CHAPTER 12

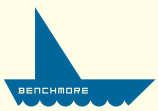
Job-Order, Process, and Hybrid Costing Systems

LEARNING OBJECTIVES

After you have mastered the material in this chapter you will be able to:

1. Distinguish between job-order and process costing systems.
2. Identify documentation used in a job-order costing system.
3. Explain how events in a job-order costing system affect financial statements.
4. Explain how events in a process costing system affect financial statements.
5. Calculate equivalent units and prepare a cost of production report.

CHAPTER OPENING



Benchmore Boat Company built five boats during the current year. Each boat has unique characteristics that affect its cost. For example, an 80-foot yacht required more labor and materials than a 30-foot sailboat. Because different boats cost different amounts, Benchmore needs a cost system that traces product costs to individual inventory items (specific boats).

In contrast, Janis Juice Company produced 500,000 cans of apple juice during the same year. Each can of juice is identical to the others. Determining the cost of a boat built by Benchmore requires a different costing system than the system Janis needs to determine the cost of a can of juice. Benchmore needs a costing system that captures the unique cost of each individual inventory item. Janis needs a costing system that distributes costs evenly across total production (number of cans of juice produced during an accounting period).

The Curious Accountant

Consider the following two situations:

First, imagine you worked at **Kellogg's**, a company that produces breakfast cereals. Assume that during the past year your company produced 70 million, 24-ounce boxes of Corn Flakes, and incurred manufacturing costs of $115 million related to this one product.

Next, imagine you worked for **Bechtel**, a private company that is one of the world's largest construction companies. During 2009 it was constructing such diverse projects as a plant to produce liquefied natural gas (LNG) in Angola, off the coast of West Africa, and a plant in Hanford, Washington, to treat nuclear waste materials. Assume that during 2009 Bechtel worked on 40 different projects and incurred manufacturing costs of $20 billion.

How would you determine the cost of one box of cereal? How would you determine the cost incurred to construct the LNG project in Angola? Which of the two questions asked above do you think would be the most difficult to answer for real world companies? (Answers on page 552.)

COSTING SYSTEMS

LO 1

Distinguish between job-order and process costing systems.

The type of product a company produces affects the type of accounting system needed to determine product cost. The two most common types of costing systems are job-order costing and process costing. Some companies use hybrid costing systems that combine features of both job-order and process systems. The following section of the text discusses the types of products most suited to each costing system and the accounting procedures used in each type of costing system.

Costing Systems and Type of Product

Job-order costing systems accumulate costs by individual products. The boats Benchmore builds are suited to job-order costing. Other products for which job-order costing is suitable include movies made by **Walt Disney Productions**, office buildings constructed by **Rust Engineering**, and airplanes made by **Boeing**. Job-order costing systems apply not only to individual inventory items but also to batches of inventory items. For example, **Hernandes Shirt Company** may account for producing a special order of 20,000 shirts sold to the United States Army as a single job. Companies use job-order costing systems when they need to know the costs of individual products or batches of products.

Process costing systems allocate costs evenly to homogeneous products. In addition to beverage companies such as Janis Juice, oil refiners such as **Texaco**, chemical producers such as **Dow Chemical**, food processors such as **General Mills**, and paint manufacturers such as **Sherwin-Williams** use process costing. These companies normally make products in mass quantities using continuous processes. The *per-unit product cost* is determined by dividing the *total* product cost by the number of units produced during the accounting period. Process costing systems provide *average* product costs.

To a lesser extent, job-order costing systems also use average costs. It is either not possible or not cost effective to trace costs of indirect materials, indirect labor, utilities, rent, and depreciation directly to particular jobs. Companies normally combine these costs and allocate them to individual products using an average overhead rate based on a common measure of production such as labor hours, machine hours, or square footage. When jobs are produced in batches of a number of similar products, the cost per unit is determined by dividing the total cost of the job by the number of units in the batch. Although more costs are traced to specific products under a job-order system than a process system, *both* systems require *some* form of *cost averaging.*

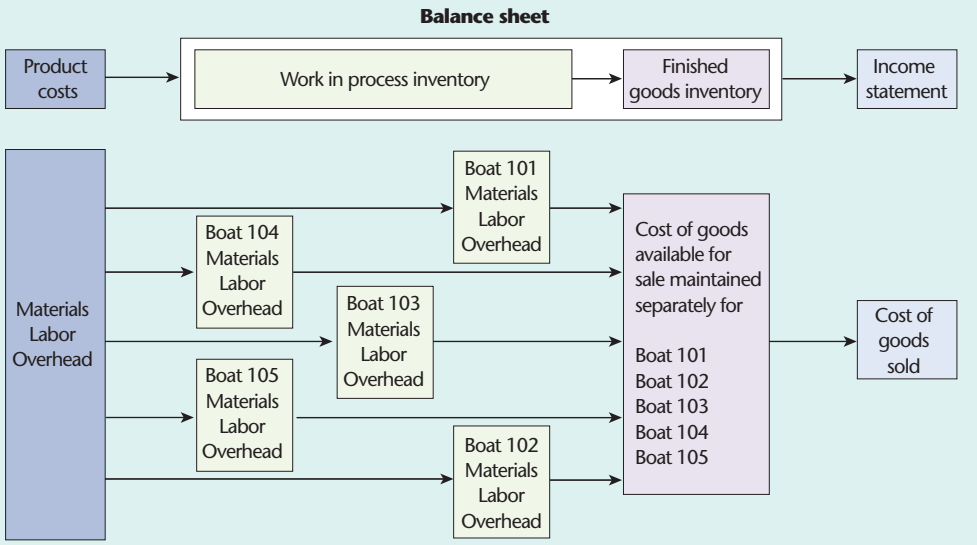
Job-Order Cost Flow

Job-order and process costing systems are patterned after the physical flow of products moving through production. For example, consider how Benchmore Boat Company builds custom boats. Each boat is a separate project. Benchmore starts a project by requisitioning raw materials from materials storage. It assigns specific employees to work on specific boats. Finally, it assigns indirect (overhead) costs to each boat based on the number of direct labor hours required to build the boat.

Benchmore's *job-order costing system* accumulates cost in a manner parallel to physical boat construction. Benchmore assigns each boat a specific job identification number. It records transactions in inventory accounts on a perpetual basis. Product costs are accumulated separately for each job identification number. The costs of each boat move through the Work in Process Inventory account to the Finished Goods Inventory account and finally to the Cost of Goods Sold account as the boat is produced and sold. Exhibit 12.1 shows the flow of product costs for the five boats Benchmore plans to build in 2012. In a job-order system, the amount recorded in the Work in Process Inventory account is the total cost to date of distinct jobs. Each distinct job

EXHIBIT 12.1

Cost Flow in a Job-Order Costing System



represents the costs of materials, labor, and overhead accumulated for that specific inventory project. The Work in Process Inventory account is a *control* account supported by numerous *subsidiary* accounts (the records for individual jobs). The Finished Goods Inventory account is also a control account. It is supported by subsidiary accounts in which are recorded the separate costs of each completed, but not yet sold, boat.

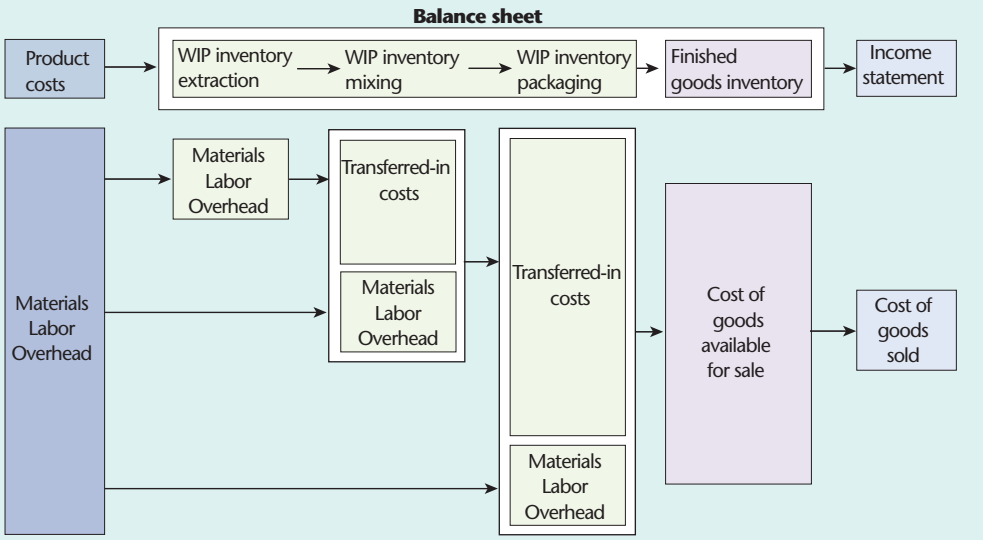
Process Cost Flow

Process costing systems use the same general ledger accounts as job-order costing systems. Product costs flow from Raw Materials Inventory to Work in Process Inventory to Finished Goods Inventory to Cost of Goods Sold. The primary difference between the two systems centers on accounting for the work in process inventory. The physical products move continuously through a series of processing centers. Instead of accumulating product costs by jobs that add up to a single Work in Process Inventory control account, process costing systems accumulate product costs by processing centers, or *departments.* Each department has its own separate Work in Process Inventory account. For example, Janis Juice Company uses three distinct processes to produce cans of apple juice. Raw apples enter the extraction department where juice concentrate is pressed from whole fruit. The concentrate moves to the mixing department where Janis adds water, sugar, food coloring, and preservatives. The resulting juice mixture moves to the packaging department where it is canned and boxed. The materials, labor, and overhead costs incurred as products move through a processing center (department) are charged to that center's Work in Process Inventory account.

Parallel to the physical flow of product through the manufacturing process, cost accumulations pass from one department to the next. The end products of one department become the raw materials of the next department. The costs transferred from one department to the next are **transferred-in costs.** Transferred-in costs are combined with the additional materials, labor, and overhead costs incurred by each succeeding department. When goods are complete, the total product cost transferred to the Finished Goods Inventory account represents the sum of product costs from all the departments. Exhibit 12.2 illustrates cost flow for the process costing system used by Janis Juice Company. Compare the cost flow patterns in Exhibits 12.1 and 12.2 to clarify the distinction between job-order and process costing systems.

EXHIBIT 12.2

Cost Flow in a Process Costing System



Hybrid Accounting Systems

Many companies use **hybrid costing systems.** Hybrid systems combine features of both process and job-order costing systems. For example, Gateway 2000 makes thousands of identical computers using a continuous assembly line that is compatible with process costing. Each unit requires the same amount of labor to assemble a standard set of parts into a finished computer ready for immediate sale. Gateway also builds custom computers with unique features. Customers can order larger monitors, more memory, or faster processors than Gateway's standard model has. Gateway meets these requests by customizing the computers as they move through production. The costs of customized features must be traced to products with a job-order type of system. Gateway charges customers a premium for the custom items.

DOCUMENTATION IN A JOB-ORDER COSTING SYSTEM

LO 2

Identify documentation used in a job-order costing system.

In a job-order costing system, product costs for each individual job are accumulated on a **job cost sheet,** also called a *job-order cost sheet* or a *job record.* As each job moves through production, detailed cost information for materials, labor, and overhead is recorded on the job cost sheet. When a job is finished, the job cost sheet summarizes all costs incurred to complete that job.

Two primary source documents, materials requisition forms and work tickets, provide the information recorded on the job cost sheet. Before starting a job, the job supervisor prepares a **materials requisition form** which lists the materials needed to begin work. The materials requisition represents the authorization for raw materials to be released from storage to production. Some companies deliver hard-copy forms to and from the different departments, but most modern businesses deliver requests electronically through a computer network. Whether recorded on paper documents or in electronic files, the information from material requisitions for each job is sent to the accounting department to be summarized on the job cost sheet.

The **work ticket,** sometimes called a *time card,* provides space for the job number, employee identification, and work description. Employees record on the work ticket the amount of time they spend on each job. This information is forwarded to the accounting department. Using wage rate records, the accounting department computes the

EXHIBIT 12.3

Job-Order Cost Sheet and Source Documents

Job Cost Sheet

Job Order No. Boat 101 Customer Name: Arturo Martinez

Due Date: 10/31/2011 Date Started: 08/01/2011 Date Finished: 11/30/2011

Direct materials		Direct labor			Applied overhead		
Req. No.	Cost	Ticket	Hours	Cost	Rate	Hours	Cost
24585	7,100	367	1,400	9,100	3.90	1,400	5,460
24600	5,600	360	1,600	10,400	3.90	1,600	6,240
24609	6,100						
Total	18,800	Total		19,500	Total		11,700

Cost summary

Direct materials	$18,800
Direct labor	19,500
Overhead	11,700
Total	$50,000

Material requisitions

	Date	Quantity
Package K	8/1	Mixed
Package R	9/1	Mixed
Package T	10/1	Mixed

Information transferred electronically

Work tickets

	Date	Hours
Process 1	9/30	1,400
Process 2	11/30	1,600

Information transferred electronically

amount of labor cost and records it on the job cost sheet. The data can be gathered manually or electronically.

Finally, each job cost sheet provides space for applied overhead. Companies maintain job cost sheet records perpetually, adding additional cost data as work on jobs progresses. Using predetermined overhead rates, estimated overhead costs are regularly added to job cost sheets. Exhibit 12.3 illustrates a job cost sheet along with materials requisition forms and work tickets for Benchmore Boat Company's job-order number Boat 101.

REALITY BYTES

Job-order, process, and hybrid costing systems apply to service businesses as well as manufacturing concerns. Consider a local franchisee of Lawn Doctor who is pricing lawn maintenance contracts for a variety of residential customers. A separate price will be quoted for each lawn, and this price will be based on what the company believes it will cost to maintain that particular lawn. Some customers have larger lawns than others, which cost more to service. Some customers want less lawn care service than others, which costs less. This type of service business will use a job-order system.

Now, consider a company in the clothes laundering business. The price the company charges to wash, press, and hang a man's shirt is the same for all shirts because the cost of servicing each shirt, whether large or small, is about the same. This business will use a process costing system to determine the cost of laundering one shirt.

However, to determine the cost of one specific customer's job a hybrid system would be used, because different customers bring in different numbers of shirts to be cleaned. While process costing is used to determine the cost to clean one shirt, job order costing is used to calculate the cost of the entire job.

JOB-ORDER COSTING SYSTEM ILLUSTRATED

LO 3

Explain how events in a job-order costing system affect financial statements.

To illustrate how a job-order costing system works, we follow the operations of Benchmore Boat Company during 2012. Exhibit 12.4 shows the company's 2012 beginning account balances.

Entries for Benchmore's 2012 accounting events, described next, are shown in ledger T-accounts in Exhibit 12.5 on page 542. As you study each event, trace it to the T-accounts. The entries in Exhibit 12.5 are cross-referenced to sequential event numbers. The individual effect of each event on the financial statements is shown and discussed in the following section.

EXHIBIT 12.4

BENCHMORE BOAT COMPANY
Trial Balance
As of January 1, 2012

	Debit	Credit
Cash	$ 73,000	
Raw materials inventory	7,000	
Work in process inventory	34,000	
Finished goods inventory	85,000	
Production supplies	300	
Manufacturing equipment	90,000	
Accumulated depreciation		$ 32,000
Common stock		200,000
Retained earnings		57,300
Total	$289,300	$289,300

EXHIBIT 12.4

continued

Subsidiary Account Balances

Work in Process Inventory		Finished Goods Inventory	
Boat 103	$14,000	Boat 101	$50,000
Boat 104	8,000	Boat 102	35,000
Boat 105	12,000		
Total	$34,000	Total	$85,000

EVENT 1 **Benchmore paid $14,000 cash to purchase raw materials.**

The effects of this event on the company's financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Cash	+	Raw Materials Inventory									
(14,000)	+	14,000	=	NA	+	NA	NA	−	NA	=	NA

Event 1 is an asset exchange; it does not affect total assets reported on the balance sheet. The asset cash decreases and the asset raw materials inventory increases. The income statement is not affected.

EVENT 2 **Benchmore used $17,000 of direct raw materials in the process of making boats.**

The amounts used for Boat 103, Boat 104, and Boat 105 were $8,000, $3,400, and $5,600, respectively. The effects of this event on the financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Raw Materials Inventory	+	Work in Process Inventory									
(17,000)	+	17,000	=	NA	+	NA	NA	−	NA	=	NA

This event is an asset exchange. It does not affect total assets reported on the balance sheet. The asset raw materials inventory decreases and the asset work in process inventory increases. The income statement is not affected. In addition to recording the effects in the Work in Process Inventory control account, Benchmore adjusted the individual job cost sheets to reflect the raw materials used on each job, as shown in Exhibit 12.5.

EVENT 3 Benchmore paid $1,200 cash to purchase production supplies.

The effects of this event on the company's financial statements are shown here.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Cash	+	Production Supplies									
(1,200)	+	1,200	=	NA	+	NA	NA	−	NA	=	NA

This event is also an asset exchange. It does not affect total assets reported on the balance sheet. One asset, cash, decreases and another asset, production supplies, increases. Purchasing production supplies does not affect the income statement. The cost of supplies is allocated to work in process inventory as part of overhead and is expensed as part of cost of goods sold.

EVENT 4 Benchmore paid $8,000 cash to production employees who worked on Boat 103.

The effects of this event on the company's financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Cash	+	Work in Process Inventory									
(8,000)	+	8,000	=	NA	+	NA	NA	−	NA	=	NA

These wages are *not* salary expense. Because the employees worked to make inventory, the cost of their labor is added to work in process inventory. This event is an asset exchange. The asset cash decreases, and the asset work in process inventory increases. Neither total assets reported on the balance sheet nor any revenues or expenses on the income statement are affected. In addition to recording the effects in the Work in Process Inventory control account, Benchmore adjusted the Boat 103 job cost sheet to reflect the labor used on the job. Refer to Exhibit 12.5; the $8,000 labor cost is entered in both the Work in Process Inventory control account and on the job cost sheet for Boat 103.

EVENT 5 Benchmore applied manufacturing overhead costs of $6,240 to the Boat 103 job.

Production employees completed Boat 103. When the boat was finished, the actual amount of many costs to make it were not then known. During the year, Benchmore sells boats before knowing the exact costs of making them. Although a portion of the total production supplies, depreciation, supervisory salaries, rental cost, and utilities were used while Boat 103 was under construction, the actual cost of these resources is not known until the end of the year. To make timely decisions, such as setting the selling prices for boats, Benchmore must assign estimated overhead costs to boats as they are completed.

To estimate overhead as accurately as possible, Benchmore first reviewed the previous year's actual overhead costs. It adjusted those amounts for expected changes. Assume Benchmore estimated total overhead costs for 2012 to be as follows: production supplies, $1,400; depreciation, $4,000; utilities and other indirect costs, $10,590, for a total of $15,990 ($1,400 + $4,000 + $10,590).

EXHIBIT 12.5

Ledger T-Accounts for Benchmore Boat Company

Cash

Bal.	73,000	(1)	14,000
(13)	91,000	(3)	1,200
		(4)	8,000
		(7)	24,500
		(8)	12,000
		(10)	10,100
Bal.	94,200		

Production Supplies

Bal.	300	(12)	1,100
(3)	1,200		
Bal.	400		

Manufacturing Equipment

Bal.	90,000		

Accumulated Dep.

		Bal.	32,000
		(11)	4,000
		Bal.	36,000

Raw Materials Inventory

Bal.	7,000	(2)	17,000
(1)	14,000		
Bal.	4,000		

Manufacturing Overhead

(10)	10,100	(5)	6,240
(11)	4,000	(9)	9,360
(12)	1,100		
(15)	400		
Bal.	0		

Work in Process Inventory

Bal.	34,000	(6)	36,240
(2)	17,000		
(4)	8,000		
(5)	6,240		
(8)	12,000		
(9)	9,360		
Bal.	50,360		

Job Cost Sheets (Subsidiary accounts)

Boat 103

Beginning balance	14,000
Materials	8,000
Labor	8,000
Overhead	6,240
Product cost	36,240
To finish goods	(36,240)
Ending balance	0

Boat 104

Beginning balance	8,000
Materials	3,400
Labor	5,000
Overhead	3,900
Ending balance	20,300

Boat 105

Beginning balance	12,000
Materials	5,600
Labor	7,000
Overhead	5,460
Ending balance	30,060

Finished Goods Inventory

Bal.	85,000	(14)	50,000
(6)	36,240		
Bal.	71,240		

Boat 101

Balance	50,000
Sold	(50,000)
Balance	0

Boat 102

Balance	35,000
Cost transferred	0
Balance	35,000

Boat 103

Balance	0
Cost transferred	36,240
Balance	36,240

Common Stock

		Bal.	200,000

Retained Earnings

		Bal.	57,300

Sales Revenue

		(13)	91,000

Cost of Goods Sold

(14)	50,000	(15)	400
Bal.	49,600		

Selling and Admin. Exp.

(7)	24,500		

Boat 101

Cost sheet data transferred to permanent storage

Benchmore has identified a cause and effect relationship between direct labor time and overhead cost. Boats that require more labor also require more overhead. For example, the more hours production employees work, the more supplies they use. Similarly, more labor hours translates into more equipment use, causing more utilities and depreciation costs. Because of the relationship between labor and indirect costs, Benchmore uses *direct labor hours* as the allocation base for overhead costs. Benchmore estimated it would use a total of 4,100 labor hours during 2012. It established a *predetermined overhead rate* as follows:

$$\text{Predetermined overhead rate} = \frac{\text{Total estimated overhead costs}}{\text{Total estimated direct labor hours}}$$

$$\text{Predetermined overhead rate} = \$15{,}990 \div 4{,}100$$

$$= \$3.90 \text{ per direct labor hour}$$

Boat 103 required 1,600 actual direct labor hours. Benchmore applied $6,240 (1,600 hours × $3.90) of overhead to that job. The effects of the overhead application on the company's financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Manufacturing Overhead	+	Work in Process Inventory									
(6,240)	+	6,240	=	NA	+	NA	NA	−	NA	=	NA

The event is an asset exchange. One asset, work in process inventory, increases and a temporary asset, manufacturing overhead, decreases. Applying overhead costs to work in process inventory does not affect the income statement. When finished goods are sold, overhead costs affect the income statement through cost of goods sold. The job cost sheet for Boat 103 reflects the applied (estimated) overhead cost. The T-accounts in Exhibit 12.5 also show the overhead application.

EVENT 6 Benchmore transferred $36,240 of product costs for completed Boat 103 from work in process inventory to finished goods inventory.

The effects of this transfer on the company's financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Work in Process Inventory	+	Finished Goods Inventory									
(36,240)	+	36,240	=	NA	+	NA	NA	−	NA	=	NA

This event is an asset exchange. Benchmore transferred cost from the Work in Process Inventory control account to the Finished Goods Inventory control account. The transfer does not affect total assets reported on the balance sheet, nor does it affect the income statement. The job cost sheet is moved to the finished goods file folder. Exhibit 12.5 illustrates these effects.

EVENT 7 Benchmore paid $24,500 cash for selling and administrative expenses.

The effects of this transaction on the financial statements follow.

Assets	=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
(24,500)	=	NA	+	(24,500)	NA	−	24,500	=	(24,500)

This is an asset use transaction. Cash and stockholders' equity (retained earnings) decrease. Recognizing the expense decreases net income.

EVENT 8 Benchmore paid $12,000 cash to production employees for work on Boats 104 and 105.

The cost of direct labor used was $5,000 for Boat 104 and $7,000 for Boat 105. These jobs were still incomplete at the end of 2012. The effects of this event on the financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Cash	+	Work in Process Inventory									
(12,000)	+	12,000	=	NA	+	NA	NA	−	NA	=	NA

This event is an asset exchange. It does not affect total assets reported on the balance sheet. It does not affect the income statement. In addition to the effects on the Work in Process Inventory control account, Benchmore adjusted the individual job cost sheets to reflect the labor used on each job. Exhibit 12.5 illustrates these effects.

EVENT 9 Benchmore applied estimated manufacturing overhead costs to the Boat 104 and Boat 105 jobs.

As previously explained, the predetermined overhead rate was $3.90 per direct labor hour (see Event 5). Assume the work described in Event 8 represented 1,000 direct labor hours for Boat 104 and 1,400 direct labor hours for Boat 105. The amount of estimated overhead cost Benchmore applied to the two jobs is calculated as follows:

Job Number	Predetermined Overhead Rate	×	Actual Labor Hours Used	=	Amount of Applied Overhead
Boat 104	$3.90	×	1,000	=	$3,900
Boat 105	3.90	×	1,400	=	5,460
Total					$9,360

The effects on the company's financial statements of applying the overhead follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Manufacturing Overhead	+	Work in Process Inventory									
(9,360)	+	9,360	=	NA	+	NA	NA	−	NA	=	NA

Applying overhead is an asset exchange. Total assets and net income, are not affected. Overhead costs of $3,900 for Boat 104 and $5,460 for Boat 105 are recorded on the job cost sheets. The total, $9,360, is recorded in the Work in Process Inventory control account. Trace these allocations to Exhibit 12.5.

EVENT 10 Benchmore paid $10,100 cash for utilities and other indirect product costs.

The effects of this event on the financial statements are shown here.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Cash	+	Manufacturing Overhead									
(10,100)	+	10,100	=	NA	+	NA	NA	−	NA	=	NA

Paying for *actual* overhead costs is an asset exchange. Total assets, net income, and job cost sheets are not affected. Recall that estimated overhead costs were previously recorded in work in process inventory and on the job cost sheets (Events 5 and 9).

EVENT 11 Benchmore recognized $4,000 of actual manufacturing equipment depreciation.

The effects of this event on the financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Book Value of Manufacturing Equipment	+	Manufacturing Overhead									
(4,000)	+	4,000	=	NA	+	NA	NA	−	NA	=	NA

Depreciation of manufacturing equipment represents an *actual* indirect product cost (overhead), *not* an expense (even though the *amount* of depreciation is an estimate). Recognizing this depreciation is an asset exchange. The book value of the manufacturing equipment decreases and the Manufacturing Overhead account increases. Neither the total amount of assets reported on the balance sheet nor the income statement are affected. The job cost sheets are also not affected when *actual* overhead cost (depreciation) is recognized. The inventory accounts and job cost sheets reflect *estimated* overhead.

EVENT 12 Benchmore counted the production supplies on hand at year-end and recognized actual overhead cost for the supplies used.

During 2012, Benchmore had available for use $1,500 of production supplies ($300 beginning balance + $1,200 supplies purchased). A physical count disclosed there were $400 of supplies on hand at the end of 2012. Benchmore therefore must have used $1,100 of supplies ($1,500 − $400). The effects on the company's financial statements of recognizing supplies used follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Production Supplies	+	Manufacturing Overhead									
(1,100)	+	1,100	=	NA	+	NA	NA	−	NA	=	NA

The event is an asset exchange. Total assets and net income are not affected. The job cost sheets are not affected. Remember that estimated overhead costs were previously recorded on the job cost sheets.

EVENT 13 Benchmore sold Boat 101 for $91,000 cash.

The effects of this event on the financial statements follow.

Assets	=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
91,000	=	NA	+	91,000	91,000	−	NA	=	91,000

Recognizing revenue from selling inventory is an asset source event. Both assets (cash) and stockholders' equity (retained earnings) increase. Revenue recognition also increases the net income reported on the income statement.

EVENT 14 Benchmore recognized cost of goods sold for Boat 101.

The effects of this event on the financial statements follow.

Assets	=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
(50,000)	=	NA	+	(50,000)	NA	−	50,000	=	(50,000)

Recognizing cost of goods sold is an asset use transaction. It decreases assets (finished goods inventory) and stockholders' equity (retained earnings). The expense recognition decreases net income. The job cost sheet for Boat 101 is transferred to the permanent files. The cost sheet is retained because information from it could be useful for estimating costs of future jobs.

EVENT 15 Benchmore closed the Manufacturing Overhead account, reducing cost of goods sold by $400.

During 2012, Benchmore applied $15,600 of estimated overhead cost to production. Actual overhead costs were $15,200. Overhead was therefore overapplied by $400 ($15,600 − $15,200), meaning too much overhead was transferred to the Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold accounts. If the amount of overapplied overhead were significant, Benchmore would have to allocate it proportionately among the inventory and Cost of Goods Sold accounts. In this case, the amount is insignificant and Benchmore assigned it entirely to cost of goods sold. The effects of this event on the company's financial statements follow.

Assets	=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
400	=	NA	+	400	NA	−	(400)	=	400

Overapplied overhead indicates the estimated cost transferred from the asset accounts to cost of goods sold was too high. The entry to close manufacturing overhead corrects the overstatement. Recording $400 in the overhead account increases total assets. The increase in assets is matched by a decrease in cost of goods sold, which reduces expenses, increases net income, and increases stockholders' equity (retained earnings). After this adjustment, the total increases in the overhead account (actual costs) equal the total decreases (estimated costs). Manufacturing Overhead is a temporary account. It is closed at year-end and does not appear in the financial statements. Exhibit 12.6 displays Benchmore Boat Company's preclosing trial balance at the end of 2012.

EXHIBIT 12.6

BENCHMORE BOAT COMPANY
Trial Balance
As of December 31, 2012

	Debit	Credit
Cash	$ 94,200	
Raw materials inventory	4,000	
Work in process inventory	50,360	
Finished goods inventory	71,240	
Production supplies	400	
Manufacturing equipment	90,000	
Accumulated depreciation		$ 36,000
Common stock		200,000
Retained earnings		57,300
Sales revenue		91,000
Cost of goods sold	49,600	
Selling and administrative expense	24,500	
Total	$384,300	$384,300

CHECK YOURSELF 12.1

Wilson Cabinets makes custom cabinets for home builders. It incurred the following costs during the most recent month.

Inventory	Materials	Labor
Job 1	$4,200	$2,700
Job 2	2,300	5,000
Job 3	1,700	800

Wilson's predetermined overhead rate is $0.80 per direct labor dollar. Actual overhead costs were $7,100. Wilson completed and sold Jobs 1 and 2 during the month, but Job 3 was not complete at month-end. The selling prices for Jobs 1 and 2 were $14,900 and $16,600, respectively. What amount of gross margin would Wilson report on the income statement for the month?

Answer Cost accumulated in the Work in Process account:

Inventory	Materials	Labor	Overhead*	Total
Job 1	$4,200	$2,700	$2,160	$ 9,060
Job 2	2,300	5,000	4,000	11,300
Job 3	1,700	800	640	3,140

*80% of direct labor cost.

Total allocated overhead is $6,800 ($2,160 + $4,000 + $640). Since actual overhead is $7,100, overhead is underapplied by $300 ($7,100 − $6,800).

Sales revenue ($14,900 + $16,600)	$31,500
Cost of goods sold (Job 1, $9,060 + Job 2, $11,300 + Underapplied overhead, $300)	(20,660)
Gross margin	$10,840

PROCESS COSTING SYSTEM ILLUSTRATED

LO 4

Explain how events in a process costing system affect financial statements.

In process costing systems, product costs flow through the same general ledger accounts as in job-order costing systems: Raw Materials Inventory, Work in Process Inventory, Finished Goods Inventory, and ultimately Cost of Goods Sold. Accounting for work in process inventory, however, differs between the two systems. Instead of accumulating work in process costs by jobs, process costing systems accumulate product costs by departments. The cost of all goods that move through a processing department during a given accounting period is charged to that department. Work in process subsidiary documents (job cost sheets) are not needed. Process costing systems are easier to use than job-order systems. They do not, however, distinguish the cost of one product from another. Process systems are therefore not appropriate for manufacturers of distinctly different products; they are suited to account for continuous mass production of uniform products. Process costing systems produce the same cost per unit for all products.

To illustrate how a process costing system operates, we analyze the operations of Janis Juice Company during 2012. Recall that Janis uses three distinct processes to produce cans of apple juice. Raw materials (whole apples) enter the *extraction department* where

EXHIBIT 12.7

JANIS JUICE COMPANY
Trial Balance
As of January 1, 2012

	Debit	Credit
Cash	$320,000	
Raw materials—fruit	7,800	
Raw materials—additives	3,100	
Raw materials—containers	9,500	
Work in process—extraction	22,360	
Work in process—mixing	7,960	
Work in process—packaging	21,130	
Finished goods inventory	20,700	
Common stock		$180,000
Retained earnings		232,550
Total	$412,550	$412,550

juice concentrate is extracted from whole fruit. The juice extract passes to the *mixing department* where Janis adds water, sugar, food coloring, and preservatives. The juice mixture then moves to the *packaging department* where it is canned and boxed for shipment. Exhibit 12.7 shows the company's 2012 beginning account balances.

The entries for Janis Juice Company's 2012 accounting events, discussed individually in the following sections, are shown in ledger T-accounts in Exhibit 12.9 on page 556. The T-account entries are cross-referenced to sequential event numbers. As you study each event, trace it to the T-accounts.

EVENT 1 Janis paid $84,000 cash to purchase raw materials.

The effects of this event on the company's financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Cash	+	Raw Materials Inventory									
(84,000)	+	84,000	=	NA	+	NA	NA	−	NA	=	NA

This event is an asset exchange. Total assets and net income are not affected. The total purchase was for $25,000 of whole fruit, $30,000 of additives, and $29,000 of containers. Janis maintains separate inventory accounts for each category of raw material. Trace the entries for this event to the ledger accounts in Exhibit 12.9.

EVENT 2 Janis processed $26,720 of whole fruit to produce juice extract.

The effects of this event on the financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Raw Materials—Fruit	+	WIP—Extraction									
(26,720)	+	26,720	=	NA	+	NA	NA	−	NA	=	NA

This event is an asset exchange. It does not affect total assets or net income. Janis assigns the cost of the materials used to the extraction department rather than to any particular product or batch of products. The extraction department adds the same amount of value to each can of juice.

EVENT 3 Janis paid $38,000 cash to production employees who worked in the extraction department.

The effects of this event on the financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Cash	+	WIP—Extraction									
(38,000)	+	38,000	=	NA	+	NA	NA	−	NA	=	NA

This event is also an asset exchange. Production labor cost is not salary expense. Total assets and net income are not affected. Like the raw materials, the labor cost is assigned to the department rather than to individual products.

EVENT 4 Janis applied estimated manufacturing overhead costs to the extraction department work in process inventory.

Janis has identified a relationship between labor dollars and indirect overhead costs. The more labor dollars paid, the more indirect resources consumed. Janis estimated total indirect costs in 2012 would be $96,000 and that it would pay $120,000 to production employees. Using these estimates, Janis established a *predetermined overhead rate* as follows.

$$\text{Predetermined overhead rate} = \text{Total estimated overhead costs} \div \text{Total estimated direct labor dollars}$$

$$\text{Predetermined overhead rate} = \$96{,}000 \div \$120{,}000$$

$$= \$0.80 \text{ per direct labor dollar}$$

Since the extraction department incurred $38,000 of labor cost (see Event 3), Janis applied $30,400 ($38,000 × $0.80) of overhead to that department. The effects of the overhead application on the financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Manufacturing Overhead	+	WIP—Extraction									
(30,400)	+	30,400	=	NA	+	NA	NA	−	NA	=	NA

The event is an asset exchange. Total assets and net income are not affected.

EVENT 5 Janis finished processing some of the whole fruit and transferred the related cost from the extraction department Work in Process Inventory account to the mixing department Work in Process Inventory account.

LO 5

Calculate equivalent units and prepare a cost of production report.

Total product costs in the extraction department Work in Process Inventory account amounted to $117,480 ($22,360 beginning balance + $26,720 materials + $38,000 labor + $30,400 applied overhead). The beginning inventory represented 100,000 units of product (cans) and the fruit Janis added started an additional 485,000 cans. The amount of fruit placed into production therefore represented 585,000 (100,000 + 485,000) units. Assume the extract transferred to the mixing department represented 500,000 cans of juice. The extraction department therefore had 85,000 (585,000 − 500,000) units in ending inventory that were *started but not completed.*

Janis had to allocate the total $117,480 product cost between the 85,000 partially completed units in ending inventory and the 500,000 completed units it transferred to the mixing department. A rational allocation requires converting the 85,000 partially completed units into *equivalent whole units.* The logic behind **equivalent whole units** relies on basic arithmetic. For example, 2 units that are 50 percent complete are equivalent to 1 whole (100 percent complete) unit (2 × 0.5 = 1). Similarly, 4 units that are 25 percent complete are equivalent to 1 whole unit (4 × 0.25 = 1). Further, 100 units that are 30 percent complete are equivalent to 30 whole units (100 units × 0.30 = 30).

An engineer estimated the 85,000 units in the extraction department's ending inventory were 40 percent complete. The equivalent whole units in ending inventory was therefore 34,000 (85,000 × 0.4). The *total* equivalent units processed by the extraction department during 2012 was 534,000 (500,000 units finished and transferred

to the mixing department plus 34,000 equivalent whole units in ending inventory). Janis determined the average **cost per equivalent unit** as follows:

$$\text{Cost per equivalent unit} = \text{Total cost} \div \text{Number of equivalent whole units}$$

$$\text{Cost per equivalent unit} = \$117{,}480 \div 534{,}000$$

$$= \$0.22 \text{ per equivalent unit}$$

Janis used the *cost per equivalent unit* to allocate the total cost incurred in the extraction department between the amount transferred to the mixing department and the amount in the extraction department's ending work in process inventory as follows.

	Equivalent Units	×	Cost per Unit	Cost to Be Allocated
Transferred-out costs	500,000	×	$0.22	$110,000
Ending inventory	34,000	×	0.22	7,480
Total				$117,480

The effects of transferring $110,000 from the extraction department's work in process inventory to the mixing department's work in process inventory follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
WIP—Extraction	+	WIP—Mixing									
(110,000)	+	110,000	=	NA	+	NA	NA	−	NA	=	NA

This event is an asset exchange. Total assets and net income are unaffected.

The allocation of costs between units transferred out and ending inventory is frequently summarized in a *cost of production report.* Cost of production reports usually provide details for three categories: the computation of equivalent units; the determination of cost per equivalent unit; and the allocation of total production cost between the units transferred out and the units in ending inventory. Exhibit 12.8 illustrates Janis's 2012 cost of production report for the extraction department.

The method used here to determine equivalent units is the **weighted average method.** The weighted average method does not account for the state of completion of units in *beginning* inventory. Equivalent units are computed for *ending* inventory only. Failing to account for equivalent units in beginning as well as ending inventories can distort the accuracy of the cost assigned to goods transferred out and goods in inventory accounts at the end of the period. Managers frequently tolerate some inaccuracy because the weighted average method is relatively easy to use. If accuracy is of paramount importance, however, a company might use the **first-in, first-out (FIFO) method.** The FIFO method accounts for the degree of completion of both beginning and ending inventories, but it is more complex to apply. Applying the FIFO method in process costing applications is explained in upper-level accounting courses. It is beyond the scope of this text.

EVENT 6 Janis mixed (used) $24,400 of additives with the extract transferred from the extraction department.

Conceptually, the juice extract transferred from the extraction department is a raw material to the mixing department. The mixing department adds other materials to the juice extract, such as sweetener, food coloring, and preservatives. Although both *transferred-in costs* and *additives* represent raw materials, they are traditionally classified separately.

EXHIBIT 12.8

JANIS JUICE COMPANY
Cost of Production Report
Extraction Department
For the Year Ended December 31, 2012

	Actual		Equivalent
Determination of Equivalent Units			
Beginning inventory	100,000		
Units added to production	485,000		
Total	585,000		
Transferred to finished goods	500,000	100% Complete	500,000
Ending inventory	85,000	40% Complete	34,000
Total	585,000		534,000
Determination of Cost per Unit			
Cost accumulation			
Beginning inventory	$ 22,360		
Materials	26,720		
Labor	38,000		
Overhead	30,400		
Total	$117,480		
Divided by	÷		
equivalent units	534,000		
Cost per equivalent unit (i.e., per can)	$ 0.22		
Cost Allocation			
To work in process inventory, mixing dept. (500,000 × $0.22)	$110,000		
To ending inventory (34,000 × $0.22)	7,480		
Total	$117,480		

Review the mixing department's Work in Process account in Exhibit 12.9 to see these costs. The effects of using additional materials in the mixing department follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Raw Materials—Additives	+	WIP—Mixing									
(24,400)	+	24,400	=	NA	+	NA	NA	−	NA	=	NA

This event is an asset exchange. Total assets and net income are not affected.

EVENT 7 Janis paid $48,000 cash to production employees who worked in the mixing department.

The effects of this event on the financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Cash	+	WIP—Mixing									
(48,000)	+	48,000	=	NA	+	NA	NA	−	NA	=	NA

This is an asset exchange. Total assets and net income are not affected.

Answers to The Curious Accountant

The company that produces breakfast cereal should use a process costing system. This system is conceptually very simple, especially when there is no beginning or ending work in process inventory. In the situation described in the Curious Accountant, the cost of one box of Corn Flakes would be calculated by dividing $115 million by 70 million boxes, yielding a cost of $1.64 per box.

The construction company should use a job-order costing system. This system, as you have seen, requires extensive recordkeeping. The cost of each item of material that goes into the LNG project and the wages of each worker who helps build the project must be tracked to the specific job in question. These costs, along with the appropriate amount of overhead, will comprise the cost of that particular job.

EVENT 8 Janis applied estimated manufacturing overhead costs to the mixing department work in process inventory.

Using the *predetermined overhead rate* calculated in Event 4, Janis determined it should apply $38,400 ($48,000 labor × 0.80 overhead rate) of overhead costs to the mixing department's work in process inventory. The effects of the overhead application on the financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Manufacturing Overhead	+	WIP—Mixing									
(38,400)	+	38,400	=	NA	+	NA	NA	−	NA	=	NA

The event is an asset exchange. Total assets and net income are not affected.

EVENT 9 Janis finished mixing some of the juice extract with additives and transferred the related cost from the mixing department Work in Process Inventory account to the packaging department Work in Process Inventory account.

Total product costs in the mixing department were $228,760 ($7,960 beginning balance + $110,000 transferred-in cost + $24,400 materials + $48,000 labor + $38,400 overhead). An engineer estimated that Janis transferred 510,000 units of mixed juice from the mixing department to the packaging department and that the 88,000 units of juice in the mixing department ending inventory were 25 percent complete.

The mixing department ending inventory therefore represented 22,000 (88,000 × 0.25) *equivalent whole units.* The total equivalent whole units produced by the mixing department was 532,000 (510,000 + 22,000). The average *cost per equivalent unit* was therefore $0.43 ($228,760 ÷ 532,000). Janis allocated the total product costs incurred in the mixing department between the amount transferred to the packaging department and the amount in the mixing department's *ending* work in process inventory as follows.

	Equivalent Units	×	Cost per Unit	Cost to Be Allocated
Transferred-out costs	510,000	×	$0.43	$219,300
Ending inventory	22,000	×	0.43	9,460
Total				$228,760

The effects of transferring $219,300 from the mixing department work in process inventory to the packaging department work in process inventory are as follows.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
WIP—Mixing	+	WIP—Packaging									
(219,300)	+	219,300	=	NA	+	NA	NA	−	NA	=	NA

This event is an asset exchange. Total assets and net income are unaffected. Find the ending balance in the mixing department's Work in Process Inventory account in Exhibit 12.9. Also find the entry that transfers $219,300 of product cost from the mixing department's Work in Process Inventory account to the packaging department's Work in Process Inventory account.

EVENT 10 Janis added containers and other packaging materials costing $32,000 to work in process in the packaging department.

The effects of this event on the financial statements follow:

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Raw Materials—Containers	+	WIP—Packaging									
(32,000)	+	32,000	=	NA	+	NA	NA	−	NA	=	NA

This event is an asset exchange. Total assets and net income are not affected.

EVENT 11 Janis paid $43,000 cash to production employees who worked in the packaging department.

The effects of this event on the financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Cash	+	WIP—Packaging									
(43,000)	+	43,000	=	NA	+	NA	NA	−	NA	=	NA

This is an asset exchange. Total assets and net income are not affected.

EVENT 12 Janis applied estimated manufacturing overhead costs to the packaging department work in process inventory.

Using the *predetermined overhead rate* calculated in Event 4, Janis determined it should apply $34,400 ($43,000 labor × 0.80 overhead rate) of overhead costs to the packaging department's work in process inventory. The effects of the overhead application on the financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Manufacturing Overhead	+	WIP—Packaging									
(34,400)	+	34,400	=	NA	+	NA	NA	−	NA	=	NA

The event is an asset exchange. Total assets and net income are not affected.

EVENT 13 Janis finished packaging some of the juice and transferred the related cost from the packaging department Work in Process Inventory account to the Finished Goods Inventory account.

Total product costs in the packaging department were $349,830 ($21,130 beginning balance + $219,300 transferred-in cost + $32,000 materials + $43,000 labor + $34,400 overhead). An engineer estimated that Janis transferred 480,000 units of packaged juice from the packaging department to finished goods inventory and that the 90,000 units of juice in the packaging department ending inventory were 30 percent complete.

The packaging department ending inventory therefore represented 27,000 (90,000 × 0.30) *equivalent whole units.* The total equivalent whole units produced by the packaging department was 507,000 (480,000 + 27,000). The average *cost per equivalent unit* was therefore $0.69 ($349,830 ÷ 507,000). Janis allocated the total product costs incurred in the packaging department between the amount transferred to finished goods inventory and the amount in the packaging department's ending work in process inventory as follows.

	Equivalent Units	×	Cost per Unit	Cost to Be Allocated
Transferred-out costs	480,000	×	$0.69	$331,200
Ending inventory	27,000	×	0.69	18,630
Total				$349,830

The effects of transferring $331,200 from the packaging department work in process inventory to the finished goods inventory follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
WIP—Packaging	+	Finished Goods									
(331,200)	+	331,200	=	NA	+	NA	NA	−	NA	=	NA

This event is an asset exchange. Total assets and net income are unaffected. Find the ending balance in the packaging department's Work in Process Inventory account in Exhibit 12.9. Also find the entry that transfers $331,200 of product cost from the packaging department's Work in Process Inventory account to the Finished Goods Inventory account.

EVENT 14 Janis paid $106,330 cash for actual overhead costs.

The effects of this event on the financial statements follow.

Assets			=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
Cash	+	Manufacturing Overhead									
(106,330)	+	106,330	=	NA	+	NA	NA	−	NA	=	NA

Incurring *actual overhead costs* is an asset exchange event. Total assets and net income are not affected.

EVENT 15 Janis sold 490,000 cans of juice for $1 per can.

The effects of this event on the financial statements follow.

Assets	=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
490,000	=	NA	+	490,000	490,000	−	NA	=	490,000

Recognizing revenue from the sale of inventory is an asset source event. Assets (cash) and stockholders' equity (retained earnings) both increase, as do revenue and net income reported on the income statement.

EVENT 16 Janis recognized cost of goods sold for the 490,000 cans of juice sold in Event 15.

The average cost per finished can of juice was $0.69 (see Event 13). Cost of goods sold was therefore $338,100 (490,000 units × $0.69). The effects of this event on the financial statements follow.

Assets	=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
(338,100)	=	NA	+	(338,100)	NA	−	338,100	=	(338,100)

Recognizing cost of goods sold is an asset use transaction. Both assets (finished goods inventory), and stockholders' equity (retained earnings), decrease. The increase in the expense, cost of goods sold, decreases net income.

EVENT 17 Janis paid $78,200 cash for selling and administrative expenses.

The effects of this event on the financial statements follow.

Assets	=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
(78,200)	=	NA	+	(78,200)	NA	−	78,200	=	(78,200)

Recognizing selling and administrative expense is an asset use transaction. It decreases assets (cash) and stockholders' equity (retained earnings). Recognizing the expense decreases net income.

EVENT 18 Janis closed the Manufacturing Overhead account and increased the Cost of Goods Sold account by $3,130.

During 2012, Janis applied $103,200 of overhead cost to production. Actual overhead costs were $106,330. Overhead was therefore underapplied by $3,130 ($106,330 − $103,200), indicating that too little overhead was transferred to work in process inventory, finished goods inventory, and cost of goods sold. Janis considered the underapplied amount insignificant and assigned it directly to cost of goods sold. The effects of this event on the financial statements follow.

Assets	=	Liabilities	+	Equity	Revenue	−	Expenses	=	Net Income
(3,130)	=	NA	+	(3,130)	NA	−	3,130	=	(3,130)

Since underapplied overhead means too little estimated cost was transferred from the asset accounts to the Cost of Goods Sold account, closing the Manufacturing Overhead account to cost of goods sold corrects the understatement. The additional overhead costs of $3,130 increase cost of goods sold and decrease net income. After this adjustment, the total increases in the overhead account (actual costs) equal the total decreases (estimated costs). The ending balance in the Manufacturing Overhead account is zero. Manufacturing overhead is not reported on any financial statement.

Exhibit 12.10 shows the year-end adjusted trial balance for Janis Juice Company.

EXHIBIT 12.9

Ledger T-Accounts for Janis Juice Company

Cash

Bal.	320,000	(1)	84,000
(15)	490,000	(3)	38,000
		(7)	48,000
		(11)	43,000
		(14)	106,330
		(17)	78,200
Bal.	412,470		

Raw Materials—Fruit

Bal.	7,800	(2)	26,720
(1)	25,000		
Bal.	6,080		

Raw Materials—Additives

Bal.	3,100	(6)	24,400
(1)	30,000		
Bal.	8,700		

Raw Materials—Containers

Bal.	9,500	(10)	32,000
(1)	29,000		
Bal.	6,500		

Manufacturing Overhead

(14)	106,330	(4)	30,400
		(8)	38,400
		(12)	34,400
		(18)	3,130
Bal.	0		

Work in Process—Extraction

Bal.	22,360	(5)	110,000
(2)	26,720		
(3)	38,000		
(4)	30,400		
Bal.	7,480		

Work in Process—Mixing

Bal.	7,960	(9)	219,300
(5)	110,000		
(6)	24,400		
(7)	48,000		
(8)	38,400		
Bal.	9,460		

Work in Process—Packaging

Bal.	21,130	(13)	331,200
(9)	219,300		
(10)	32,000		
(11)	43,000		
(12)	34,400		
Bal.	18,630		

Finished Goods Inventory

Bal.	20,700	(16)	338,100
(13)	331,200		
Bal.	13,800		

Common Stock

		Bal.	180,000

Retained Earnings

		Bal.	232,550

Sales Revenue

		(15)	490,000

Cost of Goods Sold

(16)	338,100		
(18)	3,130		
Bal.	341,230		

Selling and Admin. Exp.

(17)	78,200		

EXHIBIT 12.10

JANIS JUICE COMPANY
Adjusted Trial Balance
As of December 31, 2012

	Debit	Credit
Cash	$412,470	
Raw materials—fruit	6,080	
Raw materials—additives	8,700	
Raw materials—containers	6,500	
Work in process—extraction	7,480	
Work in process—mixing	9,460	
Work in process—packaging	18,630	
Finished goods inventory	13,800	
Common stock		$180,000
Retained earnings		232,550
Sales revenue		490,000
Cost of goods sold	341,230	
Selling and administrative expenses	78,200	
Total	$902,550	$902,550

CHECK YOURSELF 12.2

Western Manufacturing Company uses a process costing system. Its products pass through two departments. Beginning inventory in Department I's Work in Process (WIP) account was $5,000. During the month the department added $13,200 of product costs to the WIP account. There were 200 units of product in beginning inventory, and 500 units were started during the month. Ending inventory consisted of 300 units 40 percent complete. Prepare a cost of production report showing the cost of goods transferred from Department I to Department II and the cost of Department I's ending work in process inventory.

Answer

Cost of Production Report

	Actual		Equivalent Units
Determination of Equivalent Units			
Beginning inventory	200		
Units added to production	500		
Total	700		
Transferred to finished goods	400	100% Complete	400
Ending inventory	300	40% Complete	120
Total	700		520
Determination of Cost per Unit			
Cost accumulation			
Beginning inventory	$ 5,000		
Product costs added	13,200		
Total product costs	$18,200		
Divide by	÷		
equivalent units	520		
Cost per equivalent unit	$ 35		
Cost Allocation			
Transferred to Department II (400 × $35)	$14,000		
Ending WIP inventory (120 × $35)	4,200		
Total	$18,200		

FOCUS ON INTERNATIONAL ISSUES

JOB-ORDER, PROCESS, AND HYBRID COSTING SYSTEMS CROSS INTERNATIONAL BORDERS

Companies throughout the world use job-order, process, and hybrid costing systems. **Nestlé Group**, a Swiss company, makes chocolate candy bars, among many other products. A homogeneous product like candy bars requires the use of a process cost system. In contrast, **Airbus** is an aircraft manufacturing company headquartered in Toulouse, France. When it completes an order for five A320 airplanes for Air New Zealand, the cost of this order will be determined using a job-order costing system.

<< A Look Back

Job-order and *process costing systems* represent the two primary methods of accounting for product cost flows in manufacturing companies. In both systems, entries in the accounting records parallel the physical flow of products as they move through production. Job-order costing systems are used by manufacturers that produce distinct products or distinct batches of products. Products suited to job-order systems include buildings, ships, airplanes, and special-order batches. A job-order costing system accumulates costs for individual products or batches of products. Each product or batch has a job identification number. Costs are accumulated separately by job number. A job-order costing system requires detailed accounting information. The total cost of all jobs is accumulated in one Work in Process Inventory control account; details of the cost of materials, labor, and overhead for each job are kept in subsidiary records called *job-order cost sheets.* Process costing systems are used by manufacturers that make homogeneous products in a continuous production process. Products suited to a process costing system include paint, gasoline, and soft drinks. A process costing system accumulates product costs for each processing department (cutting, processing, assembling, packaging). Because the units are homogeneous, the cost per unit can be determined by dividing the total processing cost by the number of units (cost averaging). Any units that are partially complete at the end of an accounting period must be converted into equivalent whole units prior to determining the average cost per unit. The cost per equivalent whole unit is used to allocate the total processing cost among departments and ending inventories.

>> A Look Forward

The remaining two chapters are transitional chapters. Chapter 13 discusses financial statement analysis. Chapter 14 discusses advanced topics relating to the statement of cash flows. Some instructors include these subjects in the financial accounting course, and other instructors cover them in the managerial accounting course.

A step-by-step audio-narrated series of slides is provided on the text website at www.mhhe.com/edmonds2011.

SELF-STUDY REVIEW PROBLEM 1

Hill Construction Company uses a job-order costing system. The company had three jobs in process at the beginning of the month. The beginning balance in the Work in Process control account was $145,400, made up of $42,400, $65,100, and $37,900 shown on the job cost sheets for Jobs 302, 303, and 304, respectively. During the month, Hill added the following materials and labor costs to each job:

Inventory	Materials	Labor
Job 302	$10,200	$32,000
Job 303	12,400	18,000
Job 304	16,500	10,000
Total	$39,100	$60,000

Overhead cost is applied at the predetermined rate of $0.60 per direct labor dollar. Actual overhead costs for the month were $36,800. Hill completed Job 303 and sold it for $129,000 cash during the month.

Required

a. Determine the balance in the Work in Process account at the end of the month.

b. Explain how the entry to close the Manufacturing Overhead account would affect the Cost of Goods Sold account.

c. Determine the amount of gross margin Hill would report on its income statement for the month.

Solution to Requirement a

Cost accumulated in the Work in Process account:

Inventory	Beg. Bal.	+	Materials	+	Labor	+	Overhead*	=	Total
Job 302	$42,400		$10,200		$32,000		$19,200		$103,800
Job 303	65,100		12,400		18,000		10,800		106,300
Job 304	37,900		16,500		10,000		6,000		70,400

*60% of direct labor cost.

Since Hill has sold Job 303, work in process at the end of the month is the sum of costs assigned to Jobs 302 and 304, $174,200 ($103,800 + $70,400).

Solution to Requirement b

Total applied overhead is $36,000 ($19,200 + $10,800 + $6,000). Since actual overhead is $36,800, overhead is underapplied by $800 ($36,800 − $36,000). Since the overhead is underapplied, cost of goods sold is understated. The entry to close the overhead account would increase the amount of cost of goods sold by $800.

Solution to Requirement c

Sales revenue	$129,000
Cost of goods sold (Job 303, $106,300 + Underapplied overhead, $800)	(107,100)
Gross margin	$ 21,900

A step-by-step audio-narrated series of slides is provided on the text website at www.mhhe.com/edmonds2011.

SELF-STUDY REVIEW PROBLEM 2

United Technology Manufacturing Company (UTMC) uses a process costing system. Products pass through two departments. The following information applies to the Assembly Department. Beginning inventory in the department's Work in Process (WIP) account was $18,400. During the month UTMC added $200,273 of product costs to the WIP account. There were 5,700 units of product in the beginning inventory and 45,300 units started during the month. The ending inventory consisted of 4,200 units, which were 30 percent complete.

Required

Prepare a cost of production report for the month.

Solution

Cost of Production Report

	Actual		Equivalent Units
Determination of Equivalent Units			
Beginning inventory	5,700		
Units added to production	45,300		
Total	51,000		
Transferred to finished goods	46,800	100% Complete	46,800
Ending inventory	4,200	30% Complete	1,260
Total	51,000		48,060
Determination of Cost per Unit			
Cost accumulation			
Beginning inventory	$ 18,400		
Product costs added	200,273		
Total product costs	$218,673		
Divide by	÷		
equivalent units	48,060		
Cost per equivalent unit	$ 4.55		
Cost Allocation			
Transferred out (46,800 × $4.55)	$212,940		
Ending WIP inventory (1,260 × $4.55)	5,733		
Total	$218,673		

KEY TERMS

Cost per equivalent unit 550
Equivalent whole units 549
First-in, first-out (FIFO) method 550
Hybrid costing system 538
Job cost sheet 538
Job-order costing system 536
Materials requisition form 538
Process costing system 536
Transferred-in costs 537
Weighted average method 550
Work ticket 538

QUESTIONS

1. To what types of products is a job-order costing system best suited? Provide examples.
2. To what types of products is a process costing system best suited? Provide examples.
3. Why do both job-order and process costing require some form of cost averaging?
4. How is the unit cost of a product determined in a process costing system?

5. Ludwig Company, which normally operates a process costing system to account for the cost of the computers that it produces, has received a special order from a corporate client to produce and sell 5,000 computers. Can Ludwig use a job-order costing system to account for the costs associated with the special order even though it uses a process costing system for its normal operations?
6. Which system, a job-order or a process costing system, requires more documentation?
7. How do source documents help accountants operate a costing system?
8. In a job-order costing system, what are the Work in Process Inventory subsidiary records called? What information is included in these subsidiary records?
9. How is indirect labor recorded in ledger accounts? How is this labor eventually assigned to the items produced in a job-order costing system?
10. How is depreciation on manufacturing equipment recorded in ledger accounts? How is this depreciation assigned to the items produced in a job-order costing system and in a process costing system?
11. Why is a process costing system not appropriate for companies that produce items that are distinctly different from one another?
12. The president of Videl Corporation tells you that her company has a difficult time determining the cost per unit of product that it makes. It seems that some units are always partially complete. Counting these units as complete understates the cost per unit because all of the units but only part of the cost is included in the unit cost computation. Conversely, ignoring the number of partially completed products overstates the cost per unit because all of the costs are included but some of the number of units are omitted from the per-unit computation. How can Videl obtain a more accurate cost per unit figure?
13. Bindon Furniture Manufacturing has completed its monthly inventory count for dining room chairs and recorded the following information for ending inventory: 600 units 100 percent complete, 300 units 60 percent complete, and 100 units 20 percent complete. The company uses a process costing system to determine unit cost. Why would unit cost be inaccurate if 1,000 units were used to determine unit cost?
14. What is the weighted average method of determining equivalent units? Why is it used? What are its weaknesses?
15. What is the purpose of each of the three primary steps in a process costing system? Describe each.
16. In a process costing system, what does the term *transferred-in costs* mean? How is the amount of transferred-in costs determined?
17. The finishing department is the last of four sequential production departments for Kowalski Graphics, Inc. The company's other production departments are design, layout, and printing. The finishing department incurred the following costs in March 2012: direct materials, $40,000; direct labor, $80,000; applied overhead, $90,000; and transferred-in costs, $120,000. Which department incurred the transferred-in costs? In what month were the transferred-in costs incurred?

MULTIPLE-CHOICE QUESTIONS

Multiple-choice questions are provided on the text website at www.mhhe.com/edmonds2011.

EXERCISES—SERIES A

All applicable Exercises in Series A are available with McGraw-Hill's *Connect Accounting*.

connect ACCOUNTING

Exercise 12-1A *Matching products with appropriate costing systems*

LO 1

Required

Indicate which costing system (job-order, process, or hybrid) would be most appropriate for the type of product listed in the left-hand column. The first item is shown as an example.

Type of Product	Type of Costing System
a. Hollywood movie	job-order
b. Airplane	
c. Personal computer with special features	
d. Coffee table	
e. Plastic storage containers	
f. TV set	
g. Ship	
h. Potato chips	
i. House	
j. Custom-made suit	
k. Van with custom features	
l. CPA review course	
m. Shirts	
n. Pots and pans	
o. Apartment building	
p. Automobile	

LO 1

Exercise 12-2A *Identifying the appropriate costing system*

Flagg Company makes small aluminum storage bins that it sells through a direct marketing mail-order business. The typical bin measures 6 × 8 feet. The bins are normally used to store garden tools or other small household items. Flagg customizes bins for special-order customers by adding shelving; occasionally, it makes large bins following the unique specifications of commercial customers.

Required

Recommend the type of costing system (job-order, process, or hybrid) that Flagg should use. Explain your recommendation.

LO 1, 2

Exercise 12-3A *Job-order or process costing system and a pricing decision*

Sam Wu, a tailor in his home country, recently immigrated to the United States. He is interested in starting a business making custom suits for men. Mr. Wu is trying to determine the cost of making a suit so he can set an appropriate selling price. He estimates that his materials cost will range from $100 to $160 per suit. Because he will make the suits himself, he assumes there will be no labor cost. Some suits will require more time than others, but Mr. Wu considers this fact to be irrelevant because he is personally supplying the labor, which costs him nothing. Finally, Mr. Wu knows that he will incur some overhead costs such as rent, utilities, advertising, packaging, delivery, and so on; however, he is uncertain as to the exact cost of these items.

Required

a. Should Mr. Wu use a job-order or a process costing system?

b. How can Mr. Wu determine the cost of suits he makes during the year when he does not know what the total overhead cost will be until the end of the year?

c. Is it appropriate for Mr. Wu to consider labor cost to be zero?

d. With respect to the overhead costs mentioned in the problem, distinguish the *manufacturing overhead* costs from the *selling and administrative* expenses. Comment on whether Mr. Wu should include the selling and administrative expenses in determining the product cost if he uses cost-plus pricing. Comment on whether the selling and administrative expenses should be included in determining the product cost for financial reporting purposes.

LO 3

Exercise 12-4A *Job-order costing in a manufacturing company*

Ferguson Corporation builds sailboats. On January 1, 2012, the company had the following account balances: $65,000 for both cash and common stock. Boat 25 was started on February 10 and finished on May 31. To build the boat, Ferguson had incurred cash costs of $5,100 for labor and $4,350 for materials. During the same period, Ferguson paid $6,600 cash for actual manufacturing overhead costs. The company expects to incur $175,500 of indirect overhead cost during 2012. The overhead is allocated to jobs based on direct labor cost. The expected total labor cost for the year is $135,000.

Ferguson uses a just-in-time inventory management system. Consequently, it does not have raw materials inventory. Raw materials purchases are recorded directly in the Work in Process Inventory account.

Required

a. Use the horizontal financial statements model, as illustrated here, to record Ferguson's business events. The first row shows beginning balances.

Assets							=	Equity								
Cash	+	Work in Process	+	Finished Goods	+	Manuf. Overhead	=	Com. Stock	+	Ret. Ear.	Rev.	−	Exp.	=	Net Inc.
65,000	+	NA	+	NA	+	NA	=	65,000	+	NA	NA	−	NA	=	NA

b. If Ferguson desires to earn a profit equal to 20 percent of cost, for what price should it sell the boat?

c. If the boat is not sold by year-end, what amount would appear in the Work in Process Inventory and Finished Goods Inventory on the balance sheet for Boat 25?

d. Is the amount of inventory you calculated in Requirement *c* the actual or the estimated cost of the boat?

e. When is it appropriate to use estimated inventory cost on a year-end balance sheet?

Exercise 12-5A *Job-order costing in a manufacturing company* LO 3

Keeney Corporation makes custom-order furniture to meet the needs of disabled persons. On January 1, 2011, the company had the following account balances: $90,000 for both cash and common stock. In 2011, Keeney worked on three jobs. The relevant direct operating costs follow.

	Direct Labor	Direct Materials
Job 1	$ 4,000	$4,500
Job 2	2,800	1,400
Job 3	8,200	3,600
Total	$15,000	$9,500

Keeney's predetermined manufacturing overhead rate was $0.40 per direct labor dollar. Actual manufacturing overhead costs amounted to $5,758. Keeney paid cash for all costs. The company completed and delivered Jobs 1 and 2 to customers during the year. Job 3 was incomplete at the end of the year. The company sold Job 1 for $16,000 cash and Job 2 for $7,800 cash. Keeney also paid $3,000 cash for selling and administrative expenses for the year.

Keeney uses a just-in-time inventory management system. Consequently, it does not have raw materials inventory. Raw materials purchases are recorded directly in the Work in Process Inventory account.

Required

a. Record the preceding events in a horizontal statements model. The first row shows beginning balances.

Assets							=	Equity								
Cash	+	Work in Process	+	Finished Goods	+	Manuf. Overhead	=	Com. Stock	+	Ret. Ear.	Rev.	−	Exp.	=	Net Inc.
90,000	+	NA	+	NA	+	NA	=	90,000	+	NA	NA	−	NA	=	NA

b. Record the entry to close the amount of underapplied or overapplied overhead for the year to Cost of Goods Sold (in the expense category) in the horizontal financial statements model.

c. Determine the gross margin for the year.

LO 3

Exercise 12-6A *Job-order costing in a service company*

Bailes Condos Corporation is a small company owned by Ray Miller. It leases three condos of differing sizes to customers as vacation facilities. Labor costs for each condo consist of maid service and maintenance cost. Other direct operating costs consist of interest and depreciation. The direct operating costs for each condo follow.

	Direct Labor	Other Direct Operating Costs
Condo 1	$16,200	$37,800
Condo 2	18,600	42,000
Condo 3	22,500	57,000
Total	$ 5,730	$13,680

Indirect operating expenses, which amounted to $41,040, are allocated to the condos in proportion to the amount of other direct operating costs incurred for each.

Required

a. Assuming that the amount of rent revenue from Condo 2 is $96,000, what amount of income did it earn?

b. Based on the preceding information, will the company show finished goods inventory on its balance sheet? If so, what is the amount of this inventory? If not, explain why not.

LO 3

Exercise 12-7A *Job-order costing system*

The following information applies to Job 730 completed by Porthro Manufacturing Company during October 2010. The amount of labor cost for the job was $81,000. Applied overhead amounted to $102,400. The project was completed and delivered to Rodewald Company at a contract price of $314,000. Porthro recognized a gross profit of $54,400 on the job.

Required

Determine the amount of raw materials used to complete Job 730.

LO 5

Exercise 12-8A *Process costing system—determine equivalent units*

Sheridan Furniture Company's cutting department had 400 units in its beginning work in process inventory. During the accounting period it began work on 1,200 units of product and had 600 partially complete units in its ending inventory.

Required

(Each requirement is independent of the others.)

a. Assuming the ending inventory units were 60 percent complete, determine the total number of equivalent whole units (number transferred out plus number in ending inventory) accounted for by the cutting department.

b. Assuming that the total number of equivalent whole units (number transferred out plus number in ending inventory) accounted for by the cutting department was 1,240, what was the ending inventory percentage of completion?

LO 5

Exercise 12-9A *Cost allocation in a process system*

McAlister Watches, Inc., makes watches. Its assembly department started the accounting period with a beginning inventory balance of $22,000. During the accounting period, the department incurred $43,500 of transferred-in cost, $21,000 of materials cost, $60,000 of labor cost, and $67,000 of applied overhead cost. The department processed 6,100 total equivalent units of product during the accounting period.

Required

(Each requirement is independent of the others.)

a. Assuming that 1,200 equivalent units of product were in the ending work in process inventory, determine the amount of cost transferred out of the Work in Process Inventory account of the assembly department to the Finished Goods Inventory account. What was the assembly department's cost of ending work in process inventory?

b. Assuming that 5,600 units of product were transferred out of the assembly department's work in process inventory to finished goods inventory, determine the amount of the assembly department's cost of ending work in process inventory. What was the cost of the finished goods inventory transferred out of the assembly department?

Exercise 12-10A *Process costing system—determine equivalent units and allocate costs* LO 5

Milwaukee Ski Company manufactures snow skis. During the most recent accounting period, the company's finishing department transferred 4,200 sets of skis to finished goods. At the end of the accounting period, 450 sets of skis were estimated to be 40 percent complete. Total product costs for the finishing department amounted to $219,000.

Required

a. Determine the cost per equivalent.

b. Determine the cost of the goods transferred out of the finishing department.

c. Determine the cost of the finishing department's ending work in process inventory.

Exercise 12-11A *Process costing system* LO 5

Fancher Company is a cosmetics manufacturer. Its assembly department receives raw cosmetics from the molding department. The assembly department places the raw cosmetics into decorative containers and transfers them to the packaging department. The assembly department's Work in Process Inventory account had a $62,000 balance as of August 1. During August, the department incurred raw materials, labor, and overhead costs amounting to $72,000, $85,000, and $80,000, respectively. The department transferred products that cost $342,000 to the packaging department. The balance in the assembly department's Work in Process Inventory account as of August 31 was $83,000.

Required

Determine the cost of raw cosmetics transferred from the molding department to the assembly department during August.

Exercise 12-12A *Selecting the appropriate costing system* LO 1

Larry's Car Wash (LCW) offers customers three cleaning options. Under Option 1, only the exterior is cleaned. With Option 2, the exterior and interior are cleaned. Option 3 provides exterior waxing as well as exterior and interior cleaning. LCW completed 4,000 Option 1 cleanings, 5,200 Option 2 cleanings, and 3,200 Option 3 cleanings during 2012. The average cost of completing each cleaning option and the price charged for it are shown here.

	Option 1	Option 2	Option 3
Price charged	$10	$12	$21
Costs of completing task	4	5	15

Required

a. Is LCW a manufacturing or a service company? Explain.

b. Which costing system, job-order or process, is most appropriate for LCW? Why?

c. What is the balance in LCW's Work in Process and Finished Goods Inventory accounts on the December 31 balance sheet?

d. Speculate as to the major costs that LCW incurs to complete a cleaning job.

PROBLEMS—SERIES A

connect ACCOUNTING

All Problems in Series A are available with McGraw-Hill's *Connect Accounting*.

LO 3

eXcel

CHECK FIGURE
d. COGM: $14,100
NI: $3,900

Problem 12-13A *Job-order costing system*

Baucom Manufacturing Corporation was started with the issuance of common stock for $50,000. It purchased $7,000 of raw materials and worked on three job orders during 2012 for which data follow. (Assume that all transactions are for cash unless otherwise indicated.)

	Direct Raw Materials Used	Direct Labor
Job 1	$1,000	$2,000
Job 2	2,000	4,000
Job 3	3,000	2,000
Total	$6,000	$8,000

Factory overhead is applied using a predetermined overhead rate of $0.60 per direct labor dollar. Jobs 2 and 3 were completed during the period and Job 3 was sold for $10,000 cash. Baucom paid $400 for selling and administrative expenses. Actual factory overhead was $4,300.

Required

a. Record the preceding events in a horizontal statements model. The first event for 2012 has been recorded as an example.

Assets									=	Equity								
Cash	+	Raw M.	+	MOH	+	WIP	+	F. Goods	=	C. Stk.	+	Ret. Ear.		Rev.	−	Exp.	=	Net Inc.
$50,000	+	NA	+	NA	+	NA	+	NA	=	$50,000	+	NA		NA	−	NA	=	NA

b. Reconcile all subsidiary accounts with their respective control accounts.

c. Record the closing entry for over- or underapplied manufacturing overhead in the horizontal statements model, assuming that the amount is insignificant.

d. Prepare a schedule of cost of goods manufactured and sold, an income statement, and a balance sheet for 2012.

LO 3

CHECK FIGURES
d. COGM: $2,496
Total Assets: $10,504

Problem 12-14A *Job-order costing system*

Fenske Construction Company began operations on January 1, 2012, when it acquired $10,000 cash from the issuance of common stock. During the year, Fenske purchased $2,600 of direct raw materials and used $2,400 of the direct materials. There were 108 hours of direct labor worked at an average rate of $8 per hour paid in cash. The predetermined overhead rate was $3.00 per direct labor hour. The company started construction on three prefabricated buildings. The job cost sheets reflected the following allocations of costs to each building.

	Direct Materials	Direct Labor Hours
Job 1	$ 600	30
Job 2	1,000	50
Job 3	800	28

The company paid $100 cash for indirect labor costs. Actual overhead cost paid in cash other than indirect labor was $240. Fenske completed Jobs 1 and 2 and sold Job 1 for $1,600 cash. The company incurred $150 of selling and administrative expenses that were paid in cash. Over- or underapplied overhead is closed to Cost of Goods Sold.

Required

a. Record the preceding events in a horizontal statements model. The first event for 2012 has been recorded as an example.

Assets									=	Equity								
Cash	+	Raw M.	+	MOH	+	WIP	+	F. Goods	=	C. Stk.	+	Ret. Ear.		Rev.	−	Exp.	=	Net Inc.
10,000	+	NA	+	NA	+	NA	+	NA	=	10,000	+	NA		NA	−	NA	=	NA

b. Reconcile all subsidiary accounts with their respective control accounts.

c. Record the closing entry for over- or underapplied manufacturing overhead in the horizontal statements model, assuming that the amount is insignificant.

d. Prepare a schedule of cost of goods manufactured and sold, an income statement, and a balance sheet for 2012.

Problem 12-15A *Process costing system*

LO 4, 5

CHECK FIGURES
d. COGS: $36,800
Cash: $54,000

Alston Corporation makes rocking chairs. The chairs move through two departments during production. Lumber is cut into chair parts in the cutting department, which transfers the parts to the assembly department for completion. The company sells the unfinished chairs to hobby shops. The following transactions apply to Alston's operations for its first year, 2011. (Assume that all transactions are for cash unless otherwise stated.)

1. The company was started when it acquired a $100,000 cash contribution from the owners.
2. The company purchased $30,000 of direct raw materials and $800 of indirect materials. Indirect materials are capitalized in the Production Supplies account.
3. Direct materials totaling $12,000 were issued to the cutting department.
4. Labor cost was $56,400. Direct labor for the cutting and assembly departments was $20,000 and $26,000, respectively. Indirect labor costs were $10,400.
5. The predetermined overhead rate was $0.50 per direct labor dollar in each department.
6. Actual overhead costs other than indirect materials and indirect labor were $12,800 for the year.
7. The cutting department transferred $24,000 of inventory to the assembly department.
8. The assembly department transferred $40,000 of inventory to finished goods.
9. The company sold inventory costing $36,000 for $60,000.
10. Selling and administrative expenses were $6,000.
11. A physical count revealed $200 of production supplies on hand at the end of 2011.
12. Assume that over- or underapplied overhead is insignificant.

Required

a. Record the data in T-accounts.

b. Record the closing entry for over- or underapplied manufacturing overhead, assuming that the amount is insignificant.

c. Close the revenue and expense accounts.

d. Prepare a schedule of cost of goods manufactured and sold, an income statement, and a balance sheet for 2011.

Problem 12-16A *Process costing system*

LO 4, 5

CHECK FIGURES
d. NI: $21,800
Cash: $6,700

Use the ending balances from Problem 12-15A as the beginning balances for this problem. The transactions for the second year of operation (2012) are described here. (Assume that all transactions are cash transactions unless otherwise indicated.)

1. The company purchased $40,000 of direct raw materials and $1,300 of indirect materials. Indirect materials are capitalized in the Production Supplies account.
2. Materials totaling $13,400 were issued to the cutting department.

3. Labor cost was $47,000. Direct labor for the cutting and assembly departments was $22,000 and $20,000, respectively. Indirect labor costs were $5,000. (*Note:* Assume that sufficient cash is available when periodic payments are made. These amounts represent summary data for the entire year and are not presented in exact order of collection and payment.)
4. The predetermined overhead rate was $0.50 per direct labor dollar in each department.
5. Actual overhead costs other than indirect materials and indirect labor for the month were $14,600.
6. The cutting department transferred $30,000 of inventory to the assembly department.
7. The assembly department transferred $60,000 of inventory to finished goods.
8. The company sold inventory costing $34,000 for $64,000.
9. Selling and administrative expenses were $8,400.
10. At the end of 2012, $300 of production supplies was on hand.
11. Assume that over- or underapplied overhead is insignificant.

Required

a. Record the data in T-accounts.
b. Record the closing entry for over- or underapplied manufacturing overhead, assuming that the amount is insignificant.
c. Close the revenue and expense accounts.
d. Prepare a schedule of cost of goods manufactured and sold, an income statement, and a balance sheet for 2012.

LO 5

eXcel

Problem 12-17A *Process costing system cost of production report*

CHECK FIGURE
b. $33.80

Burris Company had 250 units of product in its work in process inventory at the beginning of the period and started 2,000 additional units during the period. At the end of the period, 750 units were in work in process inventory. The ending work in process inventory was estimated to be 40 percent complete. The cost of work in process inventory at the beginning of the period was $6,840, and $54,000 of product costs was added during the period.

Required

Prepare a cost of production report showing the following.

a. The number of equivalent units of production.
b. The product cost per equivalent unit.
c. The total cost allocated between the ending Work in Process Inventory and Finished Goods Inventory accounts.

LO 5

Problem 12-18A *Determining inventory cost using a process costing system*

CHECK FIGURE
b. $60

Espinoza Company had 200 units of product in work in process inventory at the beginning of the period. It started 1,400 units during the period and transferred 1,200 units to finished goods inventory. The ending work in process inventory was estimated to be 70 percent complete. Cost data for the period follow.

	Product Costs
Beginning balance	$31,600
Added during period	57,200
Total	$88,800

Required

Prepare a cost of production report showing the following.

a. The number of equivalent units of production.
b. The product cost per equivalent unit.
c. The total cost allocated between ending work in process inventory and finished goods inventory.

Problem 12-19A *Process costing system*

LO 5

CHECK FIGURE
b. $49.50

Rockwall Plastic Products Company makes a plastic toy using two departments, parts and assembly. The following data pertain to the parts department's transactions in 2011.

1. The beginning balance in the Work in Process Inventory account was $11,400. This inventory consisted of parts for 1,000 toys. The beginning balances in the Raw Materials Inventory, Production Supplies, and Cash accounts were $128,000, $2,000, and $400,000, respectively.
2. Direct materials costing $104,000 were issued to the parts department. The materials were sufficient to make 5,000 additional toys.
3. Direct labor cost was $94,000, and indirect labor costs are $9,200. All labor costs were paid in cash.
4. The predetermined overhead rate was $0.30 per direct labor dollar.
5. Actual overhead costs other than indirect materials and indirect labor for the year were $19,000, which was paid in cash.
6. The parts department completed work for 4,500 toys. The remaining toy parts were 20 percent complete. The completed parts were transferred to the assembly department.
7. All of the production supplies had been used by the end of 2011.
8. Over- or underapplied overhead was closed to the Cost of Goods Sold account.

Required

a. Determine the number of equivalent units of production.
b. Determine the product cost per equivalent unit.
c. Allocate the total cost between the ending work in process inventory and parts transferred to the assembly department.
d. Record the transactions in a partial set of T-accounts.

Problem 12-20A *Process costing system*

LO 5

eXcel

CHECK FIGURE
b. $0.14

Zest Cola Corporation produces a new soft drink brand, Sweet Spring, using two production departments, mixing and bottling. Zest's beginning balances and data pertinent to the mixing department's activities for 2011 follow.

Accounts	Beginning Balances
Cash	$ 45,000
Raw materials inventory	14,800
Production supplies	100
Work in process inventory (400,000 units)	48,000
Common stock	107,900

1. Zest Cola issued additional common stock for $54,000 cash.
2. The company purchased raw materials and production supplies for $29,600 and $800, respectively, in cash.
3. The company issued $32,360 of raw materials to the mixing department for the production of 800,000 units of Sweet Spring that were started in 2011. A unit of soft drink is the amount needed to fill a bottle.
4. The mixing department used 2,400 hours of labor during 2011, consisting of 2,200 hours for direct labor and 200 hours for indirect labor. The average wage was $9.60 per hour. All wages were paid in 2011 in cash.
5. The predetermined overhead rate was $1.60 per direct labor hour.
6. Actual overhead costs other than indirect materials and indirect labor for the year amounted to $1,260, which was paid in cash.
7. The mixing department completed 600,000 units of Sweet Spring. The remaining inventory was 25 percent complete.
8. The completed soft drink was transferred to the bottling department.
9. The ending balance in the Production Supplies account was $560.

Required

a. Determine the number of equivalent units of production.
b. Determine the product cost per equivalent unit.
c. Allocate the total cost between the ending work in process inventory and units transferred to the bottling department.
d. Record the transactions in T-accounts.

LO 4, 5

Problem 12-21A *Process costing system with second department*

CHECK FIGURES
a. Cost/unit: $1.00
b. Cost/unit: $1.60

Reed Corporation makes a health beverage named Reed that is manufactured in a two-stage production process. The drink is first created in the Conversion Department where material ingredients (natural juices, supplements, preservatives, etc.) are combined. On July 1, 2011, the company had a sufficient quantity of partially completed beverage mix in the Conversion Department to make 40,000 containers of Reed. This beginning inventory had a cost of $30,000. During July, the company added ingredients necessary to make 160,000 containers of Reed. The cost of these ingredients was $154,000. During July, liquid mix representing 180,000 containers of the beverage was transferred to the Finishing Department. The beverage mix is poured into containers and packaged for shipment in the Finishing Department. Beverage that remained in the Conversion Department at the end of July was 20 percent complete. At the beginning of July the Finishing Department had 10,000 containers of beverage mix. The cost of this mix was $24,000. The department added $44,000 of manufacturing costs (materials, labor and overhead) during July. During July, 120,000 containers of Reed were completed. The ending inventory for this department was 50 percent complete at the end of July.

Required

a. Prepare a Cost of Production Report for the Conversion Department for July.
b. Prepare a Cost of Production Report for the Finishing Department for July.
c. If 100,000 containers of Reed are sold in July for $240,000, determine the company's gross margin for July.

EXERCISES—SERIES B

LO 1

Exercise 12-1B *Matching products with appropriate costing systems*

Required

Indicate which costing system (job-order, process, or hybrid) would be most appropriate for the type of product listed in the left-hand column. The first item is shown as an example.

Type of Product	Type of Costing System
a. Shoes	Process
b. Treadmill	
c. Textbook	
d. House	
e. Oil	
f. Luxury yacht	
g. Special-order personal computer	
h. Over-the-counter personal computer	
i. Mouse pad for a computer	
j. Aircraft carrier	
k. Makeup sponge	
l. Handheld video game player	
m. Generic coffee mug	
n. Personalized coffee mug	
o. Surgery	
p. Audit engagement	

Exercise 12-2B *Identifying the appropriate costing system* LO 1

Dahl Corporation's Morgan Plant in Jacksoville, Florida, produces the company's weed-control chemical solution, Weed Terminator. Production begins with pure water from a controlled stream to which the plant adds different chemicals in the production process. Finally, the plant bottles the resulting chemical solution. The process is highly automated with different computer-controlled maneuvers and testing to ensure the quality of the end product. With only 15 employees, the plant can produce up to 6,000 bottles per day.

Required

Recommend the type of costing system (job-order, process, or hybrid) Morgan Plant should use. Explain your recommendation.

Exercise 12-3B *Job-order or process costing* LO 1, 2

Jayne Allen, an artist, plans to make her living drawing customer portraits at a stand in Underground Atlanta. She will carry her drawing equipment and supplies to work each day in bags. By displaying two of her best hand-drawn portraits on either side of her stand, she expects to attract tourists' attention. Ms. Allen can usually draw a customer's portrait in 30 minutes. Her materials cost is minimal, about $2 for a portrait. Her most significant cost will be leasing the stand for $1,200 per month. She estimates she can replace supplies and worn out equipment for $50 per month. She plans to work 20 days each month from noon to 9:00 P.M. After surveying her planned work environment before beginning the business, she observed that six other artists were providing customer portraits in that section of Underground Atlanta. Their portrait prices ranged from $25 to $45 per portrait. They also offered to frame portraits for customers at $15 per frame. Ms. Allen found that she could obtain comparable frames for $5 each and that properly framing a portrait takes about 10 minutes. The biggest challenge, Ms. Allen observed, was attracting tourists' interest. If she could draw portraits continuously during her workdays, she could earn quite a respectable income. But she noticed several of the artists were reading magazines as she walked by.

Required

a. Should Ms. Allen use a job-order or process costing system for her art business?

b. List the individual types of costs Ms. Allen will likely incur in providing portraits.

c. How could Ms. Allen estimate her overhead rate per portrait when she does not know the number of portraits she will draw in a month?

d. Ms. Allen will not hire any employees. Will she have labor cost? Explain.

Exercise 12-4B *Job-order costing in a manufacturing company* LO 3

Popejoy Drapery, Inc., specializes in making custom draperies for both commercial and residential customers. It began business on August 1, 2011, by acquiring $48,000 cash through issuing common stock. In August 2011, Popejoy accepted drapery orders, Jobs 801 and 802, for two new commercial buildings. The company paid cash for the following costs related to the orders:

Job 801	
Raw materials	$ 8,000
Direct labor (512 hours at $20 per hour)	10,240
Job 802	
Raw materials	6,000
Direct labor (340 hours at $20 per hour)	6,800

During the same month, Popejoy paid $14,400 for various indirect costs such as utilities, equipment leases, and factory-related insurance. The company estimated its annual manufacturing overhead cost would be $240,000 and expected to use 20,000 direct labor hours in its first year of operation. It planned to allocate overhead based on direct labor hours. On August 31, 2011, Popejoy completed Job 801 and collected the contract price of $28,000. Job 802 was still in process.

Popejoy uses a just-in-time inventory management system. Consequently, it has no raw materials inventory. Raw materials purchases are recorded directly in the Work in Process Inventory account.

Required

a. Use a horizontal financial statements model as follows to record Popejoy's accounting events for August 2011. The first event is shown as an example.

Assets								=	Equity			Rev.	−	Exp.	=	Net Inc.
Cash	+	Work in Process	+	Finished Goods	+	Manuf. Overhead		=	Com. Stock	+	Ret. Ear.					
48,000	+	NA	+	NA	+	NA		=	48,000	+	NA	NA	−	NA	=	NA

b. What was Popejoy's ending inventory on August 31, 2011? Is this amount the actual or the estimated inventory cost?

c. When is it appropriate to use estimated inventory cost on a year-end balance sheet?

LO 3

Exercise 12-5B *Job-order costing in a manufacturing company*

Agu Advertisements Corporation designs and produces television commercials for clients. On March 1, 2012, the company issued common stock for $75,000 cash. During March, Agu worked on three jobs. Pertinent data follow.

Special Orders	Materials	Labor
Job 301	$3,600	450 hours @ $32 per hour
Job 302	6,480	360 hours @ $60 per hour
Job 303	5,840	680 hours @ $28 per hour

Actual production overhead cost: $24,080

Predetermined overhead rate: $16 per direct labor hour

Agu paid these costs in cash. Jobs 301 and 302 were completed and sold for cash to customers during March. Job 303 was incomplete at month end. Job 301 sold for $32,000, and Job 302 sold for $45,000. Agu also paid $8,000 cash in March for selling and administrative expenses.

Agu uses a just-in-time inventory management system. Consequently, it has no raw materials inventory. Raw materials purchases are recorded directly in the Work in Process Inventory account.

Required

a. Use a horizontal financial statements model, as follows, to record Agu's accounting events for March 2012. The first event is shown as an example.

Assets								=	Equity			Rev.	−	Exp.	=	Net Inc.
Cash	+	Work in Process	+	Finished Goods	+	Manuf. Overhead		=	Com. Stock	+	Ret. Ear.					
75,000	+	NA	+	NA	+	NA		=	75,000	+	NA	NA	−	NA	=	NA

b. Record the entry to close the amount of underapplied or overapplied manufacturing overhead to Cost of Goods Sold (in the expense category) in the horizontal financial statements model.

c. Determine the gross margin for March.

Exercise 12-6B *Job-order costing in a service company* LO 3

Navasota Consulting provides financial and estate planning services on a retainer basis for the executive officers of its corporate clients. It incurred the following labor costs on services for three corporate clients during March 2011.

	Direct Labor
Contract 1	$14,000
Contract 2	7,200
Contract 3	28,800
Total	$50,000

Navasota allocated March overhead costs of $22,000 to the contracts based on the amount of direct labor costs incurred on each contract.

Required

a. Assuming the revenue from Contract 3 was $70,000, what amount of income did Navasota earn from this contract?

b. Based on the preceding information, will Navasota report finished goods inventory on its balance sheet for Contract 1? If so, what is the amount of this inventory? If not, explain why not.

Exercise 12-7B *Determine missing information for a job order* LO 3

The following information pertains to Job 712 that Gillman Manufacturing Company completed during January 2011. Materials and labor costs for the job were $70,000 and $38,000, respectively. Applied overhead costs were $44,000. Gillman completed and delivered the job to its customer and earned a $54,000 gross profit.

Required

Determine the contract price for the job.

Exercise 12-8B *Process costing: determining equivalent units* LO 5

In March 2011, Rite Corporation's battery plant had 2,000 units in its beginning work in process inventory. During March, the company added 18,000 units to production. At the end of the month, 6,000 units of product were in process.

Required

(Each requirement is independent of the other.)

a. Assuming the ending inventory units were 60 percent complete, determine the total number of equivalent units (number transferred out plus number in ending inventory) processed by the battery plant.

b. Assuming the total number of equivalent units (number transferred out plus number in ending inventory) processed by the battery plant was 15,500, what was the ending inventory percentage of completion?

Exercise 12-9B *Allocating costs in a process costing system* LO 5

Duval Corporation, a manufacturer of diabetic testing kits, started November production with $60,000 in beginning inventory. During the month, the company incurred $360,000 of materials cost and $240,000 of labor cost. It applied $165,000 of overhead cost to inventory. The company processed 15,000 total equivalent units of product.

Required

(Each requirement is independent of the other.)

a. Assuming 4,000 equivalent units of product were in ending work in process inventory, determine the amount of cost transferred from the Work in Process Inventory account to the Finished Goods Inventory account. What was the cost of the ending work in process inventory?

b. Assuming 12,000 equivalent units of product were transferred from work in process inventory to finished goods inventory, determine the cost of the ending work in process inventory. What was the cost of the finished goods inventory transferred from work in process?

LO 5

Exercise 12-10B *Process costing: determining equivalent units and allocating costs*

Bell Corporation, which makes suitcases, completed 30,000 suitcases in August 2011. At the end of August, work in process inventory consisted of 5,000 suitcases estimated to be 40 percent complete. Total product costs for August amounted to $480,000.

Required

a. Determine the cost per equivalent unit.

b. Determine the cost of the goods transferred to finished goods.

c. Determine the cost of the ending work in process inventory.

LO 5

Exercise 12-11B *Process costing: supply missing information*

Gospel Publications, Inc., produces Bibles in volume. It printed and sold 120,000 Bibles last year. Demand is sufficient to support producing a particular edition continuously throughout the year. For this operation, Gospel uses two departments, printing and binding. The printing department prints all pages and transfers them to the binding department, where it binds the pages into books. The binding department's Work in Process Inventory account had a $20,000 balance on September 1. During September, the binding department incurred raw materials, labor, and overhead costs of $5,500, $19,000, and $35,500, respectively. During the month, the binding department transferred Bibles that cost $175,000 to finished goods. The balance in the binding department's Work in Process Inventory account as of September 30 was $30,000.

Required

Determine the cost of pages transferred from the printing department to the binding department during the month of September.

LO 1

Exercise 12-12B *Selecting the appropriate costing system*

Schroeder Automotive Specialties, Inc., has a successful market niche. It customizes automobile interiors to fit the various needs of disabled customers. Some customers need special equipment to accommodate disabled drivers. Others need modified entrance and seating arrangements for disabled passengers. Customer vehicles vary according to different brands and models of sedans, minivans, sport utility vehicles, and full-size vans. Schroeder's engineers interview customers directly to ascertain their special needs. The engineers then propose a design, explaining it and its cost for the customer's approval. Customers have the opportunity to request changes. Once the company and customer agree on an engineering design and its price, they sign a contract, and the customer's vehicle is delivered to Schroeder's factory. The factory manager directs mechanics to customize the vehicle according to the engineering design.

Required

a. Is Schroeder a manufacturing company or a service company? Explain.

b. Which costing system, job-order or process, would be most appropriate for Schroeder? Why?

c. Does Schroeder have work in process and finished goods inventories?

d. Should Schroeder classify engineering design costs as materials, labor, or overhead? Why?

PROBLEMS—SERIES B

Problem 12-13B *Job-order costing system* LO 3

Plano Corporation was created on January 1, 2011, when it received a stockholder's contribution of $65,000. It purchased $7,900 of raw materials and worked on three job orders during the year. Data about these jobs follow. (Assume all transactions are for cash unless otherwise indicated.)

	Direct Raw Materials Used	Direct Labor
Job 1	$2,500	$ 3,200
Job 2	1,800	4,800
Job 3	3,200	4,480
Total	$7,500	$12,480

The average wage rate is $16 per hour. Manufacturing overhead is applied using a predetermined overhead rate of $7.50 per direct labor hour. Jobs 1 and 3 were completed during the year, and Job 1 was sold for $10,000. Plano paid $1,400 for selling and administrative expenses. Actual factory overhead was $6,000.

Required

a. Record the preceding events in a horizontal statements model. The first event for 2011 has been recorded as an example.

Assets									=	Equity						
Cash	+	Raw M.	+	MOH	+	WIP	+	F. Goods	=	C. Stk.	+	Ret. Ear.	Rev.	−	Exp.	=	Net Inc.
65,000	+	NA	+	NA	+	NA	+	NA	=	65,000	+	NA	NA	−	NA	=	NA

b. Reconcile all subsidiary accounts with their respective control accounts.

c. Record the closing entry for over- or underapplied manufacturing overhead, assuming that the amount is insignificant.

d. Prepare a schedule of cost of goods manufactured and sold, an income statement, and a balance sheet for 2011.

Problem 12-14B *Job-order costing system* LO 3

Presley Roofing Corporation was founded on January 1, 2012, when stockholders contributed $5,000 for common stock. During the year, Presley purchased $2,400 of direct raw materials and used $2,160 of direct materials. There were 80 hours of direct labor worked at an average rate of $8 per hour paid in cash. The predetermined overhead rate was $6.50 per direct labor hour. The company started three custom roofing jobs. The job cost sheets reflected the following allocations of costs to each.

	Direct Materials	Direct Labor Hours
Roof 1	$800	20
Roof 2	400	12
Roof 3	960	48

The company paid $176 cash for indirect labor costs and $240 cash for production supplies, which were all used during 2012. Actual overhead cost paid in cash other than indirect materials and indirect labor was $144. Presley completed Roofs 1 and 2 and collected the contract price for Roof 1 of $2,160 cash. The company incurred $496 of selling and administrative expenses that were paid with cash. Over- or underapplied overhead is closed to Cost of Goods Sold.

Required

a. Record the preceding events in a horizontal statements model. The first event for 2012 has been recorded as an example.

Assets										=	Equity								
Cash	+	Raw M.	+	MOH	+	WIP	+	F. Goods		=	C. Stk.	+	Ret. Ear.		Rev.	−	Exp.	=	Net Inc.
5,000	+	NA	+	NA	+	NA	+	NA		=	5,000	+	NA		NA	−	NA	=	NA

b. Reconcile all subsidiary accounts with their respective control accounts.

c. Record the closing entry for over- or underapplied manufacturing overhead in the horizontal statements model, assuming that the amount is insignificant.

d. Prepare a schedule of cost of goods manufactured and sold, an income statement, and a balance sheet for 2012.

LO 4, 5

Problem 12-15B *Process costing system*

Whitaker Food Company makes frozen vegetables. Production involves two departments, processing and packaging. Raw materials are cleaned and cut in the processing department and then transferred to the packaging department where they are packaged and frozen. The following transactions apply to Whitaker's first year (2011) of operations. (Assume that all transactions are for cash unless otherwise stated.)

1. The company was started when it acquired $100,000 cash from the issue of common stock.
2. Whitaker purchased $48,000 of direct raw materials and $8,000 of indirect materials. Indirect materials are capitalized in the Production Supplies account.
3. Direct materials totaling $38,000 were issued to the processing department.
4. Labor cost was $77,000. Direct labor for the processing and packaging departments was $32,500 and $25,500, respectively. Indirect labor costs were $19,000.
5. The predetermined overhead rate was $0.80 per direct labor dollar in each department.
6. Actual overhead costs other than indirect materials and indirect labor were $22,500 for the year.
7. The processing department transferred $60,500 of inventory to the packaging department.
8. The packaging department transferred $70,000 of inventory to finished goods.
9. The company sold inventory costing $63,000 for $117,500.
10. Selling and administrative expenses were $23,500.
11. A physical count revealed $3,000 of production supplies on hand at the end of 2011.
12. Assume that over- or underapplied overhead is insignificant.

Required

a. Record the data in T-accounts.

b. Record the closing entry for over- or underapplied manufacturing overhead, assuming that the amount is insignificant.

c. Close the revenue and expense accounts.

d. Prepare a schedule of cost of goods manufactured and sold, an income statement, and a balance sheet for 2011.

Problem 12-16B *Process costing system* LO 4, 5

Use the ending balances from Problem 12-15B as the beginning balances for this problem. The transactions for the second year of operation (2012) are described here. (Assume that all transactions are cash transactions unless otherwise indicated.)

1. The company purchased $51,000 of direct raw materials and $9,000 of indirect materials. Indirect materials are capitalized in the Production Supplies account.
2. Materials costing $41,000 were issued to the processing department.
3. Labor cost was $89,500. Direct labor for the processing and packaging departments was $36,000 and $29,500, respectively. Indirect labor costs were $24,000. (*Note:* Assume that sufficient cash is available when periodic payments are made. These amounts represent summary data for the entire year and are not presented in exact order of collection and payment.)
4. The predetermined overhead rate was $0.80 per direct labor dollar.
5. Actual overhead costs other than indirect materials and indirect labor for the year were $25,000.
6. The processing department transferred $125,000 of inventory to the packaging department.
7. The packaging department transferred $175,000 of inventory to finished goods.
8. The company sold inventory costing $171,000 for $325,000.
9. Selling and administrative expenses amounted to $32,000.
10. At the end of the year, $2,500 of production supplies was on hand.
11. Assume that over- or underapplied overhead is insignificant.

Required

a. Record the data in T-accounts.
b. Record the closing entry for over- or underapplied manufacturing overhead, assuming that the amount is insignificant.
c. Close the revenue and expense accounts.
d. Prepare a schedule of cost of goods manufactured and sold, an income statement, and a balance sheet for 2012.

Problem 12-17B *Process costing system cost of production report* LO 5

At the beginning of 2012, Lingua Company had 2,500 units of product in its work in process inventory, and it started 22,500 additional units of product during the year. At the end of the year, 6,000 units of product were in the work in process inventory. The ending work in process inventory was estimated to be 25 percent complete. The cost of work in process inventory at the beginning of the period was $10,000, and $154,000 of product costs was added during the period.

Required

Prepare a cost of production report showing the following.

a. The number of equivalent units of production.
b. The product cost per equivalent unit.
c. The total cost allocated between the ending Work in Process Inventory and Finished Goods Inventory accounts.

Problem 12-18B *Determining inventory cost using process costing* LO 5

Ash Company's beginning work in process inventory consisted of 6,000 units of product on January 1, 2011. During 2011, the company started 24,000 units of product and transferred 25,000 units to finished goods inventory. The ending work in process inventory was estimated to be 40 percent complete. Cost data for 2011 follow.

	Product Costs
Beginning balance	$ 12,000
Added during period	123,000
Total	$135,000

Required

Prepare a cost of production report showing the following.

a. The number of equivalent units of production.
b. The product cost per equivalent unit.
c. The total cost allocated between ending work in process inventory and finished goods inventory.

LO 5

Problem 12-19B *Process costing system*

Burdorf Corporation makes blue jeans. Its process involves two departments, cutting and sewing. The following data pertain to the cutting department's transactions in 2011.

1. The beginning balance in work in process inventory was $8,772. This inventory consisted of fabric for 6,000 pairs of jeans. The beginning balances in raw materials inventory, production supplies, and cash were $45,000, $2,100, and $135,600, respectively.
2. Direct materials costing $28,068 were issued to the cutting department; this amount of materials was sufficient to start work on 15,000 pairs of jeans.
3. Direct labor cost was $33,600, and indirect labor cost was $2,700. All labor costs were paid in cash.
4. The predetermined overhead rate was $0.25 per direct labor dollar.
5. Actual overhead costs other than indirect materials and indirect labor for the year amounted to $3,840, which was paid in cash.
6. The cutting department completed cutting 16,000 pairs of jeans. The remaining jeans were 40 percent complete.
7. The completed units of cut fabric were transferred to the sewing department.
8. All of the production supplies had been used by the end of the year.
9. Over- or underapplied overhead was closed to the Cost of Goods Sold account.

Required

a. Determine the number of equivalent units of production.
b. Determine the product cost per equivalent unit.
c. Allocate the total cost between ending work in process inventory and units transferred to the sewing department.
d. Record the transactions in a partial set of T-accounts.

LO 5

Problem 12-20B *Process costing system*

Seguin Paper Products Corporation produces paper cups using two production departments, printing and forming. Beginning balances and printing department data for 2011 follow.

Accounts	Beginning Balances
Cash	$50,000
Raw materials	22,000
Production supplies	1,500
Work in process inventory (300,000 units)	17,000
Common stock	90,500

1. Seguin Paper Products issued additional common stock for $110,000 cash.
2. The company purchased raw materials and production supplies for $40,000 and $3,500, respectively, in cash.
3. The company issued $57,000 of raw materials and $3,600 of production supplies to the printing department for the production of 800,000 paper cups.
4. The printing department used 6,200 hours of labor during 2011, consisting of 5,600 hours for direct labor and 600 hours for indirect labor. The average wage was $10 per hour. All the wages were paid in 2011 in cash.

5. The predetermined overhead rate was $0.25 per direct labor dollar.
6. Actual overhead costs other than indirect materials and indirect labor for the year amounted to $4,400, which was paid in cash.
7. The printing department completed 700,000 paper cups. The remaining cups were 50 percent complete.
8. The completed paper cups were transferred to the forming department.
9. The ending balance in the Production Supplies account was $1,400.

Required

a. Determine the number of equivalent units of production.
b. Determine the product cost per equivalent unit.
c. Allocate the total cost between the ending work in process inventory and units transferred to the forming department.
d. Record the transactions in T-accounts.

Problem 12-21B *Process costing system with second department* LO 4, 5

Shin Gifts makes unique western gifts that are sold at souvenir shops. One of the company's more popular products is a ceramic eagle that is produced in a mass production process that entails two manufacturing stages. In the first production stage ceramic glass is heated and molded into the shape of the eagle by the Compression Department. Finally, color and artistic detail is applied to the eagle by the Finishing Department. The company has just hired a new accountant who will be responsible for preparing the Cost of Production Report for June 2011. The accountant is given the following information from which to prepare his report.

Departmental Cost Information for June:

	Compression	Finishing
Costs in beginning inventory	$ 3,000	$14,400
Costs added during June:		
Materials	42,000	18,120
Labor	20,000	13,200
Overhead	90,000	62,000

Departmental Product Information for June:

	Compression	Finishing
Units in beginning inventory	10,000	3,600
Units started	52,000	46,000
Units in ending inventory	16,000 (25% complete)	9,600 (80% complete)

Required

a. Prepare a Cost of Production Report for the Compression Department for June.
b. Prepare a Cost of Production Report for the Finishing Department for June.
c. If 24,000 units are sold in June for $160,000, determine the company's gross margin for June.

ANALYZE, THINK, COMMUNICATE

ATC 12-1 Business Application Case *Comprehensive job-order costing problem*

This problem covers concepts that were presented in Chapters 11 and 12 concerning job-order costing systems.

Mid-Life Motorcycles (MLM) is a small shop that builds customized motorcycles, mostly for middle-aged men with significant discretionary income, who are hoping to fulfill a high-school dream. Since it works with high-end clients, all of its work is custom, and it makes

many of the bike parts, including the frames, in-house. Other parts, such as the engine, are purchased from outside suppliers and then modified in-house. Although most of its bikes are created to-order for a specific individual, the shop occasionally builds a bike with no prearranged buyer. These bikes are sometimes intended to be entered in custom-bike contest and then sold afterwards.

The shop has been in existence for 10 years, but for the sake of simplicity, assume it has no beginning inventories for 2011. Five motorcycle projects were worked on during 2011. By the end of the year, four of these projects were completed and three of these four were sold.

The following selected data are from MLM's 2011 *budget:*

Advertising	$ 5,000
Direct materials	150,000
Direct labor	130,000
Rent on office space	6,000
Rent on factory space	20,000
Indirect materials	11,000
Maintenance costs for factory equipment	3,000
Utilities costs for office space	1,000
Utilities costs for factory space	2,000
Depreciation on factory equipment	8,000
Machine hours expected to be worked	4,000
Direct labor hours expected to be worked	6,500

The following information relates to production events during 2011.

- Raw materials were purchased for $155,000.
- Materials used in production totaled $150,800; $11,500 of these were considered indirect materials costs. The remaining $139,300 of direct materials costs related to individual restoration jobs as follows:

Job Number	Direct Materials Cost
115	$28,200
116	32,100
117	25,800
118	31,700
119	21,500

- Labor costs incurred for production totaled $133,100. The workers are highly skilled craftsmen who require little supervision. Therefore all of these were considered direct labor costs and related to individual restoration jobs as follows:

Job Number	Direct Labor Cost
115	$30,900
116	29,300
117	22,100
118	36,600
119	14,200

- Paid factory rent of $18,000.
- Recorded depreciation on factory equipment of $8,500.
- Made $2,500 of payments to outside vendors for maintenance of factory equipment.
- Paid factory utilities costs of $2,400.

- Applied manufacturing overhead using a predetermined rate of $11.00 per machine hour. The 3,750 machine hours that were used relate to each job as follows:

Job Number	Machine Hours Worked
115	850
116	720
117	870
118	900
119	410

- Completed all restoration jobs except 119 and transferred the projects to finished goods.
- Sold three jobs for the following amounts:

Job Number	Sales Price
115	$88,900
116	$93,000
117	$74,800

- Closed the Manufacturing Overhead account to transfer any overapplied or underapplied overhead to the Cost of Goods Sold account.

Required

a. Assume MLM had used direct labor hours (versus machine hours) as its cost driver. Compute its predetermined overhead rate.
b. Determine the ending balance in Raw Materials Inventory.
c. Determine the ending balance in Finished Goods Inventory.
d. Determine the ending balance in Work in Process Inventory.
e. Determine the costs of goods manufactured.
f. Determine the amount of Cost of Goods Sold.
g. Determine the amount of gross margin that was earned on Jobs 115, 116, and 117.
h. Determine the amount of overapplied or underapplied overhead the existed at the end of the year.

Hint: Though not required, you might find it helpful to organize the data using a horizontal financial statements model, although it will still be necessary to prepare job cost sheet for each individual job.

ATC 12-2 Group Assignment *Job-order costing system*

Bowen Bridge Company constructs bridges for the State of Kentucky. During 2010, Bowen started work on three bridges. The cost of materials and labor for each bridge follows.

Special Orders	Materials	Labor
Bridge 305	$407,200	$352,700
Bridge 306	362,300	375,000
Bridge 307	801,700	922,800

The predetermined overhead rate is $1.20 per direct labor dollar. Actual overhead costs were $2,170,800. Bridge 306 was completed for a contract price of $1,357,000 and was turned over to the state. Construction on Bridge 305 was also completed but the state

had not yet finished its inspection process. General selling and administrative expenses amounted to $210,000. Over- or underapplied overhead is closed directly to the Cost of Goods Sold account. The company recognizes revenue when it turns over a completed bridge to a customer.

Required

a. Divide the class into groups of four or five students each and organize the groups into three sections. Assign Task 1 to the first section of groups, Task 2 to the second section, and Task 3 to the third section.

Group Tasks

(1) Determine the cost of construction for Bridge 305.

(2) Determine the cost of construction for Bridge 306.

(3) Determine the cost of construction for Bridge 307.

b. Select a spokesperson from each section. Use input from the three spokespersons to prepare an income statement and the asset section of the balance sheet.

c. Does the net income accurately reflect the profitability associated with Bridge 306? Explain.

d. Would converting to a process costing system improve the accuracy of the amount of reported net income? Explain.

ATC 12-3 Research Assignment *Identifying appropriate product costing systems for three real world companies*

Obtain the Form 10-Ks for these three companies: **AGCO Corporation**, **Crown Holdings, Inc.**, and **Noble Corporation**. To obtain the Form 10-Ks you can use either the EDGAR system following the instructions in Appendix A, or they can be found on the companies' websites: **www.agcocorp.com** (Investors), **www.crowncork.com** (For Investors), and **www.noblecorp.com** (Investor Relations). Read the "Item 1. Business" sections of their 10-Ks in order to understand the nature of these companies' businesses.

Required

For each company, determine if it primarily uses a job-order or process costing system to compute the cost of the products or services it sells. Explain the rationale for your answer. If you believe a company uses elements of both job-order and process costing systems, a hybrid system, explain the rationale for that conclusion.

ATC 12-4 Writing Assignment *Determining the proper costing system*

Professor Julia Silverman received the following e-mail message.

"I don't know if you remember me. I am Tim Wallace. I was in your introductory accounting class a couple of years ago. I recently graduated and have just started my first real job. I remember you talking about job-order and process costing systems. I even looked the subject up in the textbook you wrote. In that book, you say that a process costing system is used when a company produces a single, homogeneous, high-volume, low-cost product. Well, the company I am working for makes T-shirts. All of the shirts are the same. They don't cost much, and we make nearly a million of them every year. The only difference in any of the shirts is the label we sew in them. We make the shirts for about 20 different companies. It seems to me that we should be using a process costing system. Even so, our accounting people are using a job-order costing system. Unfortunately, you didn't tell us what to do when the company we work for is screwed up. I need some advice. Should I tell them they are using the wrong accounting system? I know I am new around here, and I don't want to offend anybody, but if your book is right, the company would be better off if it started using a process costing system. Some of these people around here didn't go to college, and I'm afraid they don't know what they are doing. I guess that's why they hired someone with a degree. Am I right about this or what?"

Required

Assume that you are Professor Silverman. Write a return e-mail responding to Mr. Wallace's inquiry.

ATC 12-5 Ethical Dilemma *Amount of equivalent units*

René Alverez knew she was in over her head soon after she took the job. Even so, the opportunity for promotion comes along rarely and she believed that she would grow into it. Ms. Alverez is the cost accounting specialist assigned to the finishing department of Standard Tool Company. Bill Sawyer, the manager of the finishing department, knows exactly what he is doing. In each of the three years he has managed the department, the cost per unit of product transferred out of his Work in Process Inventory account has declined. His ability to control cost is highly valued, and it is widely believed that he will be the successor to the plant manager, who is being promoted to manufacturing vice president. One more good year would surely seal the deal for Mr. Sawyer. It was little wonder that Ms. Alverez was uncomfortable in challenging Mr. Sawyer's estimate of the percentage of completion of the department's ending inventory. He contended that the inventory was 60 percent complete, but she believed that it was only about 40 percent complete.

After a brief altercation, Ms. Alverez agreed to sign off on Mr. Sawyer's estimate. The truth was that although she believed she was right, she did not know how to support her position. Besides, Mr. Sawyer was about to be named plant manager, and she felt it unwise to challenge such an important person.

The department had beginning inventory of 5,500 units of product and it started 94,500 units during the period. It transferred out 90,000 units during the period. Total transferred-in and production cost for the period was $902,400. This amount included the cost in beginning inventory plus additional costs incurred during the period. The target (standard) cost per unit is $9.45.

Required

a. Determine the equivalent cost per unit, assuming that the ending inventory is considered to be 40 percent complete.

b. Determine the equivalent cost per unit, assuming that the ending inventory is considered to be 60 percent complete.

c. Comment on Mr. Sawyer's motives for establishing the percentage of completion at 60 percent rather than 40 percent.

d. Assuming that Ms. Alverez is a certified management accountant, would informing the chief accountant of her dispute with Mr. Sawyer violate the confidentiality standards of ethical conduct in Exhibit 1.15 of Chapter 1?

e. Did Ms. Alverez violate any of the standards of ethical conduct in Exhibit 1.15 of Chapter 1? If so, which ones?

f. Discuss the components of the fraud triangle that affected Ms. Alverez's behavior.

ATC 12-6 Spreadsheet Assignment *Using Excel*

Lewis Company had 8,000 units of product in work in process inventory at the beginning of the period and started 16,000 units during the period. At the end of the period, 4,000 units remained in work in process. The ending work in process inventory was estimated to be 40 percent complete. The cost of the units in beginning work in process inventory was $22,080. During the period, $38,400 of product costs were added.

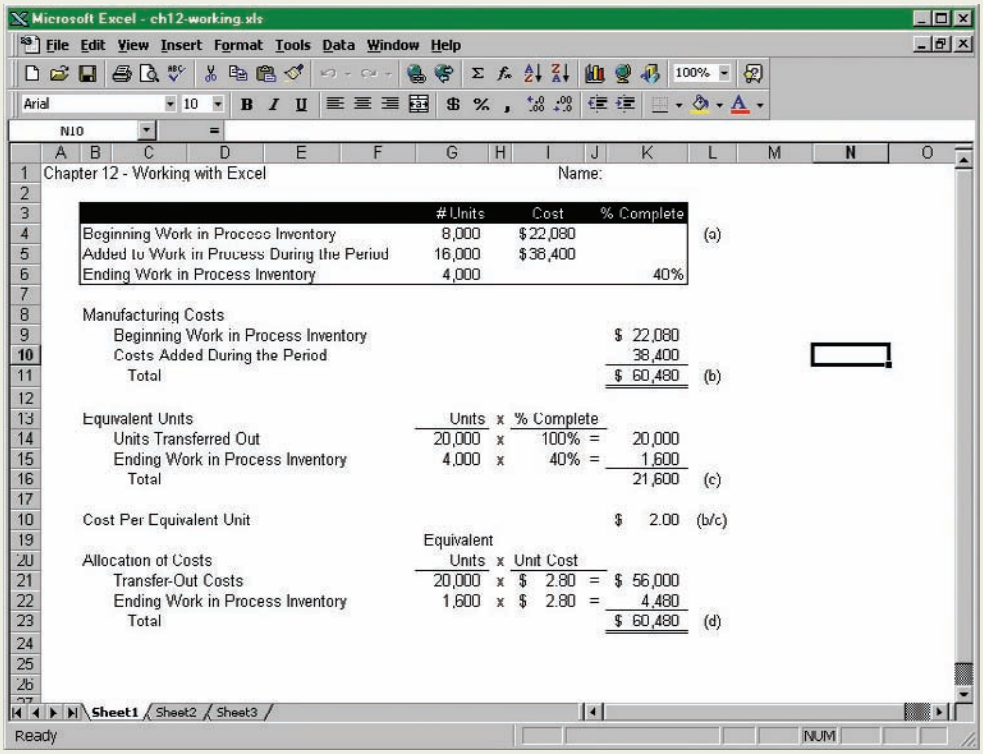
Required

a. Construct a spreadsheet that incorporates the preceding data into a table. The following screen capture is an example.

b. Insert a section into the spreadsheet to calculate total manufacturing costs.

c. Insert a section into the spreadsheet to calculate equivalent units and cost per equivalent unit.

d. Insert a section into the spreadsheet to allocate the manufacturing costs between finished goods and ending work in process.



Spreadsheet Tip

(1) The cells that contain numbers below row 7 should all be formulas so that changes to the data in rows 3 to 6 will automatically be reflected in the rest of the spreadsheet.

ATC 12-7 Spreadsheet Assignment *Mastering Excel*

Refer to the job cost sheet in Exhibit 12.3.

Required

Construct a spreadsheet that recreates the job cost sheet in Exhibit 12.3. Use formulas wherever possible, such as in the total row.

Spreadsheet Tips

(1) Center the headings for direct materials, direct labor, and applied overhead across two or three columns by choosing Format and Cells and checking the Merge box under the alignment tab. A shortcut to center these is to click on the Merge and Center icon in the formatting tool bar.

(2) All lines in the job cost sheet can be drawn using Format and Cells and then choosing the border tab.

COMPREHENSIVE PROBLEM

This is a continuation of the comprehensive problem in Chapter 11. During 2012, Anywhere, Inc. (AI), incurred the following product costs.

Raw materials	$62,000
Labor	89,422
Overhead	58,000

Recall that the 2011 ending balance in the Work in Process (WIP) account was $26,000. Accordingly, this is the beginning WIP balance for 2012. There were 110 units of product in beginning WIP inventory. AI started 1,840 units of product during 2012. Ending WIP inventory consisted of 90 units that were 60 percent complete.

Required

Prepare a cost of production report by filling in the cells that contain question marks.

Equivalent Unit Computations

	Units	% Complete	Equivalent Units
Beginning inventory	110		
Units started	1,840		
Total units available for completion	?		
Units in ending inventory	(90)	?	?
Units complete	1,860	100%	?
Total equivalent units			1,914

Cost per Equivalent Unit

	Cost	÷	Units	=	Cost Per Unit
Beginning inventory	$26,000				
Raw materials	?				
Labor	?				
Overhead	58,000				
Total product cost	?	÷	1,914	=	?

Allocation of Product Cost

Cost transferred to finished goods	?
Cost in ending inventory	?
Total product cost	$235,422