

INVENTORIES AND COST OF GOODS CALCULATION



THE NAVIGATOR ✓

- Understand *Concepts for Review*

- Read *Feature Story*

- Scan *Study Objectives*

- Read *Preview*

- Read text and answer *Before You Go On*
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- Work *Demonstration Problem*

- Review *Summary of Study Objectives*

- Complete *Assignments*

CONCEPTS FOR REVIEW

Before studying this chapter, you should know or, if necessary, review:

- a. The cost principle (Ch. 1, p. 9) and matching principle of accounting. (Ch. 4, p. 106)
- b. How to record purchases, sales, and cost of goods sold under a perpetual inventory system. (Ch. 8, pp. 234–245)
- c. How to prepare multiple-step income statements. (Ch. 6, pp. 170–174)
- d. How to prepare a classified balance sheet. (Ch. 5, pp. 154–159)
- e. The limitations of financial statements analysis. (Ch. 7, pp. 222–223)

F E A T U R E S T O R Y

\$12,800 Worth of Blueberry Muffins!

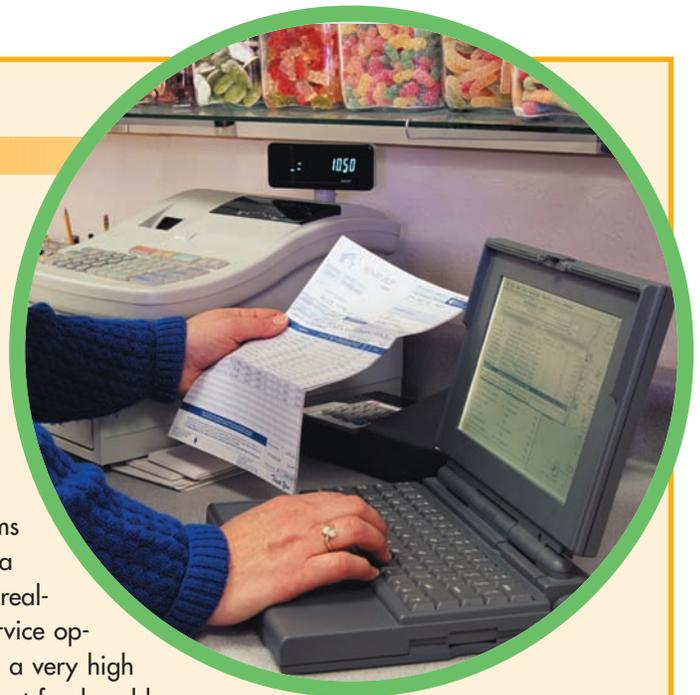
Doing physical inventory is not as simple as counting boxes and cans, especially when this involves staying in the freezer for hours in a heavy parka and gloves. As accurate as one can be, a purchasing or store-room staff, sometimes accompanied by a manager, will count all items and record the amount in the inventory book. At the end of the day, someone in the accounting office will enter in the amounts on a spreadsheet or manually extend the amounts and unit prices to get to the total value of inventory on hand. A lot of mistakes and human error can happen, and they do.

About twenty years ago, a staff member of a foodservice operation at a university did the inventory. After spending hours in the dry store-room, the walk-in refrigerators, and the freezer, he finally got all the numbers into the inventory book and passed that along to an accounting clerk to tabulate the values. The regular accounting clerk was on vacation that week, so a part-time worker was asked to extend the amounts and eventually transfer them to the cost calculation of the inventory cost of the week so as to complete the weekly operating

report and compute the hoped-for profits, for the week.

When the report was complete, although that particular week was a good one in terms of business and a profit should be realized, the foodservice operation recorded a very high profit. The assistant food and beverage director went over the weekly operation report line by line and noticed that the labor cost was in check, but the food cost saw a dramatic decrease when compared with the week before or any other week. She then started to look into the various categories of food, such as meat, dairy, poultry, coffee, baked goods, dry goods, frozen products, and the like. She finally found that the cost of the frozen products was very low. How could that be when the amount of business for the week had not fluctuated that much from other weeks?

Well, the conscientious part-time worker entered in her calculator a unit price of \$128 for the blueberry muffins rather than \$1.28. Thus the 100 units of muffins that were to be used for a big breakfast for 500



people in a few days were counted correctly by the storeroom staff, but the true cost value of \$128 now became \$12,800. With such a huge inflated inventory, of course, the cost of food used was a lot smaller, thus resulting in a very low food cost and high profits. If this was not detected, this huge value, once corrected, would greatly hurt the food cost for that operating period.

As mentioned in Chapter 8, technology has advanced to the extent that bar codes can be scanned and errors such as this can be eliminated. However, for many smaller restaurants out there, manual accounting is still being performed. So watch out for those decimal points when extending the cost of your inventories.



S T U D Y O B J E C T I V E S

After studying this chapter, you should be able to

1. Describe the steps in determining inventory quantities.
2. Prepare the entries for purchases and sales of inventory under a periodic inventory system.

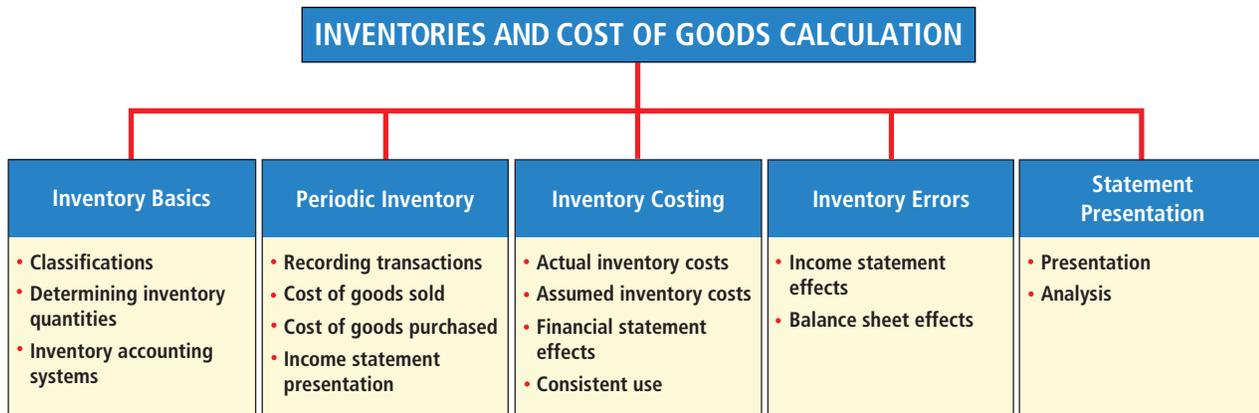
Continued

PREVIEW OF CHAPTER 9

Who would have thought that 100 boxes of (or 600 individual) blueberry muffins that are going to be used to feed 500 college students would mess up profit and loss of a foodservice unit just because of a simple data-entry and calculation error? Inventory costing and calculation are very important. They also have tax effects that can be carried to other accounting periods.

In this chapter we will first explain the methods used in determining the cost of inventory on hand on the balance sheet date. Then we will discuss the differences in perpetual and periodic inventory systems and the effects of inventory errors on a company's financial statements.

The content and organization of Chapter 9 are as follows:



STUDY OBJECTIVES (CONTINUED)

3. Determine cost of goods sold under a periodic inventory system.
4. Identify the unique features of the income statement for a merchandiser using a periodic inventory system.
5. Explain the basis of accounting for inventories, and describe the inventory cost-flow methods.
6. Explain the financial statement and the tax effects of each of the inventory cost-flow methods.
7. Indicate the effects of inventory errors on financial statements.
8. Compute and interpret inventory turnover.



INVENTORY BASICS

In our economy, inventories are an important barometer of business activity. The U.S. Commerce Department publishes monthly inventory data for retailers, wholesalers, and manufacturers. The amount of inventories and the time required to sell the goods on hand are two closely watched indicators. During downturns in the economy, there is an initial buildup of inventories because it takes longer to sell existing quantities. Inventories generally decrease with an upturn in business activity.

A delicate balance must be maintained between too little inventory and too much. A company with too little inventory to meet demand will have dissatisfied customers and sales personnel. One with too much inventory will be burdened with unnecessary carrying costs.

Inventories affect both the balance sheet and the income statement. On the **balance sheet** of merchandising companies, inventory is frequently the most significant current asset. Of course, its amount and relative importance can vary, even for companies in the same industry. For example, in 2005, **Marriott** reported inventory of \$555 million, representing 27.6 percent of total current assets. For the same period, **Starwood Hotels and Resorts Worldwide, Inc.**, reported \$280 million of inventory, representing 12.3 percent of total current assets. In the **income statement**, inventory is vital in determining the results of operations for a particular period. Also, gross profit (net sales less cost of goods sold) is closely watched by management, owners, and other interested parties.

CLASSIFYING INVENTORY

How a company classifies its inventory depends on whether the firm is a merchandiser or a manufacturer. A *merchandiser's* inventory consists of many different items. For example, in a grocery store, canned goods, dairy products, meats, and produce are just a few of the inventory items on hand. These items have two common characteristics: (1) They are owned by the company, and (2) they are in a form ready for sale in the ordinary course of business. Only one inventory classification, **merchandise inventory**, is needed to describe the many different items that make up the total inventory.

A *manufacturer's* inventories are also owned by the company, but some goods may not yet be ready for sale. As a result, inventory is usually classified into three categories: finished goods, work in process, and raw materials. For example, **General Motors** classifies vehicles completed and ready for sale as **finished goods**. The vehicles in various stages of production are classified as **work in process**. The steel, glass, upholstery, and other components that are on hand waiting to be used in production are **raw materials**.

DETERMINING INVENTORY QUANTITIES

Many businesses take a physical inventory count on the last day of the year. Businesses using the periodic inventory system must make such a count to determine the inventory on hand at the balance sheet date and to compute cost of goods sold. Even businesses using a perpetual inventory system must take a physical inventory at some time during the year.

Determining inventory quantities consists of two steps: (1) taking a physical inventory of goods on hand and (2) determining the ownership of goods.

Taking a Physical Inventory

Taking a physical inventory involves actually counting, weighing, or measuring each kind of inventory on hand. In many companies, taking an inventory is a formidable task. An inventory count is generally more accurate when goods are not being sold or received during the counting. So companies often “take inventory” when the business is closed or when business is slow. This, however, is difficult in the hospitality business because most are open 365 days a year.

To minimize errors in taking the inventory, a company should adhere to **internal control principles** and practices that safeguard inventory:

1. The counting should be done by employees who do not have custodial responsibility for the inventory.

HELPFUL HINT

Regardless of the classification, all inventories are reported under current assets on the balance sheet

STUDY OBJECTIVE 1

Describe the steps in determining inventory quantities.

2. Each counter should establish the authenticity of each inventory item. For example, does each box contain four sheetcakes? Is each bottle of liquor a full or a partial?
3. There should be a second count by another employee.
4. Prenumbered inventory tags should be used. All inventory tags should be accounted for.
5. At the end of the count, a designated supervisor should check that all inventory items are tagged and that no items have more than one tag.

After the physical inventory is taken, the quantity of each kind of inventory is listed on **inventory summary sheets**. To ensure accuracy, the listing should be verified by a second employee. Later, unit costs will be applied to the quantities in order to determine a total cost of the inventory—which is the topic of later sections.¹

ACCOUNTING IN ACTION *Business Insight*



Failure to observe the foregoing internal control procedures contributed to the Great Salad Oil Swindle. In this case, management intentionally overstated its salad oil inventory, which was stored in large holding tanks. Three procedures contributed to overstating the oil inventory: (1) Water added to the bottom of the holding tanks caused the oil to float to the top. Inventory-taking crews who viewed the holding tanks from the top observed only salad oil. In fact, as much as 37 of 40 feet of many of the holding tanks contained water. (2) The company's inventory records listed more holding tanks than it actually had. The company repainted numbers on the tanks after inventory crews examined them, so the crews counted the same tanks twice. (3) Underground pipes pumped oil from one holding tank to another during the inventory taking. Therefore, the same salad oil was counted more than once. Although the salad oil swindle was unusual, it demonstrates the complexities involved in ensuring that inventory is properly counted.



Determining Ownership of Goods

Before we can begin to calculate the cost of inventory, we need to consider the ownership of goods. Specifically, we need to be sure that we have not included in the inventory any goods that do not belong to the company.

GOODS IN TRANSIT. Goods are considered *in transit* when they are in the hands of a public carrier (such as a railroad, trucking, or airline company) on the statement date. Goods in transit should be included in the inventory of the party that has legal title to the goods. Legal title is determined by the terms of sale, as shown in Illustration 9-1 and described below.

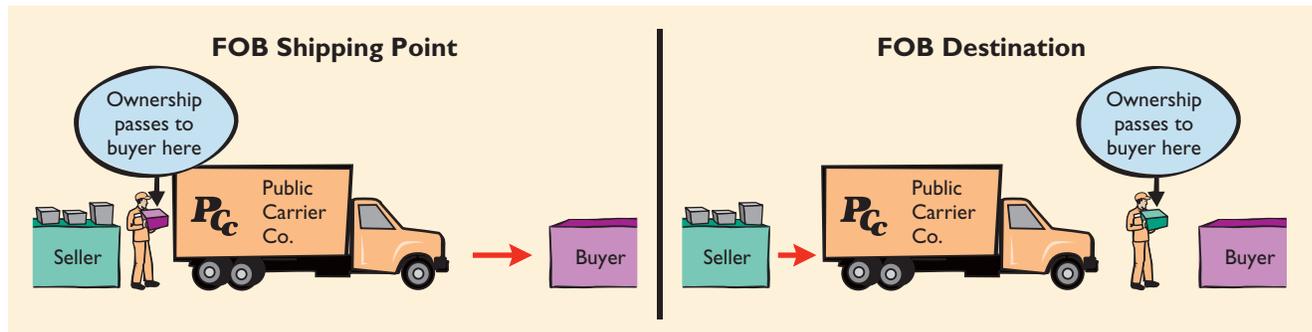
1. **FOB (free on board) shipping point.** Ownership of the goods passes to the buyer when the public carrier accepts the goods from the seller.
2. **FOB destination.** Legal title to the goods remains with the seller until the goods reach the buyer.

Inventory quantities may be seriously miscounted if goods in transit on the statement date are ignored. Assume that Hargrove Meat Company has 20,000 units of inventory on hand on December 31. It also has the following goods in transit: (1) **sales** of 1,500 units shipped December 31 FOB destination and (2) **purchases** of 2,500 units shipped FOB shipping point by the seller on

¹To estimate the cost of inventory when a physical inventory cannot be taken (the inventory is destroyed) or when it is inconvenient (during interim periods), estimating methods are applied.

Illustration 9-1

Terms of sale.



December 31. Hargrove has legal title to both the units sold and the units purchased. If units in transit are ignored, inventory quantities would be understated by 4,000 units (1,500 + 2,500).

TECHNOLOGY IN ACTION



Many companies have invested large amounts of time and money in automated inventory systems. One of the most sophisticated is **Federal Express's** Digitally Assisted Dispatch System (DADS). It uses handheld "Super-Trackers" to transmit data about the packages and documents to the firm's computer system. Based on bar codes, the system allows the firm to know where any package is at any time to prevent losses and to fulfill the firm's delivery commitments. More recently, FedEx's software enables customers to track shipments on their own PCs.

INVENTORY ACCOUNTING SYSTEMS

One of two basic systems of accounting for inventories may be used: (1) the perpetual inventory system or (2) the periodic inventory system. Chapter 8 discusses and illustrates the perpetual inventory system. This chapter discusses and illustrates the **periodic inventory system** and compares the periodic inventory system with the perpetual inventory system. The chapter then continues coverage of the perpetual inventory system.

Some businesses find it either unnecessary or uneconomical to invest in a computerized perpetual inventory system. As illustrated in Chapter 8, a perpetual inventory system keeps track of inventory in number of units *and* in dollar costs per unit. Many small merchandising business managers still feel that a perpetual inventory system costs more than it is worth. These managers can control merchandise and manage day-to-day operations either without detailed inventory records or with a perpetual **units only** inventory system.

BEFORE YOU GO ON...

▶ REVIEW IT

1. What steps are involved in determining inventory quantities?
2. How is ownership determined for goods in transit on the balance sheet date?

▶ DO IT

Hasbeen Company completed its inventory count. It arrived at a total inventory value of \$200,000. You have been informed of the information listed below. Discuss how this information affects the reported cost of inventory.

1. Purchased goods of \$10,000 that were in transit (terms: FOB shipping point) were not included in the count.

2. Sold inventory with a cost of \$12,000 that was in transit (terms: FOB shipping point) was not included in the count.

ACTION PLAN

- Apply the rules of ownership to goods held on consignment.
- Apply the rules of ownership to goods in transit FOB shipping point.

SOLUTION

The goods of \$10,000 purchased FOB shipping point should be added to the inventory count. Sold goods of \$12,000 that were in transit FOB shipping point should not be included in the ending inventory. Thus, inventory should be carried at \$198,000 (\$200,000 + \$10,000 – \$12,000).



PERIODIC INVENTORY SYSTEM

STUDY OBJECTIVE 2

Prepare the entries for purchases and sales of inventory under a periodic inventory system.

In a periodic inventory system, revenues from the sale of merchandise are recorded when sales are made, in the same way as in a perpetual system. But no attempt is made on the date of sale to record the cost of the merchandise sold. Instead, a physical inventory count is taken at the end of the period. This count determines (1) the cost of the merchandise on hand and (2) the cost of the goods sold during the period. There are other key differences: Under a periodic system, purchases of merchandise are recorded in a Purchases account rather than a Merchandise Inventory account. Also, under a periodic system, it is customary to record the following in separate accounts: purchase returns and allowances, purchase discounts, and freight-in on purchases. That way, accumulated amounts for each are known.

RECORDING TRANSACTIONS

To illustrate the recording of merchandise transactions under a periodic inventory system, we will use the purchase/sale transactions between Sellers T-Shirts and Beyer Theme Park discussed in Chapter 8.

RECORDING PURCHASES OF MERCHANDISE

On the basis of the sales invoice (Illustration 8-4 shown on page 239) and receipt of the merchandise ordered from Sellers T-Shirts, Beyer Theme Park records the \$8,000 purchase as follows:

HELPFUL HINT
Be careful not to fall into the trap of debiting purchases of equipment or supplies to Purchases.

A	=	L	+	SE
		+8,000		-8,000

May 4	Purchases	8,000	
	Accounts Payable		8,000
	(To record goods purchased on account, terms 2/10, n/30)		

Purchases is a temporary account whose normal balance is a debit.

Purchase Returns and Allowances

Some of the merchandise received from Sellers T-Shirts is defective. Beyer Theme Park returns \$3,000 worth of the goods and prepares the following entry to recognize the purchase return:

A	=	L	+	SE
		-3,000		+3,000

May 8	Accounts Payable	3,000	
	Purchase Returns and Allowances		3,000
	(To record return of defective goods purchased from Sellers T-Shirts)		

Purchase Returns and Allowances is a temporary account whose normal balance is a credit.

Freight Costs

When the purchaser directly incurs the freight costs, the account Freight-In is debited. For example, on delivery of the goods on May 6, Beyer pays Acme Freight Company \$150 for freight charges on its purchase from Sellers. The entry on Beyer's books looks like this:

May 6	Freight-In	150	
	Cash		150
	(To record payment of freight, terms FOB shipping point)		

A	=	L	+	SE
-150				-150

Like Purchases, Freight-In is a temporary account whose normal balance is a debit. **Freight-In is part of cost of goods purchased.** In accordance with the cost principle, cost of goods purchased should include any freight charges necessary to bring the goods to the purchaser. Freight costs are not subject to a purchase discount. Purchase discounts apply only on the invoice cost of the merchandise.

ALTERNATIVE TERMINOLOGY
Freight-In is frequently called *transportation-in*.

Purchase Discounts

On May 14, Beyer Theme Park pays the balance due on account to Sellers. Beyer takes the 2 percent cash discount allowed by Sellers for payment within 10 days. The payment and the discount are recorded by Beyer as follows:

May 14	Accounts Payable	5,000	
	Purchase Discounts		100
	Cash		4,900
	(To record payment to Sellers T-Shirts within the discount period)		

A	=	L	+	SE
-4,900		-5,000		+100

Purchase Discounts is a temporary account whose normal balance is a credit.

RECORDING SALES OF MERCHANDISE

The sale of \$8,000 of merchandise to Beyer on May 4 (sales invoice No. 731, Illustration 8-4 on page 239) is recorded by Sellers T-Shirts as follows:

May 4	Accounts Receivable	8,000	
	Sales		8,000
	(To record credit sales per invoice #731 to Beyer Theme Park)		

A	=	L	+	SE
+8,000				+8,000

Sales Returns and Allowances

Based on the receipt of returned goods from Beyer on May 8, Sellers records the \$3,000 sales return as follows:

May 8	Sales Returns and Allowances	3,000	
	Accounts Receivable		3,000
	(To record return of goods from Beyer Theme Park)		

A	=	L	+	SE
-3,000				-3,000

Sales Discounts

On May 15, Sellers receives payment of \$5,000 on account from Beyer. Sellers honors the 2 percent cash discount and records the payment of Beyer's account receivable in full as follows:

A	=	L	+	SE
+4,900				-100
-5,000				

May 15	Cash	4,900	
	Sales Discounts	100	
	Accounts Receivable		5,000
	(To record collection from Beyer Theme Park within 2/10, n/30 discount period)		

STUDY OBJECTIVE 3

Determine cost of goods sold under a periodic inventory system.

COST OF GOODS SOLD

As the previous entries indicate, under a periodic inventory system a running account of the changes in inventory is not recorded as either purchases or sales transactions occur. Neither the daily amount of merchandise on hand is known, nor cost of goods sold. **To determine cost of goods sold under a periodic inventory system, three steps are required:** (1) Record purchases of merchandise (as shown above). (2) Determine cost of goods purchased. (3) Determine cost of goods on hand at the beginning and end of the accounting period. Cost of goods on hand must be determined by a physical inventory count and application of the cost to the items counted in the inventory. In this section we look in more detail at this process.

HELPFUL HINT

Beginning inventory + Purchases	=	Cost of goods sold
Goods available for sale - Ending inventory		

DETERMINING COST OF GOODS PURCHASED

Earlier in this chapter we used four accounts to record the purchase of inventory under a periodic inventory system. These accounts are illustrated in Illustration 9-2.

Illustration 9-2

Normal balances: cost of goods purchased accounts

Account	Normal Balance
Purchases	Debit
Purchase Returns and Allowances	Credit
Purchase Discounts	Credit
Freight-In	Debit

All of these accounts are **temporary accounts**. They are used to determine cost of goods sold, which is an expense disclosed on the income statement. Therefore, the balances in these accounts must be reduced to zero at the end of each accounting period. Information about cost of goods sold then can be accumulated for the next accounting period.

The procedure for determining cost of goods purchased is as follows:

1. The accounts with credit balances (Purchase Returns and Allowances, Purchase Discounts) are subtracted from Purchases. The result is **net purchases**.
2. Freight-In is then added to net purchases. The result is **cost of goods purchased**.

To illustrate, assume that Sellers T-Shirts shows the following balances for the four accounts: Purchases \$325,000; Purchase Returns and Allowances \$10,400; Purchase Discounts \$6,800; and Freight-In \$12,200. Net purchases is \$307,800, and cost of goods purchased is \$320,000, as computed in Illustration 9-3.

Purchases		\$325,000
(1) Less: Purchase returns and allowances	\$10,400	
Purchase discounts	<u>6,800</u>	<u>17,200</u>
Net purchases		307,800
(2) Add: Freight-in		<u>12,200</u>
Cost of goods purchased		\$320,000

Illustration 9-3

Computation of net purchases and cost of goods purchased

Determining Cost of Goods on Hand

To determine the cost of inventory on hand, Sellers T-Shirts must take a **physical inventory**. Taking a physical inventory involves three steps:

1. Counting the units on hand for each item of inventory.
2. Applying unit costs to the total units on hand for each item.
3. Totaling the costs for each item of inventory to determine the total cost of goods on hand.

A physical inventory should be taken on or near the balance sheet date. In the hospitality industry, owing to the perishable nature of our inventory, taking inventory on a weekly or monthly basis is quite common and often necessary.

The account Merchandise Inventory is used to record the cost of inventory on hand at the balance sheet date. This amount becomes the beginning inventory for the next accounting period. For Sellers T-Shirts, the balance in Merchandise Inventory on December 31, 2007, is \$36,000. This amount is also the January 1, 2008, balance in Merchandise Inventory. During the year, *no entries are made to Merchandise Inventory*. At the end of the year, entries are made to eliminate the beginning inventory and to record the ending inventory. We will assume that Sellers' ending inventory on December 31, 2008, is \$40,000.

Computing Cost of Goods Sold

We have now reached the point where we can compute cost of goods sold. Doing so involves two steps:

1. Add cost of goods purchased to cost of goods on hand at the beginning of the period (beginning inventory). The result is **cost of goods available for sale**.
2. Subtract cost of goods on hand at the end of the period (ending inventory) from cost of goods available for sale. The result is **cost of goods sold**.

ALTERNATIVE TERMINOLOGY
Some use the term *cost of sales* instead of *cost of goods sold*.

For Sellers T-Shirts, cost of goods available for sale is \$356,000, and cost of goods sold is \$316,000, as shown in Illustration 9-4.

Beginning inventory	\$ 36,000
(1) Add: Cost of goods purchased	<u>320,000</u>
Cost of goods available for sale	356,000
(2) Less: Ending inventory	<u>40,000</u>
Cost of goods sold	\$316,000

Illustration 9-4

Computation of cost of goods available for sale and cost of goods sold

Gross profit, operating expenses, and net income are computed and reported in a periodic inventory system in the same manner as under a perpetual inventory system, as shown in Illustration 9-5.

Illustration 9-5

Income statement for a merchandiser using a periodic inventory system

HELPFUL HINT

The far right column identifies the major subdivisions of the income statement. The next column identifies the primary items comprising cost of goods sold of \$316,000 and operating expenses of \$114,000; in addition, contra revenue items of \$20,000 are reported. The third column from the right explains cost of goods purchased of \$320,000. The fourth column reports contra purchase items of \$17,200.

SELLERS T-SHIRTS			
Income Statement			
For the Year Ended December 31, 2008			
Sales revenue			
Sales			\$480,000
Less: Sales returns and allowances		\$ 12,000	
Sales discounts		8,000	20,000
Net sales			<u>460,000</u>
Cost of goods sold			
Inventory, January 1			36,000
Purchases		\$325,000	
Less: Purchase returns and allowances	\$10,400		
Purchase discounts	6,800	17,200	
Net purchases		307,800	
Add: Freight-in		12,200	
Cost of goods purchased		320,000	
Cost of goods available for sale		356,000	
Inventory, December 31		40,000	
Cost of goods sold			<u>316,000</u>
Gross profit			144,000
Operating expenses			
Store salaries expense		45,000	
Salaries expense		19,000	
Utilities expense		17,000	
Advertising expense		16,000	
Depreciation expense—store equipment		8,000	
Freight-out		7,000	
Insurance expense		2,000	
Total operating expenses			<u>114,000</u>
Net income			<u>\$ 30,000</u>

HELPFUL HINT

Beginning inventory			
	+		
Cost of goods purchased			
	=		
Ending inventory	+	Cost of goods sold	

TRANSFERS IN AND OUT

As suggested by the Helpful Hint sidebar, you can simply add beginning inventory to cost of goods purchased and then deduct from this total the ending inventory amount to get to cost of goods sold. The same formula can be slightly modified for food or for beverage in the hospitality industry. In such cases, changing the word *goods* to *food* or to *beverage* will provide you with the result. Yet, owing to the complexity of the hospitality industry (e.g., a hospitality operation can be departmentalized, and it is customary that a meal be provided to its employees during a shift), the formula to compute the true and accurate cost of food sold needs to be modified a bit more.

A hotel may be divided into banquet and room service operations; or banquet, restaurant, lounge, and room service operations; or any different venues of food and beverage operations. As such, although each operation may order its food supplies from the central storage area, there are times that things may run out and an employee may need to “borrow” items from another outlet so as to be able to fill the order of the guests. Take an example where a bartender at a lounge forgets to order lemons for the evening shift. The storeroom is now closed, and he cannot make another requisition. He therefore asks the restaurant chef to give him ten lemons to carry him over to finish his shift. This transfer of food is known as a *transfer out* from the restaurant and a *transfer in* for the lounge. Although these two operations are in the same hotel, it is important to do a separate cost calculation for each food and beverage outlet so that managers can better assess

the efficiency and the profitability of each operation. It also should be expected that if everything is performed correctly, such transfers in and out should be minimal or zero.

In this case, a more complete formula for the calculation of cost of food sold would be as shown below:

Beginning inventory	\$ 4,000
(1) Add: Cost of food purchased	12,500
(2) Add: Transfers in	50
	<hr/>
Cost of food available for sale	16,550
(3) Less: Transfer out	73
(4) Less: Ending inventory	3,540
	<hr/>
Cost of food consumed	\$12,937

Notice that the ending number is only known as cost of food *consumed* and not cost of food *sold*. As mentioned, it is customary in the hospitality business, especially in any establishment that serves food, that the employees are provided a meal during their shift. Of course, there is a cost of food involved. However, the cost of employee meals is part of employee benefits and should not be added to the cost of the food sold to the guests. Thus an extra step needs to be added:

Cost of food consumed	\$12,937
(5) Less: Employee meals	854
	<hr/>
Cost of food sold	\$12,083

This final amount, \$12,083, now can be used by management to calculate food cost percentages and other meaningful tracking and assessment data.

FOOD COST CALCULATIONS

Besides figuring out cost of inventories, it is also useful in the hospitality industry to be able to calculate and track food cost, beverage cost, and labor cost. These costs are often known as the *prime costs* of a food and beverage operation. The calculation for food cost is very similar to that of regular inventory cost.

However, in a hospitality business, if you are a manager of a restaurant and somebody asks you about the food cost of your operation, you will not quote them a dollar amount. Rather, you will give them a percentage, such as 30 or 35 percent. Why? Percentages are better for comparison and tracking purposes. The more food you are able to sell, the higher will be the sales dollar amount, and so will the cost. Thus the cost varies with sales; and therefore, food cost is called a *variable cost*.

So how is food cost percentage calculated? Simply, it is the cost of food sold divided by total sales. For example, if your food cost is \$4,146.50 and the total sales amount generated by that cost is \$11,847, then the food cost percentage would be 35 percent. Most fast food restaurants are able to maintain a food cost percentage in the 15 to 25 percent range depending on the menu items; most freestanding restaurants or those in hotels will run 30 to 40 percent. The food cost percentage is highest in clubs, as high as 50 percent. This is so because club members pay a membership fee every month already. Some clubs even require members to pay a food and beverage minimum. Thus menu prices at clubs are normally lower to offset the other revenues collected from members. With lower sales figures but the same cost to produce food items, the food cost percentage is higher.

BEVERAGE COST CALCULATIONS

The calculation of beverage cost and beverage cost percentage is exactly the same as that of food cost. First, you need to compute the inventory amounts, calculate the cost of beverage sold, and then divide the cost by the total sales dollars to

HELPFUL HINT

$$\text{Food cost \%} = \frac{\text{Cost of food sold}}{\text{Food sales}}$$

$$\text{Beverage cost \%} = \frac{\text{Cost of beverage sold}}{\text{Beverage sales}}$$

obtain the percentage. However, what should be included in beverage cost? Should all soft drinks and coffee be included since they are beverages? What about liquor, beer, and wine?

There are good reasons why food and beverage are separated. Beverage costs only include alcoholic beverages, such as liquor, beer, and wine, since taxes need to be paid by the establishments to the government. In Texas, for instance, the tax is 14 percent. Iced tea, soft drinks, milk, and coffee, although they are beverages, are considered food items and they are not taxable. The markup and pricing of beverages are always higher than food. Beverage cost percentages run in the 15 to 25 percent range. They might be higher if a restaurant is running a special at a lower price or trying to sell inventory.

INCOME STATEMENT PRESENTATION

The income statement for merchandisers under a periodic inventory system contains three features not found in the income statement of a service enterprise. These features are (1) a sales revenue section, (2) a cost of goods sold section, and (3) gross profit. These same three features appear for a merchandiser under a perpetual inventory system. But under a periodic inventory system, the cost of goods sold section generally will contain more detail. Using assumed data for specific operating expenses, the income statement for Sellers T-Shirts using a periodic inventory system is shown in Illustration 9-5. Whether the periodic or the perpetual inventory system is used, merchandise inventory is reported at the same amount in the current assets section.

STUDY OBJECTIVE 4

Identify the unique features of the income statement for a merchandiser using a periodic inventory system.

ALTERNATIVE TERMINOLOGY
Gross profit is sometimes referred to as *merchandising profit* or *gross margin*.

BEFORE YOU GO ON...

▶ REVIEW IT

1. Name two basic systems of accounting for inventory.
2. Identify the three steps in determining cost of goods sold.
3. What accounts are used in determining cost of goods purchased?
4. What is included in cost of goods available for sale?

▶ DO IT

Aerosmith Company's accounting records show the following at year-end: Purchase discounts, \$3,400; Freight-in, \$6,100; Sales, \$240,000; Purchases, \$162,500; Beginning inventory, \$18,000; Ending inventory, \$20,000; Sales discounts, \$10,000; Purchase returns, \$5,200; and Operating expenses, \$57,000. Compute the following amounts for Aerosmith Company: net sales, cost of goods purchased, cost of goods sold, gross profit, and net income.

ACTION PLAN

- Understand the relationships of the cost components in measuring net income for a merchandising company.
- Compute net sales.
- Compute cost of goods purchased.
- Compute cost of goods sold.
- Compute gross profit.
- Compute net income.

SOLUTION

Net sales: $\$240,000 - \$10,000 = \$230,000$

Cost of goods purchased: $\$162,500 - \$5,200 - \$3,400 + \$6,100 = \$160,000$

Cost of goods sold: $\$18,000 + \$160,000 - \$20,000 = \$158,000$

Gross profit: $\$230,000 - \$158,000 = \$72,000$

Net income: $\$72,000 - \$57,000 = \$15,000$



INVENTORY COSTING UNDER A PERIODIC INVENTORY SYSTEM

All expenditures needed to acquire goods and to make them ready for sale are included as inventoriable costs. **Inventoriable costs** may be regarded as a pool of costs that consists of two elements: (1) the cost of the beginning inventory and (2) the cost of goods purchased during the year. The sum of these two equals the cost of goods available for sale.

Conceptually, the costs of the purchasing, receiving, and warehousing departments (whose efforts make the goods available for sale) also should be included in inventoriable costs. But there are practical difficulties in allocating these costs to inventory. So these costs are generally accounted for as **operating expenses** in the period in which they are incurred.

Inventoriable costs are allocated either to ending inventory or to cost of goods sold. Under a periodic inventory system, the allocation is made at the end of the accounting period. First, the costs for the ending inventory are determined. Then, the cost of the ending inventory is subtracted from the cost of goods available for sale, to determine the cost of goods sold.

To illustrate, assume that General Suppliers has a cost of goods available for sale of \$120,000. This amount is based on a beginning inventory of \$20,000 and cost of goods purchased of \$100,000. The physical inventory indicates that 5,000 units are on hand. The costs applicable to the units are \$3.00 per unit. The allocation of the pool of costs is shown in Illustration 9-6. As shown, the \$120,000 of goods available for sale is allocated \$15,000 to ending inventory ($5,000 \times \$3.00$) and \$105,000 to cost of goods sold.

Pool of Costs				
Cost of Goods Available for Sale				
			Beginning inventory	\$ 20,000
			Cost of goods purchased	100,000
			Cost of goods available for sale	<u>\$120,000</u>
Step 1		Step 2		
Ending Inventory		Cost of Goods Sold		
	Unit	Total	Cost of goods available for sale	\$120,000
Units	Cost	Cost	Less: Ending inventory	15,000
<u>5,000</u>	<u>\$3.00</u>	<u>\$15,000</u>	Cost of goods sold	<u>\$105,000</u>

USING ACTUAL PHYSICAL FLOW COSTING—SPECIFIC IDENTIFICATION

Costing of the inventory is complicated because specific items of inventory on hand may have been purchased at different prices. For example, a company may experience several increases in the cost of identical goods within a given year; or unit costs may decline. Under such circumstances, how should different unit costs be allocated between ending inventory and cost of goods sold?

One answer is to use the **specific identification method** of the units purchased. This method tracks the *actual physical flow* of the goods. **Each item of inventory is marked, tagged, or coded with its “specific” unit cost.** At the end of the year,

STUDY OBJECTIVE 5

Explain the basis of accounting for inventories, and describe the inventory cost-flow methods.

HELPFUL HINT

Under a perpetual inventory system, described in Chapter 8, the allocation of costs is recognized continuously as purchases and sales are made.

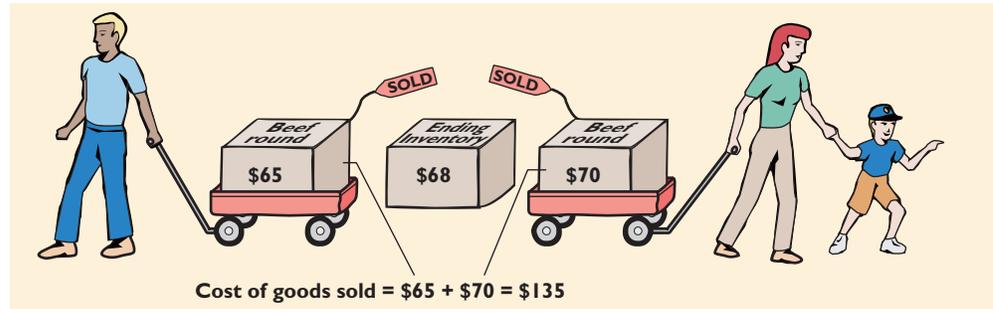
Illustration 9-6

Allocation (matching) of pool of costs

the specific costs of items still in inventory make up the total cost of the ending inventory (Illustration 9-7). This method is most accurate because it looks at the exact cost of every single item. At any point in time, as long as you count the inventory and add up all the tags, you will get the exact cost of inventory. However, for the hospitality industry, this method is not the most practical. Imagine tagging every can of tomato juice at a restaurant. Imagine putting a price on each bar of soap a hotel puts in guest rooms. Imagine having to put a tag on each bottle of beer at a piano lounge in a casino. These items are often indistinguishable from one another. In such cases (as the next section will show), we must make assumptions about which units were sold.

Illustration 9-7

Specific identification method



The general rule is this: When feasible, specific identification is the ideal method of allocating cost of goods available for sale. It reports ending inventory at actual cost and matches the actual cost of goods sold against sales revenue.

HELPFUL HINT

A major disadvantage of the specific identification method is that management may be able to manipulate net income through specific identification of items sold.

USING ASSUMED COST-FLOW METHODS—FIFO, LIFO, AND AVERAGE COST

Because specific identification is often impractical, other cost-flow methods are allowed. These assume flows of costs that may be unrelated to the physical flow of goods. For this reason, we call them **assumed cost-flow methods** or **cost-flow assumptions**:

1. First-in, first-out (FIFO)
2. Last-in, first-out (LIFO)
3. Average cost

To illustrate these three inventory cost-flow methods, we will assume that Bow Foods uses a *periodic inventory system*. The information shown in Illustration 9-8 relates to one of its products, cheddar cheese.

INTERNATIONAL NOTE

A survey of accounting standards in 21 major industrial countries found that all three methods were permissible. In Ireland and the United Kingdom, LIFO is permitted only in extreme circumstances.

Illustration 9-8

Inventoriable units and costs for Bow Foods

BOW FOODS Cheddar Cheese Blocks				
Date	Explanation	Units	Unit Cost	Total Cost
1/1	Beginning inventory	100	\$10	\$ 1,000
4/15	Purchase	200	11	2,200
8/24	Purchase	300	12	3,600
11/27	Purchase	400	13	5,200
	Total	1,000		\$12,000

During the year, 550 units were sold, and 450 units are on hand at 12/31.

There is no accounting requirement that the cost-flow assumption be consistent with the physical movement of the goods. Management selects the

appropriate cost-flow method. Even in the same industry, different companies may reach different conclusions as to the most appropriate method.

First-in, First-out (FIFO)

The **first-in, first-out (FIFO) method** assumes that the *earliest goods* purchased are the first to be sold. FIFO often parallels the actual physical flow of merchandise because it generally is good business practice to sell the earliest units first. Under the FIFO method, the *costs* of the earliest goods purchased are the first to be recognized as cost of goods sold. (Note that this does not necessarily mean that the earliest units *are* sold first but that the costs of the earliest units are recognized first. In a bin of sunglasses at a theme park souvenir shop, for example, no one really knows, nor would it matter, which sunglasses are sold first.) The allocation of the cost of goods available for sale at Bow Foods under FIFO is shown in Illustrations 9-9 and 9-10.

Note that the ending inventory is based on the latest units purchased. That is, **under FIFO, the cost of the ending inventory is found by taking the unit cost of the most recent purchase and working backward until all units of inventory are costed.**

Pool of Costs				
Cost of Goods Available for Sale				
Date	Explanation	Units	Unit Cost	Total Cost
1/1	Beginning inventory	100	\$10	\$ 1,000
4/15	Purchase	200	11	2,200
8/24	Purchase	300	12	3,600
11/27	Purchase	400	13	5,200
	Total	1,000		<u>\$12,000</u>

Step 1		Step 2		
Ending Inventory		Cost of Goods Sold		
Date	Units	Unit Cost	Total Cost	
11/27	400	\$13	\$5,200	Cost of goods available for sale
8/24	50	12	600	Less: Ending inventory
Total	<u>450</u>		<u>\$5,800</u>	Cost of goods sold
				<u>\$ 6,200</u>

Illustration 9-9

Allocation of costs—FIFO method

HELPFUL HINT

Note the sequencing of the allocation: (1) Compute ending inventory. (2) Determine cost of goods sold.

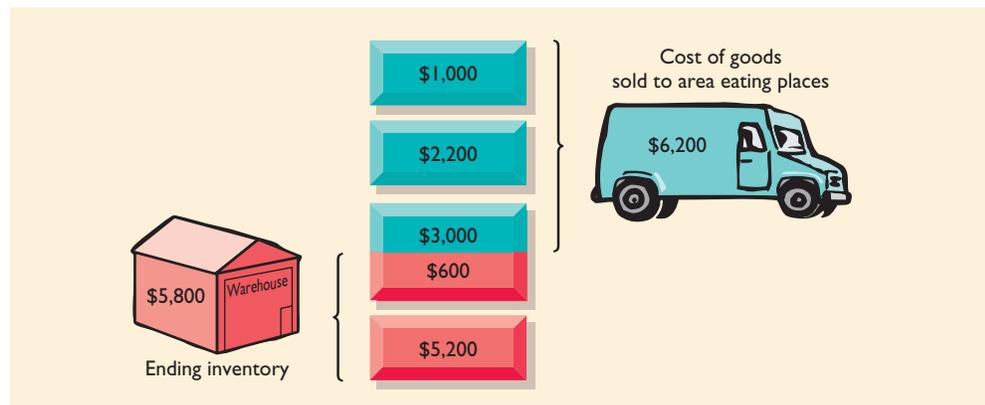


Illustration 9-10

FIFO—First costs in are first costs out in computing cost of goods sold

We can verify the accuracy of the cost of goods sold by recognizing that the *first units acquired are the first units sold*. The computations for the 550 units sold are shown in Illustration 9-11.

Illustration 9-11

Proof of cost of goods sold

Date	Units	Unit Cost	Total Cost
1/1	100 ×	\$10	= \$1,000
4/15	200 ×	11	= 2,200
8/24	250 ×	12	= 3,000
Total	550		<u>\$6,200</u>

Last-in, First-out (LIFO)

The **last-in, first-out (LIFO) method** assumes that the *latest goods* purchased are the first to be sold. LIFO seldom coincides with the actual physical flow of inventory. Only for goods in piles, such as hay, coal, or produce at the grocery store, would LIFO match the physical flow of inventory. Under the LIFO method, the *costs* of the latest goods purchased are the first to be assigned to cost of goods sold (CGS). The allocation of the cost of goods available for sale (CGAS) at Bow Foods under LIFO is shown in Illustration 9-12.

Illustration 9-12

Allocation of costs—LIFO method

Pool of Costs				
Cost of Goods Available for Sale				
Date	Explanation	Units	Unit Cost	Total Cost
1/1	Beginning inventory	100	\$10	\$ 1,000
4/15	Purchase	200	11	2,200
8/24	Purchase	300	12	3,600
11/27	Purchase	400	13	5,200
	Total	1,000		<u>\$12,000</u>

Step 1		Step 2	
Ending Inventory		Cost of Goods Sold	
Date	Units	Unit Cost	Total Cost
1/1	100	\$10	\$1,000
4/15	200	11	2,200
8/24	150	12	1,800
Total	450		<u>\$5,000</u>

	Cost of goods available for sale	\$12,000
	Less: Ending inventory	<u>5,000</u>
	Cost of goods sold	<u>\$ 7,000</u>

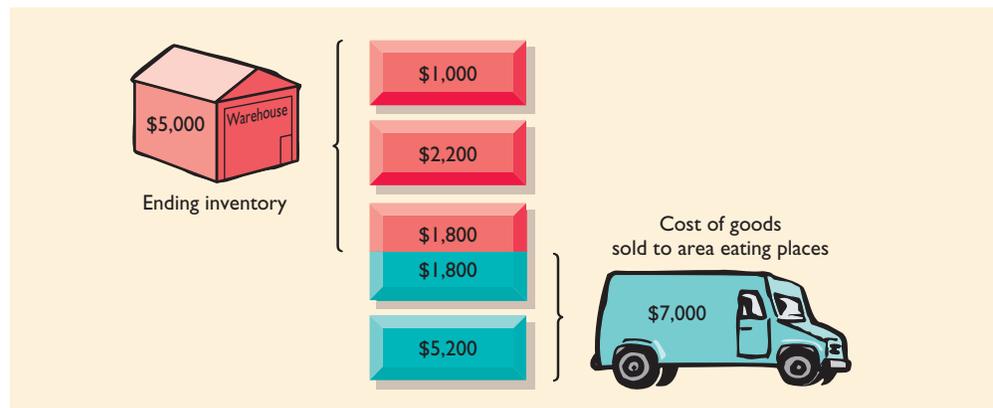
HELPFUL HINT

The costs allocated to ending inventory (\$5,000) plus the costs allocated to CGS (\$7,000) must equal CGAS (\$12,000).

Illustration 9-13 graphically displays the LIFO cost flow.

Illustration 9-13

LIFO—Last costs in are first costs out in computing cost of goods sold



Under the LIFO method, the cost of the ending inventory is found by taking the unit cost of the oldest goods and working forward until all units of inventory

are costed. As a result, the first costs assigned to ending inventory are the costs of the beginning inventory. Proof of the costs allocated to cost of goods sold is shown in Illustration 9-14.

Date	Units	Unit Cost	Total Cost
11/27	400	× \$13	= \$5,200
8/24	150	× 12	= 1,800
Total	550		<u>\$7,000</u>

Illustration 9-14

Proof of cost of goods sold

Under a periodic inventory system, **all goods purchased during the period are assumed to be available for the first sale, regardless of the date of purchase.**

Average Cost

The **average-cost method** assumes that the goods available for sale have the same (average) cost per unit. Generally such goods are identical. Under this method, the cost of goods available for sale is allocated on the basis of the **weighted-average unit cost**. Illustration 9-15 shows the formula and a sample computation of the weighted-average unit cost.



Illustration 9-15

Formula for weighted-average unit cost

The weighted-average unit cost is then applied to the units on hand. This computation determines the cost of the ending inventory. The allocation of the cost of goods available for sale at Bow Foods using average cost is shown in Illustrations 9-16 and 9-17.

Pool of Costs				
Cost of Goods Available for Sale				
Date	Explanation	Units	Unit Cost	Total Cost
1/1	Beginning inventory	100	\$10	\$ 1,000
4/15	Purchase	200	11	2,200
8/24	Purchase	300	12	3,600
11/27	Purchase	400	13	5,200
	Total	1,000		<u>\$12,000</u>

Step 1			Step 2	
Ending Inventory			Cost of Goods Sold	
\$12,000	÷ 1,000	= \$12.00	Cost of goods available for sale	\$12,000
	Unit	Total	Less: Ending inventory	<u>5,400</u>
Units	Cost	Cost	Cost of goods sold	<u>\$ 6,600</u>
450	× \$12.00	= <u>\$5,400</u>		

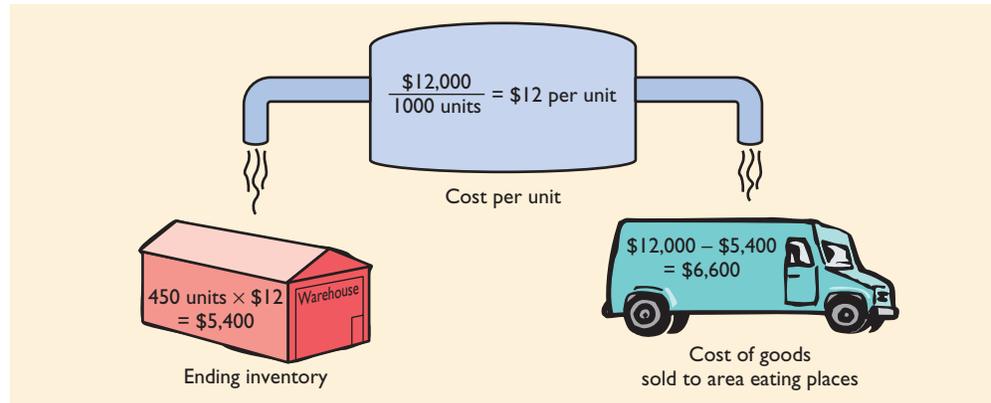
Illustration 9-16

Allocation of costs—average-cost method

To verify the cost of goods sold data in Illustration 9-16, multiply the units sold by the weighted-average unit cost (550 × \$12 = \$6,600). Note that this method

Illustration 9-17

Average cost—the average cost of the goods available for sale during the period is the cost used to compute cost of goods sold



does not use the average of the unit costs. That average is \$11.50 (\$10 + \$11 + \$12 + \$13 = \$46; \$46 ÷ 4). Instead, the average-cost method uses the average *weighted* by the quantities purchased at each unit cost.

FINANCIAL STATEMENT EFFECTS OF COST-FLOW METHODS

Each of the three cost-flow methods is acceptable. For example, **Wendy’s International** currently uses the FIFO method. **Campbell Soup Company** uses LIFO, whereas **Isle of Capri Casinos** uses the average-cost method. A company also may use more than one cost-flow method at the same time. **Del Monte Corporation** uses LIFO for domestic inventories and FIFO for foreign inventories. Companies adopt different inventory cost-flow methods for various reasons. Usually, one of the following factors is involved:

1. Income statement effects
2. Balance sheet effects
3. Tax effects

STUDY OBJECTIVE 6

Explain the financial statement and tax effects of each of the inventory cost-flow methods.

Income Statement Effects

To understand why companies might choose a particular cost-flow method, let’s compare their effects on the financial statements of Bow Foods. The condensed income statements in Illustration 9-18 assume that Bow Foods sold its 550 units for \$11,500 and that its operating expenses were \$2,000. Its income tax rate is 30 percent.

Illustration 9-18

Comparative effects of cost-flow methods

BOW FOODS			
Condensed Income Statements			
	<u>FIFO</u>	<u>LIFO</u>	<u>Average Cost</u>
Sales	\$11,500	\$11,500	\$11,500
Beginning inventory	1,000	1,000	1,000
Purchases	11,000	11,000	11,000
Cost of goods available for sale	12,000	12,000	12,000
Ending inventory	5,800	5,000	5,400
Cost of goods sold	6,200	7,000	6,600
Gross profit	5,300	4,500	4,900
Operating expenses	2,000	2,000	2,000
Income before income taxes ²	3,300	2,500	2,900
Income tax expense (30%)	990	750	870
Net income	\$ 2,310	\$ 1,750	\$ 2,030

²It is assumed that Bow Foods is a corporation, and corporations are required to pay income taxes.

The cost of goods available for sale (\$12,000) is the same under each of the three inventory cost-flow methods. But the ending inventory is different in each method, and this difference affects cost of goods sold. Each dollar of difference in ending inventory therefore results in a corresponding dollar difference in income before income taxes. For Bow Foods, there is an \$800 difference between FIFO and LIFO.

In a period of rising prices, FIFO produces a higher net income. This happens because the expenses matched against revenues are the lower unit costs of the first units purchased. In a period of rising prices (as is the case here), FIFO reports the highest net income (\$2,310) and LIFO the lowest (\$1,750); average cost falls in the middle (\$2,030). To management, higher net income is an advantage: It causes external users to view the company more favorably. Also, if management bonuses are based on net income, FIFO will provide the basis for higher bonuses.

Some argue that the use of LIFO in a period of rising prices enables the company to avoid reporting **paper** or **phantom profit** as economic gain. To illustrate, assume that Kralik Resorts buys golf shirts to be sold to its guests at \$20 per unit on January 10. It buys 200 more on December 31 at \$24 each. During the year, it sells 200 units at \$30 each. The results under FIFO and LIFO are shown in Illustration 9-19.

	<u>FIFO</u>	<u>LIFO</u>
Sales (200 × \$30)	\$6,000	\$6,000
Cost of goods sold	4,000 (200 × \$20)	4,800 (200 × \$24)
Gross profit	<u>\$2,000</u>	<u>\$1,200</u>

HELPFUL HINT

If prices are falling, the results from the use of FIFO and LIFO are reversed: FIFO will report the lowest net income and LIFO the highest.

Illustration 9-19

Income statement effects compared

Under LIFO, the company has recovered the current replacement cost (\$4,800) of the units sold. The gross profit in economic terms under LIFO is real. Under FIFO, the company has recovered only the January 10 cost (\$4,000). To replace the units sold, it must reinvest \$800 (200 × \$4) of the gross profit. Thus \$800 of the gross profit under FIFO is phantom or illusory. As a result, reported net income under FIFO is also overstated in real terms.

Balance Sheet Effects

A major advantage of FIFO is that in a period of rising prices, the costs allocated to ending inventory will be close to their current cost. For Bow Foods, for example, 400 of the 450 units in the ending inventory are costed at the November 27 unit cost of \$13.

A major shortcoming of LIFO is that in a period of rising prices, the costs allocated to ending inventory may be understated in terms of current cost. This is true for Bow Foods: The cost of the ending inventory includes the \$10 unit cost of the beginning inventory. The understatement becomes even greater if the inventory includes goods purchased in one or more prior accounting periods.

Tax Effects

We have seen that both inventory on the balance sheet and net income on the income statement are higher when FIFO is used in a period of rising prices. Why, then, would a company use LIFO? The reason is that LIFO results in the lowest income taxes during times of rising prices. The lower net income reported by LIFO translates to a lower tax liability. For example, at Bow Foods, income taxes are \$750 under LIFO, compared with \$990 under FIFO. The tax saving of \$240 makes more cash available for use in the business.

USING INVENTORY COST-FLOW METHODS CONSISTENTLY

Whatever cost-flow method a company chooses, it should be used consistently from one period to another. Consistent application makes financial statements more comparable over successive time periods. In contrast, using FIFO in one year and LIFO in the next would make it difficult to compare the net incomes of the two years.

Although consistent application is preferred, a company *may* change its method of inventory costing. Such a change and its effects on net income should be disclosed in the financial statements. A typical disclosure is shown in Illustration 9-20, using information from recent financial statements of **Quaker Oats Company**.

Illustration 9-20

Disclosure of change in cost-flow method



QUAKER OATS COMPANY Notes to the Financial Statements

Note 1 Effective July 1, the Company adopted the LIFO cost flow assumption for valuing the majority of U.S. Grocery Products inventories. The Company believes that the use of the LIFO method better matches current costs with current revenues. The effect of this change on the current year was to decrease net income by \$16.0 million.

BEFORE YOU GO ON...

▶ REVIEW IT

1. How do the cost and matching principles apply to inventoriable costs?
2. How are the three assumed cost-flow methods applied in allocating inventoriable costs?
3. What factors should be considered by management in selecting an inventory cost-flow method?
4. Which inventory cost-flow method produces (a) the highest net income in a period of rising prices and (b) the lowest income taxes?

▶ DO IT

The accounting records of Shumway Eggrolls show the following data:

Beginning inventory	4,000 units at \$3
Purchases	6,000 units at \$4
Sales	5,000 units at \$12

Determine the cost of goods sold during the period under a periodic inventory system using (a) the FIFO method, (b) the LIFO method, and (c) the average-cost method.

ACTION PLAN

- Understand the periodic inventory system.
- Compute cost of goods sold under the periodic inventory system using the FIFO cost-flow method.
- Compute cost of goods sold under the periodic inventory system using the LIFO cost-flow method.
- Compute cost of goods sold under the periodic inventory system using the average-cost method.

SOLUTION

(a) FIFO: $(4,000 @ \$3) + (1,000 @ \$4) = \$12,000 + \$4,000 = \$16,000$

(b) LIFO: $5,000 @ \$4 = \$20,000$

(c) Average cost: $[(4,000 @ \$3) + (6,000 @ \$4)] \div 10,000 = (\$12,000 + \$24,000) \div 10,000 = \$3.60$ per unit; $5,000 @ \$3.60 = \$18,000$



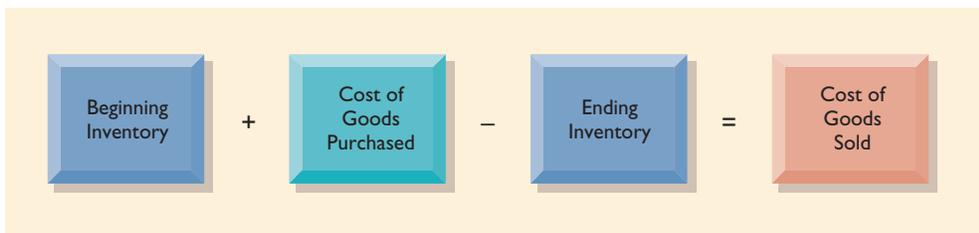
INVENTORY ERRORS

Unfortunately, errors occasionally occur in taking or costing inventory. Some errors are caused by counting or pricing the inventory incorrectly. Others occur because of improper recognition of the transfer of legal title to goods in transit. When errors occur, they affect both the income statement and the balance sheet.

INCOME STATEMENT EFFECTS

Remember that both the beginning and the ending inventories are used to determine cost of goods sold in a periodic system. The ending inventory of one period automatically becomes the beginning inventory of the next period. Inventory errors thus affect the determination of cost of goods sold and net income.

The effects on cost of goods sold can be determined by using the formula in Illustration 9-21. First, enter the incorrect data in the formula. Then substitute the correct data, and find the difference between the two CGS amounts.



STUDY OBJECTIVE 7

Indicate the effects of inventory errors on the financial statements.

Illustration 9-21

Formula for cost of goods sold

If beginning inventory is understated, cost of goods sold will be understated. If ending inventory is understated, cost of goods sold will be overstated. The effects of inventory errors on the current year's income statement are shown in Illustration 9-22.

<u>Inventory Error</u>	<u>Cost of Goods Sold</u>	<u>Net Income</u>
Beginning inventory understated	Understated	Overstated
Beginning inventory overstated	Overstated	Understated
Ending inventory understated	Overstated	Understated
Ending inventory overstated	Understated	Overstated

Illustration 9-22

Effects of inventory errors on current year's income statement

An error in ending inventory in the current period will have a *reverse effect on net income of the next period*. This is shown in Illustration 9-23. Note that understating ending inventory in 2008 understates beginning inventory in 2009 and overstates net income in 2009.

Over the two years, total net income is correct. The errors offset one another. Notice that for 2008 and 2009, total income using incorrect data is \$35,000 (\$22,000 + \$13,000). This is the same as the total income of \$35,000 (\$25,000 + \$10,000) using correct data. Also note in this example that an error in the beginning inventory does not result in a corresponding error in the ending inventory. The correctness of the ending inventory depends entirely on the accuracy of taking and costing the inventory at the balance sheet date.

ETHICS NOTE

Inventory fraud includes pricing inventory at amounts in excess of their actual value or claiming to have inventory when no inventory exists. Inventory fraud is usually done to overstate ending inventory, which understates cost of goods sold and creates higher income.

Illustration 9-23

Effects of inventory errors on two years' income statements

Condensed Income Statement				
	2008		2009	
	Incorrect	Correct	Incorrect	Correct
Sales	\$80,000	\$80,000	\$90,000	\$90,000
Beginning inventory	\$20,000	\$20,000	\$12,000	\$15,000
Cost of goods purchased	40,000	40,000	68,000	68,000
Cost of goods available for sale	60,000	60,000	80,000	83,000
Ending inventory	12,000	15,000	23,000	23,000
Cost of goods sold	48,000	45,000	57,000	60,000
Gross profit	32,000	35,000	33,000	30,000
Operating expenses	10,000	10,000	20,000	20,000
Net income	\$22,000	\$25,000	\$13,000	\$10,000
		(\$3,000) Net income understated		\$3,000 Net income overstated
	Total income for two years correct			

BALANCE SHEET EFFECTS

The effect of ending-inventory errors on the balance sheet can be determined by the basic accounting equation: Assets = Liabilities + Stockholders' Equity. Errors in the ending inventory have the effects on these components shown in Illustration 9-24.

Illustration 9-24

Ending-inventory error—balance sheet effects

Ending-Inventory Error	Assets	Liabilities	Stockholders' Equity
Overstated	Overstated	None	Overstated
Understated	Understated	None	Understated

The effect of an error in ending inventory on the next period was shown in Illustration 9-23. If the error is not corrected, total net income for the two periods would be correct. Thus, total stockholders' equity reported on the balance sheet at the end of the next period will also be correct.

STATEMENT PRESENTATION AND ANALYSIS

PRESENTATION

As indicated in Chapter 8, inventory is classified as a current asset after receivables in the balance sheet. In a multiple-step income statement, cost of goods sold is subtracted from sales. There also should be disclosure of (1) the major inventory classifications, (2) the basis of accounting (cost, or lower of cost or market), and (3) the costing method (FIFO, LIFO, or average).

Disney, for example, in its September 30, 2000, consolidated balance sheet, reported inventory of \$702 million under current assets. The accompanying notes to

the financial statements, as shown in Illustration 9-25, disclosed the following information.

THE WALT DISNEY COMPANY AND SUBSIDIARIES Notes to the Financial Statements
Note 1. Description of the Business and Summary of Significant Accounting Policies
Inventories
Carrying amounts of merchandise, materials and supplies inventories are generally determined on a moving-average cost basis and are stated at the lower of cost or market.

Illustration 9-25

Inventory disclosures by **The Walt Disney Company**. Information from Disney Worldwide Industries

ANALYSIS

The amount of inventory carried by a company has significant economic consequences. And inventory management is a double-edged sword that requires constant attention. On the one hand, management wants to have a great variety and quantity on hand so that customers have a wide selection and items are always in stock. But such a policy may incur high carrying costs (e.g., investment, storage, insurance, obsolescence, and damage). On the other hand, low inventory levels lead to stockouts and lost sales.

Common ratios used to manage and evaluate inventory levels are inventory turnover and a related measure, average days to sell the inventory.

Inventory turnover measures the number of times, on average, the inventory is sold during the period. Its purpose is to measure the liquidity of the inventory. The inventory turnover is computed by dividing cost of goods sold by the average inventory during the period. Unless seasonal factors are significant, average inventory can be computed from the beginning and ending inventory balances. For example, **Darden Restaurants** reported in its 2002 Annual Report a beginning inventory of \$148,429,000 and an ending inventory of \$172,413,000 and cost of goods sold for the year ended May 26, 2002, of \$1,384,481,000. The inventory turnover formula and computation for Darden are shown in Illustration 9-26.

Cost of Goods Sold	÷	Average Inventory	=	Inventory Turnover
\$1,384,481,000	÷	$\frac{\$148,429,000 + \$172,413,000}{2}$	=	8.63 times

Illustration 9-26

Inventory turnover formula and computation for **Darden Restaurants**

A variant of the inventory turnover ratio is the **average days to sell inventory**. For example, the inventory turnover for Darden of 8.63 times divided into 365 is approximately 42 days. This is the approximate age of the inventory.

There are typical levels of inventory in every industry. Companies that are able to keep their inventory at lower levels and higher turnovers and still satisfy customer needs are the most successful.

BEFORE YOU GO ON...▶ **REVIEW IT**

1. Why is it appropriate to report inventories at the lower of cost or market?
2. How do inventory errors affect financial statements?
3. What does inventory turnover reveal?



DEMONSTRATION PROBLEM

Gerald D. Englehart Steakhouse has the following inventory, purchases, and sales data on its premium individually packaged beef for the month of March:

Inventory:	March 1	200 lbs @ \$4.00	\$ 800
Purchases:			
	March 10	500 lbs @ \$4.50	2,250
	March 20	400 lbs @ \$4.75	1,900
	March 30	300 lbs @ \$5.00	1,500
Sales:			
	March 15	500 lbs	
	March 25	400 lbs	

The physical inventory count on March 31 shows 500 pounds on hand.

Instructions

Under a *periodic inventory system*, determine the cost of inventory on hand at March 31 and the cost of goods sold for March under the (a) first-in, first-out (FIFO) method, (b) last-in, first-out (LIFO) method, and (c) average-cost method.

SOLUTION TO DEMONSTRATION PROBLEM

The cost of goods available for sale is \$6,450, as follows:

Inventory:	200 lbs @ \$4.00		\$ 800
Purchases:			
	March 10	500 lbs @ \$4.50	2,250
	March 20	400 lbs @ \$4.75	1,900
	March 30	300 lbs @ \$5.00	1,500
Total cost of goods available for sale			\$6,450

Under a *periodic inventory system*, cost of goods sold under each cost-flow method is as follows.

FIFO Method

Ending inventory:

Date	Units	Unit Cost	Total Cost
March 30	300	\$5.00	\$1,500
March 20	200	4.75	950
			\$2,450

$$\text{Cost of goods sold: } \$6,450 - \$2,450 = \underline{\underline{\$4,000}}$$

LIFO Method

Ending inventory:

Date	Units	Unit Cost	Total Cost
March 1	200	\$4.00	\$ 800
March 10	300	4.50	1,350
			\$2,150

$$\text{Cost of goods sold: } \$6,450 - \$2,150 = \underline{\underline{\$4,300}}$$

Weighted-Average Cost Method

$$\text{Weighted-average unit cost: } \$6,450 \div 1,400 = \$4.607$$

$$\text{Ending inventory: } 500 \times \$4.607 = \underline{\underline{\$2,303.50}}$$

$$\text{Cost of goods sold: } \$6,450 - \$2,303.50 = \underline{\underline{\$4,146.50}}$$

ACTION PLAN

- Compute the cost of inventory under the periodic FIFO method by allocating to the units on hand the *latest costs*.
- Compute the cost of inventory under the periodic LIFO method by allocating to the units on hand the *earliest costs*.
- Compute the cost of inventory under the periodic average-cost method by allocating to the units on hand a *weighted-average cost*.



SUMMARY OF STUDY OBJECTIVES

1. Describe the steps in determining inventory quantities. The steps in determining inventory quantities are (1) taking a physical inventory of goods on hand and (2) determining the ownership of goods in transit.

2. Prepare the entries for purchases and sales of inventory under a periodic inventory system. In recording purchases, entries are required for (a) cash and credit purchases, (b) purchase returns and allowances, (c) purchase discounts, and (d) freight costs. In recording sales, entries are required for (a) cash and credit sales, (b) sales returns and allowances, and (c) sales discounts.

3. Determine cost of goods sold under a periodic inventory system. The steps in determining cost of goods sold are (a) record the purchases of merchandise, (b) determine cost of goods purchased, and (c) determine cost of goods on hand at the beginning and the end of the accounting period.

4. Identify the unique features of the income statement for a merchandiser using a periodic inventory system. The income statement for a merchandiser contains three sections: sales revenue, cost of goods sold, and operating expenses. The cost of goods sold section under a periodic inventory system generally reports beginning and ending inventory, cost of goods purchased, and cost of goods available for sale.

5. Explain the basis of accounting for inventories, and describe the inventory cost-flow methods. The primary basis of accounting for inventories is cost. Cost includes all expenditures necessary to acquire goods and to make them ready for sale. Inventoriable costs include (1) cost of beginning inventory and (2) cost of goods purchased. The inventory cost-flow methods are specific identification, FIFO, LIFO, and average cost.

6. Explain the financial statement and tax effects of each of the inventory cost-flow methods. The cost of goods available for sale may be allocated to cost of goods sold and ending inventory by specific identification or by a method based on an assumed cost flow. These methods have different effects on financial statements during periods of changing prices. When prices are rising, FIFO results in lower cost of goods sold and higher net income than the average-cost and the LIFO methods. LIFO results in the lowest income taxes (because of lower net income). In the balance sheet, FIFO results in an ending inventory that is closest to current value. The inventory under LIFO is the farthest from current value.

7. Indicate the effects of inventory errors on the financial statements. In the income statement of the current year, (a) an error in beginning inventory will have a reverse effect on net income (overstatement of inventory results in understatement of net income); and (b) an error in ending inventory will have a similar effect on net income (overstatement of inventory results in overstatement of net income). If ending inventory errors are not corrected in the next period, their effect on net income for that period is reversed, and total net income for the two years will be correct. In the balance sheet, ending inventory errors will have the same effect on total assets and total stockholders' equity and no effect on liabilities.

8. Compute and interpret inventory turnover. Inventory turnover is calculated as cost of goods sold divided by average inventory. It can be converted to average days in inventory by dividing 365 days by the inventory turnover ratio. A higher turnover or lower average days in inventory suggests that management is trying to keep inventory levels low relative to sales.



GLOSSARY

Average-cost method Inventory costing method that assumes that the goods available for sale have the same (average) cost per unit; generally the goods are identical (p. 277).

Cost of goods available for sale The sum of the beginning merchandise inventory plus cost of goods purchased (p. 269).

Cost of goods purchased The sum of net purchases plus freight-in (p. 268).

Cost of goods sold The total cost of merchandise sold during the period, determined by subtracting ending inventory from cost of goods available for sale (p. 269).

First-in, first-out (FIFO) method Inventory costing method that assumes that the costs of the earliest goods acquired are the first to be recognized as cost of goods sold (p. 275).

Inventoriable costs All expenditures needed to acquire goods and to make them ready for sale. The pool of costs consists of two elements: (1) the cost of the beginning inventory and (2) the cost of goods purchased during the period (p. 273).

Inventory turnover A measure of the number of times on average the inventory is sold during the period; computed

by dividing cost of goods sold by the average inventory during the period (p. 283).

Last-in, first-out (LIFO) method Inventory costing method that assumes that the costs of the latest units purchased are the first to be allocated to cost of goods sold (p. 276).

Net purchases Purchases less purchase returns and allowances and purchase discounts (p. 268).

Periodic inventory system An inventory system in which inventoriable costs are allocated to ending inventory and cost of goods sold at the end of the period. Cost of goods sold is computed at the end of the period by subtracting the ending inventory (costs are assigned based on a physical count of items on hand) from the cost of goods available for sale (p. 265).

Specific identification method An actual, physical flow inventory costing method in which items still in inventory are specifically costed to arrive at the total cost of the ending inventory (p. 273).

EXERCISES

Identify the components of inventoriable costs.

(SO 2)

Compute ending inventory using FIFO and LIFO.

(SO 2)

Compute the ending inventory using average cost.

(SO 2)

Explain the financial statement effect of inventory cost-flow assumptions.

(SO 3)

Determine correct income statement amounts.

(SO 5)

Compute inventory turnover and days in inventory.

(SO 6)

Apply cost flow methods to perpetual inventory records.

(SO 7)

Apply the gross profit method.

(SO 8)

Compute inventory and cost of goods sold using FIFO and LIFO.

(SO 2)

9-1 The ledger of Perez Company includes the following items: **(a)** Freight-in, **(b)** Purchase Returns and Allowances, **(c)** Purchases, **(d)** Sales Discounts, and **(e)** Purchase Discounts. Identify the items that are included in inventoriable costs.

9-2 In its first month of operations Rusch BBQ made three purchases of sausages in the following sequence: **(1)** 300 pounds at \$6, **(2)** 400 pounds at \$7, and **(3)** 200 pounds at \$8. Assuming there are 450 pounds on hand, compute the cost of the ending inventory under the **(a)** FIFO method and **(b)** LIFO method. Rusch uses a periodic inventory system.

9-3 Data for Rusch BBQ are presented in 9-2. Compute the cost of the ending inventory under the average-cost method, assuming there are 450 pounds on hand.

9-4 The management of Muni Corp. is considering the effects of various inventory costing methods on its financial statements and its income tax expense. Assuming that the price the company pays for inventory is increasing, which method will:

- (a)** provide the highest net income?
- (b)** provide the highest ending inventory?
- (c)** result in the lowest income tax expense?
- (d)** result in the most stable earnings over a number of years?

9-5 Farr Company reports net income of \$90,000 in 2008. However, ending inventory was understated \$5,000. What is the correct net income for 2008? What effect, if any, will this error have on total assets as reported in the balance sheet at December 31, 2008.

9-6 On December 31, 2008, the following information was available for Simon Hotels: ending inventory \$40,000; beginning inventory \$60,000; cost of goods sold \$300,000; and sales revenue \$380,000. Calculate inventory turnover and days in inventory for Simon Hotels.

9-7 Abbott's Liquor Store uses a perpetual inventory system. Data for the Texas Chardonnay include the following purchases:

<u>Date</u>	<u>Number of Bottles</u>	<u>Unit Price</u>
May 7	50	\$10
July 28	30	13

On June 1, Abbott's sold 30 bottles, and on August 27, 35 more bottles. Prepare the perpetual inventory calculations for the above transactions using **(a)** FIFO, **(b)** LIFO, and **(c)** average cost.

9-8 On May 31, Stuart Dining has net sales of \$330,000 and cost of goods available for sale of \$230,000. Compute the estimated cost of the ending inventory, assuming the gross profit is 40 percent.

9-9 Sherpers carries a special French wine that is popular with wine enthusiasts. Below is information relating to Sherper's purchases of this wine during September. During the same month, 124 bottles were sold. Sherpers uses a periodic inventory system.

<u>Date</u>	<u>Explanation</u>	<u>Bottles</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Sept. 1	Inventory	26	\$ 97	\$ 2,522
Sept. 12	Purchases	45	102	4,590
Sept. 19	Purchases	20	104	2,080
Sept. 26	Purchases	50	105	5,250
	Totals	141		<u>\$14,442</u>

Instructions

- (a)** Compute the ending inventory at September 30 using the FIFO and the LIFO methods. Prove the amount allocated to cost of goods sold under each method.
- (b)** For both FIFO and LIFO, calculate the sum of ending inventory and cost of goods sold. What do you notice about the answers you found for each method?

9-10 Zambia Pastry uses a periodic inventory system. Its records show the following for the month of May, in which 70 units were sold.

		<u>Units</u>	<u>Unit Cost</u>	<u>Total Cost</u>
May 1	Inventory	30	\$ 8	\$240
15	Purchases	25	11	275
24	Purchases	<u>35</u>	12	<u>420</u>
	Totals	<u>90</u>		<u>\$935</u>

Compute inventory and cost of goods sold using FIFO and LIFO.
(SO 2)

Instructions

Compute the ending inventory at May 31 using the FIFO and the LIFO methods. Prove the amount allocated to cost of goods sold under each method.

EXPLORING THE WEB

9-11 A company's annual report usually will identify the inventory method used. Knowing that, you can analyze the effects of the inventory method on the income statement and the balance sheet.

Address: www.darden.com

Steps

1. From Darden Restaurants' homepage, choose **Investor Relations**.
2. Choose **Annual Report & Financials**.
3. Choose **Annual Report 2006—HTML version**.
4. Click on **Financial Renew** under the Table of Contents.
5. Click on **Consolidated Balance Sheets**.

Instructions

Answer the following questions based on the 2006 Annual Report.

- (a) At Darden's fiscal year-end, what was the net inventory on the balance sheet?
- (b) How has this changed from the previous fiscal year-end?
- (c) What inventory method does Darden use (see notes to Consolidated Financial Statements)?

ETHICS CASE

9-12 J. K. Leask Wholesale Corp. uses the LIFO method of inventory costing. In the current year, profit at J. K. Leask is running unusually high. The corporate tax rate is also high this year, but it is scheduled to decline significantly next year. In an effort to lower the current year's net income and to take advantage of the changing income tax rate, the president of J. K. Leask Wholesale instructs the accountant to recommend to the purchasing department a large purchase of inventory for delivery three days before the end of the year. The price of the inventory to be purchased has doubled during the year, and the purchase will represent a major portion of the ending inventory value.

Instructions

- (a) What is the effect of this transaction on this year's and next year's income statement and income tax expense? Why?
- (b) If J. K. Leask Wholesale had been using the FIFO method of inventory costing, would the president give the same directive?
- (c) Should the plant accountant order the inventory purchase to lower income? What are the ethical implications of this order?



Remember to go back to the Navigator box on the chapter-opening page and check off your completed work.