liabilities or Add decreases in accrued liabilities
Depreciation expense	Do not include in operating activities because item is a noncash expense
Interest expense	Deduct increases in interest payable or Add decreases in interest payable
Gain or loss on sale of equipment	Do not include in operating activities because item is included in investing activities
Income tax expense	Deduct increases in income tax payable or Add decreases in income tax payable

KEY TAKEAWAY

- The same four steps apply to preparing the statement of cash flows using the direct method as with the indirect method. The difference is in the operating activities section of step 1. In step 1, the indirect method starts with net income and makes adjustments to convert net income to a cash basis. The direct method makes adjustments directly to each income statement revenue and expense line item, thereby converting each line item to a cash basis. The resulting cash provided by (used by) operating activities is identical in both approaches.

REVIEW PROBLEM 12.9

Using the information presented for Phantom Books in , prepare the operating activities section of the statement of cash flows using the direct method. Follow the format presented in , and refer to the adjustment rules in .

Solution to Review Problem 12.9

The operating activities section of the statement of cash flows for Phantom Books using the direct method is presented as follows. Notice that cash provided by operating activities of \$82,000 shown here using the *direct* method is identical to cash provided by operating activities using the *indirect* method (shown in the solution to).

Cash flows from operating activities

Cash receipts from customers	\$ 756,000 ^a
Cash payments to suppliers	(560,000) ^b
Cash payments for operating expenses	(75,000) ^c
Cash payments for interest expense	(11,000) ^d
Cash payments for income taxes	(28,000) ^e
Cash provided by operating activities	<u>\$ 82,000</u>

^a \$756,000 = \$750,000 sales revenue + \$6,000 decrease in accounts receivable.

^b \$560,000 = \$546,000 cost of goods sold + \$13,000 increase in inventory + \$1,000 decrease in accounts payable.

^c \$75,000 = \$79,000 operating expenses – \$4,000 decrease in prepaid expenses.

^d Since no interest payable balances exist this year or last year, the interest expense of \$11,000 is the same as cash payments for interest expense.

^e \$28,000 = \$30,000 income tax expense – \$2,000 increase in income tax payable.

END-OF-CHAPTER EXERCISES

Questions

1. Why was the statement of cash flows created by the Financial Accounting Standards Board (FASB)?
2. Describe the three classifications of cash flows, and provide examples of activities that would appear in each classification.
3. Which section of the statement of cash flows is widely regarded as the most important? Why?
4. Briefly describe the four steps required to prepare the statement of cash flows using the indirect method.

5. Refer to the Why is the indirect method used by most companies?
6. Describe the three adjustments necessary to convert net income to a cash basis using the indirect method. Provide an example for each adjustment.
7. Why is depreciation expense added back to net income using the indirect method of preparing the statement of cash flows?
8. Assume you are using the *indirect* method to prepare the operating activities section of the statement of cash flows. Describe the adjustment rules for current assets and current liabilities, and provide one example for each rule.
9. You have just completed the statement of cash flows for a company, and the bottom of the statement shows a net increase in cash of \$250,000. Describe where this increase should be shown elsewhere in the financial statements.
10. Provide an example of a noncash investing or financing activity. Describe how these transactions are disclosed in the financial statements.
11. How is the operating cash flow ratio calculated, and what does it tell the user?
12. How is the capital expenditure ratio calculated, and what does it tell the user?
13. How is free cash flow calculated, and what does it tell the user?
14. **Appendix.** Describe how the indirect method differs from the direct method.
15. **Appendix.** Assume you are using the *direct* method to prepare the operating activities section of the statement of cash flows. Describe the adjustment rule used to convert *sales revenue* to *cash receipts from customers*.
16. **Appendix.** Assume you are using the *direct* method to prepare the operating activities section of the statement of cash flows. Describe the adjustment rules used to convert *cost of goods sold* to *cash payments to suppliers*.

Brief Exercises

17. **Evaluating Cash Flows at Home Store, Inc.** Refer to the dialogue at Home Store, Inc., presented at the beginning of the chapter and the follow-up dialogue after .

Required:

- a. Why was the CEO concerned about the company's cash flow?



- b. Why did the CEO state, “We probably should have financed the equipment rather than having paid for it all at once”?

Classifying Cash Flows. Identify whether each of the following items would appear in the operating, investing, or financing activities section of the statement of cash flows. Briefly explain your answer for each item.

1. Cash receipts from the sale of common stock
2. Cash receipts from the sale of a building
3. Cash payments for income taxes
4. Cash receipts from issuance of bonds
5. Cash payments for the purchase of equipment

Operating Activities Section Using the Indirect Method. The following income statement and current sections of the balance sheet are for Donzi, Inc.

**Donzi, Inc.
Income Statement
for the Year Ended December 31, 2012**

Sales	\$ 650,000
Cost of goods sold	410,000
Gross margin	<u>\$ 240,000</u>
Selling and administrative expenses	89,000
Depreciation expense	21,000
Operating income	<u>\$ 130,000</u>
Gain on sale of equipment	1,600
Income before taxes	<u>\$ 131,600</u>
Income tax expense	46,600
Net income	<u><u>\$ 85,000</u></u>

	December 31	
	2012	2011
Current assets		
Cash	\$ 40,000	\$ 32,000
Accounts receivable	10,000	8,000
Merchandise inventory	12,500	16,000
Prepaid expenses	4,000	2,700
Current liabilities		
Accounts payable	4,500	3,700
Income tax payable	2,200	1,800

Required:

Using the indirect method, prepare the operating activities section of the statement of cash flows for Donzi, Inc., for the year ended December 31, 2012. Use the format presented in .

(Appendix) Operating Activities Section Using the Direct Method. The following income statement and current sections of the balance sheet are for Donzi, Inc. (this is the same information as the previous brief exercise).

Donzi, Inc. Income Statement for the Year Ended December 31, 2012	
Sales	\$ 650,000
Cost of goods sold	410,000
Gross margin	\$ 240,000
Selling and administrative expenses	89,000
Depreciation expense	21,000
Operating income	\$ 130,000
Gain on sale of equipment	1,600
Income before taxes	\$ 131,600
Income tax expense	46,600
Net income	\$ 85,000

December 31		
	2012	2011
Current assets		
Cash	\$ 40,000	\$ 32,000
Accounts receivable	10,000	8,000
Merchandise inventory	12,500	16,000
Prepaid expenses	4,000	2,700
Current liabilities		
Accounts payable	4,500	3,700
Income tax payable	2,200	1,800

Required:

Using the direct method, prepare the operating activities section of the statement of cash flows for Donzi, Inc., for the year ended December 31, 2012. Use the format presented in .

Investing Activities Section. The following information is from the noncurrent asset portion of Santana, Inc.'s balance sheet.

December 31		
	2012	2011
Property, plant and equipment	\$180,000	\$150,000
Accumulated depreciation	(111,000)	(95,000)
Long-term investments	41,000	26,000

The following activities occurred during 2012:

- Sold equipment with a book value of \$3,000 (= \$13,000 cost – \$10,000 accumulated depreciation) for \$4,000 cash and depreciation expense for the year totaled \$26,000
- Purchased property for \$43,000 cash
- Purchased long-term investments for \$15,000 cash

Required:

Prepare the investing activities section of the statement of cash flows for Santana, Inc., for the year ended December 31, 2012. Use the format presented in .

Financing Activities Section. The following information is from the noncurrent liabilities and owners' equity portions of Canton Company's balance sheet.

	December 31	
	2012	2011
Bonds payable	\$ 410,000	\$ 330,000
Common stock	800,000	700,000
Retained earnings	995,000	950,000

The following activities occurred during 2012:

- Issued bonds for \$80,000 cash
- Issued common stock for \$100,000 cash
- Earned net income totaling \$60,000
- Paid cash dividends totaling \$15,000

Required:

Prepare the financing activities section of the statement of cash flows for Canton Company for the year ended December 31, 2012. Use the format presented in .

Cash Flow Measures. The selected information in the following is from Diaz Company's financial records for the most recent fiscal year.

Current assets	\$600,000
Current liabilities	\$250,000
Cash provided by operating activities	\$700,000
Net income	\$300,000

Capital expenditures	\$550,000
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Required:

Calculate Diaz Company's

1. Operating cash flow ratio;
2. Capital expenditure ratio; and
3. Free cash flow.

Exercises: Set A

24. Classifying Cash Flows. Identify whether each of the following items would appear in the operating, investing, or financing activities section of the statement of cash flows. Briefly explain your answer for each item.

1. Cash payments for the repurchase of common stock
2. Cash payments for the purchases of merchandise
3. Cash receipts from the collection of interest on loans made to other entities
4. Cash receipts from the collection of principal on loans made to other entities
5. Cash payments to shareholders for dividends
6. Cash payments for the purchase of equipment

25. Operating Activities Section Using the Indirect Method. The following income statement and current sections of the balance sheet are for Capstone, Inc.

**Capstone, Inc.
Income Statement
for the Year Ended December 31, 2012**

Sales	\$990,000
Cost of goods sold	520,000
Gross margin	\$470,000
Selling and administrative expenses	110,000
Depreciation expense	63,000
Operating income	\$297,000
Loss on sale of equipment	(4,100)
Income before taxes	\$292,900
Income tax expense	112,900
Net income	\$180,000

December 31

	<u>2012</u>	<u>2011</u>
Current assets		
Cash	\$ 62,000	\$ 76,000
Accounts receivable	21,000	24,000
Merchandise inventory	45,000	33,000
Prepaid expenses	11,000	12,200
Current liabilities		
Accounts payable	53,000	60,500
Income tax payable	8,600	13,400

Required:

- a. Using the indirect method, prepare the operating activities section of the statement of cash flows for Capstone, Inc., for the year ended December 31, 2012. Use the format presented in .
- b. How much cash was provided by (used by) operating activities? Briefly describe what this amount tells us about the company.

(Appendix) Operating Activities Section Using the Direct

Method. The following income statement and current sections of the balance sheet are for Capstone, Inc. (this is the same information as the previous exercise).

Capstone, Inc.
Income Statement
for the Year Ended December 31, 2012

Sales	\$ 990,000
Cost of goods sold	520,000
Gross margin	\$ 470,000
Selling and administrative expense	110,000
Depreciation expense	63,000
Operating income	\$ 297,000
Loss on sale of equipment	(4,100)
Income before taxes	\$ 292,900
Income tax expense	112,900
Net income	\$ 180,000

December 31

	<u>2012</u>	<u>2011</u>
Current assets		
Cash	\$ 62,000	\$ 76,000
Accounts receivable	21,000	24,000
Merchandise inventory	45,000	33,000
Prepaid expenses	11,000	12,200
Current liabilities		
Accounts payable	53,000	60,500
Income tax payable	8,600	13,400

Required:

- a. Using the direct method, prepare the operating activities section of the statement of cash flows for Capstone, Inc., for the year ended December 31, 2012. Use the format presented in .
- b. How much cash was provided by (used by) operating activities? Briefly describe what this amount tells us about the company.

Investing Activities Section. The following information is from the noncurrent asset portion of Caldera, Inc.'s balance sheet.

December 31		
	2012	2011
Property, plant and equipment	\$ 580,000	\$ 440,000
Accumulated depreciation	(235,000)	(200,000)
Loans made to other entities	20,000	300,000
Long-term investments	33,000	60,000

The following activities occurred during 2012:

- Sold equipment with a book value of \$46,000 (= \$170,000 cost – \$124,000 accumulated depreciation) for \$37,000 cash and depreciation expense for the year totaled \$159,000
- Purchased equipment for \$310,000 cash
- No additional loans to other entities were made during the year (Hint: Solve for the principal amount on loans collected during the year.)
- Sold long-term investments with an original cost of \$27,000 for \$33,000 cash

Required:

- e. Prepare the investing activities section of the statement of cash flows for Caldera, Inc., for the year ended December 31, 2012. Use the format presented in .
- f. How much cash was provided by (used by) investing activities? Briefly describe what this amount tells us about the company.

Financing Activities Section. The following information is from the noncurrent liabilities and owners' equity portions of Flash, Inc.'s balance sheet.

	December 31	
	2012	2011
Long-term notes payable	\$350,000	\$260,000
Bonds payable	54,000	87,000
Common stock	350,000	410,000
Retained earnings	880,000	720,000

The following activities occurred during 2012:

- Paid principal amount of \$20,000 for long-term notes payable
- Received \$110,000 for long-term notes payable
- Paid principal amount on bonds totaling \$33,000
- Repurchased common stock for \$60,000 cash
- Earned net income totaling \$200,000
- Paid cash dividends totaling \$40,000

Required:

- g. Prepare the financing activities section of the statement of cash flows for Flash, Inc., for the year ended December 31, 2012. Use the format presented in .
- h. How much cash was provided by (used by) financing activities? Briefly describe what this amount tells us about the company.

Operating Activities Section Using the Indirect Method and Cash Ratios. The following data are for Cycle Company.

	December 31	
	2012	2011
Current assets		
Cash	\$ 80,000	\$ 65,000
Accounts receivable	18,000	16,000
Merchandise inventory	15,500	20,000
Prepaid expenses	4,200	3,500
Current liabilities		
Accounts payable	35,400	36,600
Income tax payable	1,400	1,900

Other Data for the Year Ended December 31, 2012		
Net income	\$40,000	From income statement
Depreciation expense	6,000	
Loss on sale of equipment	3,200	From accounting records
Capital expenditures	28,000	

Required:

- a. Using the indirect method, prepare the operating activities section of the statement of cash flows for Cycle Company for the year ended December 31, 2012. Use the format presented in .
- b. Calculate the following cash measures:
 1. Operating cash flow ratio
 2. Capital expenditure ratio
 3. Free cash flow

Exercises: Set B

30. **Classifying Cash Flows.** Identify whether each of the following items would appear in the operating, investing, or financing activities section of the statement of cash flows. Briefly explain your answer for each item.
 1. Cash receipts from the sale of goods
 2. Cash payments for the purchases of merchandise
 3. Cash receipts from the issuance of bonds
 4. Cash payments to shareholders for dividends
 5. Cash payments to employees
 6. Cash receipts from the sale of equipment
31. **Operating Activities Section Using the Indirect Method.** The following income statement and current sections of the balance sheet are for Manor Company.

**Manor Company
Income Statement
for the Year Ended December 31, 2012**

Sales	\$460,000
Cost of goods sold	225,000
Gross margin	\$235,000
Selling and administrative expense	75,000
Depreciation expense	18,000
Operating income	\$142,000
Gain on sale of equipment	12,200
Income before taxes	\$154,200
Income tax expense	124,200
Net income	\$ 30,000

December 31

	<u>2012</u>	<u>2011</u>
Current assets		
Cash	\$ 98,000	\$ 95,000
Accounts receivable	89,000	65,000
Merchandise inventory	80,000	46,000
Prepaid expenses	31,000	34,000
Current liabilities		
Accounts payable	64,000	77,000
Income tax payable	26,000	23,000

Required:

- a. Using the indirect method, prepare the operating activities section of the statement of cash flows for Manor Company for the year ended December 31, 2012. Use the format presented in .
- b. How much cash was provided by (used by) operating activities? Briefly describe what this amount tells us about the company.

(Appendix) Operating Activities Section Using the Direct

Method. The following income statement and current sections of the balance sheet are for Manor Company (this is the same information as the previous exercise).

**Manor Company
Income Statement
for the Year Ended December 31, 2012**

Sales	\$460,000
Cost of goods sold	225,000
Gross margin	\$235,000
Selling and administrative expense	75,000
Depreciation expense	18,000
Operating income	\$142,000
Gain on sale of equipment	12,200
Income before taxes	\$154,200
Income tax expense	124,200
Net income	<u>\$ 30,000</u>

December 31

	<u>2012</u>	<u>2011</u>
Current assets		
Cash	\$ 98,000	\$ 95,000
Accounts receivable	89,000	65,000
Merchandise inventory	80,000	46,000
Prepaid expenses	31,000	34,000
Current liabilities		
Accounts payable	64,000	77,000
Income tax payable	26,000	23,000

Required:

- a. Using the direct method, prepare the operating activities section of the statement of cash flows for Manor Company for the year ended December 31, 2012. Use the format presented in .
- b. How much cash was provided by (used by) operating activities? Briefly describe what this amount tells us about the company.

Investing Activities Section. The following information is from the noncurrent asset portion of Gebhardt Company's balance sheet.

	December 31	
	2012	2011
Property, plant and equipment	\$ 670,000	\$ 710,000
Accumulated depreciation	(275,000)	(290,000)
Loans made to other entities	60,000	25,000
Long-term investments	59,000	43,000

The following activities occurred during 2012:

- Sold equipment with a book value of \$4,000 (= \$90,000 cost – \$86,000 accumulated depreciation) for \$9,000 cash and depreciation expense for the year totaled \$71,000
- Purchased equipment for \$50,000 cash
- Loans totaling \$62,000 were made to other entities during the year (Hint: Solve for the principal amount on loans collected during the year.)
- Purchased long-term investments for \$16,000 cash

Required:

- Prepare the investing activities section of the statement of cash flows for Gebhardt, Inc., for the year ended December 31, 2012. Use the format presented in .
- How much cash was provided by (used by) investing activities? Briefly describe what this amount tells us about the company.

Financing Activities Section. The following information is from the noncurrent liabilities and owners' equity portions of System, Inc.'s balance sheet.

	December 31	
	2012	2011
Long-term notes payable	\$ 60,000	\$ 90,000
Bonds payable	148,000	115,000
Common stock	340,000	270,000
Retained earnings	810,000	660,000

The following activities occurred during 2012:

- Paid principal amount of \$70,000 for long-term notes payable
- Received \$40,000 for long-term notes payable
- Paid principal amount on bonds totaling \$15,000 (Hint: Solve for the proceeds received from the issuance of bonds.)
- Issued common stock for \$100,000 cash (Hint: Solve for the amount paid for the repurchase of stock.)
- Earned net income totaling \$170,000
- Paid cash dividends totaling \$20,000

Required:

- g. Prepare the financing activities section of the statement of cash flows for System, Inc., for the year ended December 31, 2012. Use the format presented in .
- h. How much cash was provided by (used by) financing activities? Briefly describe what this amount tells us about the company.

Operating Activities Section Using the Indirect Method and Cash Ratios. The following data are for Mills Company.

	December 31	
	2012	2011
Current assets		
Cash	\$50,000	\$85,000
Accounts receivable	26,000	32,000
Merchandise inventory	46,000	41,500
Prepaid expenses	5,500	7,600
Current liabilities		
Accounts payable	37,000	34,300
Income taxes payable	2,200	3,300

Other Data for the Year Ended December 31, 2012		
Net income	\$ 165,000	From income statement
Depreciation expense	26,000	
Gain on sale of equipment	8,500	From accounting records
Capital expenditures	147,000	

Required:

- a. Using the indirect method, prepare the operating activities section of the statement of cash flows for Mills Company for the year ended December 31, 2012. Use the format presented in .
- b. Calculate the following cash measures:
 1. Operating cash flow ratio
 2. Capital expenditure ratio
 3. Free cash flow

Problems

36. Classifying Cash Flows. Big Sky, Inc., had the following transactions during 2012:

1. Issued common stock for \$150,000 cash
2. Paid \$25,000 in principal on previously issued bonds
3. Paid \$300,000 in salaries and wages to employees
4. Sold property for \$45,000 cash
5. Paid \$3,000 in cash dividends
6. Received \$600,000 from customers for cash sales
7. Paid \$350,000 cash for merchandise
8. Converted bonds into common stock
9. Purchased a building for \$850,000 cash
10. Paid \$310,000 for operating expenses
11. Received \$200,000 cash for the sale of long-term investments

12. Issued bonds for \$87,000 cash
13. Repurchased common stock for \$35,000 cash
14. Issued common stock to purchase land valued at \$450,000
15. Paid \$10,000 cash for interest on notes payable

Required:

Classify each transaction as one of the following: operating activity, investing activity, financing activity, or noncash transaction. Briefly explain your answer for each item.

37. **Prepare a Statement of Cash Flows, Indirect Method.** Glenbrook Company's most recent balance sheet, income statement, and other important information for 2012 are presented as follows.

Glenbrook Company Balance Sheet December 31, 2012 and December 31, 2011		
	2012	2011
Assets		
Current assets		
Cash	\$ 139,000	\$ 185,000
Accounts receivable	75,000	66,000
Merchandise inventory	113,000	116,000
Prepaid expenses	9,000	4,000
Noncurrent assets		
Property, plant, and equipment	761,000	705,000
Accumulated depreciation	(225,000)	(188,000)
Long-term investments	125,000	74,000
Total assets	\$ 997,000	\$ 962,000
Liabilities and owners' equity		
Current liabilities		
Accounts payable	\$ 84,000	\$ 68,000
Income tax payable	28,000	34,000
Noncurrent liabilities		
Bonds payable	54,000	38,000
Owners' equity		
Common stock	437,000	482,000
Retained earnings	394,000	340,000
Total liabilities and owners' equity	\$ 997,000	\$ 962,000

**Glenbrook Company
Income Statement
for the Year Ended December 31, 2012**

Sales	\$640,000
Cost of goods sold	300,000
Gross margin	<u>\$340,000</u>
Operating expenses	180,000
Depreciation expense	47,000
Operating income	<u>\$113,000</u>
Interest expense	5,000
Loss on sale of equipment	2,000
Income before taxes	<u>\$106,000</u>
Income tax expense	40,000
Net income	<u>\$ 66,000</u>

Additional data for 2012 are as follows:

- Sold equipment with a book value of \$30,000 (= \$40,000 cost – \$10,000 accumulated depreciation) for \$28,000 cash
- Purchased equipment for \$96,000 cash
- There were no sales of long-term investments (Hint: Solve for the purchase of long-term investments.)
- Issued bonds for \$16,000 cash
- Repurchased common stock (treasury shares) for \$45,000 cash
- Declared and paid \$12,000 in cash dividends

Required:

- g. Use the four steps described in the chapter to prepare a statement of cash flows for the year ended December 31, 2012, using the *indirect* method. Refer to the format presented in .
- h. Briefly describe the major changes in cash identified in the statement of cash flows.

(Appendix) Prepare a Statement of Cash Flows, Direct Method. Refer to the information for Glenbrook Company presented in the previous problem.

Required:

- a. Use the four steps described in the chapter, including the appendix, to prepare a statement of cash flows for the year ended December 31, 2012, using the *direct* method. Refer to the operating activities section format using the direct method presented in and the adjustment rules for the direct method presented in .
- b. Briefly describe the major changes in cash identified in the statement of cash flows.

Prepare and Analyze a Statement of Cash Flows, Indirect

Method. Travel Supply, Inc.'s most recent balance sheet, income statement, and other important information for 2012 are presented as follows.

Travel Supply, Inc. Balance Sheet December 31, 2012 and December 31, 2011		
	2012	2011
Assets		
Current assets		
Cash	\$ 85,000	\$ 34,000
Accounts receivable	25,000	28,000
Merchandise inventory	83,000	65,000
Prepaid expenses	1,000	5,000
Noncurrent assets		
Property, plant, and equipment	245,000	221,000
Accumulated depreciation	(70,000)	(61,000)
Long-term investments	18,000	31,000
Total assets	\$ 387,000	\$ 323,000
Liabilities and owners' equity		
Current liabilities		
Accounts payable	\$ 20,000	\$ 30,000
Income tax payable	7,000	6,000
Noncurrent liabilities		
Notes payable	4,000	20,000
Owners' equity		
Common stock	225,000	217,000
Retained earnings	131,000	50,000
Total liabilities and owners' equity	\$ 387,000	\$ 323,000

**Travel Supply, Inc.
Income Statement
for the Year Ended December 31, 2012**

Sales	\$ 445,000
Cost of goods sold	168,000
Gross margin	<u>\$ 277,000</u>
Operating expenses	96,000
Depreciation expense	29,000
Operating income	<u>\$ 152,000</u>
Interest expense	(2,000)
Gain on sale of equipment	5,000
Loss on sale of long-term investments	(4,000)
Income before taxes	<u>\$ 151,000</u>
Income tax expense	48,000
Net income	<u>\$ 103,000</u>

Additional data for 2012 are as follows:

- Sold equipment with a book value of \$3,000 (= \$23,000 cost – \$20,000 accumulated depreciation) for \$8,000 cash
- Purchased equipment for \$47,000 cash
- Sold long-term investments for \$9,000 cash and these investments had an original cost of \$13,000
- Paid \$16,000 cash for principal amount on notes payable
- Issued common stock for \$8,000 cash
- Declared and paid \$22,000 in cash dividends

Required:

- g. Use the four steps described in the chapter to prepare a statement of cash flows for the year ended December 31, 2012, using the *indirect* method. Refer to the format presented in .
- h. The owner of Travel Supply, Inc., wants to know why cash only increased \$51,000 even though the company had net income of \$103,000, issued common stock for \$8,000, and sold long-term investments for \$9,000. Use the information in the statement of cash flows to briefly explain why cash only increased \$51,000.

Prepare a Statement of Cash Flows, Indirect Method; Analyze Using Cash Ratios. Nolan Company's most recent balance sheet, income statement, and other important information for 2012 are presented as follows.

Nolan Company Balance Sheet December 31, 2012 and December 31, 2011		
	2012	2011
Assets		
Current assets		
Cash	\$ 165,000	\$ 82,000
Accounts receivable	59,000	51,000
Merchandise inventory	86,000	90,000
Prepaid expenses	12,000	8,000
Noncurrent assets		
Property, plant, and equipment	155,000	172,000
Accumulated depreciation	(35,000)	(29,000)
Long-term investments	21,000	29,000
Total assets	\$ 463,000	\$ 403,000
Liabilities and owners' equity		
Current liabilities		
Accounts payable	25,000	22,000
Income tax payable	1,000	3,000
Noncurrent liabilities		
Bonds payable	30,000	11,000
Owners' equity		
Common stock	352,000	317,000
Retained earnings	55,000	50,000
Total liabilities and owners' equity	\$ 463,000	\$ 403,000

Nolan Company Income Statement for the Year Ended December 31, 2012	
Sales	\$ 615,000
Cost of goods sold	429,000
Gross margin	\$ 186,000
Operating expenses	155,000
Depreciation expense	20,000
Operating income	\$ 11,000
Interest expense	(3,000)
Gain on sale of equipment	8,000
Loss on sale of long-term investments	(2,000)
Income before taxes	\$ 14,000
Income tax expense	5,000
Net income	\$ 9,000

Additional data for 2012 are as follows:

- Sold equipment with a book value of \$13,000 (= \$27,000 cost – \$14,000 accumulated depreciation) for \$21,000 cash
- Purchased equipment for \$10,000 cash
- Sold long-term investments for \$6,000 cash and these investments had an original cost of \$8,000
- Received \$19,000 cash related to notes payable
- Issued common stock for \$35,000 cash
- Declared and paid \$4,000 in cash dividends

Required:

- g. Use the four steps described in the chapter to prepare a statement of cash flows for the year ended December 31, 2012, using the *indirect* method. Refer to the format presented in .
- h. The owner of Nolan Company wants to know how cash more than doubled, from \$82,000 to \$165,000, given the company's modest net income of \$9,000. Use the information in the statement of cash flows to briefly explain why cash more than doubled.

i. Calculate the following cash measures:

1. Operating cash flow ratio
2. Capital expenditure ratio (Hint: Capital expenditures can be found in the *investing activities* section of the statement of cash flows prepared in part a.)
3. Free cash flow

(Appendix) Prepare a Statement of Cash Flows (Direct Method);

Analyze Using Cash Ratios. Refer to the information for Nolan Company presented in the previous problem.

Required:

- a. Use the four steps described in the chapter, including the appendix, to prepare a statement of cash flows for the year ended December 31, 2012,

using the *direct* method. Refer to the operating activities section format using the direct method presented in , and the adjustment rules for the direct method presented in .

b. Briefly describe the major changes in cash identified in the statement of cash flows.

c. Calculate the following cash measures:

1. Operating cash flow ratio
2. Capital expenditure ratio (Hint: Capital expenditures can be found in the *investing activities* section of the statement of cash flows prepared in part *a*.)
3. Free cash flow

Prepare and Analyze a Statement of Cash Flows, Indirect Method and Direct Method. Ritz Company's most recent balance sheet, income statement, and other important information for 2012 are presented as follows.

**Ritz Company
Balance Sheet
December 31, 2012 and
December 31, 2011**

	<u>2012</u>	<u>2011</u>
Assets		
Current assets		
Cash	\$ 278,000	\$ 350,000
Accounts receivable	345,000	260,000
Merchandise inventory	295,000	160,000
Prepaid expenses	26,000	35,000
Noncurrent assets		
Property, plant, and equipment	490,000	450,000
Accumulated depreciation	(325,000)	(275,000)
Long-term investments	160,000	179,000
Total assets	<u>\$1,269,000</u>	<u>\$1,159,000</u>
Liabilities and owners' equity		
Current liabilities		
Accounts payable	\$ 55,000	\$ 60,000
Accrued payable	16,000	29,000
Interest payable	21,000	15,000
Income tax payable	15,000	12,000
Noncurrent liabilities		
Notes payable	115,000	10,000
Owners' equity		
Common stock	675,000	668,000
Retained earnings	372,000	365,000
Total liabilities and owners' equity	<u>\$1,269,000</u>	<u>\$1,159,000</u>

**Ritz Company
Income Statement
for the Year Ended December 31, 2012**

Sales	\$ 950,000
Cost of goods sold	590,000
Gross margin	<u>\$ 360,000</u>
Operating expenses	145,000
Depreciation expense	135,000
Operating income	<u>\$ 80,000</u>
Interest expense	(8,000)
Gain on sale of equipment	17,000
Loss on sale of long-term investments	(1,000)
Income before taxes	<u>\$ 88,000</u>
Income tax expense	70,000
Net income	<u>\$ 18,000</u>

Additional data for 2012 are as follows:

- Sold equipment with a book value of \$15,000 (= \$100,000 cost – \$85,000 accumulated depreciation) for \$32,000 cash
- Purchased equipment for \$140,000 cash

- Sold long-term investments for \$23,000 cash and these investments had an original cost of \$24,000
- Purchased long-term investments for \$5,000 cash
- Issued bonds for \$105,000 cash
- Issued common stock for \$7,000 cash
- Declared and paid \$11,000 in cash dividends

Required:

- h. Use the four steps described in the chapter to prepare a statement of cash flows for the year ended December 31, 2012, using the *indirect* method. Refer to the format presented in .
- i. The owner of Ritz Company wants to know why cash decreased from \$350,000 to \$278,000 given the company's net income of \$18,000. Use the information in the statement of cash flows to briefly explain why cash decreased.
- j. Use the four steps described in the chapter, as well as in the appendix, to prepare a statement of cash flows for the year ended December 31, 2012, using the *direct* method. Refer to the operating activities section format using the direct method presented in and the adjustment rules for the direct method presented in .

One Step Further: Skill-Building Cases

43. Southwest Airlines **Statement of Cash Flows**. Refer to the How could **Southwest's** cash balance increase by \$147,000,000 even though the company generated \$1,600,000,000 in cash from operating activities?
44. Home Depot **and** Lowe's **Statement of Cash Flows**. Refer to the How much cash was generated from daily activities for each company? Where was the bulk of this cash spent for each company?
45. **Internet Project: Statement of Cash Flows**. Using the Internet, find the most recent annual report for a company of your choice. Print the

statement of cash flows and include it with your response to the following requirements.

Required:

- a. How much cash was provided by (used by) *operating* activities? Compare this amount to net income (often called *net earnings*) and explain why the two are different.
- b. What method did the company use to prepare the *operating* activities section, direct or indirect? Explain.
- c. How much cash was provided by (used by) *investing* activities? Which activity in this section had the biggest impact on investing cash flows?
- d. How much cash was provided by (used by) *financing* activities? Which activity in this section had the biggest impact on financing cash flows?
- e. Calculate free cash flow. Did the company generate enough cash from operating activities to cover capital expenditures? Explain.

Dividend Cash Flow at Microsoft. Refer to the How much did **Microsoft** pay in dividends during the second quarter of 2005? Why did **Microsoft** pay such a large dividend to shareholders?

Cash Flows at Amazon.com. Refer to the Why does **Amazon.com** prefer to use *free cash flow per share* rather than *earnings per share* to evaluate the company?

Group Activity: Analyzing General Motors Statement of Cash Flows. The following information is from the consolidated statement of cash flows for **General Motors (GM)** for the year ended December 31, 2005 (in millions).

Net cash used in operating activities	\$ (16,856)
Net cash provided by investing activities	8,565
Net cash provided by financing activities	3,480
Effect of exchange rate changes on cash and cash equivalents	(85)
Reclassified cash and cash equivalents	(371)
Net decrease in cash and cash equivalents	\$ (5,267)
Cash and cash equivalents at the beginning of the year	35,993
Cash and cash equivalents at the end of the year	<u>\$ 30,726</u>

Required:

An investment advisor recently reviewed **GM's** statement of cash flows and balance sheet and stated: "**GM** is doing great! They are sitting on cash of more than \$30,000,000,000. There is no cash flow problem with this company!" In groups of two to four students, decide whether you agree with this statement. Support your conclusion with an analysis of **GM's** cash flows.

Comprehensive Case

49. Ethics: Manipulating Data to Reach Target Cash Flow. Country Market, Inc., sells food and beverage products at its five retail stores. The company's fiscal year ends on December 31. The company's president and CEO, Jean Williams, just received a draft of the statement of cash flows from the controller, Stan Walker. Jean is very interested in the results since a significant part of her annual bonus depends on generating at least \$400,000 in cash from *operating* activities. A summary of the statement is provided in the following:

Cash provided by operating activities	\$ 380,000
Cash used by investing activities	(220,000)
Cash provided by financing activities	75,000
Net increase in cash	<u>\$ 235,000</u>

Becky Swanson, the chief financial officer (CFO) for Country Market, is approached by Jean:

<i>Jean:</i>	<i>Becky, have you seen the statement of cash flows?</i>
<i>Becky:</i>	<i>No, not yet. Last I heard Stan was just about done with it.</i>
<i>Jean:</i>	<i>He just dropped off a copy for my review.</i>
<i>Becky:</i>	<i>Excellent. How does it look?</i>
<i>Jean:</i>	<i>Overall it looks fine, but something must be wrong with the operating activities</i>

	<i>number. I assumed it would be well above \$400,000. Can you take a look at it and make sure we exceed \$400,000?</i>
<i>Becky:</i>	<i>I'll do what I can.</i>
<i>Jean:</i>	<i>Great. I knew I could depend on you.</i>
Shortly after this discussion, Becky returned with revised numbers:	
<i>Becky:</i>	<i>Jean, here is the corrected statement of cash flows (see as follows). I was able to reclassify a portion of cash received from the sale of long-term investments to the operating activities section to get to \$403,000.</i>
<i>Jean:</i>	<i>Excellent! Thanks, Becky, I knew you could do it!</i>

Cash provided by operating activities	\$ 403,000
Cash used by investing activities	(243,000)
Cash provided by financing activities	75,000
Net increase in cash	<u>\$ 235,000</u>

Required:

- What impact did the reclassification of cash flows have on the total net increase in cash? Explain.
- Are Becky's actions ethical? Explain.
- If you were the CFO, how would you handle Jean's request? (If necessary, review the presentation of ethics in for additional information.)

Chapter 13

How Do Managers Use Financial and Nonfinancial Performance Measures?



Source: Photo courtesy of Jon

Seidman, <http://www.flickr.com/photos/jonseidman1988/4481833335/>.

Sandy Masako is the CEO of a fast-food restaurant called Chicken Deluxe. The company operates hundreds of restaurants throughout North America and is choosing between two

suppliers of soft drinks: Deep Fizz Company and Extreme Fizz, Inc. Consumer surveys indicate no significant preference between the two. Sandy is meeting with Dave Roberts, the CFO, and Karen Kraft, the purchasing manager, to discuss the company's options.

<i>Sandy (CEO):</i>	<i>We have a big decision to make. Our soft drink contract is up at the end of this year, and we need to decide on a supplier for next year.</i>
<i>Karen (Purchasing Manager):</i>	<i>I've had preliminary discussions with both Deep Fizz and Extreme Fizz, and the costs of their products are about the same.</i>
<i>Dave (CFO):</i>	<i>Based on extensive surveys with our customers, they are not particularly concerned about which supplier we choose, as long as it's either Deep Fizz or Extreme Fizz.</i>
<i>Karen:</i>	<i>Both companies would like our business. This is a big contract for either of them!</i>
<i>Sandy:</i>	<i>OK, so we have two companies offering the same terms, and customers who would be satisfied with either company's products. Are there any other criteria we should consider?</i>
<i>Dave:</i>	<i>We must have a supplier that is on solid financial ground. If our supplier were to have financial difficulties that jeopardized product quality or timing of deliveries, we would be in a bind.</i>
<i>Karen:</i>	<i>I agree. We need to determine whether these companies are in good financial shape.</i>
<i>Dave:</i>	<i>I suggest we have our accounting staff evaluate their financial information by analyzing and comparing certain key financial measures.</i>
<i>Sandy:</i>	<i>What do you have in mind?</i>

Dave:	<i>My staff can look at financial trends and calculate several different ratios to evaluate the strength of each company's income statement and balance sheet. We can compare these ratios for both companies and also compare them to industry standards. This analysis should give us a better idea about the financial stability of each company.</i>
Sandy:	<i>Excellent! We have a few months to make our decision. How much time do you need?</i>
Dave:	<i>We can have it ready within a few weeks.</i>
Sandy:	<i>Great, let's plan on reviewing your analysis next month.</i>

Chicken Deluxe is facing a supplier decision common to many companies. Financial stability is an important factor in deciding on a supplier, along with the quality of product and reliability of service. Chicken Deluxe must analyze financial information for Deep Fizz and Extreme Fizz to determine the financial condition of each company.

The analysis of a company's financial information typically follows a three-pronged approach. First, trends within a company's own financial information are analyzed, such as sales and earnings from one year to the next, using two methods—trend analysis and common-size analysis. Second, financial measures are compared between competitors. Finally, financial ratios are compared to industry averages. We discuss these three approaches next using Coca-Cola as an example. We will revisit the decision facing Chicken Deluxe later in the chapter.

13.1 Trend Analysis of Financial Statements

LEARNING OBJECTIVE

1. Perform trend analysis to evaluate financial statement information.

Question: How is trend analysis used to evaluate the financial health of an organization?

Answer: Trend analysis evaluates an organization's financial information over a period of time. Periods may be measured in months, quarters, or years, depending on the circumstances. The goal is to calculate and analyze the amount change and percent change from one period to the next.

For example, in fiscal years 2010 and 2009, Coca-Cola had the operating income shown as follows. (Amounts are in millions. To convert to the actual amount, simply multiply the amount given times one million. For example, $\$8,449 \times 1,000,000 = \$8,449,000,000$. Thus Coca-Cola had operating income of \$8,449,000,000 in 2010.)

	Amount 2010	Amount 2009	Amount Change	Percent Change
Operating income	\$8,449	\$8,231	?	?

Although readers of the financial information can see that operating income increased from 2009 to 2010, the exact dollar amount of the change and the percent change is more helpful in evaluating the company's performance. The dollar amount of change is calculated as follows:

Key Equation

Amount of change = Current year amount – Base year amount

$$\text{Amount of change} = \$8,449 - \$8,231 = \$218$$

Question: As you can see, operating income increased by \$218,000,000 from 2009 to 2010. Is this a significant increase for Coca-Cola?

Answer: Most of us consider \$218,000,000 to be a huge amount, but the only way to gauge the true significance of this amount for Coca-Cola is to calculate the percent change from 2009 to 2010. The percent change is calculated as the current year amount minus the base year amount, divided by the base year amount.

Key Equation

Percent change = (Current year amount – Base year amount) ÷ Base year amount

The calculation that follows shows operating income increased 2.6 percent from 2009 to 2010.

Although not an extraordinarily significant increase, this does represent positive results for Coca-Cola.

Percent change 2.6% = (Current year amount – Base year amount) ÷ Base year amount = $(\$8,449 - \$8,231) \div \$8,231$

Trend Analysis for the Income Statement and Balance Sheet

Question: Trend analysis is often used to evaluate each line item on the income statement and balance sheet. How is this analysis prepared?

Answer: Figure 13.1 "Income Statement Trend Analysis for " shows Coca-Cola's income statement trend analysis, and Figure 13.2 "Balance Sheet Trend Analysis for " shows Coca-Cola's balance sheet trend analysis. Carefully examine each of these figures, including the comments.

Figure 13.1 Income Statement Trend Analysis for Coca-Cola

Coca-Cola Company Income Statement Years Ended December 31 (dollar amounts are in millions)						
	2010	2009	Increase (decrease) from 2009 to 2010			
			Amount Change	Percent		
Net Sales	\$35,119	\$30,990	\$4,129	13.3%	Net sales increased 13.3%, and cost of goods sold increased 14.5%, resulting in a 12.7% increase in gross margin. Good news for Coca-Cola!	
Cost of goods sold	12,693	11,088	1,605	14.5%		
Gross margin	\$22,426	\$19,902	\$2,524	12.7%		
Selling and administrative expenses	13,158	11,358	1,800	15.8%	Selling and administrative expenses increased 15.8%, while other operating expenses increased 161.7%	
Other operating expenses	819	313	506	161.7%		
Operating income	\$ 8,449	\$ 8,231	\$ 218	2.6%	Operating income increased 2.6%, interest expense increased 106.5%, and other income increased 555.6% (related to a one-time acquisition gain).	
Interest expense	733	355	378	106.5%		
Other income (expenses; net)	6,477	988	5,489	555.6%		
Income before taxes	\$14,193	\$ 8,864	\$5,329	60.1%	Income before taxes increased 60.1%, resulting in a 16.9% increase in income tax expense. Net income increased a substantial 73.1% (much of this was related to a one-time acquisition gain).	
Income tax expense	2,384	2,040	344	16.9%		
Net income	\$11,809	\$ 6,824	\$4,985	73.1%		

Note: Percent change for each line item is found by dividing the increase (decrease) amount by the 2009 amount. For example, net sales 13.3 percent increase equals $\$4,129 \div \$30,990$.

Figure 13.1 "Income Statement Trend Analysis for " shows that net sales increased by \$4,129,000,000, or 13.3 percent. Cost of goods sold had a corresponding increase of \$1,605,000,000, or 14.5 percent. The increase in net sales and related increase in cost of goods sold resulted in an increase in gross margin of \$2,524,000,000, or 12.7 percent. The increase in selling and administrative expenses of \$1,800,000,000, or 15.8 percent, outpaced the increase in net sales, resulting in a relatively small increase in operating income of \$218,000,000, or 2.6 percent. The significant increase in other income (expenses), net of 555.6 percent relates to a one-time gain of \$4,978,000,000 resulting from Coca-Cola's acquisition of Coca-Cola Enterprises, Inc., in 2010 (this information comes from the notes to the financial statements). This one-time gain caused an unusually large increase in net income for 2010. This is important as we continue our analysis of Coca-Cola Company throughout the chapter. Net income will appear to have an unusually large increase as we cover various measures of performance, but keep in mind that the one-time gain in 2010 of \$4,978,000,000 caused most of the increase from 2009 to 2010.

Figure 13.2 Balance Sheet Trend Analysis for Coca-Cola

Coca-Cola Company Balance Sheet (dollar amounts are in millions)					Increase (decrease) from 2009 to 2010	
	2010	2009	Amount	Percent		
Assets						
Current assets						
Cash and cash equivalents	\$11,199	\$ 9,151	\$ 2,048	22.4%	Cash and cash equivalents increased 22.4%, marketable securities increased 122.5%, inventory increased 12.6%, and other current assets increased 42.0%.	
Marketable securities	138	62	76	122.6%		
Accounts receivable (net)	4,430	3,758	672	17.9%		
Merchandise inventory	2,650	2,354	296	12.6%		
Other current assets	3,162	2,226	936	42.0%		
Noncurrent assets						
Long-term investments	9,706	8,731	975	11.2%	Long-term investments increased 11.2%; property, plant, and equipment increased 54.0%; and intangible assets increased 109.8%.	
Property, plant, and equipment (net)	14,727	9,561	5,166	54.0%		
Intangible assets	20,909	12,828	14,081	109.8%		
Total assets	\$72,921	\$48,571	\$24,350	49.8%	Total assets increased 49.8%.	
Liabilities and shareholders' equity						
Current liabilities						
Accounts payable and accrued liabilities	\$ 8,859	\$ 6,657	\$ 2,202	33.1%	Accounts payable and accrued liabilities increased 33.1%. Loans and notes payable increased 20.0%, and other liabilities increased 391.7%.	
Loans and notes payable	8,100	6,749	1,351	20.0%		
Other liabilities	1,549	315	1,234	391.7%		
Noncurrent liabilities						
Long-term debt	14,841	5,059	8,982	177.5%	Long-term debt increased 177.5%, and other liabilities and deferred taxes increased 99.2%.	
Other liabilities and deferred taxes	8,055	4,545	4,510	99.2%		
Shareholders' equity						
Common stock	10,917	9,417	1,520	16.1%	Common stock and retained earnings increased. Accumulated other loss and treasury stock went further into negative territory.	
Retained earnings	49,592	42,064	7,508	17.8%		
Accumulated other income (loss)	(1,456)	(757)	(683)	91.5%		
Treasury stock	(22,762)	(25,308)	(2,364)	9.3%		
Total liabilities and shareholders' equity	\$72,921	\$48,671	\$24,250	49.8%	Total liabilities and shareholders' equity increased 49.8%.	

Note: Percent change for each line item is found by dividing the increase (decrease) amount by the 2009 amount. For example, cash and cash equivalents 22.4 percent increase equals $\$2,048 \div \$9,151$.

Current Assets and Current Liabilities

Question: What does the balance sheet trend analysis in Figure 13.2 "Balance Sheet Trend Analysis for " tell us about current assets and current liabilities for Coca-Cola?

Answer: Figure 13.2 "Balance Sheet Trend Analysis for " shows that cash and cash equivalents increased by \$2,048,000,000, or 22.4 percent. Coca-Cola's statement of cash flows would provide detailed information regarding this increase. (Chapter 12 "How Is the Statement of Cash Flows Prepared and Used?" covers the statement of cash flows.) Marketable securities increased 122.6 percent, accounts receivable increased 17.9 percent, and merchandise inventory increased 12.6 percent. Other current assets increased 42.0 percent.

Moving to current liabilities, accounts payable and accrued liabilities increased by 33.1 percent, loans and notes payable increased 20.0 percent, and other current liabilities decreased 391.7 percent (mostly attributable to a significant increase in the current portion of long-term debt).

Noncurrent Assets and Noncurrent Liabilities

Question: What does the balance sheet trend analysis in Figure 13.2 "Balance Sheet Trend Analysis for " tell us about noncurrent assets and noncurrent liabilities for Coca-Cola?

Answer: Figure 13.2 "Balance Sheet Trend Analysis for " shows that long-term investments increased 11.2 percent. Property, plant, and equipment increased 54.0 percent, and intangible assets increased by a significant 109.8 percent. Both items appearing under noncurrent liabilities increased, with a 177.5 percent increase in long-term debt and a 99.2 percent increase in other liabilities and deferred taxes.

Shareholders' Equity

Question: What does the balance sheet trend analysis in Figure 13.2 "Balance Sheet Trend Analysis for " tell us about shareholders' equity for Coca-Cola?

Answer: Common stock increased 16.1 percent, and retained earnings increased 17.8 percent. Accumulated other income (loss) went further into negative territory by 91.5 percent, and treasury stock increased 9.3 percent.

Big Picture Balance Sheet Trend Analysis

Question: What are some of the key big picture items identified in the balance sheet trend analysis shown in Figure 13.2 "Balance Sheet Trend Analysis for "?

Answer: Overall, total assets increased by \$24,250,000,000, or 49.8 percent. Of course, total liabilities and shareholders' equity also increased by the same amount. The increases identified in almost every asset, liability, and shareholders' equity line item are significant. From reading the notes to the financial statements, the authors were able to identify the main source of these increases. In 2010, Coca-Cola acquired the remaining 67 percent of Coca-Cola Enterprises, Inc.'s (CCE) North America business that Coca-Cola did not already own. This resulted in significant increases in noncurrent assets and noncurrent liabilities, which were acquired as part of this transaction. It also resulted in the reporting of a one-time gain on the income statement of \$4,978,000,000, which came from Coca-Colaremeasuring its equity interest in CCE to fair value upon close of the transaction in 2010.

This analysis points to the reason we perform trend analysis—to identify the increases and decreases in dollar amounts from one year to the next and to take a close look at unusual trends.

Trend Analysis over Several Years

Question: The trend analysis just described works well when comparing financial data for two years. However, many prefer to review trends over more than two years. How might a trend analysis for several years be prepared?

Answer: A common approach is to establish the oldest year as the base year and compute future years as a percentage of the base year. For example, Coca-Cola had the following net sales and operating income for each of the past five years (in millions):

	2010	2009	2008	2007	2006
Net sales	\$35,119	\$30,990	\$31,944	\$28,857	\$24,088
Operating income	\$ 8,449	\$ 8,231	\$ 8,446	\$ 7,252	\$ 6,308

Assuming 2006 is the base year, the trend percentage is calculated for each year using the following formula:

Key Equation

Trend percentage = Current year ÷ Base year

Figure 13.3 "Percentage Trend Analysis for " shows Coca-Cola's trend percentages for net sales and operating income. Most analysts would expand this analysis to include most, if not all, of the income statement line items.

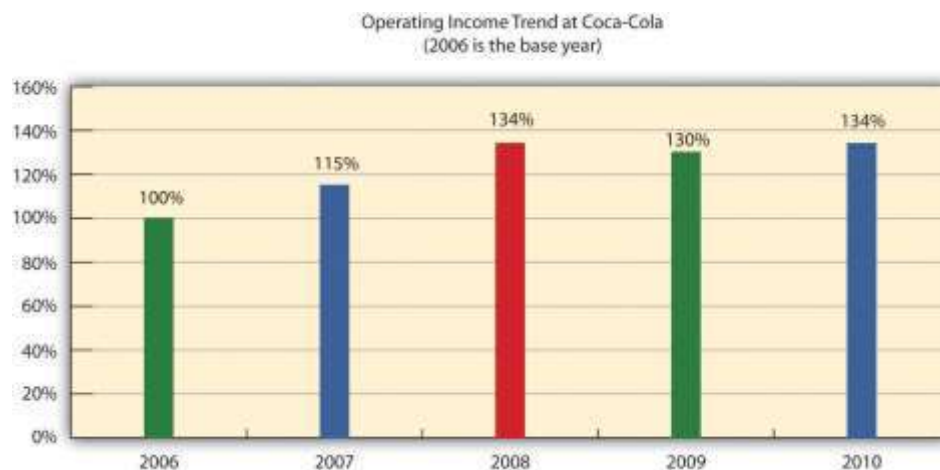
Figure 13.3 Percentage Trend Analysis for Coca-Cola

Coca-Cola Company Percentage Trend Analysis (dollar amounts are in millions)					
	2010	2009	2008	2007	2006
Net sales	\$35,119	\$30,990	\$31,944	\$28,857	\$24,088
Trend percentage	146%	129%	133%	120%	100%
Operating income	\$ 8,449	\$ 8,231	\$ 8,446	\$ 7,252	\$ 6,308
Trend percentage	134%	130%	134%	115%	100%

Note: Trend percentages are calculated as the current year divided by the base year (2006). For example, the net sales 2010 trend percentage of 146 percent equals \$35,119 (net sales for 2010) divided by \$24,088 (net sales for the base year 2006).

All percentages shown in Figure 13.3 "Percentage Trend Analysis for " are relative to the base year, which is fiscal year 2006. Notice that the increase in operating income of 34 percent (= 134 percent – 100 percent) from 2006 to 2010 was less than the increase in net sales of 46 percent for the same period. This signals that the increase in Coca-Cola's operating expenses outpaced the increase in net sales during this period. Figure 13.4 "Five-Year Percentage Trend in Operating Income for " shows the trend percentages in Coca-Cola's operating income from 2006 to 2010.

Figure 13.4 Five-Year Percentage Trend in Operating Income for Coca-Cola



KEY TAKEAWAY

- Trend analysis provides a means to analyze company data over a period of time by focusing on the change in specific line items within the income statement and balance sheet. Changes are typically measured in dollars and percentages. Trends over several years can be evaluated by calculating the trend percentage as the current year divided by the base year.

Business in Action 13.1

Trends Presented in Annual Reports

Most public companies present trend information in their annual reports. For example, **Intel** shows net revenues, gross margin, research and development costs, operating income, and net income for the past five years. **Nike** and **PepsiCo** both show the percent change in selected income statement line items for the past two years. **Costco Wholesale Corporation** presents selected income statement

information for the past five years. The fact that these financial data are provided in the annual report confirms the importance of presenting trend information to shareholders. Sources: **Intel**, “Annual Report, 2010,” <http://www.intel.com>; **Nike**, “Annual Report, 2010,” <http://www.nike.com>; **PepsiCo**, “Annual Report, 2010,” <http://www.pepsico.com>; **Costco Wholesale Corporation**, “Annual Report, 2010,” <http://www.costco.com>.

REVIEW PROBLEM 13.1

The following income statements and balance sheets are for **PepsiCo, Inc.** We use this information in review problems throughout the chapter.

PepsiCo, Inc. Income Statement Years Ended December 25, 2010 and December 26, 2009 (in millions)		
	2010	2009
Net sales	\$57,838	\$43,232
Cost of goods sold	<u>26,575</u>	<u>20,099</u>
Gross margin	\$31,263	\$23,133
Selling and administrative expenses	22,814	15,026
Other operating expenses	<u>117</u>	<u>63</u>
Operating income	\$ 8,332	\$ 8,044
Interest expense	903	397
Other income (expense; net)	<u>785</u>	<u>399</u>
Income before taxes	\$ 8,214	\$ 8,046
Income tax expense	<u>1,894</u>	<u>2,100</u>
Net income	<u>\$ 6,320</u>	<u>\$ 5,946</u>

PepsiCo, Inc. Balance Sheet December 25, 2010 and December 26, 2009		
	2010	2009
Assets		
Current assets		
Cash and cash equivalents	\$ 5,943	\$ 3,943
Marketable securities	426	192
Accounts receivable (net)	6,323	4,624
Merchandise inventory	3,372	2,618
Other current assets	1,505	1,194
Noncurrent assets		
Property, plant and equipment (net)	19,058	12,671
Intangible assets	28,469	9,157
Other assets	3,057	5,449
Total assets	<u>\$68,153</u>	<u>\$39,848</u>
Liabilities and shareholders' equity		
Current liabilities		
Short-term obligations	\$ 4,898	\$ 464
Accounts payable and other liabilities	10,923	8,127
Income taxes payable	71	165
Noncurrent liabilities		
Long-term debt	19,999	7,400
Other liabilities and deferred taxes	10,786	6,250
Shareholders' equity		
Preferred stock (net of repurchased stock)	(109)	(104)
Common stock	4,558	280
Retained earnings	37,402	34,443
Accumulated income (loss)	(3,630)	(3,794)
Treasury stock	(16,745)	(13,383)
Total liabilities and shareholder's equity	<u>\$68,153</u>	<u>\$39,848</u>

1. Prepare a trend analysis for **PepsiCo's** income statement using the format shown in Figure 13.1 "Income Statement Trend Analysis for ".
2. Prepare a trend analysis for **PepsiCo's** balance sheet using the format shown in Figure 13.2 "Balance Sheet Trend Analysis for ".
3. Compare **PepsiCo's** increase in net income from 2009 to 2010 to **Coca-Cola's** increase shown in Figure 13.1 "Income Statement Trend Analysis for ". Which company has the highest percentage growth in net income?
4. Compare **PepsiCo's** increase in total assets from 2009 to 2010 to **Coca-Cola's** increase shown in Figure 13.2 "Balance Sheet Trend Analysis for ". Which company has the highest percentage growth in total assets?

Solution to Review Problem 13.1

1.

PepsiCo, Inc. Income Statement Years Ended December 25, 2010 and December 26, 2009 (dollar amounts are in millions)				
	2010	2009	Increase (decrease) from 2009 to 2010	
			Amount	Percent
Net Sales	\$57,838	\$43,232	\$14,606	33.8%
Cost of goods sold	26,575	20,099	6,476	32.2%
Gross margin	\$31,263	\$23,133	\$ 8,130	35.1%
Selling and administrative expenses	22,814	15,026	7,788	51.8%
Other operating expenses	117	63	54	85.7%
Operating income	\$ 8,332	\$ 8,044	\$ 288	3.6%
Interest expense	903	397	506	127.5%
Other income (expenses; net)	785	399	386	96.7%
Income before taxes	\$ 8,214	\$ 8,046	\$ 168	2.1%
Income tax expense	1,894	2,100	(206)	(9.8%)
Net income	\$ 6,320	\$ 5,946	\$ 374	6.3%

Note: Percent change for each line item is found by dividing the increase (decrease) amount by the 2009 amount. For example, net sales 33.8 percent increase equals $\$14,606 \div \$43,232$.

2.

PepsiCo, Inc. Balance Sheet Years Ended December 25, 2010 and December 26, 2009 (dollar amounts are in millions)				
	2010	2009	Increase (decrease) from 2009 to 2010	
			Amount	Percent
Assets:				
Current assets:				
Cash and cash equivalents	\$ 3,943	\$ 3,943	\$ 2,000	50.7%
Marketable securities	428	192	234	121.9%
Accounts receivable (net)	6,323	4,624	1,699	36.7%
Merchandise inventory	3,372	2,618	754	28.8%
Other current assets	1,505	1,194	311	26.0%
Noncurrent assets:				
Property, plant and equipment (net)	19,050	12,671	6,387	50.4%
Intangible assets	28,469	9,157	19,312	210.9%
Other assets	3,057	5,448	(2,392)	(43.9%)
Total assets	\$68,153	\$39,848	\$28,305	71.0%
Liabilities and shareholder's equity				
Current liabilities:				
Short-term obligations	\$ 4,898	\$ 464	\$ 4,434	955.6%
Accounts payable and accrued liabilities	10,923	8,127	2,796	34.4%
Income taxes payable	71	165	(94)	(57.0%)
Noncurrent liabilities:				
Long-term debt	19,999	7,400	12,599	170.3%
Other liabilities and deferred taxes	10,706	6,250	4,456	72.6%
Shareholder's equity:				
Preferred stock (net of repurchased stock)	(109)	(104)	(5)	4.8%
Common stock	4,558	280	4,278	1,527.9%
Retained earnings	37,402	34,443	2,959	8.6%
Accumulated other income (loss)	(3,630)	(3,794)	164	(4.3%)
Treasury stock	(16,745)	(13,383)	(3,362)	25.1%
Total liabilities and shareholders' equity	\$68,153	\$39,848	\$28,305	71.0%

Note: Percent change for each line item is found by dividing the increase (decrease) amount by the 2009 amount. For example, cash and cash equivalents 50.7 percent increase equals $\$2,000 \div \$3,943$.

3. Net income at **PepsiCo** increased \$374,000,000, or 6.3 percent, while net income at **Coca-Cola** increased \$4,985,000,000, or 73.1 percent (as shown in [Figure 13.1 "Income Statement Trend Analysis for "](#)). Thus **Coca-Cola's** growth in net income far exceeded that of **PepsiCo**. As mentioned earlier, this huge increase in **Coca-Cola's** net income is largely attributable to a one-time gain in 2010 of \$4,978,000,000.
4. Total assets at **PepsiCo** increased \$28,305,000,000, or 71.0 percent, while total assets at **Coca-Cola** increased \$24,250,000,000, or 49.8 percent (as shown in [Figure 13.2 "Balance Sheet Trend Analysis for "](#)). Thus **PepsiCo's** growth in total assets far exceeded that of **Coca-Cola**.

13.2 Common-Size Analysis of Financial Statements

LEARNING OBJECTIVE

1. Perform common-size analysis to evaluate financial statement information.

Question: How is common-size analysis used to evaluate the financial health of an organization?

Answer: Common-size analysis (also called vertical analysis) converts each line of financial statement data to an easily comparable, or common-size, amount measured as a percent. This is done by stating income statement items as a percent of net sales and balance sheet items as a percent of total assets (or total liabilities and shareholders' equity). For example, Coca-Cola had net income of \$11,809,000,000 and net sales of \$35,119,000,000 for 2010. The common-size percent is simply net income divided by net sales, or 33.6 percent ($= \$11,809 \div \$35,119$).

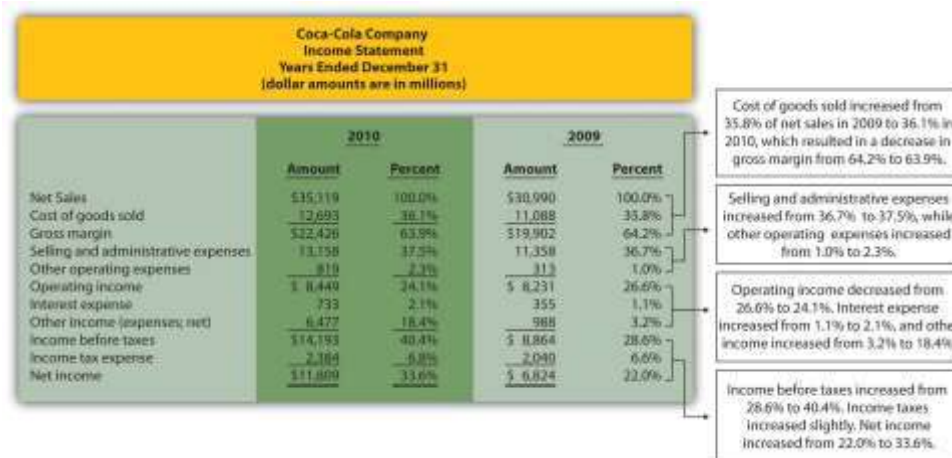
There are two reasons to use common-size analysis: (1) to evaluate information from one period to the next within a company and (2) to evaluate a company relative to its competitors. Common-size analysis answers such questions as "how do our current assets as a percent of total assets compare with last year?" and "how does our net income as a percent of net sales compare with that of our competitors?"

Using Common-Size Analysis to Evaluate Trends within a Company

Question: How is a formal common-size analysis prepared, and what does it tell us for Coca-Cola?

Answer: Figure 13.5 "Common-Size Income Statement Analysis for " presents the common-size analysis for Coca-Cola's income statement, and Figure 13.6 "Common-Size Balance Sheet Analysis for " shows the common-size analysis for Coca-Cola's balance sheet. As you look at these figures, notice that net sales are used as the base for the income statement, and total assets (or total liabilities and shareholders' equity) are used as the base for the balance sheet. That is, for the income statement, each item is measured as a percent of net sales, and for the balance sheet, each item is measured as a percent of total assets (or total liabilities and shareholders' equity).

Figure 13.5 Common-Size Income Statement Analysis for Coca-Cola

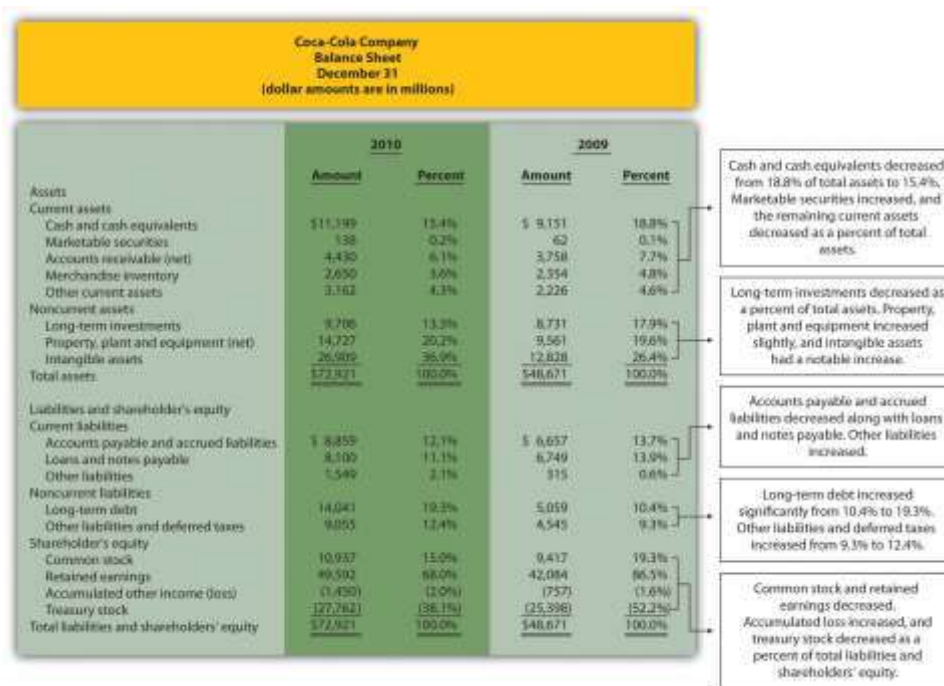


Note: All percentages use net sales as the base. For example, 2010 cost of goods sold percent of 36.1 percent equals $\$12,693 \text{ cost of goods sold} \div \$35,119 \text{ net sales}$. Note that rounding issues sometimes cause subtotals in the percent column to be off by a small amount.

In general, managers prefer expenses as a percent of net sales to decrease over time, and profit figures as a percent of net sales to increase over time. As you can see in Figure 13.5 "Common-Size Income Statement Analysis for ", Coca-Cola's gross margin as a percent of net sales decreased from 2009 to 2010 (64.2 percent versus 63.9 percent). Operating income declined as

well (26.6 percent versus 24.1 percent). Income before taxes increased significantly from 28.6 percent in 2009 to 40.4 percent in 2010, again mainly due to a one-time gain of \$4,978,000,000 in 2010. This caused net income to increase as well, from 22.0 percent in 2009 to 33.6 percent in 2010. In the expense category, cost of goods sold as a percent of net sales increased, as did other operating expenses, interest expense, and income tax expense. Selling and administrative expenses increased from 36.7 percent in 2009 to 37.5 percent in 2010.

Figure 13.6 Common-Size Balance Sheet Analysis for Coca-Cola



As you can see from Figure 13.6 "Common-Size Balance Sheet Analysis for ", the composition of assets, liabilities, and shareholders' equity accounts changed from 2009 to 2010. Notable changes occurred for intangible assets (26.4 percent in 2009 versus 36.9 percent in 2010), long-term debt (10.4 percent in 2009 versus 19.3 percent in 2010), retained earnings (86.5 percent in 2009 versus 68.0 percent in 2010), and treasury stock (52.2 percent in 2009 versus 38.1 percent in 2010).

Using Common-Size Analysis to Evaluate Competitors

Question: To this point, we have used common-size analysis to evaluate just one company, Coca-Cola. Common-size analysis is, however, also an effective way of comparing two companies with different levels of revenues and assets. For example, suppose one company has operating income of \$100,000, and a competing company has operating income of \$2,000,000. If both companies have similar levels of net sales and total assets, it is reasonable to assume that the more profitable company is the better performer. However, most companies are not the same size. How do we compare companies of different sizes?

Answer: This is where common-size analysis can help. Figure 13.7 "Common-Size Income Statement Analysis for " shows an income statement comparison for Coca-Cola and PepsiCo using common-size analysis. (The information for Coca-Cola comes from Figure 13.5 "Common-Size Income Statement Analysis for ", and the information for PepsiCo comes from the solution to part 1 of Note 13.15 "Review Problem 13.2" at the end of this segment.)

Figure 13.7 Common-Size Income Statement Analysis for Coca-Cola andPepsiCo

Coca-Cola Company and PepsiCo Inc. Comparative Income Statements Fiscal Year 2010 (dollar amounts are in millions)				
	Amount		Percent	
	Coca-Cola	PepsiCo	Coca-Cola	PepsiCo
Net sales	\$35,119	\$57,838	100.0%	100.0%
Cost of goods sold	12,692	26,575	36.1%	45.9%
Gross margin	\$22,426	\$31,263	63.9%	54.1%
Selling and administrative expenses	11,158	22,814	31.5%	39.4%
Other operating expenses	839	117	2.3%	0.2%
Operating income	\$ 8,449	\$ 8,332	24.1%	14.4%
Interest expense	753	903	2.1%	1.6%
Other income (expenses; net)	8,477	785	18.4%	1.4%
Income before taxes	\$14,193	\$ 8,214	40.4%	14.2%
Income tax expense	2,384	1,894	6.8%	3.3%
Net income	\$11,809	\$ 6,320	33.6%	10.9%

Coca-Cola's cost of goods sold as a percent of net sales is substantially less than PepsiCo, resulting in a much higher gross margin percentage.

Selling and administrative expenses percentage for Coca-Cola is less than for PepsiCo.

Operating income percentage is significantly higher for Coca-Cola.

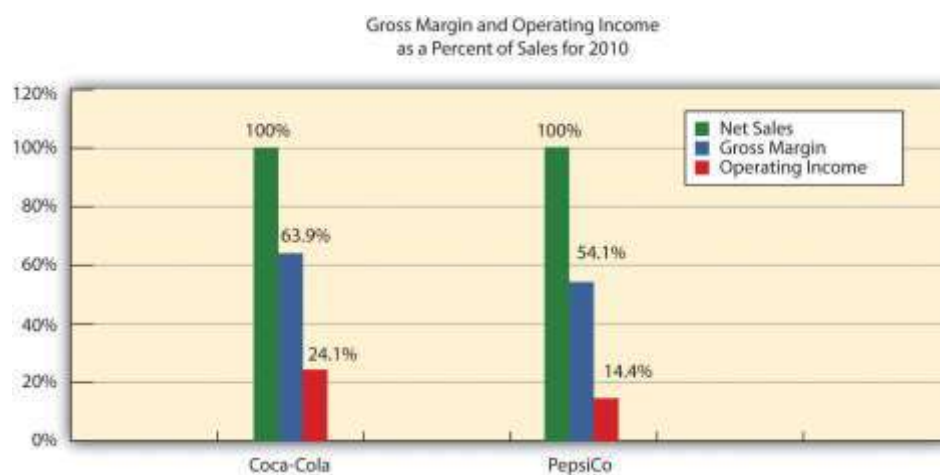
Income before taxes and net income percentages are significantly higher for Coca-Cola.

Note that rounding issues sometimes cause subtotals in the percent column to be off by a small amount.

Notice that PepsiCo has the highest net sales at \$57,838,000,000 versus Coca-Cola at \$35,119,000,000. Once converted to common-size percentages, however, we see that Coca-

Cola outperforms PepsiCo in virtually every income statement category. Coca-Cola's cost of goods sold is 36.1 percent of net sales compared to 45.9 percent at PepsiCo. Coca-Cola's gross margin is 63.9 percent of net sales compared to 54.1 percent at PepsiCo. Coca-Cola's operating income is 24.1 percent of sales compared to 14.4 percent at PepsiCo. Figure 13.8 "Comparison of Common-Size Gross Margin and Operating Income for " compares common-size gross margin and operating income for Coca-Cola and PepsiCo.

Figure 13.8 Comparison of Common-Size Gross Margin and Operating Income for Coca-Cola and PepsiCo



Common-size analysis enables us to compare companies on equal ground, and as this analysis shows, Coca-Cola is outperforming PepsiCo in terms of income statement information. However, as you will learn in this chapter, there are many other measures to consider before concluding that Coca-Cola is winning the financial performance battle.

Common-size analysis is obviously crucial to comparative analysis. In fact, some sources of industry data present the information exclusively in a common-size format, and most of the accounting software available today has been engineered to facilitate this type of analysis.

Business in Action 13.2

Common-Size Analysis Using Accounting Software

Most accounting computer programs, including QuickBooks, Peachtree, and MAS 90, provide common-size analysis reports. You simply select the appropriate report format

and financial statement date, and the system prints the report. Thus accountants using this type of software can focus more on analyzing common-size information than on preparing it.

KEY TAKEAWAY

- Common-size analysis converts each line of financial statement data to an easily comparable amount measured as a percent. Income statement items are stated as a percent of net sales and balance sheet items are stated as a percent of total assets (or total liabilities and shareholders' equity). Common-size analysis allows for the evaluation of information from one period to the next within a company and between competing companies.

REVIEW PROBLEM 13.2

Refer to the information presented in [Note 13.10 "Review Problem 13.1" for PepsiCo](#), and perform the following:

- Prepare a common-size analysis for **PepsiCo's** income statement using the format shown in [Figure 13.5 "Common-Size Income Statement Analysis for "](#).
- Prepare a common-size analysis for **PepsiCo's** balance sheet using the format shown in [Figure 13.6 "Common-Size Balance Sheet Analysis for "](#).
- Briefly describe any significant changes from 2009 to 2010 identified in parts **1** and **2**.

Solution to Review Problem 13.2

1.

PepsiCo, Inc. Income Statement Years Ended December 25, 2010 and December 26, 2009 (dollar amounts are in millions)				
	2010		2009	
	Amount	Percent	Amount	Percent
Net sales	\$57,858	100.0%	\$43,232	100.0%
Cost of goods sold	26,375	45.6%	20,099	46.5%
Gross margin	\$31,483	54.4%	\$23,133	53.5%
Selling and administrative expenses	22,814	39.4%	19,028	44.0%
Other operating expenses	317	0.5%	63	0.1%
Operating income	\$ 8,352	14.4%	\$ 4,042	9.3%
Interest expense	901	1.6%	392	0.9%
Other income (expenses; net)	785	1.4%	299	0.7%
Income before taxes	\$ 8,236	14.2%	\$ 3,949	9.1%
Income tax expense	1,894	3.3%	2,100	4.9%
Net income	\$ 6,342	10.9%	\$ 1,849	4.2%

Note: All percentages use net sales as the base. For example, 2010 cost of goods sold percent of 45.9 percent equals \$26,575 cost of goods sold ÷ \$57,838 net sales. Note that rounding issues sometimes cause subtotals in the percent column to be off by a small amount.

2.

PepsiCo, Inc. Balance Sheet December 25, 2010 and December 26, 2009 (dollar amounts are in millions)				
	2010		2009	
	Amount	Percent	Amount	Percent
Assets				
Current assets:				
Cash and cash equivalents	\$ 5,943	8.7%	\$ 3,943	9.9%
Marketable securities	426	0.6%	192	0.5%
Accounts receivable (net)	6,323	9.3%	4,624	11.6%
Merchandise inventory	3,372	4.9%	2,618	6.6%
Other current assets	1,505	2.2%	1,194	3.0%
Noncurrent assets:				
Property, plant and equipment (net)	19,058	28.0%	12,671	31.8%
Intangible assets	28,469	41.8%	9,157	23.0%
Other assets	3,057	4.5%	5,449	13.7%
Total assets	\$68,153	100.0%	\$39,848	100.0%
Liabilities and shareholders' equity				
Current liabilities:				
Short-term obligations	4,898	7.2%	464	1.2%
Accounts payable and other liabilities	10,923	16.0%	8,127	20.4%
Income taxes payable	71	0.1%	165	0.4%
Noncurrent liabilities:				
Long-term debt	19,999	29.3%	7,400	18.6%
Other liabilities and deferred taxes	10,786	15.8%	6,250	15.7%
Shareholders' equity:				
Preferred stock (net of repurchased stock)	(109)	(0.2%)	(104)	(0.3%)
Common stock	4,558	6.7%	280	0.7%
Retained earnings	37,402	54.9%	34,443	86.4%
Accumulated income (loss)	(3,630)	(5.3%)	(3,794)	(9.5%)
Treasury stock	(16,745)	(24.6%)	(13,383)	(33.6%)
Total liabilities and shareholders' equity	\$68,153	100.0%	\$39,848	100.0%

Note: All percentages use total assets or total liabilities and shareholders' equity as the base. For example, 2010 cash and cash equivalents percent of 8.7 percent equals \$5,943 ÷ \$68,153. Note that rounding issues sometimes cause subtotals in the percent column to be off by a small amount.

3. The composition of **PepsiCo's** income statement remained relatively consistent from 2009 to 2010. The most notable change occurred with

selling and administrative expenses, which increased from 34.8 percent of sales in 2009 to 39.4 percent of sales in 2010. This in turn drove down operating income from 18.6 percent in 2009 to 14.4 percent in 2010. This also likely caused the decrease in income before taxes, income tax expense, and net income.

The composition of **PepsiCo's** balance sheet had some significant changes from 2009 to 2010. The most notable changes occurred with intangible assets (23.0 percent in 2009 versus 41.8 percent in 2010), other assets (13.7 percent in 2009 versus 4.5 percent in 2010), short-term obligations (1.2 percent in 2009 versus 7.2 percent in 2010), long-term debt (18.6 percent in 2009 versus 29.3 percent in 2010), common stock (0.7 percent in 2009 versus 6.7 percent in 2010), and retained earnings (86.4 percent in 2009 versus 54.9 percent in 2010).

13.3 Ratio Analysis of Financial Information

LEARNING OBJECTIVE

1. Use ratio analysis to measure profitability, short-term liquidity, long-term solvency, and market valuation.

Question: Although reviewing trends and using common-size analysis provides an excellent starting point for analyzing financial information, managers, investors, and other stakeholders also use various ratios to assess the financial performance and financial condition of organizations. What are the four categories of ratios used to evaluate the financial health of an organization?

Answer: The four categories of ratios presented in this chapter are as follows (in order of presentation):

1. Ratios used to measure profitability (focus is on the income statement)
2. Ratios used to measure short-term liquidity (focus is on short-term liabilities)
3. Ratios used to measure long-term solvency (focus is on long-term liabilities)

4. Ratios used to measure market valuation (focus is on market value of the company)

For each ratio, we (1) explain the meaning, (2) provide the formula, (3) calculate the ratio for Coca-Cola for two years, and (4) compare the ratio for Coca-Cola to PepsiCo's ratio and industry averages. (Note: All industry averages throughout this chapter were obtained from <http://moneycentral.msn.com>. Some averages are not available or not applicable and will be noted as such.)

Table 13.1 "Financial Ratio Formulas" summarizes the formulas for all the ratios presented in this section, and Table 13.2 "Summary of Financial Ratios for " shows the ratio results for Coca-Cola, PepsiCo, and the industry averages that will be covered throughout this section.

Table 13.1 Financial Ratio Formulas

Profitability Measures
1. $\text{Gross margin ratio} = \frac{\text{Gross margin}}{\text{Net sales}}$ Indicates the gross margin generated for each dollar in net sales.
2. $\text{Profit margin ratio} = \frac{\text{Net income}}{\text{Net sales}}$ Indicates the profit generated for each dollar in net sales.
3. $\text{Return on assets} = \frac{\text{Net income}}{\text{Average total assets}}$ Indicates how much net income was generated from each dollar in average assets invested.
4.

Return on common shareholders' equity = $\frac{\text{Net income} - \text{Preferred dividends}}{\text{Average common shareholders' equity}}$

Indicates how much net income was generated from each dollar of common shareholders' equity.

5.

Earnings per share = $\frac{\text{Net income} - \text{Preferred dividends}}{\text{Weighted average common shares outstanding}}$

Indicates how much net income was earned for each share of common stock outstanding.

Short-Term Liquidity Measures

6.

Current ratio = $\frac{\text{Current assets}}{\text{Current liabilities}}$

Indicates whether a company has sufficient current assets to cover current liabilities.

7.

Quick ratio = $\frac{\text{Cash} + \text{Marketable securities} + \text{Short-term receivables}}{\text{Current liabilities}}$

Indicates whether a company has sufficient quick assets to cover current liabilities.

8.

Receivables turnover ratio = $\frac{\text{Credit sales}}{\text{Average accounts receivable}}$

Indicates how many times receivables are collected in a given period.

9.

Average collection period = $\frac{365 \text{ days}}{\text{Receivables turnover ratio}}$

Indicates how many days it takes on average to collect on credit sales.

10.

Inventory turnover ratio = $\frac{\text{Cost of goods sold}}{\text{Average inventory}}$

Indicates how many times inventory is sold and restocked in a given period.

11.

Average sale period = $\frac{365 \text{ days}}{\text{Inventory turnover ratio}}$

Indicates how many days it takes on average to sell the company's inventory.

Long-Term Solvency Measures

12.

Debt to assets = $\frac{\text{Total liabilities}}{\text{Total assets}}$

Indicates the percentage of assets funded by creditors.

13.

Debt to equity = $\frac{\text{Total liabilities}}{\text{Total shareholders' equity}}$

Indicates the amount of debt incurred for each dollar that owners provide.

14.

Times interest earned = $\frac{\text{Net income} + \text{Income tax expense} + \text{Interest expense}}{\text{Interest expense}}$

Indicates the company's ability to cover its interest expense related to long-term debt with current period earnings.

Market Valuation Measures				
15.	<p>Market capitalization=Market price per share×Number of shares outstanding</p> <p>Indicates the value of a company at a point in time.</p>			
16.	<p>Price-earnings ratio=Market price per shareEarnings per share</p> <p>Indicates the premium investors are willing to pay for shares of stock relative to the company's earnings.</p>			

Table 13.2 Summary of Financial Ratios for **Coca-Cola, PepsiCo**, and the Industry Average

		Coca-Cola 2010	PepsiCo 2010	Industry Average 2010
Profitability Measures				
1.	Gross margin ratio	63.9 percent	54.1 percent	56.1 percent
2.	Profit margin ratio	33.6 percent	10.9 percent	19.2 percent
3.	Return on assets	19.4 percent	11.7 percent	14.2 percent
4.	Return on common shareholders' equity	41.7 percent	32.3 percent	34.7 percent
5.	Earnings per share	\$5.12	\$3.97	Not applicable
Short-Term Liquidity Measures				
6.	Current ratio	1.17 to 1	1.11 to 1	1.20 to 1

		Coca-Cola 2010	PepsiCo 2010	Industry Average 2010
7.	Quick ratio	0.85 to 1	0.80 to 1	1.10 to 1
8.	Receivables turnover ratio	8.58 times	10.57 times	9.70 times
9.	Average collection period	42.54 days	34.53 days	37.63 days
10.	Inventory turnover ratio	5.07 times	8.87 times	7.50 times
11.	Average sale period	71.99 days	41.15 days	48.67 days
Long-Term Solvency Measures				
12.	Debt to assets	0.57 to 1	0.68 to 1	0.48 to 1
13.	Debt to equity	1.33 to 1	2.17 to 1	0.94 to 1
14.	Times interest earned	20.36 times	10.10 times	10.70 times
Market Valuation Measures				
15.	Market capitalization	\$146,500,000,000	\$100,700,000,000	\$87,500,000,000
16.	Price-earnings ratio	12.48 times	16.04 times	14.60 times

Before we discuss the various ratios, it is important to note that different terms are often used in financial statements to describe the same item. For example, some companies use the term net revenues instead of net sales, and the income statement is often called the statement of earnings, or consolidated statement of earnings. Also be sure to review the income statement and balance sheet information for Coca-Cola shown in Figure 13.5 "Common-Size Income Statement Analysis for " and Figure 13.6 "Common-Size Balance Sheet Analysis for ". We refer to these figures throughout this section. (All the dollar amounts given for Coca-Cola are in millions unless stated otherwise.)

Profitability Ratios

Question: Analysts, shareholders, suppliers, and other stakeholders often want to evaluate profit trends within a company and compare a company's profits with competitors' profits. What are the five common ratios used to evaluate company profitability?

Answer: The five ratios used to evaluate profitability are as follows:

1. Gross margin ratio
2. Profit margin ratio
3. Return on assets
4. Return on common shareholders' equity
5. Earnings per share

Gross Margin Ratio

Question: How is the gross margin ratio calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: The gross margin ratio indicates the gross margin generated for each dollar in net sales and is calculated as gross margin (which is net sales minus cost of goods sold) divided by net sales:

Key Equation

$$\text{Gross margin ratio} = \frac{\text{Gross margin}}{\text{Net sales}}$$

The gross margin ratio for Coca-Cola using 2010 information is calculated as follows, with PepsiCo and industry average information following it:

$$\text{Gross margin ratio} = \frac{\$22,426}{\$35,119} = 63.9\%$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
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Gross margin ratio	63.9 percent	64.2 percent	54.1 percent	56.1 percent
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The gross margin ratio indicates Coca-Cola generated 63.9 cents in gross margin for every dollar in net sales. This ratio decreased slightly from 2009 to 2010 and is substantially higher than PepsiCo's 54.1 percent. Coca-Cola is also higher than the industry average of 56.1 percent. (Alternative terms: Gross margin is often called gross profit, net sales is often called net revenues, and cost of goods sold is often called cost of sales.)

Profit Margin Ratio

Question: How is the profit margin ratio calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: The profit margin ratio shows the profit generated for each dollar in net sales. It is calculated as net income divided by net sales:

Key Equation

$$\text{Profit margin ratio} = \frac{\text{Net income}}{\text{Net sales}}$$

The profit margin ratio for Coca-Cola using 2010 information is calculated as follows, with PepsiCo and industry average information following it:

$$\text{Profit margin ratio} = \frac{\$11,809}{\$35,119} = 33.6\%$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Profit margin ratio	33.6 percent	22.0 percent	10.9 percent	19.2 percent

The profit margin ratio indicates Coca-Cola generated 33.6 cents in net income for every dollar in net sales. This ratio increased significantly from 2009 to 2010 and is substantially higher

than PepsiCo's 10.9 percent. Coca-Cola is also higher than the industry average of 19.2 percent. (Alternative term: Net income is often called net earnings.)

Return on Assets

Question: The gross margin ratio and profit margin ratio focus solely on income statement information. Analysts also want to know what size asset base generated the net income. For example, a company with assets of \$100,000 and net income of \$15,000 is likely performing better than a company with assets of \$300,000 and identical net income of \$15,000. A measure that considers the assets required to generate net income is called return on assets. How is return on assets calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: The return on assets ratio is used to evaluate how much net income was generated from each dollar in average assets invested. Return on assets is net income divided by average total assets:

Key Equation

$$\text{Return on assets} = \frac{\text{Net income}}{\text{Average total assets}}$$

The average total assets amount is found by adding together total assets at the end of the current year and previous year (2010 and 2009 for this example) and dividing by two. The return on assets ratio for Coca-Cola for 2010 is calculated as follows, with PepsiCo and industry average information following it:

$$\text{Return on assets} = \frac{\$11,809}{(\$72,921 + \$48,671) \div 2} = \frac{\$11,809}{\$60,796} = 19.4\%$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Return on assets	19.4 percent	15.3 percent	11.7 percent	14.2 percent

The return on assets ratio indicates Coca-Cola generated 19.4 cents in net income for every dollar in average assets. This ratio increased from 2009 to 2010 and is higher than PepsiCo's 11.7 percent. Coca-Cola exceeded the industry average of 14.2 percent.

(Note: There are several variations on the return on assets calculation. Some prefer to use average operating assets in the denominator. Others adjust net income in the numerator by adding back interest expense net of the interest expense tax benefit. We leave these variations to advanced cost and intermediate accounting textbooks.)

Return on Common Shareholders' Equity

Question: How is the return on common shareholders' equity ratio calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: Common shareholders are interested in the return on common shareholders' equity ratio because this ratio tells them how much net income was generated from each dollar of common shareholders' equity. The return on common shareholders' equity ratio is calculated as follows:

Key Equation

$$\text{Return on common shareholders' equity} = \frac{\text{Net income} - \text{Preferred dividends}}{\text{Average common shareholders' equity}}$$

Note that preferred dividends are deducted from net income in the numerator. If the company does not have any outstanding preferred stock, as is the case with Coca-Cola, the preferred dividends amount is zero.

Average common shareholders' equity in the denominator is found by adding together all items in the shareholders' equity section of the balance sheet at the end of the current year and previous year (2010 and 2009 for this example), except preferred stock items, and dividing by two.

Because Coca-Cola does not have preferred stock, an average of all items in the shareholders' equity section is in the denominator. The return on common shareholders' equity ratio for Coca-

Cola for 2010 is calculated as follows, with PepsiCo and industry average information following it:

$$\text{Return on common shareholders' equity} = \$11,809 - \$0 [(\$10,937 + \$49,592 - \$1,450 - \$27,762) + (\$9,417 + \$42,084 - \$757 - \$25,398)] \div 2 = \$11,809 / \$28,332 = 41.7\%$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Return on common shareholders' equity	41.7 percent	29.5 percent	32.3 percent	34.7 percent

The return on common shareholders' equity ratio indicates Coca-Cola generated 41.7 cents in net income for every dollar in average common shareholders' equity. This ratio increased significantly from 2009 to 2010 and is higher than PepsiCo's 32.3 percent. Coca-Cola exceeded the industry average of 34.7 percent.

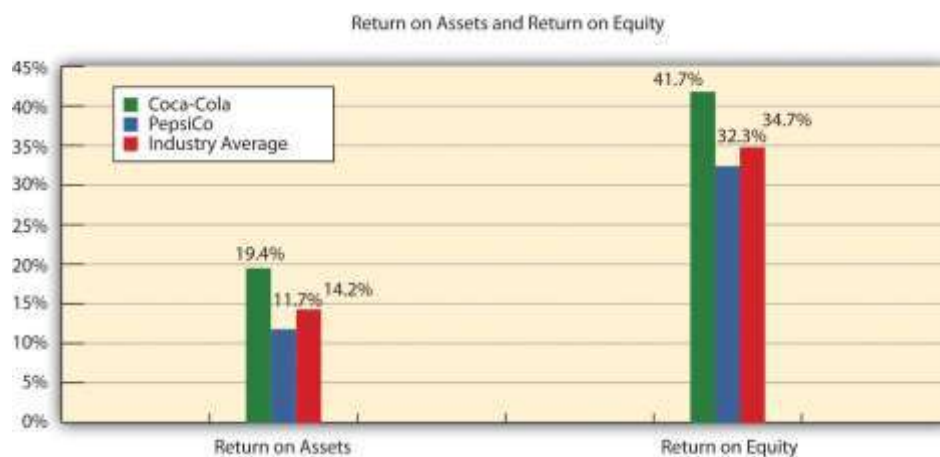
Coca-Cola's return on common shareholders' equity of 41.7 percent is higher than its return on assets of 19.4 percent, indicating that the company has positive financial leverage. Financial leverage describes a company's ability to leverage common shareholders' equity by taking on debt at an interest rate lower than the company's return on assets. For example, assume a company has equity of \$10,000 earning 10 percent. The company can leverage this equity by borrowing \$8,000 with a 6 percent interest rate. Assuming the company uses this \$8,000 to purchase assets that earn 10 percent, the company has created positive financial leverage since the cost of borrowing is lower than the return on assets. This results in a return on equity that is higher than the return on assets. (Note: For a one-year period, the return on assets is \$1,800 [= \$18,000 × 10 percent] less the cost of debt of \$480 [= 6 percent × \$8,000], or \$1,320. This results in a return on assets of 7.3 percent [= \$1,320 ÷ \$18,000]. Positive financial leverage causes the return on equity to be much higher at 13.2 percent [= \$1,320 ÷ \$10,000 equity].)

Although some level of financial leverage is generally regarded as healthy, companies that are highly leveraged tend to be riskier than similar companies with less leverage. Analysts and

shareholders should avoid drawing quick conclusions that increases in return on common shareholders' equity are always better than decreases without thoroughly reviewing the rest of the data.

Figure 13.9 "Return on Assets and Return on Equity for " shows the return on assets and return on equity for Coca-Cola, PepsiCo, and the industry average.

Figure 13.9 Return on Assets and Return on Equity for Coca-Cola, PepsiCo, and the Industry Average



Earnings per Share

Question: How is earnings per share calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: Earnings per share indicates how much net income was earned for each share of common stock outstanding. The earnings per share ratio states net income on a per share basis and is calculated as the following:

Key Equation

$$\text{Earnings per share} = \frac{\text{Net income} - \text{Preferred dividends}}{\text{Weighted average common shares outstanding}}$$

Note that preferred dividends are deducted from net income in the numerator. If the company does not have any outstanding preferred stock, as is the case with Coca-Cola, the preferred

dividends amount is zero. The weighted average common shares outstanding amount used in the denominator is typically provided in the financial statements, either on the income statement or in the notes to the financial statements. (More advanced intermediate accounting textbooks discuss this calculation in detail. Throughout this chapter, we provide the number of weighted average common shares outstanding.)

Earnings per share for Coca-Cola using 2010 information is calculated as follows, with PepsiCo and industry average information following it (dollar amount and shares are in millions, except per share amount):

$$\text{Earnings per share} = \$11,809 \div 2,308 \text{ shares} = \$5.12 \text{ per share}$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Earnings per share	\$5.12	\$2.95	\$3.97	Not applicable

The earnings per share amount at Coca-Cola indicates the company earned \$5.12 for each share of common stock outstanding. This ratio increased from 2009 to 2010. Although earnings per share is useful for looking at trends over time within a company, it cannot be compared in any meaningful way from one company to another because different companies have different numbers of shares outstanding.

For example, assume two identical companies earn \$10,000 for the year. One company has one share of common stock outstanding, and the other has two shares outstanding. Thus one company has earnings per share of \$10,000 ($= \$10,000 \div 1 \text{ share}$) and the other company has earnings per share of \$5,000 ($= \$10,000 \div 2 \text{ shares}$). The second company is not performing any worse; it simply has more shares outstanding. This is why you should not compare earnings per share across companies. (Alternative terms: Earnings per share are often called EPS or income per share.)



Source: Photo courtesy of

DangApricot, <http://commons.wikimedia.org/wiki/File:AnnTaylorLoftSign.JPG>.

The Importance of Earnings per Share

The business press often uses earnings per share to announce a company's earnings. For example, the Associated Press addressed earnings at **AnnTaylor Stores Corporation**, a retailer of women's clothing, as follows: "Quarterly income fell to \$7,100,000, or 10 cents per share, from \$30,100,000, or 41 cents, the year before.

Setting aside relocation costs, adjusted earnings were 18 cents per share, a penny higher than the average estimate from analysts polled by Thomson Financial.”

This quote demonstrates not only that earnings per share data are important when announcing a company’s earnings but also that analysts use these data when making predictions about a company’s performance. A quick perusal of any business publication, such as *The Wall Street Journal*, or a review of online business press releases at sites like <http://finance.yahoo.com> will confirm that earnings per share data are commonly used to announce a company’s financial results.

Source: Associated Press, “AnnTaylor’s 2Q Profit Plummets on Charge,” August 19, 2005.

REVIEW PROBLEM 13.3

Refer to the information presented in [Note 13.10 "Review Problem 13.1"](#) for **PepsiCo**, and perform the following for 2010:

1. Calculate the gross margin ratio, and briefly describe what it means for **PepsiCo**.
2. Calculate the profit margin ratio, and briefly describe what it means for **PepsiCo**.
3. Calculate return on assets, and briefly describe what it means for **PepsiCo**.
4. Calculate return on common shareholders’ equity, and briefly describe what it means for **PepsiCo**. Assume **PepsiCo** recorded preferred dividends of \$6,000,000 in 2010.
5. Calculate earnings per share, and briefly describe what it means for **PepsiCo**. Assume weighted average common shares outstanding totaled 1,590,000,000 shares.

Solutions to Review Problem 13.3

1.

$$\text{Gross margin ratio} = \frac{\text{Gross margin}}{\text{Net sales}} = \frac{\$31,263}{\$57,838} = 54.1\%$$

For every dollar in net sales, **PepsiCo** generated 54.1 cents in gross margin.

2.

$$\text{Profit margin ratio} = \frac{\text{Net income}}{\text{Net sales}} = \frac{\$6,320}{\$57,838} = 10.9\%$$

For every dollar in net sales, **PepsiCo** generated 10.9 cents in net income.

3.

$$\text{Return on assets} = \frac{\text{Net income}}{\text{Average total assets}} = \frac{\$6,320}{(\$68,153 + \$39,848) \div 2} = \frac{\$6,320}{\$54,001} = 11.7\%$$

For every dollar in average assets, **PepsiCo** generated 11.7 cents in net income.

4.

$$\text{Return on common shareholders' equity} = \frac{\text{Net income} - \text{Preferred dividends}}{\text{Average common shareholders' equity}} = \frac{\$6,320 - \$6[(\$4,558 + \$37,402 - \$3,630 - \$16,745) + (\$280 + \$34,443 - \$3,794 - \$13,383)]}{2} = \frac{\$6,314}{\$19,566} = 32.3\%$$

For every dollar in average common shareholders' equity, **PepsiCo** generated 32.3 cents in net income (after deducting preferred dividends).

5.

$$\text{Earnings per share} = \frac{\text{Net income} - \text{Preferred dividends}}{\text{Weighted average common shares outstanding}} = \frac{\$6,320 - \$61,590 \text{ shares}}{\$3.97 \text{ per share}}$$

For each common share outstanding, **PepsiCo** generated \$3.97 in net income (after deducting preferred dividends).

Short-Term Liquidity Ratios

Question: Suppliers and other short-term lenders often want to evaluate whether companies can meet short-term obligations. What are the four common ratios used to evaluate short-term liquidity?

Answer: The four ratios used to evaluate short-term liquidity are as follows:

1. Current ratio
2. Quick ratio
3. Receivables turnover ratio (often converted to average collection period)
4. Inventory turnover ratio (often converted to average sale period)

Current Ratio

Question: How is the current ratio calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: The current ratio indicates whether a company has sufficient current assets to cover current liabilities. It is found by dividing current assets by current liabilities:

Key Equation

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

The current ratio for Coca-Cola for 2010 is calculated as follows, with PepsiCo and industry average information following it:

$$\text{Current ratio} = \frac{\$11,199 + \$138 + \$4,430 + \$2,650 + \$3,162}{\$8,859 + \$8,100 + \$1,549} = \frac{\$21,579}{\$18,508} = 1.17 \text{ to } 1$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Current ratio	1.17 to 1	1.28 to 1	1.11 to 1	1.20 to 1

The current ratio indicates Coca-Cola had \$1.17 in current assets for every dollar in current liabilities. This ratio decreased from 2009 to 2010 and is slightly higher than PepsiCo's 1.11 to 1 ratio. Coca-Cola is close to the industry average of 1.20 to 1. In general, a current ratio above 1 to 1 is preferable, which indicates the company has sufficient current assets to cover current liabilities. However, finding the ideal minimum current ratio is dependent on many factors, such as the industry, the overall financial condition of the company, and the composition of the

company's current assets and current liabilities. Because of variations in these factors from one company to the next, a more stringent measure of short-term liquidity is often used. We present this measure, called the quick ratio, next.

Quick Ratio

Question: How is the quick ratio calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: The quick ratio (also called acid-test ratio) indicates whether a company has sufficient quick, or highly liquid, assets to cover current liabilities. The quick ratio is quick assets divided by current liabilities:

Key Equation

$$\text{Quick ratio} = \frac{\text{Cash} + \text{Marketable securities} + \text{Short-term receivables}}{\text{Current liabilities}}$$

Notice the numerator excludes current assets that are not easily and quickly converted to cash. Although inventory is typically excluded from the numerator, further analysis is needed to evaluate whether inventory should be included. For example, grocery stores turn inventory over very quickly, typically within a couple of weeks, and should consider including inventory in the quick ratio. Producers of wine, on the other hand, turn inventory over very slowly, and should consider excluding inventory in the numerator of the quick ratio. For the sake of consistency, you should exclude inventory from the numerator in this chapter, unless told otherwise. (Note: Many companies provide two quick ratio calculations, one that includes inventory in the numerator and one that excludes inventory in the numerator. If two ratios are presented, it is important to label each ratio to indicate whether inventory has been included or excluded.)

It is helpful when reviewing a company's balance sheet to remember that current assets are presented in order of liquidity, with the most liquid current asset appearing first and the least liquid appearing last. This helps in determining whether a particular current asset should be included or excluded in the numerator of the quick ratio. The quick ratio for Coca-Cola for 2010 is calculated as follows, with PepsiCo and industry average information following it:

$$\text{Quick ratio} = \frac{\$11,199 + \$138 + \$4,430}{\$8,859 + \$8,100 + \$1,549} = \frac{\$15,767}{\$18,508} = 0.85 \text{ to } 1$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Quick ratio	0.85 to 1	0.95 to 1	0.80 to 1	1.10 to 1

The quick ratio indicates Coca-Cola had \$0.85 in quick assets for every dollar in current liabilities. This ratio decreased from 2009 to 2010 and is slightly higher than PepsiCo's 0.80 to 1 ratio. Coca-Cola is below the industry average of 1.10 to 1.

Receivables Turnover Ratio

Question: How is the receivables turnover ratio calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: The receivables turnover ratio indicates how many times receivables are collected in a given period and is found by dividing credit sales by average accounts receivable:

Key Equation

$$\text{Receivables turnover ratio} = \frac{\text{Credit sales}}{\text{Average accounts receivable}}$$

Assume all net sales presented on the income statement are on account, and therefore will be used in the numerator. The average accounts receivable amount in the denominator is found by adding together accounts receivable at the end of the current year and previous year (2010 and 2009 for this example) and dividing by two. The receivables turnover ratio for Coca-Cola for 2010 is calculated as follows, with PepsiCo and industry average information following it:

$$\text{Receivables turnover ratio} = \frac{\$35,119}{(\$4,430 + \$3,758) \div 2} = \frac{\$35,119}{\$4,094} = 8.58 \text{ times}$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Receivables turnover ratio	8.58 times	9.05 times	10.57 times	9.70 times

The receivables turnover ratio indicates Coca-Cola collected receivables 8.58 times during 2010. This ratio decreased from 2009 to 2010 and is lower than PepsiCo's 10.57 times. Coca-Cola is below the industry average of 9.70 times.

Question: How is the receivables turnover ratio converted to average collection period?

Answer: The receivables turnover ratio can be converted to the average collection period, which indicates how many days it takes on average to collect on credit sales, as follows:

Key Equation

$$\text{Average collection period} = \frac{365 \text{ days}}{\text{Receivables turnover ratio}}$$

This ratio is typically compared to the company's credit terms to evaluate how effectively receivables are being collected. The average collection period for Coca-Cola for 2010 is calculated as follows, with PepsiCo and industry average information following it:

$$\text{Average collection period} = \frac{365 \text{ days}}{8.58 \text{ times}} = 42.54 \text{ days}$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Average collection period	42.54 days	40.33 days	34.53 days	37.63 days

The average collection period indicates Coca-Cola collected credit sales in 42.54 days, on average. The number of days increased slightly from 2009 to 2010 and is higher than PepsiCo's 34.53 days. Coca-Cola is also above the industry average of 37.63 days and therefore is slower at collecting accounts receivable than the industry as a whole.

Inventory Turnover Ratio

Question: How is the inventory turnover ratio calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: The inventory turnover ratio indicates how many times inventory is sold and restocked in a given period. It is calculated as cost of goods sold divided by average inventory:

Key Equation

$$\text{Inventory turnover ratio} = \frac{\text{Cost of goods sold}}{\text{Average inventory}}$$

The average inventory amount in the denominator is found by adding together inventory at the end of the current year and previous year (2010 and 2009 for this example) and dividing by two. The inventory turnover ratio for Coca-Cola for 2010 is calculated as follows, with PepsiCo and industry average information following it:

$$\text{Inventory turnover ratio} = \$12,693 \div (\$2,650 + \$2,354) \div 2 = \$12,693 \div \$2,502 = 5.07 \text{ times}$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Inventory turnover ratio	5.07 times	4.88 times	8.87 times	7.50 times

The inventory turnover ratio indicates Coca-Cola sold and restocked inventory 5.07 times during 2010. This ratio increased slightly from 2009 to 2010 and is substantially lower than PepsiCo's 8.87 times. Coca-Cola is well below the industry average of 7.50 times.

Question: How is the inventory turnover ratio converted to average sale period?

Answer: The inventory turnover ratio can be converted to the average sale period, which indicates how many days it takes on average to sell the company's inventory, as follows:

Key Equation

$$\text{Average sale period} = \frac{365 \text{ days}}{\text{Inventory turnover ratio}}$$

The average sale period for Coca-Cola for 2009 is calculated as follows, withPepsiCo and industry average information following it:

$$\text{Average sale period} = 365 \text{ days} / 5.07 \text{ times} = 71.99 \text{ days}$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Average sale period	71.99 days	74.80 days	41.15 days	48.67 days

The average sale period indicates Coca-Cola sold its inventory in 71.99 days, on average. The number of days decreased from 2009 to 2010 and is substantially higher than PepsiCo's 41.15 days. Coca-Cola is also above the industry average of 48.67 days and therefore is slower at selling inventory than the industry as a whole.

Business in Action 13.4

Industry Variations in Inventory and Receivable Turnover

Retail grocery stores turn inventory over every 22 days, meaning that shelves are emptied and restocked about every three weeks. In addition to extremely fast inventory turnover, retail grocery stores collect credit sales in seven days. Thus it takes 29 days, on average, to convert freshly stocked inventory to cash. Very few industries are able to convert inventory to cash as quickly. Examples of inventory and receivable turnover for several industries are shown in the following.

	Receivables Turnover	Inventory Turnover
Auto manufacturers	39 days	41 days
Chemical manufacturing	51 days	61 days

Forestry and wood products	46 days	53 days
Computer systems	78 days	18 days

Source: Industry averages found at MSN Money, Home Page, "<http://moneycentral.msn.com>.

REVIEW PROBLEM 13.4

Refer to the information presented in [Note 13.10 "Review Problem 13.1"](#) for **PepsiCo**, and perform the following requirements for 2010:

1. Calculate the current ratio, and briefly describe what it means for **PepsiCo**.
2. Calculate the quick ratio, and briefly describe what it means for **PepsiCo**.
3. Calculate the receivables turnover ratio and average collection period, and briefly describe what these measures mean for **PepsiCo**. Assume all sales are on account.
4. Calculate the inventory turnover ratio and average sale period, and briefly describe what these measures mean for **PepsiCo**.

Solution to Review Problem 13.4

1.

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}} = \frac{\$5,943 + \$426 + \$6,323 + \$3,372 + \$1,505 + \$4,898 + \$10,923 + \$71}{\$17,569} = \frac{\$15,892}{\$15,892} = 1.11 \text{ to } 1$$

For every dollar in current liabilities, **PepsiCo** had \$1.11 in current assets.

2.

$$\text{Quick ratio} = \frac{\text{Cash} + \text{Marketable securities} + \text{Short-term receivables}}{\text{Current liabilities}} = \frac{\$5,943 + \$426 + \$6,323}{\$17,569} = \frac{\$12,692}{\$15,892} = 0.80 \text{ to } 1$$

For every dollar in current liabilities, **PepsiCo** had \$0.80 in quick assets.

3.

Receivables turnover ratio = $\frac{\text{Credit sales}}{\text{Average accounts receivable}} = \frac{\$57,838(\$6,323 + \$4,624) \div 2}{\$57,838\$5,474} = 10.57 \text{ times}$

PepsiCo collected receivables 10.57 times during 2010.

Average collection period = $\frac{365 \text{ days}}{\text{Receivables turnover ratio}} = \frac{365 \text{ days}}{10.57 \text{ times}} = 34.53 \text{ days}$

PepsiCo collected credit sales in 34.53 days, on average.

4.

Inventory turnover ratio = $\frac{\text{Cost of goods sold}}{\text{Average inventory}} = \frac{\$26,575(\$3,372 + \$2,618) \div 2}{\$26,575\$2,995} = 8.87 \text{ times}$

PepsiCo sold and restocked inventory 8.87 times during 2010.

Average sale period = $\frac{365 \text{ days}}{\text{Inventory turnover ratio}} = \frac{365 \text{ days}}{8.87 \text{ times}} = 41.15 \text{ days}$

PepsiCo sold its inventory in 41.15 days, on average.

Long-Term Solvency Ratios

Question: Banks, bondholders, and other long-term lenders often want to evaluate whether companies can meet long-term obligations. What are the three common ratios used to evaluate long-term solvency?

Answer: The three ratios used to evaluate long-term solvency are as follows:

1. Debt to assets
2. Debt to equity
3. Times interest earned

Debt to Assets

Question: How is the debt to assets ratio calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: The debt to assets ratio indicates the percentage of assets funded by creditors and is used to evaluate the financial leverage of a company. Debt to assets is found by dividing total liabilities by total assets:

Key Equation

$$\text{Debt to assets} = \frac{\text{Total liabilities}}{\text{Total assets}}$$

The higher the percentage, the higher the financial leverage. The debt to assets ratio for Coca-Cola for 2010 is calculated as follows, with PepsiCo and industry average information following it:

$$\text{Debt to assets} = \frac{\$8,859 + \$8,100 + \$1,549 + \$14,041 + \$9,055}{\$72,921} = \frac{\$41,604}{\$72,921} = 0.57 \text{ to } 1$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Debt to assets	0.57 to 1	0.48 to 1	0.68 to 1	0.48 to 1

The debt to assets ratio indicates that creditors funded 57 percent of Coca-Cola's assets at the end of 2010. This ratio increased from 2009 to 2010 and is lower than PepsiCo's 0.68 to 1. Coca-Cola is higher than the industry average of 0.48 to 1.

A review of the basic balance sheet equation shows that the complement of the debt to assets ratio provides the percentage of assets funded by shareholders. Thus for every dollar Coca-Cola has in assets, creditors fund \$0.57 and shareholders fund \$0.43 (= \$1 – \$0.57):

$$\text{Assets } \$1.00 = \text{Liabilities} + \text{Shareholders' equity} = \$0.57 + \$0.43$$

The debt to assets ratio reveals Coca-Cola (0.57 to 1) and PepsiCo (0.68 to 1) are more highly leveraged than the industry average of 0.48 to 1.

Debt to Equity

Question: How is the debt to assets ratio calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: A variation of the debt to assets ratio is the debt to equity ratio, which measures the balance of liabilities and shareholders' equity used to fund assets. The debt to equity ratio is total liabilities divided by total shareholders' equity:

Key Equation

$$\text{Debt to equity} = \frac{\text{Total liabilities}}{\text{Total shareholders' equity}}$$

This ratio indicates the amount of debt incurred for each dollar that owners provide. The debt to equity ratio for Coca-Cola for 2010 is calculated as follows, with PepsiCo and industry average information following it:

$$\text{Debt to equity} = \frac{\$8,859 + \$8,100 + \$1,549 + \$14,041 + \$9,055}{\$10,937 + \$49,592 - \$1,450 - \$27,762} = \frac{\$41,604}{\$31,317} = 1.33 \text{ to } 1$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Debt to equity	1.33 to 1	0.92 to 1	2.17 to 1	0.94 to 1

The debt to equity ratio indicates that Coca-Cola had \$1.33 in liabilities for each dollar in shareholders' equity. This ratio increased from 2009 to 2010 and is substantially lower than PepsiCo's 2.17 to 1. However, Coca-Cola is higher than the industry average of 0.94 to 1.

Business in Action 13.5



Source: Photo courtesy of
spechtenhauser, <http://www.flickr.com/photos/usinside/2931437356/>.

Financial Leverage at **General Motors** and **Toyota**

Prior to the company's bankruptcy filing in 2009, **General Motors (GM)** was the largest manufacturer of automobiles and trucks in the world (ranked by revenues). However, **GM** took on substantial amounts of debt over several years. With an average debt to equity ratio of 2.5 to 1, the automobile industry is relatively highly leveraged,

but **GM's** ratio was substantially higher at 11.3 to 1. This means that **GM** had \$11.30 in debt for every \$1 in shareholders' equity.

Toyota Motor Corporation, on the other hand, was not highly leveraged; it had a debt to equity ratio of 1 to 1. Thus **Toyota** had \$1 in debt for every \$1 in shareholders' equity. It is important to review other financial ratios before concluding that **Toyota** was in better financial shape than **GM**, but the fact that **GM** was much more highly leveraged than **Toyota** likely played a big role in **GM's** downfall!

Source: Industry averages found at MSN Money, Home

Page," <http://moneycentral.msn.com> and Yahoo! Finance, "Home

Page," <http://biz.yahoo.com>.

Times Interest Earned

Question: How is times interest earned calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: The times interest earned ratio (also called interest coverage ratio) measures the company's ability to cover its interest expense related to long-term debt with current period earnings. The times interest earned ratio is net income before income tax expense and interest expense divided by interest expense:

Key Equation

$$\text{Times interest earned} = \frac{\text{Net income} + \text{Income tax expense} + \text{Interest expense}}{\text{Interest expense}}$$

Notice that income tax expense and interest expense are added back in the numerator to find net income available to cover interest expense. The times interest earned ratio for **Coca-Cola** for 2010 is calculated as follows, with **PepsiCo** and industry average information following it:

$$\text{Times interest earned} = \frac{\$11,809 + \$2,384 + \$733}{\$733} = \frac{\$14,926}{\$733} = 20.36 \text{ times}$$

	Coca-Cola	Coca-Cola	PepsiCo	Industry Average
--	-----------	-----------	---------	------------------

	2010	2009	2010	2010
Times interest earned	20.36 times	25.97 times	10.10 times	10.70 times

The times interest earned ratio indicates **Coca-Cola** had earnings to cover interest expense 20.36 times. This ratio decreased from 2009 to 2010 and is much higher than **PepsiCo's** 10.10 times. **Coca-Cola** is also higher than the industry average of 10.70 times. It appears that **Coca-Cola** has plenty of earnings to cover interest expense.

REVIEW PROBLEM 13.5

Refer to the information presented in [Note 13.10 "Review Problem 13.1"](#) for **PepsiCo**, and perform the following requirements for 2010:

1. Calculate the debt to assets ratio, and briefly describe what it means for **PepsiCo**.
2. Calculate the debt to equity ratio, and briefly describe what it means for **PepsiCo**.
3. Calculate the times interest earned ratio, and briefly describe what it means for **PepsiCo**.

Solution to Review Problem 13.5

1.

$$\text{Debt to assets} = \frac{\text{Total liabilities}}{\text{Total assets}} = \frac{\$4,898 + \$10,923 + \$71 + \$19,999 + \$10,786}{\$68,153} = \frac{\$46,677}{\$68,153} = 0.68 \text{ to } 1$$

Creditors funded 68 percent of **PepsiCo's** assets. Owners funded the remaining 32 percent.

2.

$$\text{Debt to equity} = \frac{\text{Total liabilities}}{\text{Total shareholders' equity}} = \frac{\$4,898 + \$10,923 + \$71 + \$19,999 + \$10,786}{\$21,476} = \frac{\$46,677}{\$21,476} = 2.17 \text{ to } 1$$

For every dollar in shareholders' equity, **PepsiCo** had \$2.17 in liabilities.

3.

$$\text{Times interest earned} = \frac{\text{Net income} + \text{Income tax expense} + \text{Interest expense}}{\text{Interest expense}} = \frac{\$6,320 + \$1,894 + \$903}{\$903} = \frac{\$9,117}{\$903} = 10.10 \text{ times}$$

PepsiCo had earnings to cover interest expense 10.10 times.

Market Valuation Measures

Question: Existing and potential shareholders are often interested in a company's market value. What are the two common measures used to evaluate market value?

Answer: The two measures used to determine and evaluate the market value of a company are as follows:

1. Market capitalization
2. Price-earnings ratio

Market Capitalization

Question: How is market capitalization calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: Market capitalization (also called market cap) measures the value of a company at a point in time. It is determined by multiplying market price per share times the number of shares outstanding:

Key Equation

$$\text{Market capitalization} = \text{Market price per share} \times \text{Number of shares outstanding}$$

Coca-Cola's market capitalization for 2010 is calculated as follows, with PepsiCo information following it. The number of shares outstanding at Coca-Cola's fiscal year ended December 31, 2010, totaled 2,292,000,000 (= 3,520,000,000 shares issued – 1,228,000,000 treasury shares). The market price per share at that time was \$63.92.

$$\text{Market capitalization} = \$63.92 \text{ per share} \times 2,292,000,000 \text{ shares} = \$146,500,000,000$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Market capitalization	\$146,500,000,000	\$123,200,000,000	\$100,700,000,000	\$87,500,000,000

Coca-Cola's market capitalization indicates that the company's shares outstanding had a market value totaling \$146,500,000,000 at the end of 2010. This amount increased significantly from 2009 to 2010 and is higher than PepsiCo's \$100,700,000,000. Both Coca-Cola and PepsiCo are above the industry average of \$87,500,000,000.

(Note that the number of shares outstanding is typically found in the shareholders' equity section of the balance sheet or in the notes to the financial statements. We provide the number of shares outstanding throughout this chapter, unless noted otherwise. This number is different than the weighted average shares outstanding used to calculate earnings per share earlier in the chapter. Also note that the price per share amount is from Yahoo's finance Web site at <http://finance.yahoo.com>. We provide this information throughout the chapter, unless noted otherwise.)

Looking at a company's market capitalization is a quick way of gauging its aggregate value. But what does a number like Coca-Cola's \$146,500,000,000 market capitalization really tell us about how a company compares to others? Note 13.54 "Business in Action 13.6" has the answer.

Business in Action 13.6

Three Categories of Market Capitalization

Most investors refer to market capitalization as *market cap*. Companies are typically classified into one of three market cap categories: small-cap, midcap, and large-cap. In general, small-cap companies have a market value of less than \$1,000,000,000, midcap companies have a market value between \$1,000,000,000 and \$12,000,000,000, and large-cap companies have a market value greater than \$12,000,000,000.

Thus small-cap mutual funds are stock funds that invest in companies with a market value of less than \$1,000,000,000. Midcap mutual funds are stock funds that invest in

companies with a market value between \$1,000,000,000 and \$12,000,000,000, and so on. These categories are important to investors because the stocks of small-cap companies tend to be more volatile than those of mid- or large-cap companies.

Source: Definitions are from the Web site of Vanguard, one of the world's largest investment management firms (<http://www.vanguard.com>).

Price-Earnings Ratio

Question: How is the price-earnings ratio calculated, and what does it tell us about Coca-Cola relative to PepsiCo and the industry average?

Answer: The price-earnings ratio (also called P/E ratio) measures the premium investors are willing to pay for shares of stock relative to the company's earnings. The price-earnings ratio is found by dividing market price per share by earnings per share:

Key Equation

$$\text{Price-earnings ratio} = \frac{\text{Market price per share}}{\text{Earnings per share}}$$

In general, a relatively high price-earnings ratio indicates investors expect favorable future earnings, whereas a relatively low price-earnings ratio indicates investors expect moderate future earnings. The price-earnings ratio for Coca-Cola for 2010 is calculated as follows, with PepsiCo and industry average information following it. The market price information was given in the market capitalization example, and we calculated earnings per share earlier in the chapter.

$$\text{Price-earnings ratio} = \frac{\$63.92}{\$5.12} = 12.48 \text{ times}$$

	Coca-Cola 2010	Coca-Cola 2009	PepsiCo 2010	Industry Average 2010
Price-earnings ratio	12.48 times	18.21 times	16.04 times	14.60 times

The price-earnings ratio indicates investors were willing to pay 12.48 times the earnings for Coca-Cola's stock. This ratio decreased from 2009 to 2010 and is lower than PepsiCo's 16.04 times. Coca-Cola is also lower than the industry average of 14.60 times.

KEY TAKEAWAY

- Shareholders, creditors, and analysts often evaluate a company's profitability. Five ratios used to evaluate *profitability* are the gross margin ratio, the profit margin ratio, return on assets, return on common shareholders' equity, and earnings per share. Suppliers and other short-term creditors often evaluate whether a company can meet short-term obligations. Four ratios used to evaluate *short-term liquidity* are the current ratio, the quick ratio, the receivables turnover ratio (often converted to average collection period), and the inventory turnover ratio (often converted to average sale period). Banks, bondholders, and other long-term lenders often evaluate whether companies can meet long-term obligations. Three ratios used to evaluate *long-term solvency* are debt to assets, debt to equity, and times interest earned. Shareholders are particularly interested in a company's market value. Two measures used to determine and evaluate the *market value* of a company are market capitalization and the price-earnings ratio.

REVIEW PROBLEM 13.6

Perform the following requirements for **PepsiCo** for 2010:

1. Calculate the market capitalization, and briefly describe what it means for **PepsiCo**. Assume **PepsiCo** had 1,581,000,000 shares outstanding at the end of 2010, and the market price per share was \$63.68.
2. Calculate the price-earnings ratio, and briefly describe what it means for **PepsiCo**. (Hint: Earnings per share was calculated for **PepsiCo** in [Note 13.29 "Review Problem 13.3"](#).)

Solution to Review Problem 13.6

1.

Market capitalization=Market price per share×Number of shares outstanding=\$63.68×
1,581,000,000=\$100.7 billion (rounded)

PepsiCo's shares outstanding had a market value of \$100,700,000,000 at the end of 2010.

2.

Price-
earnings ratio=Market price per shareEarnings per share=\$63.68\$3.97=16.04 times

Investors were willing to pay 16.04 times earnings for**PepsiCo's** stock.

13.4 Wrap-Up of Chapter Example

Recall the dialogue at Chicken Deluxe between Sandy Masako, the CEO; Dave Roberts, the CFO; and Karen Kraft, the purchasing manager. Chicken Deluxe must choose between Deep Fizz Company and Extreme Fizz, Inc., as the supplier of the company's beverages. Dave was asked to evaluate the financial condition of each company and report back to the group. The group reconvenes the following month, where Dave presents the financial measures for each company. As you read the dialogue, refer to Table 13.3 "Summary of Financial Ratios for Deep Fizz Company; Extreme Fizz, Inc.; and the Industry Average"; it is the summary of financial measures that Dave provides to the group.

Table 13.3 Summary of Financial Ratios for Deep Fizz Company; Extreme Fizz, Inc.; and the Industry Average

		Deep Fizz	Extreme Fizz	Industry Average				
Profitability Measures								
1.	Gross margin ratio	63.1 percent	54.1 percent	53.1 percent				

		Deep Fizz	Extreme Fizz	Industry Average				
2.	Profit margin ratio	22.1 percent	23.2 percent	19.2 percent				
3.	Return on assets	15.1 percent	17.3 percent	14.2 percent				
4.	Return on common shareholders' equity	36.5 percent	34.9 percent	34.7 percent				
5.	Earnings per share	\$2.01	\$3.76	Not applicable				
Short-Term Liquidity Measures								
6.	Current ratio	0.85 to 1	1.25 to 1	1.20 to 1				
7.	Quick ratio	0.62 to 1	0.87 to 1	1.10 to 1				
8.	Receivables turnover ratio	9.10 times	10.18 times	9.70 times				
9.	Average collection period	40.11 days	35.85 days	37.63 days				
10.	Inventory turnover ratio	5.12 times	7.86 times	7.50 times				
11.	Average sale period	72.29 days	46.44 days	48.67 days				
Long-Term Solvency Measures								

		Deep Fizz	Extreme Fizz	Industry Average				
12.	Debt to assets	0.34 to 1	0.38 to 1	0.48 to 1				
13.	Debt to equity	0.67 to 1	0.86 to 1	0.94 to 1				
14.	Times interest earned	31.60 times	38.93 times	10.70 times				
Market Valuation Measures								
15.	Market capitalization	\$91,800,000,000	\$86,500,000,000	\$87,500,000,000				
16.	Price-earnings ratio	19.34 times	20.31 times	14.60 times				
Sandy:	<i>Let's get started! Dave, what do you have for us?</i>							
Dave:	<i>I used several different financial ratios to evaluate profitability, short-term liquidity, long-term solvency, and market valuation for Deep Fizz Company and Extreme Fizz, Inc., Here is a summary of the results. Items 1 through 4 show that both companies are doing very well with regard to profitability, and exceed the industry average in all four categories. Earnings per share are not relevant for comparative purposes because different companies have different amounts of shares outstanding.</i>							
Sandy:	<i>The profitability measures look good for both companies. What about the balance sheet?</i>							
Dave:	<i>For the most part, Extreme Fizz has the edge on short-term liquidity, with top marks for all short-term liquidity measures. However, Deep Fizz is not far behind. Based on items 6 through 11, I consider both companies to have strong short-term liquidity. The only concern is with Deep Fizz's slow inventory turnover, which is well below Extreme Fizz and the industry average.</i>							

		Deep Fizz	Extreme Fizz	Industry Average				
Sandy:	<i>What about long-term solvency? Given both companies have strong profitability and excellent short-term liquidity, my biggest concern is whether these companies are able to meet long-term obligations.</i>							
Dave:	<i>The short answer is both companies will be able to meet long-term obligations as indicated in the debt to assets, debt to equity, and times interest earned ratios. Also notice that both companies have large market capitalizations, and price-earnings ratios are strong across the board!</i>							
Sandy:	<i>So what do we get from all this information?</i>							
Dave:	<i>Both companies are solid. We shouldn't have to worry about either company having financial difficulties in the near future.</i>							
Karen:	<i>Looks like we'll have to review other factors in deciding which company to use as our supplier.</i>							
Sandy:	<i>I agree. Thanks, Dave, for your analysis. If nothing else, this puts my mind at ease about whichever company we ultimately select as our supplier.</i>							

As you can see from the Chicken Deluxe example, analysts use many different financial measures to evaluate financial performance. In the case of Deep Fizz and Extreme Fizz, both companies appear to be strong performers. Armed with this information, management can confidently choose either company knowing the winner will be on solid financial ground for years to come.

13.5 Nonfinancial Performance Measures: The Balanced Scorecard

LEARNING OBJECTIVE

1. Develop and analyze nonfinancial performance measures using a balanced scorecard.

Question: Although financial measures are important for evaluation purposes, many organizations use a mix of financial and nonfinancial measures to evaluate performance. For example, airlines track on-time arrival percentages carefully, and delivery companies like Federal Express (FedEx) and United Parcel Service (UPS) monitor percentages of on-time deliveries. The balanced scorecard uses several alternative measures to evaluate performance. What is a balanced scorecard and how does it help companies to evaluate performance?

Answer: The balanced scorecard is a balanced set of measures that organizations use to motivate employees and evaluate performance. These measures are typically separated into four perspectives outlined in the following. (Dr. Robert S. Kaplan and Dr. David P. Norton created the balanced scorecard, and it is actively promoted through their company, Balanced Scorecard Collaborative. More information can be found at the company's Web site at <http://www.bscoll.com>.)

1. Financial. Measures that shareholders, creditors, and other stakeholders use to evaluate financial performance.
2. Internal business process. Measures that management uses to evaluate efficiency of existing business processes.
3. Learning and growth. Measures that management uses to evaluate effectiveness of employee training.
4. Customer. Measures that management uses to evaluate whether the organization is meeting customer expectations.

The goal is to link these four perspectives to the company's strategies and goals. For example, a high percentage of on-time arrivals is likely an important goal from the perspective of the customer of an airline. A high percentage of defect-free computer chips is likely an important goal from the internal business process perspective of a computer chip maker. A high number of continuing education hours is likely an important goal from the learning and growth perspective

for tax personnel at an accounting firm. Measures from a financial perspective were covered earlier in this chapter.

Companies that use the balanced scorecard typically establish several measures for each perspective. lists several examples of these measures.

Table 13.4 Balanced Scorecard Measures

Financial	Internal Business Process	Learning and Growth	Customer
Gross margin ratio	Defect-free rate	Hours of employee training	Customer satisfaction (survey)
Return on assets	Customer response time	Employee satisfaction (survey)	Number of customer complaints
Receivables turnover	Capacity utilization	Employee turnover	Market share
Inventory turnover	New product development time	Number of employee accidents	Number of returned products

Measures established across the four perspectives of the balanced scorecard are linked in a way that motivates employees to achieve company goals. For example, if the company wants to increase the defect-free rate and reduce product returns, effective employee training and low employee turnover will help in achieving this goal. The idea is to establish company goals first, then create measures that motivate employees to reach company goals.

KEY TAKEAWAY

- Most organizations use a mix of financial and nonfinancial measures to evaluate performance. The balanced scorecard approach uses a balanced set of measures separated into four perspectives—financial, internal business process, learning and

growth, and customer. The last three perspectives tend to include nonfinancial measures, such as hours of employee training or number of customer complaints, to evaluate performance. The goal is to link financial and nonfinancial measures to the company's strategies and goals.

REVIEW PROBLEM 13.7

Assume Chicken Deluxe, the fast-food restaurant franchise featured in this chapter, uses a balanced scorecard. Provide at least two examples of measures that Chicken Deluxe might use for each of the following perspectives of the balanced scorecard:

1. Financial
2. Internal business process
3. Learning and growth
4. Customer

Solution to Review Problem 13.7

1. Answers will vary. Several examples of financial measures are as follows:

1. Gross margin ratio
2. Profit margin ratio
3. Return on assets
4. Receivables turnover
5. Inventory turnover

Answers will vary. Several examples of internal business process measures are as follows:

1. Capacity utilization
2. Amount of food spoilage
3. Order response time

Answers will vary. Several examples of learning and growth measures are as follows:

1. Hours of employee training

2. Employee satisfaction
3. Employee turnover
4. Number of employee accidents

Answers will vary. Several examples of customer perspective measures are as follows:

1. Customer satisfaction
2. Number of customer complaints
3. Market share
4. Amount of food returned

END-OF-CHAPTER EXERCISES

Questions

1. What is trend analysis? Explain how the percent change from one period to the next is calculated.
2. What is common-size analysis? How is common-size analysis information used?
3. Explain the difference between trend analysis and common-size analysis.
4. Name the ratios used to evaluate profitability. Explain what the statement “evaluate profitability” means.
5. **Coca-Cola’s** return on assets was 19.4 percent, and return on common shareholders’ equity was 41.7 percent. Briefly explain why these two percentages are different.
6. **Coca-Cola** had earnings per share of \$5.12, and **PepsiCo** had earnings per share of \$3.97. Is it accurate to conclude **PepsiCo** was more profitable? Explain your reasoning.
7. Name the ratios used to evaluate short-term liquidity. Explain what the statement “evaluate short-term liquidity” means.
8. Explain the difference between the current ratio and the quick ratio.
9. **Coca-Cola** had an inventory turnover ratio of 5.07 times (every 71.99 days), and **PepsiCo** had an inventory turnover ratio of 8.87 times (every 41.15 days). Which company had the best inventory turnover? Explain your reasoning.

10. Name the ratios used to evaluate long-term solvency. Explain what the term “long-term solvency” means.
11. Name the measures used to determine and evaluate the market value of a company. Briefly describe the meaning of each measure.
12. What is the balanced scorecard? Briefly describe the four perspectives of the balanced scorecard.

Brief Exercises

13. **Evaluating Suppliers at Chicken Deluxe.** Refer to the dialogue at Chicken Deluxe presented at the beginning of the chapter and the follow-up dialogue immediately following .

Required:

- a. What is the big decision that Chicken Deluxe is facing?
- b. Briefly describe the results of Dave’s analysis of the two suppliers.

Trend Analysis. The following condensed income statement is for **Apple, Inc.**

Apple, Inc. Income Statement Years Ended September 24, 2011 and September 25, 2010 (in millions)		
	2011	2010
Net sales	\$108,249	\$65,225
Cost of goods sold	64,431	39,541
Gross margin	\$ 43,818	\$25,684
Research and development	2,429	1,782
Selling and administrative expenses	7,599	5,517
Operating income	\$ 33,790	\$18,385
Other income (expenses; net)	415	155
Income before taxes	\$ 34,205	\$18,540
Income tax expense	8,283	4,527
Net income	\$ 25,922	\$14,013

Required:

Prepare a trend analysis of the income statements from 2010 to 2011. Use the format shown in as a guide. (Round percent computations to one decimal place.)

Common-Size Analysis. Refer to the condensed income statement for **Apple, Inc.**, in Brief Exercise 14.

Required:

Prepare a common-size analysis of the income statements for 2010 and 2011. Use the format shown in as a guide. (Round percent computations to one decimal place.)

Gross Margin and Profit Margin Ratios. Refer to the condensed income statement for **Apple, Inc.**, in Brief Exercise 14.

Required:

Compute the following profitability ratios for 2011, and provide a brief explanation after each ratio (round computations to one decimal place):

1. Gross margin ratio
2. Profit margin ratio

Current and Quick Ratios. A condensed balance sheet for **Apple, Inc.**, appears in the following.

Apple, Inc.
Balance Sheet
September 24, 2011
(in millions)

Assets	
Current assets	
Cash and cash equivalents	\$ 9,815
Short-term marketable securities	16,137
Accounts receivable (net)	5,369
Merchandise inventory	776
Other current assets	12,891
Total current assets	<u>\$ 44,988</u>
Noncurrent assets	
Property, plant and equipment (net)	7,777
Other assets	63,606
Total assets	<u><u>\$116,371</u></u>
Liabilities and shareholders' equity	
Current liabilities	
Accounts payable and other liabilities	\$ 14,632
Accrued expenses	13,338
Total current liabilities	<u>\$ 27,970</u>
Noncurrent liabilities	
Long-term debt	11,786
Shareholders' equity	
Common stock	13,331
Retained earnings	63,284
Total liabilities and shareholders' equity	<u><u>\$116,371</u></u>

Required:

Compute the following short-term liquidity ratios for 2011, and provide a brief explanation after each ratio (round computations to two decimal places):

1. Current ratio
2. Quick ratio

Long-Term Solvency Ratios. Refer to the condensed balance sheet for **Apple, Inc.**, in Brief Exercise 17.

Required:

Compute the following long-term solvency ratios for 2011, and provide a brief explanation after each ratio (round computations to two decimal places):

1. Debt to assets
2. Debt to equity

Market Capitalization. On September 24, 2011, **Apple, Inc.**, had 929,277,000 shares of common stock issued and outstanding, and the market price per share on that date was \$403.33.

Required:

Compute Apple's market capitalization at September 24, 2011, and provide a brief explanation of what this measures represents (state the answer in billions).

Balanced Scorecard. Provide two nonfinancial measures likely used by delivery companies like **FedEx** and **UPS**.

Exercises: Set A

21. **Trend Analysis.** The following condensed income statement is for **CarMax, Inc.**, a large retailer of used vehicles.

Carmax, Inc. Income Statement Years Ended February 28, 2011 and February 28, 2010 (in millions)		
	2011	2010
Net sales	\$8,976	\$7,470
Cost of goods sold	<u>7,674</u>	<u>6,371</u>
Gross margin	\$1,302	\$1,099
Selling and administrative expenses	<u>905</u>	<u>819</u>
Operating income	\$ 397	\$ 280
Interest expense	<u>3</u>	<u>3</u>
Other income (expenses; net)	<u>220</u>	<u>176</u>
Income before taxes	\$ 614	\$ 453
Income tax expense	<u>233</u>	<u>171</u>
Net income	<u>\$ 381</u>	<u>\$ 282</u>

Required:

- a. Prepare a trend analysis of the income statements from 2010 to 2011. Use the format shown in as a guide. (Round computations to one decimal place.)

- b. What does the trend analysis prepared in requirement a tell you about the company?

Common-Size Analysis. Refer to the condensed income statement for **CarMax, Inc.**, in Exercise 21.

Required:

- a. Prepare a common-size analysis of the income statements for 2011 and 2010. Use the format shown in as a guide. (Round computations to one decimal place.)

- b. What does the common-size analysis in requirement a tell you about the company?

Profitability Ratios. Refer to the condensed income statement for **CarMax, Inc.**, in Exercise 21 and to the company's balance sheet shown as follows.

Carmax, Inc.
Balance Sheet
February 28, 2011 and February 28, 2010
(in millions)

	<u>2011</u>	<u>2010</u>
Assets		
Current assets		
Cash and cash equivalents	\$ 202	\$ 18
Accounts receivable (net)	120	682
Merchandise inventory	1,049	843
Other current assets	39	13
Total current assets	<u>\$ 1,410</u>	<u>\$ 1,556</u>
Noncurrent assets		
Property, plant and equipment (net)	920	894
Other assets	4,510	106
Total assets	<u>\$ 6,840</u>	<u>\$ 2,556</u>
Liabilities and shareholders' equity		
Current liabilities		
Accounts payable and other liabilities	\$ 373	\$ 348
Short-term debt	134	123
Income taxes payable and deferred taxes	1	6
Total current liabilities	<u>\$ 508</u>	<u>\$ 477</u>
Noncurrent liabilities		
Long-term debt	3,909	27
Other liabilities	131	118
Shareholders' equity		
Common stock	934	858
Retained earnings	1,358	1,076
Total liabilities and shareholders' equity	<u>\$ 6,840</u>	<u>\$ 2,556</u>

Required:

Compute the following profitability ratios for 2011, and provide a brief explanation after each ratio (round percentage computations to one decimal place and earnings per share to two decimal places):

1. Gross margin ratio
2. Profit margin ratio
3. Return on assets
4. Return on common shareholders' equity
5. Earnings per share (assume weighted average shares outstanding totaled 223,449,000 shares)

Short-Term Liquidity Ratios. Refer to the condensed income statement for **CarMax, Inc.**, in Exercise 21 and to the company's balance sheet in Exercise 23.

Required:

Compute the following short-term liquidity ratios for 2011, and provide a brief explanation after each ratio (round computations to two decimal places):

1. Current ratio
2. Quick ratio
3. Receivables turnover ratio and average collection period (assume all sales are on account)
4. Inventory turnover ratio and average sale period

Long-Term Solvency Ratios. Refer to the condensed income statement for **CarMax, Inc.**, in Exercise 21 and to the company's balance sheet in Exercise 23.

Required:

Compute the following long-term solvency ratios for 2011, and provide a brief explanation after each ratio (round computations to two decimal places):

1. Debt to assets
2. Debt to equity
3. Times interest earned

Market Valuation Measures. The following requirements are for **CarMax, Inc.**, as of February 28, 2011.

Required:

- a. Compute the following market valuation measures for 2011, and provide a brief explanation after each measure (state market capitalization in billions, and round price-earnings ratio to two decimal places):

1. Market capitalization (assume 225,885,693 shares were issued and outstanding at February 28, 2011, and the market price was \$35.37 per share)
2. Price-earnings ratio (assume earnings per share was \$1.71)
- b. Refer to In which category does **CarMax** belong? Explain.

Balanced Scorecard Customer Measures. Tech University has more than 10,000 students enrolling in courses each term. The management would like to develop a balanced scorecard to assess performance.

Required:

Provide at least three customer measures Tech University can use on its balanced scorecard. Assume students are the customers.

Exercises: Set B

28. **Trend Analysis.** The following condensed income statement is for **Colgate-Palmolive Company**, a large retailer of personal and home care products.

Colgate-Palmolive Company Income Statement Years Ended December 31, 2010 and December 31, 2009 (in millions)		
	2010	2009
Net sales	\$15,564	\$15,327
Cost of goods sold	6,360	6,319
Gross margin	\$ 9,204	\$ 9,008
Selling and administrative expenses	5,414	5,282
Operating income	\$ 3,790	\$ 3,726
Interest expense	59	77
Other expenses	411	217
Income before taxes	\$ 3,320	\$ 3,432
Income tax expense	1,117	1,141
Net income	\$ 2,203	\$ 2,291

Required:

- a. Prepare a trend analysis of the income statements from 2009 to 2010. Use the format shown in as a guide. (Round computations to one decimal place.)

- b. What does the trend analysis prepared in requirement a tell you about the company?

Common-Size Analysis. Refer to the condensed income statement for **Colgate-Palmolive Company** in Exercise 28.

Required:

- a. Prepare a common-size analysis of the income statements for 2010 and 2009. Use the format shown in a as a guide. (Round computations to one decimal place.)

- b. What does the common-size analysis in requirement a tell you about the company?

Profitability Ratios. Refer to the condensed income statement for **Colgate-Palmolive Company** in Exercise 28. Assume the company paid preferred dividends totaling \$34,000,000 during 2010. (The company had preferred stock outstanding during 2010, but eliminated all preferred stock by the end of 2010. This is why preferred stock has a zero balance as of December 31, 2010.)

Colgate-Palmolive Company Balance Sheet December 31, 2010 and December 31, 2009 (in millions)		
	2010	2009
Assets		
Current assets		
Cash and cash equivalents	\$ 490	\$ 600
Accounts receivable (net)	1,610	1,626
Merchandise inventory	1,222	1,209
Other current assets	408	375
Total current assets	\$ 3,730	\$ 3,810
Noncurrent assets		
Property, plant and equipment (net)	3,603	3,516
Other assets	3,749	3,808
Total assets	\$11,172	\$11,134
Liabilities and shareholders' equity		
Current liabilities		
Accounts payable and other liabilities	\$ 2,847	\$ 2,851
Short-term debt	609	361
Income taxes payable	272	382
Total current liabilities	\$ 3,728	\$ 3,594
Noncurrent liabilities		
Long-term debt and other liabilities	4,627	4,278
Shareholders' equity		
Preferred stock	0	169
Common stock	1,865	2,497
Retained earnings	14,329	13,157
Accumulated other income	(2,072)	(2,086)
Treasury stock	(11,305)	(10,478)
Total liabilities and shareholders' equity	\$11,172	\$11,134

Required:

Compute the following profitability ratios for 2010, and provide a brief explanation after each ratio (round percentage computations to one decimal place and earnings per share to two decimal places):

1. Gross margin ratio
2. Profit margin ratio
3. Return on assets
4. Return on common shareholders' equity
5. Earnings per share (assume weighted average shares outstanding totaled 487,800,000 shares)

Short-Term Liquidity Ratios. Refer to the condensed income statement for **Colgate-Palmolive Company** in Exercise 28 and to the company's balance sheet in Exercise 30.

Required:

Compute the following short-term liquidity ratios for 2010, and provide a brief explanation after each ratio (round computations to two decimal places):

1. Current ratio
2. Quick ratio
3. Receivables turnover ratio and average collection period (assume all sales are on account)
4. Inventory turnover ratio and average sale period

Long-Term Solvency Ratios. Refer to the condensed income statement for **Colgate-Palmolive Company** in Exercise 28 and to the company's balance sheet in Exercise 30.

Required:

Compute the following long-term solvency ratios for 2010, and provide a brief explanation after each ratio (round computations to two decimal places):

1. Debt to assets
2. Debt to equity
3. Times interest earned

Market Valuation Measures. The following requirements are for **Colgate-Palmolive Company** as of December 31, 2010.

Required:

- a. Compute the following market valuation measures for 2010, and provide a brief explanation after each measure (state market capitalization in billions, and round price-earnings ratio to two decimal places):

1. Market capitalization (assume 494,850,467 shares were issued and outstanding at December 31, 2010, and the market price was \$77.74 per share)
2. Price-earnings ratio (assume earnings per share was \$4.45)

- b. Refer to In which category does Colgate-Palmolive belong? Explain.

Balanced Scorecard Internal Business Process Measures. Tony's Pizzeria serves pizzas at its restaurants and provides delivery services to customers. The management would like to develop a balanced scorecard to assess performance.

Required:

Provide at least three internal business process measures Tony's Pizzeria can use on its balanced scorecard.

Problems

35. **Trend Analysis and Common-Size Analysis.** The following condensed income statement and balance sheet are for **Nordstrom, Inc.**, a large retailer of apparel. (Note that **Nordstrom's** 2010 fiscal year ends on January 29, 2011. This is called the 2010 fiscal year because only one month is in 2011, the other 11 months of the fiscal year are in 2010, and the company has

chosen to refer to this as the 2010 fiscal year. This same concept applies to fiscal year 2009.)

Nordstrom, Inc.
Income Statement
Years Ended January 29, 2011 and January 30, 2010
(in millions)

	<u>2010</u>	<u>2009</u>
Net sales	\$ 9,700	\$8,627
Cost of goods sold	5,897	5,328
Gross margin	<u>\$ 3,803</u>	<u>\$3,299</u>
Selling and administrative expenses	<u>2,685</u>	<u>2,465</u>
Operating income	\$ 1,118	\$ 834
Interest expense	<u>127</u>	<u>138</u>
Income before taxes	\$ 991	\$ 696
Income tax expense	<u>378</u>	<u>255</u>
Net income	<u>\$ 613</u>	<u>\$ 441</u>

Nordstrom, Inc.
Balance Sheet
January 29, 2011 and January 30, 2010
(in millions)

	<u>2011</u>	<u>2010</u>
Assets		
Current assets		
Cash and cash equivalents	\$1,506	\$ 795
Accounts receivable (net)	2,026	2,035
Merchandise inventory	977	898
Other current assets	<u>315</u>	<u>326</u>
Total current assets	\$4,824	\$4,054
Noncurrent assets		
Property, plant and equipment (net)	2,318	2,242
Other assets	<u>320</u>	<u>283</u>
Total assets	<u>\$7,462</u>	<u>\$6,579</u>
Liabilities and shareholders' equity		
Current liabilities		
Accounts payable and accrued liabilities	\$1,221	\$1,062
Other current liabilities	<u>658</u>	<u>952</u>
Total current liabilities	\$1,879	\$2,014
Noncurrent liabilities		
Long-term debt and other liabilities	3,562	2,993
Shareholders' equity		
Common stock	1,168	1,066
Retained earnings	882	525
Accumulated other income (loss)	<u>(29)</u>	<u>(19)</u>
Total liabilities and shareholders' equity	<u>\$7,462</u>	<u>\$6,579</u>

Required:

- a. Prepare a trend analysis of the income statements from 2009 to 2010. Use the format shown in as a guide. (Round computations to one decimal place.)
- b. Prepare a trend analysis of the balance sheets from 2009 to 2010. Use the format shown in as a guide. (Round computations to one decimal place.)
- c. Identify all items that changed by more than 20 percent in the trend analyses prepared in requirements **a** and **b**, and briefly comment on the results.
- d. Prepare a common-size analysis of the income statements for 2010 and 2009. Use the format shown in as a guide. (Round computations to one decimal place.)
- e. Prepare a common-size analysis of the balance sheets for 2010 and 2009. Use the format shown in as a guide. (Round computations to one decimal place.)
- f. What does the common-size analysis prepared in requirements **d** and **e** tell you about the company?

Profitability and Short-Term Liquidity Ratios. Refer to the information presented in Problem 35 for **Nordstrom**.

Required:

- a. Compute the following profitability ratios for 2010, and provide a brief explanation after each ratio (round percentage computations to one decimal place and earnings per share to two decimal places):
 1. Gross margin ratio
 2. Profit margin ratio
 3. Return on assets
 4. Return on common shareholders' equity
 5. Earnings per share (weighted average shares outstanding totaled 218,800,000 shares)

b. Compute the following short-term liquidity ratios for 2010, and provide a brief explanation after each ratio (round computations to two decimal places):

1. Current ratio
2. Quick ratio
3. Receivables turnover ratio and average collection period (assume all sales are on account)
4. Inventory turnover ratio and average sale period

Long-Term Solvency Ratios and Market Valuation Measures. Refer to the information presented in Problem 35 for **Nordstrom**.

Required:

a. Compute the following long-term solvency ratios for 2010, and provide a brief explanation after each ratio (round computations to two decimal places):

1. Debt to assets
2. Debt to equity
3. Times interest earned

b. Compute the following market valuation measures for 2010, and provide a brief explanation after each measure (state market capitalization in billions, and round price-earnings ratio to two decimal places):

1. Market capitalization (assume 218,000,000 shares were issued and outstanding at January 29, 2011, and the market price was \$40.08 per share)
2. Price-earnings ratio (assume the earnings per share amount was \$2.80)

Income Statement Trend, Common-Size, and Profitability

Analysis. The following condensed income statement and balance sheet are

for **Starbucks Corporation**, a large retailer of specialty coffee with stores throughout the world.

Starbucks Corporation
Income Statement
Years Ended October 2, 2011 and October 3, 2010
(in millions)

	<u>2011</u>	<u>2010</u>
Net sales	\$11,700	\$ 10,707
Cost of goods sold	4,949	4,459
Gross margin	<u>\$ 6,751</u>	<u>\$ 6,248</u>
Operating expenses	5,227	4,977
Operating income	<u>\$ 1,524</u>	<u>\$ 1,271</u>
Interest expense	33	33
Other income	320	199
Income before taxes	<u>\$ 1,811</u>	<u>\$ 1,437</u>
Income tax expense	566	491
Net income	<u><u>\$ 1,245</u></u>	<u><u>\$ 946</u></u>

Starbucks Corporation
Balance Sheet
October 2, 2011 and October 3, 2010
(in millions)

	<u>2011</u>	<u>2010</u>
Assets		
Current assets		
Cash and cash equivalents	\$ 1,148	\$ 1,164
Short-term investments	903	286
Accounts receivable (net)	387	303
Merchandise inventory	966	543
Other current assets	391	460
Total current assets	<u>\$3,795</u>	<u>\$2,756</u>
Noncurrent assets		
Property, plant and equipment (net)	2,355	2,417
Other assets	1,210	1,213
Total assets	<u><u>\$7,360</u></u>	<u><u>\$6,386</u></u>
Liabilities and shareholders' equity		
Current liabilities		
Accounts payable and accrued liabilities	\$ 1,480	\$ 1,219
Other current liabilities	596	560
Total current liabilities	<u>\$2,076</u>	<u>\$1,779</u>
Noncurrent liabilities		
Long-term debt and other liabilities	898	924
Shareholders' equity		
Common stock	41	146
Retained earnings	4,297	3,471
Accumulated other income	48	66
Total liabilities and shareholders' equity	<u><u>\$7,360</u></u>	<u><u>\$6,386</u></u>

Required:

- a. Prepare a trend analysis of the income statements from 2010 to 2011. Use the format shown in as a guide. (Round computations to one decimal place.)
 - b. Identify all items that changed by more than 20 percent in the trend analysis prepared in requirement **a**, and briefly comment on the results.
 - c. Prepare a common-size analysis of the income statements for 2011 and 2010. Use the format shown in as a guide. (Round computations to one decimal place.)
 - d. What does the common-size analysis prepared in requirement **c** tell you about the company?
-
- e. Compute the following profitability ratios for 2011, and provide a brief explanation after each ratio (round percentage computations to one decimal place and earnings per share to two decimal places):
 1. Gross margin ratio
 2. Profit margin ratio
 3. Return on assets
 4. Return on common shareholders' equity
 5. Earnings per share (assume weighted average shares outstanding totaled 748,300,000 shares)

Short-Term Liquidity, Long-Term Solvency, and Market

Valuation. Refer to the information presented in Problem 38 for **Starbucks**.

Required:

- a. Compute the following short-term liquidity ratios for 2011, and provide a brief explanation after each ratio (round computations to two decimal places):
 1. Current ratio
 2. Quick ratio



3. Receivables turnover ratio and average collection period (assume all sales are on account)
4. Inventory turnover ratio and average sale period

b. Compute the following long-term solvency ratios for 2011, and provide a brief explanation after each ratio (round computations to two decimal places):

1. Debt to assets
2. Debt to equity
3. Times interest earned

c. Compute the following market valuation measures for 2011, and provide a brief explanation after each measure (state market capitalization in billions, and round price-earnings ratio to two decimal places):

1. Market capitalization (assume 744,800,000 shares were issued and outstanding at October 2, 2011, and the market price was \$37.14 per share)
2. Price-earnings ratio (assume the earnings per share amount was \$1.66)

Balance Sheet Trend and Common-Size Analysis. The following condensed income statement and balance sheet are for **Wal-Mart Stores, Inc.** (note that **Wal-Mart's** 2010 fiscal year ends on January 31, 2011. This is called the 2010 fiscal year because only one month is in 2011, the other 11 months of the fiscal year are in 2010, and the company has chosen to refer to this as the 2010 fiscal year. This same concept applies to fiscal year 2009.)

Wal-Mart Stores, Inc.
Income Statement
Years ended January 31, 2011 and January 31, 2010
(in millions)

	<u>2011</u>	<u>2010</u>
Net sales	\$421,849	\$408,085
Cost of goods sold	315,287	304,444
Gross margin	<u>\$106,562</u>	<u>\$103,641</u>
Operating expenses	81,020	79,639
Operating income	<u>\$ 25,542</u>	<u>\$ 24,002</u>
Interest expense	2,205	2,065
Other income	<u>201</u>	<u>181</u>
Income before taxes	<u>\$ 23,538</u>	<u>\$ 22,118</u>
Income tax expense	7,579	7,156
Non-operating income (loss)	<u>430</u>	<u>(592)</u>
Net income	<u><u>\$ 16,389</u></u>	<u><u>\$ 14,370</u></u>

Wal-Mart Stores, Inc.
Balance Sheet
January 31, 2011 and January 31, 2010
(in millions)

	<u>2011</u>	<u>2010</u>
Assets		
Current assets		
Cash and cash equivalents	\$ 7,395	\$ 7,907
Accounts receivable (net)	5,089	4,144
Merchandise inventory	36,318	32,713
Other current assets	<u>3,091</u>	<u>3,268</u>
Total current assets	<u>\$ 51,893</u>	<u>\$ 48,032</u>
Noncurrent assets		
Property, plant and equipment (net)	107,878	102,307
Other assets	<u>20,892</u>	<u>20,068</u>
Total assets	<u><u>\$180,663</u></u>	<u><u>\$170,407</u></u>
Liabilities and shareholders' equity		
Current liabilities		
Accounts payable and accrued liabilities	\$ 52,415	\$ 50,532
Other current liabilities	<u>6,069</u>	<u>5,011</u>
Total current liabilities	<u>\$ 58,484</u>	<u>\$ 55,543</u>
Noncurrent liabilities		
Long-term debt and other liabilities	50,932	42,216
Shareholders' equity		
Common stock	3,929	4,181
Retained earnings	63,967	66,357
Accumulated other income and noncontrolling interest	<u>3,351</u>	<u>2,110</u>
Total liabilities and shareholders' equity	<u><u>\$180,663</u></u>	<u><u>\$170,407</u></u>

Required:

- a. Prepare a trend analysis of the balance sheets from 2009 to 2010. Use the format shown in as a guide. (Round computations to one decimal place.)
- b. Prepare a common-size analysis of the balance sheets for 2010 and 2009. Use the format shown in as a guide. (Round computations to one decimal place.)
- c. What does the balance sheet common-size analysis prepared in requirement **b** tell you about the company?

Income Statement Trend and Common-Size Analysis; Profitability

Ratios. Refer to the information presented in Problem 40 for Wal-Mart.

Required:

- a. Prepare a trend analysis of the income statements from 2009 to 2010. Use the format shown in as a guide. (Round computations to one decimal place.)
 - b. Based on the income statement trend analysis prepared in requirement **a**, describe what caused the increase in operating income from 2009 to 2010.
 - c. Prepare a common-size analysis of the income statements for 2010 and 2009. Use the format shown in as a guide. (Round computations to one decimal place.)
 - d. What does the income statement common-size analysis prepared in requirement **c** tell you about the company?
- e. Compute the following profitability ratios for 2010, and provide a brief explanation after each ratio (round percentage computations to one decimal place and earnings per share to two decimal places):
- 1. Gross margin ratio
 - 2. Profit margin ratio
 - 3. Return on assets
 - 4. Return on common shareholders' equity
 - 5. Earnings per share (assume weighted average shares outstanding totaled 3,656,000,000 shares)



Short-Term Liquidity, Long-Term Solvency, Market Valuation, and Balanced Scorecard. Refer to the information presented in Problem 40 for **Wal-Mart**.

Required:

a. Compute the following short-term liquidity ratios for 2010, and provide a brief explanation after each ratio (round computations to two decimal places):

1. Current ratio
2. Quick ratio
3. Receivables turnover ratio and average collection period (assume all sales are on account)
4. Inventory turnover ratio and average sale period

b. Compute the following long-term solvency ratios for 2010, and provide a brief explanation after each ratio (round computations to two decimal places):

1. Debt to assets
2. Debt to equity
3. Times interest earned

c. Compute the following market valuation measures for 2010, and provide a brief explanation after each measure (state market capitalization in billions, and round price-earnings ratio to two decimal places):

1. Market capitalization (assume 3,516,000,000 shares were issued and outstanding at January 31, 2011, and the market price was \$54.58 per share)
2. Price-earnings ratio (assume the earnings per share amount was \$4.48)

- d. Assume **Wal-Mart** uses a balanced scorecard to assess performance. Provide at least two learning and growth measures the company can use on its balanced scorecard.

One Step Further: Skill-Building Cases

43. **Trend Information in Annual Reports.** Refer to Why is trend information important to shareholders?
44. **Earnings per Share.** Refer to Was **AnnTaylor Stores'** earnings per share higher or lower than analysts expected? Explain whether you would expect the company's stock price to increase or decrease as a result of the press release.
45. **Inventory Turnover in the Computer Industry.** Refer to Why do you think inventory turnover for the computer hardware industry is so quick?
46. **Financial Leverage in the Auto Industry.** Refer to Why do most investors consider **GM** to be highly leveraged?
47. **Market Capitalization Categories.** Refer to Define what is meant by small-cap, midcap, and large-cap. In which category does **Coca-Cola** belong? Explain.
48. **Internet Project: Financial Statement Analysis.** Using the Internet, find the most recent annual report (or form 10K) for a manufacturing or retail company of your choice. Most companies have links to the information at their Web sites under titles, such as *investor relations* or *financial reports*. Print the income statement and balance sheet for the company selected and include these documents with your response to the following requirements.

Required:

- a. Compute the following profitability ratios for the most current year, and provide a brief explanation after each ratio (round percentage computations to one decimal place):
 1. Gross margin ratio
 2. Profit margin ratio

3. Return on assets
4. Return on common shareholders' equity

b. Compute the following short-term liquidity ratios for the most current year, and provide a brief explanation after each ratio (round computations to two decimal places):

1. Current ratio
2. Quick ratio
3. Receivables turnover ratio and average collection period (assume all sales are on account)
4. Inventory turnover ratio and average sale period

c. Compute the following long-term solvency ratios for the most current year, and provide a brief explanation after each ratio (round computations to two decimal places):

1. Debt to assets
 2. Debt to equity
- d. Provide a one-page written report summarizing your results in requirements **a**, **b**, and **c**. Identify any areas of concern as well as areas of strength for the company.

Group Activity: Analyzing Lowe's Companies, Inc. The condensed income statement and balance sheet information provided as follows is for **Lowe's Companies, Inc.**, a large retail company that sells building materials and supplies. **Lowe's** had 1,354,000,000 shares issued and outstanding at January 28, 2011, and the market price per share on that date was \$24.83. (Note that **Lowe's** 2010 fiscal year ends on January 28, 2011. This is called the 2010 fiscal year because only one month is in 2011, the other 11 months of the fiscal year are in 2010, and the company has chosen to refer to this as the 2010 fiscal year. This same concept applies to fiscal year 2009.)

Lowe's Companies, Inc.
Income Statement
Years ended January 28, 2011 and January 29, 2010
(in millions)

	<u>2010</u>	<u>2009</u>
Net sales	\$ 48,815	\$ 47,220
Cost of goods sold	<u>31,663</u>	<u>30,757</u>
Gross margin	\$ 17,152	\$ 16,463
Operating expenses	13,592	13,351
Operating income	3,560	3,112
Other expenses (net)	<u>332</u>	<u>287</u>
Income before taxes	\$ 3,228	\$ 2,825
Income tax expense	<u>1,218</u>	<u>1,042</u>
Net income	<u>\$ 2,010</u>	<u>\$ 1,783</u>

Lowe's Companies, Inc.
Balance Sheet
January 28, 2011 and January 29, 2010
(in millions)

	<u>2011</u>	<u>2010</u>
Assets		
Current assets		
Cash and cash equivalents	\$ 652	\$ 632
Short-term investments	471	425
Merchandise inventory	8,321	8,249
Other current assets	<u>523</u>	<u>426</u>
Total current assets	\$ 9,967	\$ 9,732
Noncurrent assets		
Property, plant and equipment (net)	22,089	22,499
Other assets	<u>1,643</u>	<u>774</u>
Total assets	<u>\$ 33,699</u>	<u>\$ 33,005</u>
Liabilities and shareholders' equity		
Current liabilities		
Accounts payable and accrued liabilities	\$ 5,018	\$ 4,864
Other current liabilities	<u>2,101</u>	<u>2,491</u>
Total current liabilities	\$ 7,119	\$ 7,355
Noncurrent liabilities		
Long-term debt and other liabilities	8,468	6,581
Shareholders' equity		
Common stock	688	735
Retained earnings	<u>17,424</u>	<u>18,334</u>
Total liabilities and shareholders' equity	<u>\$ 33,699</u>	<u>\$ 33,005</u>

Form groups of two to four students. Each group is to be assigned one of the following three categories of financial measures:

1. Profitability measures

1. Gross margin ratio
2. Profit margin ratio
3. Return on assets
4. Return on common shareholders' equity

2. Short-term liquidity measures

1. Current ratio
2. Quick ratio
3. Inventory turnover ratio and average sales period

3. Long-term solvency and market valuation measures

1. Debt to assets
2. Debt to equity
3. Market capitalization

Required:

d. Calculate the financial measures assigned to your group. Round all computations to two decimal places, except the market capitalization measure, which can be rounded to the nearest billion dollars.

e. Provide a brief explanation of each measure your group calculated in requirement a.

f. Discuss the results of your group with the class.

Performing Income Statement Trend Analysis Using Excel. Review the information for **Apple, Inc.**, in Brief Exercise 14.

Required:

Perform income statement trend analysis for **Apple, Inc.**, using an Excel spreadsheet. The format should be similar to the one in . Round percent computations to one decimal place.

Comprehensive Cases

51. Financial Statement Analysis and Industry Standards; Manufacturing

Company. Susan Hartford is the president and CEO of Computer Makers, Inc. The company is in the process of looking for a supplier of computer chips, and Susan has asked her staff to review the financial stability of **Intel Corporation**, the world's largest maker of computer chips. Susan's staff began by collecting industry average information, which is shown as follows, and would like your help in calculating and evaluating these measures for **Intel**.

Measure	Industry Average	Intel
Gross margin	57.7 percent	?
Profit margin	21.9 percent	?
Return on assets	17.7 percent	?
Return on common shareholders' equity	21.5 percent	?
Current ratio	2.3 to 1	?
Quick ratio	1.9 to 1	?
Receivables turnover	12.8 times	?
Inventory turnover	4.8 times	?
Debt to assets	0.21 to 1	?
Debt to equity	0.26 to 1	?
Market capitalization	\$80,000,000,000	?

52. **Intel's** income statement and balance sheet are provided as follows. The price for 1 share of common stock at December 25, 2010, the end of **Intel's** fiscal year, was \$20.13. The number of shares issued and

outstanding at December 25, 2010, totaled 5,581,000,000. Assume all sales were on account.

53.

Intel Corporation Income Statement Years Ended December 25, 2010 and December 26, 2009 (in millions)		
	2010	2009
Net sales	\$43,623	\$35,127
Cost of goods sold	15,132	15,566
Gross margin	\$28,491	\$19,561
Operating expenses	12,903	13,850
Operating income	\$15,588	\$ 5,711
Other income (expenses; net)	457	(7)
Income before taxes	\$16,045	\$ 5,704
Income tax expense	4,581	1,335
Net income	<u>\$11,464</u>	<u>\$ 4,369</u>

54.

Intel Corporation Balance Sheet December 25, 2010 and December 26, 2009 (in millions)		
	2010	2009
Assets		
Current assets		
Cash and cash equivalents	\$ 5,498	\$ 3,987
Short-term investments	16,387	9,933
Accounts receivable (net)	2,867	2,273
Merchandise inventory	3,757	2,935
Other current assets	3,102	2,029
Total current assets	<u>\$31,611</u>	<u>\$ 21,157</u>
Noncurrent assets		
Property, plant and equipment (net)	17,899	17,225
Other assets	13,676	14,713
Total assets	<u>\$63,186</u>	<u>\$ 53,095</u>
Liabilities and shareholders' equity		
Current liabilities		
Accounts payable and accrued liabilities	\$ 8,667	\$ 6,826
Other current liabilities	660	765
Total current liabilities	<u>\$ 9,327</u>	<u>\$ 7,591</u>
Noncurrent liabilities		
Long-term debt and other liabilities	4,429	3,800
Shareholders' equity		
Common stock	16,178	14,993
Retained earnings	32,919	26,318
Accumulated other income (loss)	333	393
Total liabilities and shareholders' equity	<u>\$63,186</u>	<u>\$ 53,095</u>

55. Required:

- a. Using the industry average measures provided, compute the same measures for **Intel** for its fiscal year ended December 25, 2010. (State your results in the same format used for industry averages.)
- b. Summarize your results in requirement **a** by completing a table using the following headings:

Measure	Industry Average	Intel Corporation

- c. Immediately following each measure, indicate whether **Intel's** financial condition is better or worse than the industry average.
- d. Using your answers to requirements **a** and **b** to support your position, determine whether **Intel** is financially stable.

Ethics: Manipulating Data to Meet Loan Requirements. Custom Tech, Inc., designs and produces computers for a variety of customers. The company has encountered a cash shortage resulting from collection problems with several customers. If Custom Tech is unable to collect a significant portion of its receivables relatively soon, the company will not be able to pay suppliers and employees next quarter. As a result, Custom Tech's president, Don Lardner, began discussions with a local bank about obtaining a short-term loan. Don did not mention the cause of the cash flow shortage other than to say, "This happens the same time every year due to the cyclical nature of our business."

In a meeting with the bank's loan officer, Jan Johnson, Don was told the loan should not be a problem as long as Custom Tech maintains a profit margin ratio above 10 percent, quick ratio above 1.0 to 1, and debt to equity ratio below 1.4 to 1. Don indicated this was in line with his company's performance and agreed to provide financial statements for the most recent year at their next meeting.

The financial statements shown as follows are for Custom Tech's most recent year ended December 31. This information has not yet been provided to the bank.

Custom Tech, Inc. Income Statement Most Recent Year Ended December 31 (in thousands)	
Net sales	\$ 300
Cost of goods sold	120
Gross margin	\$ 180
Operating expenses	135
Income before taxes	\$ 45
Tax expense	12
Net income	<u>\$ 33</u>

Custom Tech, Inc. Balance Sheet December 31 (in thousands)	
Assets	
Current assets	
Cash and cash equivalents	\$ 15
Accounts receivable (net)	75
Merchandise inventory	40
Other current assets	35
Total current assets	<u>\$165</u>
Noncurrent assets	
Property, plant and equipment (net)	85
Total assets	<u>\$250</u>
Liabilities and shareholders' equity	
Current liabilities	
Accounts payable and accrued liabilities	\$100
Total current liabilities	<u>\$100</u>
Noncurrent liabilities	
Long-term debt	50
Shareholders' equity	
Common stock	60
Retained earnings	40
Total liabilities and shareholders' equity	<u>\$250</u>

Required:

- Calculate the ratios required by the bank and determine whether Custom Tech will qualify for the loan.

- b. Assume you are the CFO for Custom Tech. Don Lardner asks you to reclassify \$30,000 in current liabilities to common stock. Don states, “We owe it to our shareholders and employees to do whatever it takes to get this loan! Without it, we may have to file for bankruptcy and let our employees go. Once we get this loan and collect our outstanding receivables we’ll be in good shape.” Prepare a revised balance sheet after making the \$30,000 reclassification, recalculate the ratios required by the bank, and determine whether Custom Tech will qualify for the loan with the revised numbers.
- c. Are the president’s actions ethical? If you were the CFO, how would you handle the president’s request? (To answer these questions, you may want to review the presentation of ethics in .)