

Process Costing



the navigator

- Scan Study Objectives
- Read Feature Story
- Read Preview
- Read Text and answer **Do it!**
p. 103 p. 106 p. 109 p. 114
- Work Using the Decision Toolkit
- Review Summary of Study Objectives
- Work Comprehensive **Do it!** p. 126
- Answer Self-Study Questions
- Complete Assignments

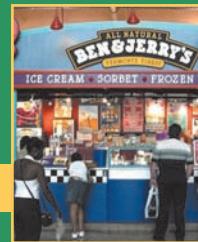
study objectives

After studying this chapter, you should be able to:

- 1 Understand who uses process cost systems.
- 2 Explain the similarities and differences between job order cost and process cost systems.
- 3 Explain the flow of costs in a process cost system.
- 4 Make the journal entries to assign manufacturing costs in a process cost system.
- 5 Compute equivalent units.
- 6 Explain the four steps necessary to prepare a production cost report.
- 7 Prepare a production cost report.



the navigator

feature story

Ben & Jerry's Tracks Its Mix-Ups

Ben & Jerry's Homemade, Inc. (www.benjerry.com) is one of the "hottest" and "coolest" U.S. companies. Based in Waterbury, Vermont, the ice cream company that started out of a garage in 1978 is now a public company.

Making ice cream is a process—a movement of product from a mixing department to a prepping department to a pint department. The mixing department is where the ice cream is created. In the prep area, the production process adds extras such as cherries and walnuts to make plain ice cream into "Cherry Garcia," Ben & Jerry's most popular flavor, or fudge-covered waffle cone pieces and a swirl of caramel for "Stephen Colbert's

Americone Dream." The pint department is where the ice cream is actually put into containers. As the product is processed from one department to the next, the appropriate materials, labor, and overhead are added to it.

"The incoming ingredients from the shipping and receiving departments are stored in certain locations, either in a freezer or dry warehouse," says Beecher Eurich, staff accountant. "As ingredients get added, so do the costs associated with them." How much ice cream is produced? Running plants around the clock, the company produces 18 million gallons a year.

With the company's process costing system, Eurich can tell you

how much a certain batch of ice cream costs to make—its materials, labor, and overhead in each of the production departments. She generates reports for the production department heads, but makes sure not to overdo it. "You can get bogged down in numbers," says Eurich. "If you're generating a report that no one can use, then that's a waste of time."

It's more likely, though, that Ben & Jerry's production people want to know how efficient they are. Why? Many own stock in the company.



Inside Chapter 3

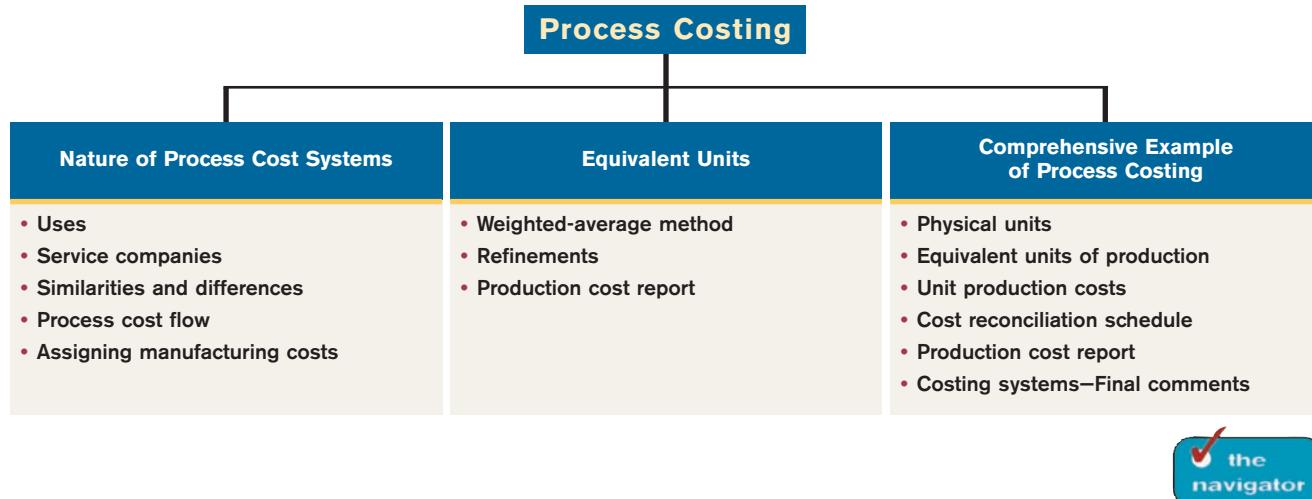
Choosing a Cost Driver (p. 105)

Keeping Score for the Xbox (p. 109)

preview of chapter 3

The cost accounting system used by companies such as *Ben & Jerry's* is **process cost accounting**. In contrast to job order cost accounting, which focuses on the individual job, process cost accounting focuses on the processes involved in mass-producing products that are identical or very similar in nature. The primary objective of the chapter is to explain and illustrate process costing.

The content and organization of this chapter are as follows.



The Nature of Process Cost Systems

USES OF PROCESS COST SYSTEMS

study objective

1

Understand who uses process cost systems.

Companies use **process cost systems** to apply costs to similar products that are mass-produced in a continuous fashion. *Ben & Jerry's* uses a process cost system: Production of the ice cream, once it begins, continues until the ice cream emerges, and the processing is the same for the entire run—with precisely the same amount of materials, labor, and overhead. Each finished pint of ice cream is indistinguishable from another.

A company such as *USX* uses process costing in the manufacturing of steel. *Kellogg* and *General Mills* use process costing for cereal production; *ExxonMobil* uses process costing for its oil refining. *Sherwin Williams* uses process costing for its paint products. At a bottling company like *Coca-Cola*, the manufacturing process begins with the blending of ingredients. Next, automated machinery moves the bottles into position and fills them. The production process then caps, packages, and forwards the bottles to the finished goods warehouse. Illustration 3-1 shows this process.

Illustration 3-1

Manufacturing processes



For Coca-Cola, as well as the other companies just mentioned, once production begins, it continues until the finished product emerges, and each unit of finished product is like every other unit.

In comparison, a job order cost system assigns costs to a *specific job*. Examples are the construction of a customized home, the making of a motion picture, or the manufacturing of a specialized machine. Illustration 3-2 provides examples of companies that primarily use either a process cost system or a job order cost system.

Illustration 3-2 Process cost and job order cost companies and products

Process Cost System Company	Product	Job Order Cost System Company	Product
Coca-Cola, PepsiCo	Soft drinks	Young & Rubicam, J. Walter Thompson	Advertising
ExxonMobil, Royal Dutch Shell	Oil	Walt Disney, Warner Brothers	Motion pictures
Intel, Advanced Micro Devices	Computer chips	Center Ice Consultants, Ice Pro	Ice rinks
Dow Chemical, DuPont	Chemicals	Kaiser, Mayo Clinic	Patient health care

PROCESS COSTING FOR SERVICE COMPANIES

Frequently, when we think of service companies, we think of specific, nonroutine tasks, such as rebuilding an automobile engine, providing consulting services on a business acquisition, or working on a major lawsuit. However, many service companies specialize in performing repetitive, routine aspects of a particular business. For example, auto-care vendors such as **Jiffy Lube** focus on the routine aspects of car care. **H&R Block** focuses on the routine aspects of basic tax practice, and many large law firms focus on routine legal services, such as uncomplicated divorces. Service companies that provide specific, nonroutine services will probably benefit from using a job order cost system. Those that perform routine, repetitive services will probably be better off with a process cost system.



SIMILARITIES AND DIFFERENCES BETWEEN JOB ORDER COST AND PROCESS COST SYSTEMS

In a job order cost system, companies assign costs to each job. In a process cost system, companies track costs through a series of connected manufacturing processes or departments, rather than by individual jobs. Thus, companies use process cost systems when they produce a large volume of uniform or relatively homogeneous products. Illustration 3-3 (page 102) shows the basic flow of costs in these two systems.

The following analysis highlights the basic similarities and differences between these two systems.

study objective 2

Explain the similarities and differences between job order cost and process cost systems.

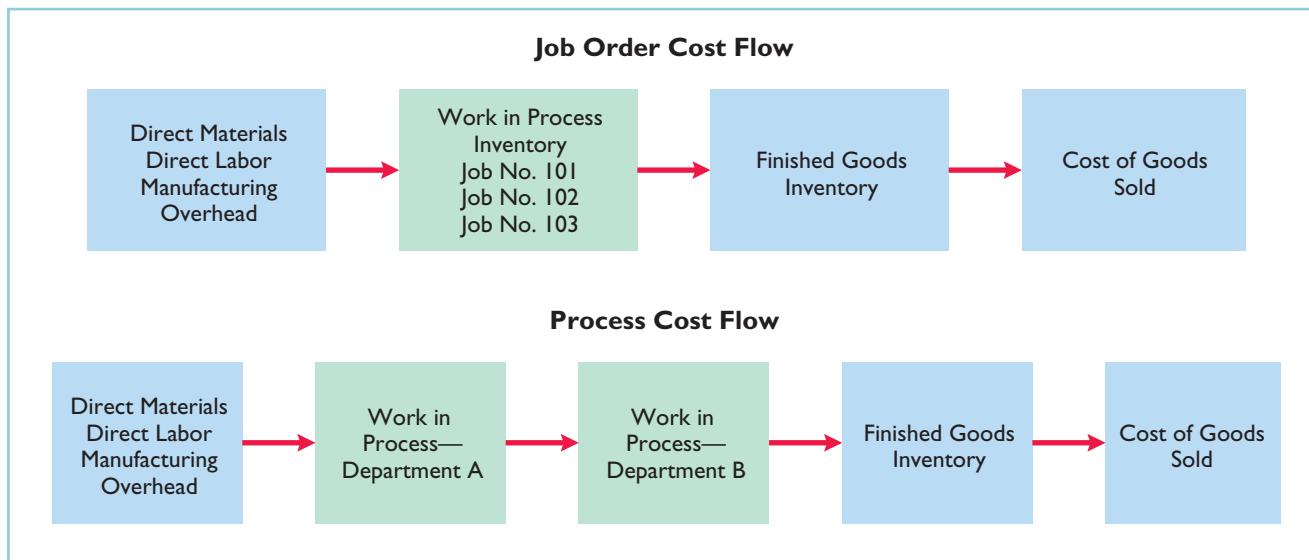


Illustration 3-3 Job order cost and process cost flow

Similarities

Job order cost and process cost systems are similar in three ways:

1. **The manufacturing cost elements.** Both costing systems track three manufacturing cost elements—direct materials, direct labor, and manufacturing overhead.
2. **The accumulation of the costs of materials, labor, and overhead.** Both costing systems debit raw materials to Raw Materials Inventory; factory labor to Factory Labor; and manufacturing overhead costs to Manufacturing Overhead.
3. **The flow of costs.** As noted above, both systems accumulate all manufacturing costs by debits to Raw Materials Inventory, Factory Labor, and Manufacturing Overhead. Both systems then assign these costs to the same accounts—Work in Process, Finished Goods Inventory, and Cost of Goods Sold. **The methods of assigning costs, however, differ significantly.** These differences are explained and illustrated later in the chapter.

Differences

The differences between a job order cost and a process cost system are as follows.

1. **The number of work in process accounts used.** A job order cost system uses only one work in process account. A process cost system uses multiple work in process accounts.
2. **Documents used to track costs.** A job order cost system charges costs to individual jobs and summarizes them in a job cost sheet. A process cost system summarizes costs in a production cost report for each department.
3. **The point at which costs are totaled.** A job order cost system totals costs when the job is completed. A process cost system totals costs at the end of a period of time.
4. **Unit cost computations.** In a job order cost system, the unit cost is the total cost per job divided by the units produced. In a process cost system, the unit cost is total manufacturing costs for the period divided by the units produced during the period.

Illustration 3-4 summarizes the major differences between a job order cost and a process cost system.

Features	Job Order Cost System	Process Cost System
Work in process accounts	• One work in process account	• Multiple work in process accounts
Documents used	• Job cost sheets	• Production cost reports
Determination of total manufacturing costs	• Each job	• Each period
Unit-cost computations	• Cost of each job ÷ Units produced for the job	• Total manufacturing costs ÷ Units produced during the period

Illustration 3-4

Job order versus process cost systems

Do it!

Indicate whether each of the following statements is true or false.

1. A law firm is likely to use process costing for major lawsuits.
2. A manufacturer of paintballs is likely to use process costing.
3. Both job order and process costing determine total costs at the end of a period of time.
4. Process costing does not keep track of manufacturing overhead.

Solution

1. false. 2. true. 3. false. 4. false.

Related exercise material: E3-1 and **Do it! 3-1**.

before you go on...

Compare Job Order and Process Cost Systems**Action Plan**

- Use job order costing in situations where unit costs are high, unit volume is low, and products are unique.
- Use process costing when there is a large volume of relatively homogeneous products.

**PROCESS COST FLOW**

Illustration 3-5 shows the flow of costs in the process cost system for Tyler Company. Tyler Company manufactures automatic can openers that it sells to retail outlets. Manufacturing consists of two processes: machining and assembly. The Machining Department shapes, hones, and drills the raw materials. The Assembly Department assembles and packages the parts.

study objective 3

Explain the flow of costs in a process cost system.

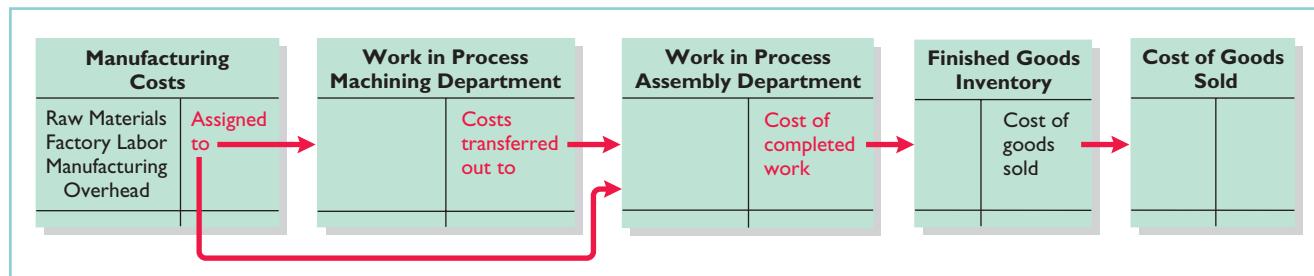


Illustration 3-5 Flow of costs in process cost system

As the flow of costs indicates, the company can add materials, labor, and manufacturing overhead in both the Machining and Assembly departments. When it finishes its work, the Machining Department transfers the partially

completed units to the Assembly Department. The Assembly Department finishes the goods and then transfers them to the finished goods inventory. Upon sale, Tyler removes the goods from the finished goods inventory. Within each department, a similar set of activities is performed on each unit processed.

ASSIGNING MANUFACTURING COSTS—JOURNAL ENTRIES

study objective 4

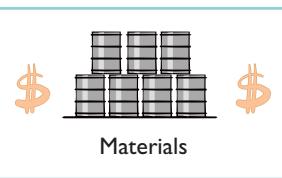
Make the journal entries to assign manufacturing costs in a process cost system.

As indicated, the accumulation of the costs of materials, labor, and manufacturing overhead is the same in a process cost system as in a job order cost system. That is, both systems follow these procedures:

- Companies debit all raw materials to Raw Materials Inventory at the time of purchase.
- They debit all factory labor to Factory Labor as the labor costs are incurred.
- They debit overhead costs to Manufacturing Overhead as these costs are incurred.

However, the assignment of the three manufacturing cost elements to Work in Process in a process cost system is different from a job order cost system. Here we'll look at how companies assign these manufacturing cost elements in a process cost system.

Materials Costs



All raw materials issued for production are a materials cost to the producing department. A process cost system may use materials requisition slips, but **it generally requires fewer requisitions than in a job order cost system, because the materials are used for processes rather than for specific jobs** and therefore typically are for larger quantities.

At the beginning of the first process, a company usually adds most of the materials needed for production. However, other materials may be added at various points. For example, in the manufacture of **Hershey** candy bars, the chocolate and other ingredients are added at the beginning of the first process, and the wrappers and cartons are added at the end of the packaging process. Tyler Company adds materials at the beginning of each process. Tyler makes the following entry to record the materials used:

Work in Process—Machining Work in Process—Assembly Raw Materials Inventory (To record materials used)		XXXX XXXX	XXXX
--	--	--------------	------

Ice cream maker **Ben & Jerry's** adds materials in three departments: milk and flavoring in the mixing department, extras such as cherries and walnuts in the prepping department, and cardboard containers in the pintering (packaging) department.



Factory Labor Costs

In a process cost system, as in a job order cost system, companies may use time tickets to determine the cost of labor assignable to production departments. Since they assign labor costs to a process rather than a job, they can obtain, from the payroll register or departmental payroll summaries, the labor cost chargeable to a process.

Labor costs for the Machining Department will include the wages of employees who shape, hone, and drill the raw materials. The entry to assign these costs for Tyler Company is:

Work in Process—Machining	XXXX	
Work in Process—Assembly	XXXX	
Factory Labor		XXXX
(To assign factory labor to production)		

Manufacturing Overhead Costs

The objective in assigning overhead in a process cost system is to allocate the overhead costs to the production departments on an objective and equitable basis. That basis is the activity that “drives” or causes the costs. A primary driver of overhead costs in continuous manufacturing operations is **machine time used**, not direct labor. Thus, companies **widely use machine hours** in allocating manufacturing overhead costs. Tyler’s entry to allocate overhead to the two processes is:

Work in Process—Machining	XXXX	
Work in Process—Assembly	XXXX	
Manufacturing Overhead		XXXX
(To assign overhead to production)		



Management Insight

Choosing a Cost Driver

In one of its automated cost centers, **Caterpillar** feeds work into the cost center, where robotic machines process it and transfer the finished job to the next cost center without human intervention. One person tends all of the machines and spends more time maintaining machines than operating them. In such cases, overhead rates based on direct labor hours may be misleading. Surprisingly, some companies continue to assign manufacturing overhead on the basis of direct labor despite the fact that there is no cause-and-effect relationship between labor and overhead.



What is the result if a company uses the wrong “cost driver” to assign manufacturing overhead?

Transfer to Next Department

At the end of the month, Tyler needs an entry to record the cost of the goods transferred out of the Machining Department. In this case, the transfer is to the Assembly Department, and Tyler makes the following entry.

Work in Process—Assembly	XXXXXX	
Work in Process—Machining		XXXXXX
(To record transfer of units to the Assembly Department)		

Transfer to Finished Goods

When the Assembly Department completes the units, it transfers them to the finished goods warehouse. The entry for this transfer is as follows.

Finished Goods Inventory Work in Process—Assembly (To record transfer of units to finished goods)	XXXXXX	XXXXXX
---	--------	--------

Transfer to Cost of Goods Sold

When Tyler sells the finished goods, it records the cost of goods sold as follows.

Cost of Goods Sold Finished Goods Inventory (To record cost of units sold)	XXXXXX	XXXXXX
--	--------	--------

before you go on...

Manufacturing Costs in Process Costing

Action Plan

- In process cost accounting, keep separate work in process accounts for each process.
- When the costs are assigned to production, debit the separate work in process accounts.
- Transfer cost of completed units to the next process or to Finished Goods.

Do it!

Ruth Company manufactures ZEBO through two processes: blending and bottling. In June, raw materials used were Blending \$18,000 and Bottling \$4,000. Factory labor costs were Blending \$12,000 and Bottling \$5,000. Manufacturing overhead costs were Blending \$6,000 and Bottling \$2,500. The company transfers units completed at a cost of \$19,000 in the Blending Department to the Bottling Department. The Bottling Department transfers units completed at a cost of \$11,000 to Finished Goods. Journalize the assignment of these costs to the two processes and the transfer of units as appropriate.

Solution

The entries are:

Work in Process—Blending	18,000	
Work in Process—Bottling	4,000	
Raw Materials Inventory (To record materials used)	22,000	
Work in Process—Blending	12,000	
Work in Process—Bottling	5,000	
Factory Labor (To assign factory labor to production)	17,000	
Work in Process—Blending	6,000	
Work in Process—Bottling	2,500	
Manufacturing Overhead (To assign overhead to production)	8,500	
Work in Process—Bottling	19,000	
Work in Process—Blending (To record transfer of units to the Bottling Department)	19,000	
Finished Goods Inventory	11,000	
Work in Process—Bottling (To record transfer of units to finished goods)	11,000	

Related exercise material: BE3-1, BE3-2, BE3-3, E3-2, E3-4, and **Do it! 3-2.**



Equivalent Units

Suppose you have a work-study job in the office of your college's president, and she asks you to compute the cost of instruction per full-time equivalent student at your college. The college's vice president for finance provides the following information.

Costs:	
Total cost of instruction	<u>\$9,000,000</u>
Student population:	
Full-time students	900
Part-time students	1,000

study objective 5
Compute equivalent units.

Illustration 3-6
Information for full-time student example

Part-time students take 60% of the classes of a full-time student during the year. To compute the number of full-time equivalent students per year, you would make the following computation.

Full-time Students	+	Equivalent Units of Part-time Students	=	Full-time Equivalent Students
900	+	(60% × 1,000)	=	1,500

Illustration 3-7
Full-time equivalent unit computation

The cost of instruction per full-time equivalent student is therefore the total cost of instruction (\$9,000,000) divided by the number of full-time equivalent students (1,500), which is \$6,000 ($\$9,000,000 \div 1,500$).

A process cost system uses the same idea, called equivalent units of production. **Equivalent units of production** measure the work done during the period, expressed in fully completed units. Companies use this measure to determine the cost per unit of completed product.

WEIGHTED-AVERAGE METHOD

The formula to compute equivalent units of production is as follows.

Units Completed and Transferred Out	+	Equivalent Units of Ending Work in Process	=	Equivalent Units of Production
-------------------------------------	---	--	---	--------------------------------

Illustration 3-8
Equivalent units of production formula

To better understand this concept of equivalent units, consider the following two separate examples.

Example 1: In a specific period the entire output of Sullivan Company's Blending Department consists of ending work in process of 4,000 units which are 60% complete as to materials, labor, and overhead. The equivalent units of production for the Blending Department are therefore 2,400 units ($4,000 \times 60\%$).

Example 2: The output of Kori Company's Packaging Department during the period consists of 10,000 units completed and transferred out, and 5,000 units in ending work in process which are 70% completed. The equivalent units of production are therefore 13,500 [$10,000 + (5,000 \times 70\%)$].

This method of computing equivalent units is referred to as the **weighted-average method**. It considers the degree of completion (weighting) of the units completed and transferred out and the ending work in process.

REFINEMENTS ON THE WEIGHTED-AVERAGE METHOD

Kellogg Company has produced Eggo® Waffles since 1970. Three departments produce these waffles: Mixing, Baking, and Freezing/Packaging. The Mixing Department combines dry ingredients, including flour, salt, and baking powder, with liquid ingredients, including eggs and vegetable oil, to make waffle batter. Illustration 3-9 provides information related to the Mixing Department at the end of June.

Illustration 3-9

Information for Mixing Department

	MIXING DEPARTMENT		
	Physical Units	Percentage Complete	
		Materials	Conversion Costs
Work in process, June 1	100,000	100%	70%
Started into production	800,000		
Total units	<u>900,000</u>		
Units transferred out	700,000		
Work in process, June 30	200,000	100%	60%
Total units	<u>900,000</u>		

Helpful Hint When are separate unit cost computations needed for materials and conversion costs?
Answer: Whenever the two types of costs do not occur in the process at the same time.

Illustration 3-9 indicates that the beginning work in process is 100% complete as to materials cost and 70% complete as to conversion costs. **Conversion costs** are the sum of labor costs and overhead costs. In other words, Kellogg adds both the dry and liquid ingredients (materials) at the beginning of the waffle-making process, and the conversion costs (labor and overhead) related to the mixing of these ingredients are incurred uniformly and are 70% complete. The ending work in process is 100% complete as to materials cost and 60% complete as to conversion costs.

We then use the Mixing Department information to determine equivalent units. **In computing equivalent units, the beginning work in process is not part of the equivalent-units-of-production formula.** The units transferred out to the Baking Department are fully complete as to both materials and conversion costs. The ending work in process is fully complete as to materials, but only 60% complete as to conversion costs. We therefore need to make **two equivalent unit computations**: one for materials, and the other for conversion costs. Illustration 3-10 shows these computations.

Illustration 3-10

Computation of equivalent units—Mixing Department

Ethics Note An unethical manager might use incorrect completion percentages when determining equivalent units. This results in either raising or lowering costs. Since completion percentages are somewhat subjective, this form of income manipulation can be difficult to detect.

	MIXING DEPARTMENT		
	Equivalent Units	Conversion	
		Materials	Costs
Units transferred out	700,000	700,000	
Work in process, June 30			
$200,000 \times 100\%$	200,000		
$200,000 \times 60\%$			120,000
Total equivalent units	<u>900,000</u>		<u>820,000</u>

We can refine the earlier formula used to compute equivalent units of production (Illustration 3-8, page 107) to show the computations for materials and for conversion costs, as follows.

Units Completed and Transferred Out—Materials	+	Equivalent Units of Ending Work in Process—Materials	=	Equivalent Units of Production—Materials
Units Completed and Transferred Out—Conversion Costs	+	Equivalent Units of Ending Work in Process—Conversion Costs	=	Equivalent Units of Production—Conversion Costs

Illustration 3-11
Refined equivalent units of production formula



Management Insight

Keeping Score for the Xbox

When you are as big and as profitable as Microsoft, you get to a point where continued rapid growth is very difficult. For example, many believe it is unlikely that Microsoft will see much growth in software sales. As a result, the company is looking for new markets, such as the video game market with its Xbox player.

Profitability in the video-game hardware market has been elusive. Microsoft has struggled to control the costs of both manufacturing and distribution. One analyst predicted that Microsoft's "snowballing" costs in the next period could exceed budget by \$2.4 billion. Microsoft's Chief Financial Officer blamed the high costs on unexpectedly high volumes, saying, "We pushed market volumes very high in the Xbox business. As a result of that we incurred some costs in the supply chain." Given these issues, and despite its incredible success as a software company, some observers question whether Microsoft will be able to make the changes that are required to become a successful hardware manufacturer.

Source: Robert A. Guth, "Microsoft Net Rises 16%, but Costs Damp Results," *Wall Street Journal*, April 28, 2006.



In what ways has cost accounting probably become more critical for Microsoft in recent years?

Do it!

The fabricating department has the following production and cost data for the current month.

Beginning Work in Process	Units Transferred Out	Ending Work in Process
-0-	15,000	10,000

Materials are entered at the beginning of the process. The ending work in process units are 30% complete as to conversion costs. Compute the equivalent units of production for (a) materials and (b) conversion costs.

Solution

- Since materials are entered at the beginning of the process, the equivalent units of ending work in process are 10,000. Thus, $15,000 \text{ units} + 10,000 \text{ units} = 25,000$ equivalent units of production for materials.
- Since ending work in process is only 30% complete as to conversion costs, the equivalent units of ending work in process are $3,000 (30\% \times 10,000 \text{ units})$. Thus, $15,000 \text{ units} + 3,000 \text{ units} = 18,000$ equivalent units of production for conversion costs.

before you go on...

Equivalent Units

Action Plan

- To measure the work done during the period, expressed in fully completed units, compute equivalent units of production.
- Use the appropriate formula:
Units completed and transferred out + Equivalent units of ending work in process = Equivalent units of production.

Related exercise material: BE3-5, BE3-10, E3-5, E3-6, E3-7, E3-8, E3-9, E3-10, E3-11, E3-13, and **Do it! 3-3**.

study objective**6**

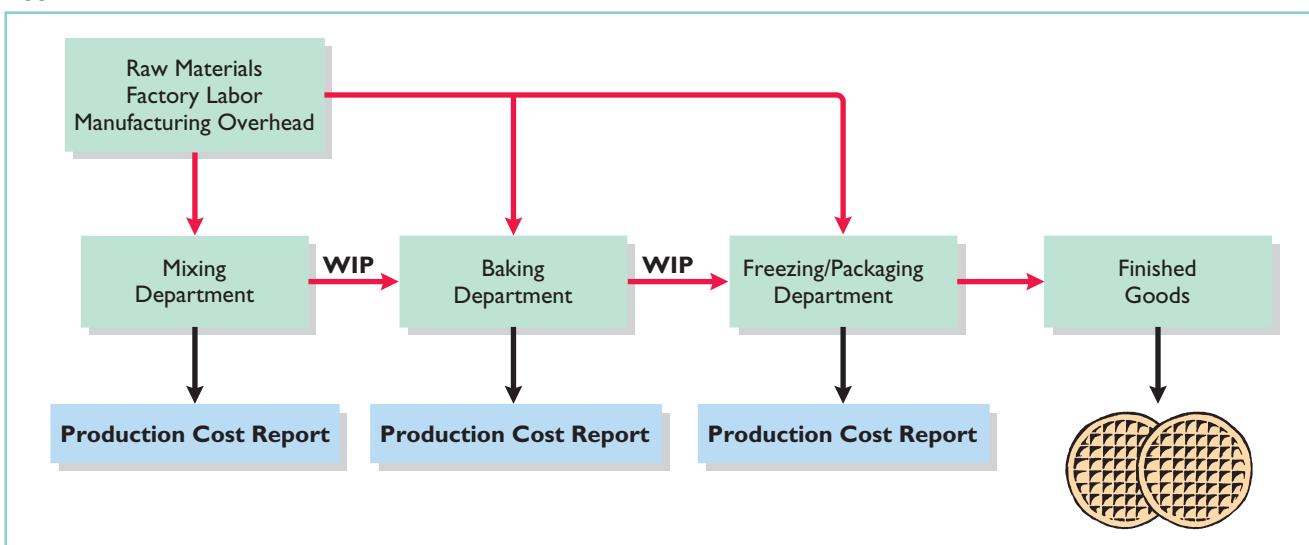
Explain the four steps necessary to prepare a production cost report.

Illustration 3-12

Flow of costs in making Eggo® Waffles

PRODUCTION COST REPORT

As mentioned earlier, companies prepare a production cost report for each department. A **production cost report** is the key document that management uses to understand the activities in a department; it shows the production quantity and cost data related to that department. For example, in producing Eggo® Waffles, **Kellogg Company** uses three production cost reports: Mixing, Baking, and Freezing/Packaging. Illustration 3-12 shows the flow of costs to make an Eggo® Waffle and the related production cost reports for each department.



In order to complete a production cost report, the company must perform four steps, which, as a whole, make up the process costing system.

1. Compute the physical unit flow.
2. Compute the equivalent units of production.
3. Compute unit production costs.
4. Prepare a cost reconciliation schedule.

The next section explores these steps in an extended example.

Comprehensive Example of Process Costing

Illustration 3-13 shows assumed data for the Mixing Department at **Kellogg Company** for the month of June. We will use this information to complete a production cost report for the Mixing Department.

COMPUTE THE PHYSICAL UNIT FLOW (STEP 1)

Physical units are the actual units to be accounted for during a period, irrespective of any work performed. To keep track of these units, add the units started (or transferred) into production during the period to the units in process at the beginning of the period. This amount is referred to as the **total units to be accounted for**.

MIXING DEPARTMENT	
Units	
Work in process, June 1	100,000
Direct materials: 100% complete	
Conversion costs: 70% complete	
Units started into production during June	800,000
Units completed and transferred out to Baking Department	700,000
Work in process, June 30	200,000
Direct materials: 100% complete	
Conversion costs: 60% complete	
Costs	
Work in process, June 1	
Direct materials: 100% complete	\$ 50,000
Conversion costs: 70% complete	35,000
Cost of work in process, June 1	<u>\$ 85,000</u>
Costs incurred during production in June	
Direct materials	\$400,000
Conversion costs	170,000
Costs incurred in June	<u>\$570,000</u>

Illustration 3-13
Unit and cost data—Mixing Department

The total units then are accounted for by the output of the period. The output consists of units transferred out during the period and any units in process at the end of the period. This amount is referred to as the **total units accounted for**. Illustration 3-14 shows the flow of physical units for Kellogg's Mixing Department for the month of June.

MIXING DEPARTMENT	
	Physical Units
Units to be accounted for	
Work in process, June 1	100,000
Started (transferred) into production	800,000
Total units	<u>900,000</u>
Units accounted for	
Completed and transferred out	700,000
Work in process, June 30	200,000
Total units	<u>900,000</u>

Illustration 3-14
Physical unit flow—Mixing Department

The records indicate that the Mixing Department must account for 900,000 units. Of this sum, 700,000 units were transferred to the Baking Department and 200,000 units were still in process.

COMPUTE EQUIVALENT UNITS OF PRODUCTION (STEP 2)

Once the physical flow of the units is established, Kellogg must measure the Mixing Department's productivity in terms of equivalent units of production. The Mixing Department adds materials at the beginning of the process, and it incurs conversion costs uniformly during the process. Thus, we need two computations of equivalent units: one for materials and one for conversion costs. The equivalent unit computation is as follows.

Helpful Hint Materials are not always added at the beginning of the process. For example, materials are sometimes added uniformly during the process.

Illustration 3-15

Computation of equivalent units—Mixing Department

Helpful Hint Remember that we ignore the beginning work in process in this computation.

	Equivalent Units	
	Materials	Conversion Costs
Units transferred out	700,000	700,000
Work in process, June 30		
$200,000 \times 100\%$	200,000	
$200,000 \times 60\%$		120,000
Total equivalent units	<u>900,000</u>	<u>820,000</u>

COMPUTE UNIT PRODUCTION COSTS (STEP 3)

Armed with the knowledge of the equivalent units of production, we can now compute the unit production costs. **Unit production costs** are costs expressed in terms of equivalent units of production. When equivalent units of production are different for materials and conversion costs, we compute three unit costs: (1) materials, (2) conversion, and (3) total manufacturing.

The computation of total materials cost related to Eggo® Waffles is as follows.

Illustration 3-16

Total materials cost computation

Work in process, June 1		
Direct materials cost	\$ 50,000	
Costs added to production during June		
Direct materials cost	400,000	
Total materials cost	<u><u>\$450,000</u></u>	

The computation of unit materials cost is as follows.

Illustration 3-17

Unit materials cost computation

Total Materials Cost	\div	Equivalent Units of Materials	=	Unit Materials Cost
\$450,000	\div	900,000	=	\$0.50

Illustration 3-18 shows the computation of total conversion costs.

Illustration 3-18

Total conversion costs computation

Work in process, June 1		
Conversion costs	\$ 35,000	
Costs added to production during June		
Conversion costs	170,000	
Total conversion costs	<u><u>\$205,000</u></u>	

The computation of unit conversion cost is as follows.

Illustration 3-19

Unit conversion cost computation

Total Conversion Costs	\div	Equivalent Units of Conversion Costs	=	Unit Conversion Cost
\$205,000	\div	820,000	=	\$0.25

Total manufacturing cost per unit is therefore computed as shown in Illustration 3-20.

Unit Materials Cost	+	Unit Conversion Cost	=	Total Manufacturing Cost per Unit
\$0.50	+	\$0.25	=	\$0.75

Illustration 3-20
Total manufacturing cost per unit

PREPARE A COST RECONCILIATION SCHEDULE (STEP 4)

We are now ready to determine the cost of goods transferred out of the Mixing Department to the Baking Department and the costs in ending work in process. Kellogg charged total costs of \$655,000 to the Mixing Department in June, calculated as follows.

Costs to be accounted for	
Work in process, June 1	\$ 85,000
Started into production	<u>570,000</u>
Total costs	\$655,000

Illustration 3-21
Costs charged to Mixing Department

The company then prepares a cost reconciliation schedule to assign these costs to (a) units transferred out to the Baking Department and (b) ending work in process.

MIXING DEPARTMENT		
Cost Reconciliation Schedule		
Costs accounted for		
Transferred out ($700,000 \times \$0.75$)		\$ 525,000
Work in process, June 30		
Materials ($200,000 \times \$0.50$)	\$100,000	
Conversion costs ($120,000 \times \$0.25$)	<u>30,000</u>	<u>130,000</u>
Total costs		\$655,000

Illustration 3-22
Cost reconciliation schedule—Mixing Department

Kellogg uses the total manufacturing cost per unit, \$0.75, in costing the **units completed** and transferred to the Baking Department. In contrast, the unit cost of materials and the unit cost of conversion are needed in costing **units in process**. The **cost reconciliation schedule** shows that the **total costs accounted for** (Illustration 3-22) equal the **total costs to be accounted for** (Illustration 3-21).

PREPARING THE PRODUCTION COST REPORT

At this point, Kellogg is ready to prepare the production cost report for the Mixing Department. As indicated earlier, this report is an internal document for management that shows production quantity and cost data for a production department.

There are four steps in preparing a production cost report. They are:

1. Prepare a physical unit schedule.
2. Compute equivalent units.
3. Compute unit costs.
4. Prepare a cost reconciliation schedule.

Illustration 3-23 (page 114) shows the production cost report for the Mixing Department. The report identifies the four steps.

study objective 7
Prepare a production cost report.

Illustration 3-23

Production cost report

	A	B	C	D	E	F
1	Mixing Department Production Cost Report For the Month Ended June 30, 2011					
2					Equivalent Units	
3					Physical Units	
4					Materials	Conversion Costs
5					Step 1	Step 2
6	QUANTITIES					
7	Units to be accounted for					
8	Work in process, June 1	100,000				
9	Started into production	800,000				
10	Total units	900,000				
11	Units accounted for					
12	Transferred out	700,000	700,000	700,000		
13	Work in process, June 30	200,000	200,000	120,000	(200,000 × 60%)	
14	Total units	900,000	900,000	820,000		
15	COSTS				Materials	Conversion Costs
16	Unit costs [Step 3]					Total
17	Costs in June	(a)	\$450,000	\$205,000	\$655,000	
18	Equivalent units	(b)	900,000	820,000		
19	Unit costs [(a) ÷ (b)]		\$0.50	\$0.25	\$0.75	
20	Costs to be accounted for					
21	Work in process, June 1					\$85,000
22	Started into production					570,000
23	Total costs					\$655,000
24	Cost Reconciliation Schedule [Step 4]					
25	Costs accounted for					\$525,000
26	Transferred out (700,000 × \$0.75)					
27	Work in process, June 30					
28	Materials (200,000 × \$0.50)			\$100,000		
29	Conversion costs (120,000 × \$0.25)			30,000	130,000	
	Total costs					\$655,000

Production cost reports provide a basis for evaluating the productivity of a department. In addition, managers can use the cost data to assess whether unit costs and total costs are reasonable. By comparing the quantity and cost data with predetermined goals, top management can also judge whether current performance is meeting planned objectives.



DECISION TOOLKIT

DECISION CHECKPOINTS	INFO NEEDED FOR DECISION	TOOL TO USE FOR DECISION	HOW TO EVALUATE RESULTS
What is the cost of a product?	Cost of materials, labor, and overhead assigned to processes used to make the product	Production cost report	Compare costs to previous periods, to competitors, and to expected selling price to evaluate overall profitability.

before you go on...

Do it!

In March, Rodayo Manufacturing had the following unit production costs: materials \$6 and conversion costs \$9. On March 1, it had zero work in process. During March, Rodayo transferred out 12,000 units. As of March 31, 800 units that were 25 percent complete as to conversion costs and 100 percent complete as to materials were in ending work in process. Assign the costs to the units transferred out and in process.

Cost Reconciliation Schedule

Solution

The assignment of costs is as follows.

Costs accounted for		
Transferred out ($12,000 \times \$15$)		\$180,000
Work in process, March 31		
Materials ($800 \times \$6$)	\$4,800	
Conversion costs ($200^a \times \$9$)	<u>1,800</u>	6,600
Total costs		<u><u>\$186,600</u></u>
^a $800 \times 25\%$		

Related exercise material: **BE3-5, BE3-6, BE3-7, BE3-10, E3-5, E3-6, E3-8, E3-9, E3-10, E3-11,** and **Do it! 3-4.**

Action Plan

- Assign the total manufacturing cost of \$15 per unit to the 12,000 units transferred out.
- Assign the materials cost and conversion costs based on equivalent units of production to units in ending work in process.

**COSTING SYSTEMS—FINAL COMMENTS**

Companies often use a combination of a process cost and a job order cost system. Called **operations costing**, this hybrid system is similar to process costing in its assumption that standardized methods are used to manufacture the product. At the same time, the product may have some customized, individual features that require the use of a job order cost system.

Consider, for example, the automobile manufacturer **Ford Motor Company**. Each vehicle at a given plant goes through the same assembly line, but Ford uses different materials (such as seat coverings, paint, and tinted glass) for different vehicles. Similarly, **Kellogg's** Pop-Tarts® toaster pastries go through numerous standardized processes—mixing, filling, baking, frosting, and packaging. The pastry dough, though, comes in different flavors—plain, chocolate, and graham—and fillings include Smucker's® real fruit, chocolate fudge, vanilla creme, brown sugar cinnamon, and s'mores.

A cost-benefit tradeoff occurs as a company decides which costing system to use. A job order cost system, for example, provides detailed information related to the cost of the product. Because each job has its own distinguishing characteristics, the system can provide an accurate cost per job. This information is useful in controlling costs and pricing products. However, the cost of implementing a job order cost system is often expensive because of the accounting costs involved.

On the other hand, for a company like **Intel**, which makes computer chips, is there a benefit in knowing whether the cost of the one hundredth chip produced is different from the one thousandth chip produced? Probably not. An average cost of the product will suffice for control and pricing purposes.

In summary, when deciding to use one of these systems, or a combination system, a company must weigh the costs of implementing the system against the benefits from the additional information provided.

**DECISION TOOLKIT****DECISION CHECKPOINTS****INFO NEEDED FOR DECISION****TOOL TO USE FOR DECISION****HOW TO EVALUATE RESULTS**

What costing method should be used?

Type of product or service produced

Cost of accounting system; benefits of additional information

The benefits of providing the additional information should exceed the costs of the accounting system needed to develop the information.



USING THE DECISION TOOLKIT

Essence Company manufactures a high-end after-shave lotion, called Eternity, in 10-ounce plastic bottles. Because the market for after-shave lotion is highly competitive, the company is very concerned about keeping its costs under control. Eternity is manufactured through three processes: mixing, filling, and corking. Materials are added at the beginning of the process, and labor and overhead are incurred uniformly throughout each process. The company uses a weighted-average method to cost its product. A partially completed production cost report for the month of May for the Mixing Department is shown below.

ESSENCE COMPANY

Mixing Department
Production Cost Report
For the Month Ended May 31, 2011

Quantities	Physical Units	Equivalent Units		Total
		Materials	Conversion Costs	
Units to be accounted for	Step 1			
Work in process, May 1	1,000			
Started into production	2,000			
Total units	<u>3,000</u>			
Units accounted for				
Transferred out	2,200	?	?	
Work in process, May 31	800	?	?	
Total units	<u>3,000</u>	<u>?</u>	<u>?</u>	
Costs		Materials	Conversion Costs	
Unit costs Step 3				
Costs in May	(a)	?	?	?
Equivalent units	(b)	<u>?</u>	<u>?</u>	<u>?</u>
Unit costs [(a) ÷ (b)]		<u>?</u>	<u>?</u>	<u>?</u>
Costs to be accounted for				
Work in process, May 1				\$ 56,300
Started into production				<u>119,320</u>
Total costs				<u>\$175,620</u>
Cost Reconciliation Schedule Step 4				
Costs accounted for				?
Transferred out				?
Work in process, May 31				?
Materials		?		?
Conversion costs		?		?
Total costs				<u>?</u>
Additional information:				
Work in process, May 1, 1,000 units				
Materials cost, 1,000 units (100% complete)			\$49,100	
Conversion costs, 1,000 units (70% complete)			<u>7,200</u>	\$ 56,300
Materials cost for May, 2,000 units				<u>\$100,000</u>
Work in process, May 31, 800 units, 100% complete as to materials and 50% complete as to conversion costs.				

Instructions

- Prepare a production cost report for the Mixing Department for the month of May.
- Prepare the journal entry to record the transfer of goods from the Mixing Department to the Filling Department.
- Explain why Essence Company is using a process cost system to account for its costs.

Solution

- (a) A completed production cost report for the Mixing Department is shown below. Computations to support the amounts reported follow the report.

ESSENCE COMPANY
 Mixing Department
 Production Cost Report
 For the Month Ended May 31, 2011

Quantities	Equivalent Units		
	Physical Units	Conversion Materials	Conversion Costs
	Step 1	Step 2	
Units to be accounted for			
Work in process, May 1	1,000		
Started into production	2,000		
Total units	<u>3,000</u>		
Units accounted for			
Transferred out	2,200	2,200	2,200
Work in process, May 31	800	800	400 ($800 \times 50\%$)
Total units	<u>3,000</u>	<u>3,000</u>	<u>2,600</u>
Costs			
Unit costs Step 3			
Costs in May*	(a)	\$149,100	\$26,520
Equivalent units	(b)	<u>3,000</u>	<u>2,600</u>
Unit costs [(a) \div (b)]		\$49.70	\$10.20
Costs to be accounted for			
Work in process, May 1			\$ 56,300
Started into production			119,320
Total costs			<u>\$175,620</u>

*Additional computations to support production cost report data:

Materials cost—\$49,100 + \$100,000

Conversion costs—\$7,200 + \$19,320 (\$119,320 – \$100,000)

Cost Reconciliation Schedule Step 4

Costs accounted for			
Transferred out ($2,200 \times \$59.90$)			\$131,780
Work in process, May 31			
Materials ($800 \times \$49.70$)		\$39,760	
Conversion costs ($400 \times \$10.20$)		4,080	43,840
Total costs			<u>\$175,620</u>

(b) Work in Process—Filling	131,780	
Work in Process—Mixing		131,780

Action Plan

- Compute the physical unit flow—that is, the total units to be accounted for.
- Compute the equivalent units of production.
- Compute the unit production costs, expressed in terms of equivalent units of production.
- Prepare a cost reconciliation schedule, which shows that the total costs accounted for equal the total costs to be accounted for.



- (c) Companies use process cost systems to apply costs to similar products that are mass-produced in a continuous fashion. Essence Company uses a process cost system because production of the after-shave lotion, once it begins, continues until the after-shave lotion emerges. The processing is the same for the entire run—with precisely the same amount of materials, labor, and overhead. Each bottle of Eternity after-shave lotion is indistinguishable from another.

Summary of Study Objectives

- 1 Understand who uses process cost systems.** Companies that mass-produce similar products in a continuous fashion use process cost systems. Once production begins, it continues until the finished product emerges. Each unit of finished product is indistinguishable from every other unit.
- 2 Explain the similarities and differences between job order cost and process cost systems.** Job order cost systems are similar to process cost systems in three ways: (1) Both systems track the same cost elements—direct materials, direct labor, and manufacturing overhead. (2) Both accumulate costs in the same accounts—Raw Materials Inventory, Factory Labor, and Manufacturing Overhead. (3) Both assign accumulated costs to the same accounts—Work in Process, Finished Goods Inventory, and Cost of Goods Sold. However, the method of assigning costs differs significantly.
- There are four main differences between the two cost systems: (1) A process cost system uses separate accounts for each department or manufacturing process, rather than only one work in process account used in a job order cost system. (2) A process cost system summarizes costs in a production cost report for each department. A job order cost system charges costs to individual jobs and summarizes them in a job cost sheet. (3) Costs are totaled at the end of a time period in a process cost system, but at the completion of a job in a job order cost system. (4) A process cost system calculates unit cost as: Total manufacturing costs for the period \div Units produced during the period. A job order cost system calculates unit cost as: Total cost per job \div Units produced.
- 3 Explain the flow of costs in a process cost system.** A process cost system assigns manufacturing costs for raw materials, labor, and overhead to work in process accounts for various departments or manufacturing processes. It transfers the costs of partially completed units from one department to another as those units move through the manufacturing process. The system transfers the costs of completed work to Finished Goods Inventory. Finally, when inventory is sold, the system transfers the costs to Cost of Goods Sold.
- 4 Make the journal entries to assign manufacturing costs in a process cost system.** Entries to assign the costs of raw materials, labor, and overhead consist of a credit to Raw Materials Inventory, Factory Labor, and Manufacturing Overhead, and a debit to Work in Process for each department. Entries to record the cost of goods transferred to another department are a credit to Work in Process for the department whose work is finished and a debit to the department to which the goods are transferred. The entry to record units completed and transferred to the warehouse is a credit to Work in Process for the department whose work is finished and a debit to Finished Goods Inventory. The entry to record the sale of goods is a credit to Finished Goods Inventory and a debit to Cost of Goods Sold.
- 5 Compute equivalent units.** Equivalent units of production measure work done during a period, expressed in fully completed units. Companies use this measure to determine the cost per unit of completed product. Equivalent units are the sum of units completed and transferred out plus equivalent units of ending work in process.
- 6 Explain the four steps necessary to prepare a production cost report.** The four steps to complete a production cost report are: (1) Compute the physical unit flow—that is, the total units to be accounted for. (2) Compute the equivalent units of production. (3) Compute the unit production costs, expressed in terms of equivalent units of production. (4) Prepare a cost reconciliation schedule, which shows that the total costs accounted for equal the total costs to be accounted for.
- 7 Prepare a production cost report.** The production cost report contains both quantity and cost data for a production department. There are four sections in the report: (1) number of physical units, (2) equivalent units determination, (3) unit costs, and (4) cost reconciliation schedule.





DECISION TOOLKIT A SUMMARY

DECISION CHECKPOINTS	INFO NEEDED FOR DECISION	TOOL TO USE FOR DECISION	HOW TO EVALUATE RESULTS
What is the cost of a product?	Costs of materials, labor, and overhead assigned to processes used to make the product	Production cost report	Compare costs to previous periods, to competitors, and to expected selling price to evaluate overall profitability.
Which costing method should be used?	Type of product or service produced	Cost of accounting system; benefits of additional information	The benefits of providing the additional information should exceed the costs of the accounting system needed to develop the information.

appendix

FIFO Method

In this chapter we demonstrated the weighted-average method of computing equivalent units. Some companies use a different method, referred to as the **first-in, first-out (FIFO) method**, to compute equivalent units. The purpose of this appendix is to illustrate how companies use the FIFO method to prepare a production cost report.

EQUIVALENT UNITS UNDER FIFO

Under the FIFO method, companies compute equivalent units on a first-in, first-out basis. Some companies favor the FIFO method because the FIFO cost assumption usually corresponds to the actual physical flow of the goods. Under the FIFO method, companies therefore assume that the beginning work in process is completed before new work is started.

Using the FIFO method, equivalent units are the sum of the work performed to:

1. Finish the units of beginning work in process inventory.
2. Complete the units started into production during the period (referred to as the **units started and completed**).
3. Start, but only partially complete, the units in ending work in process inventory.

Normally, in a process costing system, some units will always be in process at both the beginning and end of the period.

study objective 8

Compute equivalent units using the FIFO method.

Illustration

Illustration 3A-1 (page 120) shows the physical flow of units for the Assembly Department of Shutters Inc. In addition, it indicates the degree of completion of the work in process accounts in regard to conversion costs.

Illustration 3A-1

Physical unit flow—
Assembly Department

ASSEMBLY DEPARTMENT		<u>Physical Units</u>
Units to be accounted for		
Work in process, June 1 (40% complete)	500	
Started (transferred) into production	8,000	
Total units	<u>8,500</u>	
Units accounted for		
Completed and transferred out	8,100	
Work in process, June 30 (75% complete)	400	
Total units	<u>8,500</u>	

In Illustration 3A-1, the units completed and transferred out (8,100) plus the units in ending work in process (400) equal the total units to be accounted for (8,500). Using FIFO, we then compute equivalent units as follows.

1. The 500 units of beginning work in process were 40 percent complete. Thus, 300 equivalent units ($60\% \times 500$ units) were required to complete the beginning inventory.
2. The units started and completed during the current month are the units transferred out minus the units in beginning work in process. For the Assembly Department, units started and completed are 7,600 ($8,100 - 500$).
3. The 400 units of ending work in process were 75 percent complete. Thus, equivalent units were 300 ($400 \times 75\%$).

Equivalent units for the Assembly Department are 8,200, computed as follows.

Illustration 3A-2

Computation of equivalent
units—FIFO method

ASSEMBLY DEPARTMENT			
<u>Production Data</u>	<u>Physical Units</u>	<u>Work Added This Period</u>	<u>Equivalent Units</u>
Work in process, June 1	500	60%	<u>300</u>
Started and completed	7,600	100%	<u>7,600</u>
Work in process, June 30	<u>400</u>	75%	<u>300</u>
Total	<u>8,500</u>		<u>8,200</u>

COMPREHENSIVE EXAMPLE

To provide a complete illustration of the FIFO method, we will use the data for the Mixing Department at **Kellogg Company** for the month of June, as shown in Illustration 3A-3 (page 121).

Compute the Physical Unit Flow (Step 1)

Illustration 3A-4 (page 121) shows the physical flow of units for **Kellogg** for the month of June for the Mixing Department.

Under the FIFO method, companies often expand the physical units schedule, as shown in Illustration 3A-5 (page 121) to explain the transferred-out section. As a result, this section reports the beginning work in process and the units started and completed. These two items further explain the completed and transferred-out section.

MIXING DEPARTMENT	
Units	
Work in process, June 1	100,000
Direct materials: 100% complete	
Conversion costs: 70% complete	
Units started into production during June	800,000
Units completed and transferred out to Baking Department	700,000
Work in process, June 30	200,000
Direct materials: 100% complete	
Conversion costs: 60% complete	
Costs	
Work in process, June 1	
Direct materials: 100% complete	\$ 50,000
Conversion costs: 70% complete	35,000
Cost of work in process, June 1	<u>\$ 85,000</u>
Costs incurred during production in June	
Direct materials	\$400,000
Conversion costs	170,000
Costs incurred in June	<u>\$570,000</u>

Illustration 3A-3
Unit and cost data—Mixing Department

MIXING DEPARTMENT	
	Physical Units
Units to be accounted for	
Work in process, June 1	100,000
Started (transferred) into production	<u>800,000</u>
Total units	<u>900,000</u>
Units accounted for	
Completed and transferred out	700,000
Work in process, June 30	<u>200,000</u>
Total units	<u>900,000</u>

Illustration 3A-4
Physical unit flow—Mixing Department

MIXING DEPARTMENT	
	Physical Units
Units to be accounted for	
Work in process, June 1	100,000
Started (transferred) into production	<u>800,000</u>
Total units	<u>900,000</u>
Units accounted for	
Completed and transferred out	
Work in process, June 1	100,000
Started and completed	<u>600,000</u>
	<u>700,000</u>
Work in process, June 30	200,000
Total units	<u>900,000</u>

Illustration 3A-5
Physical unit flow (FIFO)—Mixing Department

The records indicate that the Mixing Department must account for 900,000 units. Of this sum, 700,000 units were transferred to the Baking Department and 200,000 units were still in process.

Helpful Hint Materials are not always added at the beginning of the process. For example, companies sometimes add materials uniformly during the process.

Compute Equivalent Units of Production (Step 2)

As with the method presented in the chapter, once they determine the physical flow of the units, companies need to determine equivalent units of production. The Mixing Department adds materials at the beginning of the process, and it incurs conversion costs uniformly during the process. Thus, Kellogg must make two computations of equivalent units: one for materials and one for conversion costs.

EQUIVALENT UNITS FOR MATERIALS Since Kellogg adds materials at the beginning of the process, no additional materials costs are required to complete the beginning work in process. In addition, 100 percent of the materials costs has been incurred on the ending work in process. Thus, the computation of equivalent units for materials is as follows.

Illustration 3A-6

Computation of equivalent units—materials

MIXING DEPARTMENT—MATERIALS			
Production Data	Physical Units	Materials Added This Period	Equivalent Units
Work in process, June 1	100,000	—0—	—0—
Started and finished	600,000	100%	600,000
Work in process, June 30	<u>200,000</u>	100%	200,000
Total	<u>900,000</u>		800,000

EQUIVALENT UNITS FOR CONVERSION COSTS The 100,000 units of beginning work in process were 70 percent complete in terms of conversion costs. Thus, the Mixing Department required 30,000 equivalent units ($30\% \times 100,000$ units) of conversion costs to complete the beginning inventory. In addition, the 200,000 units of ending work in process were 60 percent complete in terms of conversion costs. Thus, the equivalent units for conversion costs is 750,000, computed as follows.

Illustration 3A-7

Computation of equivalent units—conversion costs

MIXING DEPARTMENT—CONVERSION COSTS			
Production Data	Physical Units	Work Added This Period	Equivalent Units
Work in process, June 1	100,000	30%	30,000
Started and finished	600,000	100%	600,000
Work in process, June 30	<u>200,000</u>	60%	120,000
Total	<u>900,000</u>		750,000

Compute Unit Production Costs (Step 3)

Armed with the knowledge of the equivalent units of production, Kellogg can now compute the unit production costs. Unit production costs are costs expressed in terms of equivalent units of production. When equivalent units of production are different for materials and conversion costs, companies compute three unit costs: (1) materials, (2) conversion, and (3) total manufacturing.

Under the FIFO method, the unit costs of production are based entirely on the production costs incurred during the month. Thus, the costs in the beginning work in process are not relevant, because they were incurred on work done in the preceding month. As Illustration 3A-3 (page 121) indicated, the costs incurred during production in June were:

Direct materials	\$400,000
Conversion costs	170,000
Total costs	<u><u>\$570,000</u></u>

Illustration 3A-8
Costs incurred during production in June

Illustration 3A-9 shows the computation of unit materials cost, unit conversion costs, and total unit cost related to Eggo® Waffles.

(1)	Total Materials Cost	\div	Equivalent Units of Materials	=	Unit Materials Cost
	\$400,000	\div	800,000	=	\$0.50
(2)	Total Conversion Costs	\div	Equivalent Units of Conversion Costs	=	Unit Conversion Cost
	\$170,000	\div	750,000	=	\$0.227 (rounded)*
(3)	Unit Materials Cost	+	Unit Conversion Cost	=	Total Manufacturing Cost per Unit
	\$0.50	+	\$0.227	=	\$0.727

Illustration 3A-9
Unit cost formulas and computations—Mixing Department

*For homework problems, round unit costs to three decimal places.

As shown, the unit costs are \$0.50 for materials, \$0.227 for conversion costs, and \$0.727 for total manufacturing costs.

Prepare a Cost Reconciliation Schedule (Step 4)

Kellogg is now ready to determine the cost of goods transferred out of the Mixing Department to the Baking Department and the costs in ending work in process. The total costs charged to the Mixing Department in June are \$655,000, calculated as follows.

Costs to be accounted for	
Work in process, June 1	\$ 85,000
Started into production	570,000
Total costs	<u><u>\$655,000</u></u>

Illustration 3A-10
Costs charged to Mixing Department

Kellogg next prepares a cost reconciliation to assign these costs to (1) units transferred out to the Baking Department and (2) ending work in process. Under the FIFO method, the first goods to be completed during the period are the units in beginning work in process. Thus, the cost of the beginning work in process is always assigned to the goods transferred to the next department (or finished goods, if processing is complete). Under the FIFO method, ending work in process also

will be assigned only the production costs incurred in the current period. Illustration 3A-11 shows a cost reconciliation schedule for the Mixing Department.

Illustration 3A-11

Cost reconciliation report

MIXING DEPARTMENT		
Cost Reconciliation Schedule		
Costs accounted for		
Transferred out		
Work in process, June 1	\$ 85,000	
Costs to complete beginning work in process		
Conversion costs ($30,000 \times \$0.227$)	<u>6,810</u>	
Total costs	91,810	
Units started and completed ($600,000 \times \$0.727$)	<u>435,950*</u>	
		<u>527,760</u>
Total costs transferred out		
Work in process, June 30		
Materials ($200,000 \times \$0.50$)	\$100,000	
Conversion costs ($120,000 \times \$0.227$)	<u>27,240</u>	
		<u>127,240</u>
Total costs		<u><u>\$655,000</u></u>

*Any rounding errors should be adjusted in the “Units started and completed” calculation.

As you can see, the total costs accounted for (\$655,000 from Illustration 3A-11) equal the total costs to be accounted for (\$655,000 from Illustration 3A-10).

Preparing the Production Cost Report

At this point, Kellogg is ready to prepare the production cost report for the Mixing Department. This report is an internal document for management that shows production quantity and cost data for a production department.

As discussed on page 110, there are four steps in preparing a production cost report:

1. Prepare a physical unit schedule.
2. Compute equivalent units.
3. Compute unit costs.
4. Prepare a cost reconciliation schedule.

Illustration 3A-12 (page 125) shows the production cost report for the Mixing Department, with the four steps identified in the report.

As indicated in the chapter, production cost reports provide a basis for evaluating the productivity of a department. In addition, managers can use the cost data to assess whether unit costs and total costs are reasonable. By comparing the quantity and cost data with predetermined goals, top management can also judge whether current performance is meeting planned objectives.

FIFO AND WEIGHTED-AVERAGE

The weighted-average method of computing equivalent units has **one major advantage**: It is simple to understand and apply. In cases where prices do not fluctuate significantly from period to period, the weighted-average method will be very similar to the FIFO method. In addition, companies that have been using just-in-time procedures effectively for inventory control purposes will have minimal inventory balances, and therefore differences between the weighted-average and the FIFO methods will not be material.

Conceptually, the FIFO method is superior to the weighted-average method because it measures **current performance** using only costs incurred in the current

Mixing Department.xls

**Mixing Department
Production Cost Report
For the Month Ended June 30, 2011**

	A	B	C	D	E	F	G
					Equivalent Units		
			Physical Units	Materials	Conversion Costs		
6	QUANTITIES			Step 1	Step 2		
7	Units to be accounted for						
8	Work in process (WIP), June 1	100,000					
9	Started into production	800,000					
10	Total units	900,000					
12	Units accounted for						
13	Completed and transferred out						
14	Work in process, June 1	100,000	0	30,000			
15	Started and completed	600,000	600,000	600,000			
16	Work in process, June 30	200,000	200,000	120,000			
17	Total units	900,000	800,000	750,000			
19	COSTS						
20	Unit costs Step 3				Conversion Costs		
21	Costs in June (excluding beginning WIP)	(a)	\$400,000	\$170,000	\$570,000		
22	Equivalent units	(b)	800,000	750,000			
23	Unit costs [(a) ÷ (b)]		\$0.50	\$0.227	\$0.727		
25	Costs to be accounted for						
26	Work in process, June 1				\$85,000		
27	Started into production				570,000		
28	Total costs				\$655,000		
30	Cost Reconciliation Schedule Step 4						
31	Costs accounted for						
32	Transferred out						
33	Work in process, June 1				\$85,000		
34	Costs to complete beginning work in process						
35	Conversion costs ($30,000 \times \$0.227$)				6,810		
36	Total costs				91,810		
37	Units started and completed ($600,000 \times \$0.727$)**				435,950		**Any rounding errors should be adjusted in the "Units started and completed"
38	Total costs transferred out				527,760		
39	Work in process, June 30						
40	Materials ($200,000 \times \$0.50$)			\$100,000			
41	Conversions costs ($120,000 \times \$0.227$)			27,240	127,240		
42	Total costs				\$655,000		
43							

Illustration 3A-12
Production cost report—
FIFO method

period. Managers are, therefore, not held responsible for costs from prior periods over which they may not have had control. In addition, the FIFO method **provides current cost information**, which the company can use to establish **more accurate pricing strategies** for goods manufactured and sold in the current period.

Helpful Hint What are the two self-checks in the report?

Answer: (1) Total physical units accounted for must equal the total units to be accounted for.
(2) Total costs accounted for must equal the total costs to be accounted for.

Summary of Study Objective for Appendix

8 Compute equivalent units using the FIFO method.

Equivalent units under the FIFO method are the sum of the work performed to: (1) Finish the units of beginning work in process inventory, if any; (2) complete

the units started into production during the period; and (3) start, but only partially complete, the units in ending work in process inventory.



Glossary

Conversion costs (p. 108) The sum of labor costs and overhead costs.

Cost reconciliation schedule (p. 113) A schedule that shows that the total costs accounted for equal the total costs to be accounted for.

Equivalent units of production (p. 107) A measure of the work done during the period, expressed in fully completed units.

Operations costing (p. 115) A combination of a process cost and a job order cost system, in which products are manufactured primarily by standardized methods, with some customization.

Physical units (p. 110) Actual units to be accounted for during a period, irrespective of any work performed.

Process cost system (p. 100) An accounting system used to apply costs to similar products that are mass-produced in a continuous fashion.

Production cost report (p. 110) An internal report for management that shows both production quantity and cost data for a production department.

Total units (costs) accounted for (pp. 111, 113) The sum of the units (costs) transferred out during the period plus the units (costs) in process at the end of the period.

Total units (costs) to be accounted for (pp. 110, 113) The sum of the units (costs) started (or transferred) into production during the period plus the units (costs) in process at the beginning of the period.

Unit production costs (p. 112) Costs expressed in terms of equivalent units of production.

Weighted-average method (p. 107) Method of computing equivalent units of production which considers the degree of completion (weighting) of the units completed and transferred out and the ending work in process.

Comprehensive Do it!



Karlene Industries produces plastic ice cube trays in two processes: heating and stamping. All materials are added at the beginning of the Heating Department process. Karlene uses the weighted-average method to compute equivalent units.

On November 1, the Heating Department had in process 1,000 trays that were 70% complete. During November, it started into production 12,000 trays. On November 30, 2011, 2,000 trays that were 60% complete were in process.

The following cost information for the Heating Department was also available.

Work in process, November 1:		Costs incurred in November:	
Materials	\$ 640	Material	\$3,000
Conversion costs	<u>360</u>	Labor	2,300
Cost of work in process, Nov. 1	<u><u>\$1,000</u></u>	Overhead	4,050

Instructions

- Prepare a production cost report for the Heating Department for the month of November 2011, using the weighted-average method.
- Journalize the transfer of costs to the Stamping Department.

Solution to Comprehensive *Do it!*

(a)

KARLENE INDUSTRIES**Heating Department
Production Cost Report
For the Month Ended November 30, 2011**

Quantities	Equivalent Units		
	Physical Units	Conversion Costs	
		Materials	Step 2
Units to be accounted for			
Work in process, November 1	1,000		
Started into production	<u>12,000</u>		
Total units	<u>13,000</u>		
Units accounted for			
Transferred out	11,000	11,000	11,000
Work in process, November 30	<u>2,000</u>	<u>2,000</u>	<u>1,200</u>
Total units	<u>13,000</u>	<u>13,000</u>	<u>12,200</u>
Costs			Conversion
Unit costs Step 3		Materials	Costs
Costs in November	(a)	\$ 3,640*	\$ 6,710**
Equivalent units	(b)	<u>13,000</u>	<u>12,200</u>
Unit costs [(a) ÷ (b)]		<u>\$0.28</u>	<u>\$0.55</u>
Costs to be accounted for			
Work in process, November 1			\$ 1,000
Started into production			<u>9,350</u>
Total costs			<u>\$10,350</u>
*640 + 3,000			
**360 + 2,300 + 4,050			
Cost Reconciliation Schedule Step 4			
Costs accounted for			
Transferred out (11,000 × \$0.83)			\$ 9,130
Work in process, November 30			
Materials (2,000 × \$0.28)		\$560	
Conversion costs (1,200 × \$0.55)		<u>660</u>	<u>1,220</u>
Total costs			<u>\$10,350</u>
(b) Work in Process—Stamping	9,130		
Work in Process—Heating			
(To record transfer of units to the Stamping Department)			9,130

Action Plan

- Compute the physical unit flow—that is, the total units to be accounted for.
- Compute the equivalent units of production.
- Compute the unit production costs, expressed in terms of equivalent units of production.
- Prepare a cost reconciliation schedule, which shows that the total costs accounted for equal the total costs to be accounted for.

Note: All asterisked Questions, Exercises, and Problems relate to material in the appendix to the chapter.

Self-Study Questions

Answers are at the end of the chapter.

- (SO 1) 1. Which of the following items is *not* characteristic of a process cost system?
- (a) Once production begins, it continues until the finished product emerges.

- (b) The products produced are heterogeneous in nature.
(c) The focus is on continually producing homogeneous products.



- (d) When the finished product emerges, all units have precisely the same amount of materials, labor, and overhead.

(SO 2) 2. Indicate which of the following statements is *not* correct.

- (a) Both a job order and a process cost system track the same three manufacturing cost elements—direct materials, direct labor, and manufacturing overhead.
- (b) A job order cost system uses only one work in process account, whereas a process cost system uses multiple work in process accounts.
- (c) Manufacturing costs are accumulated the same way in a job order and in a process cost system.
- (d) Manufacturing costs are assigned the same way in a job order and in a process cost system.

(SO 3) 3. In a process cost system, the flow of costs is:

- (a) work in process, cost of goods sold, finished goods.
- (b) finished goods, work in process, cost of goods sold.
- (c) finished goods, cost of goods sold, work in process.
- (d) work in process, finished goods, cost of goods sold.

(SO 4) 4. In making the journal entry to assign raw materials costs, a company:

- (a) debits Finished Goods Inventory.
- (b) often debits two or more work in process accounts.
- (c) generally credits two or more work in process accounts.
- (d) credits Finished Goods Inventory.

(SO 4) 5. In a process cost system, manufacturing overhead:

- (a) is assigned to finished goods at the end of each accounting period.
- (b) is assigned to a work in process account for each job as the job is completed.
- (c) is assigned to a work in process account for each production department on the basis of a predetermined overhead rate.
- (d) is assigned to a work in process account for each production department as overhead costs are incurred.

(SO 5) 6. Conversion costs are the sum of:

- (a) fixed and variable overhead costs.
- (b) labor costs and overhead costs.
- (c) direct material costs and overhead costs.
- (d) direct labor and indirect labor costs.

(SO 5) 7. The Mixing Department's output during the period consists of 20,000 units completed and transferred out, and 5,000 units in ending work in process 60% complete as to materials and conversion costs. Beginning inventory is 1,000 units, 40% complete as to materials and conversion costs. The equivalent units of production are:

- (a) 22,600.
- (b) 23,000.
- (c) 24,000.
- (d) 25,000.

8. In RYZ Company, there are zero units in beginning work in process, 7,000 units started into production, and 500 units in ending work in process 20% completed. The physical units to be accounted for are:

- (a) 7,000.
- (b) 7,360.
- (c) 7,500.
- (d) 7,340.

9. Mora Company has 2,000 units in beginning work in process, 20% complete as to conversion costs, 23,000 units transferred out to finished goods, and 3,000 units in ending work in process $33\frac{1}{3}\%$ complete as to conversion costs.

The beginning and ending inventory is fully complete as to materials costs. Equivalent units for materials and conversion costs are, respectively:

- (a) 22,000, 24,000.
- (b) 24,000, 26,000.
- (c) 26,000, 24,000.
- (d) 26,000, 26,000.

10. Fortner Company has no beginning work in process; 9,000 units are transferred out and 3,000 units in ending work in process are one-third finished as to conversion costs and fully complete as to materials cost. If total materials cost is \$60,000, the unit materials cost is:

- (a) \$5.00.
- (b) \$5.45 rounded.
- (c) \$6.00.
- (d) No correct answer is given.

11. Largo Company has unit costs of \$10 for materials and \$30 for conversion costs. If there are 2,500 units in ending work in process, 40% complete as to conversion costs, and fully complete as to materials cost, the total cost assignable to the ending work in process inventory is:

- (a) \$45,000.
- (b) \$55,000.
- (c) \$75,000.
- (d) \$100,000.

12. A production cost report:

- (a) is an external report.
- (b) shows both the production quantity and cost data related to a department.
- (c) shows equivalent units of production but not physical units.
- (d) contains six sections.

13. In a production cost report, units to be accounted for are calculated as:

- (a) Units started into production + Units in ending work in process.
- (b) Units started into production – Units in beginning work in process.
- (c) Units transferred out + Units in beginning work in process.
- (d) Units started into production + Units in beginning work in process.

- (SO 8) *14. Hollins Company uses the FIFO method to compute equivalent units. It has 2,000 units in beginning work in process, 20% complete as to conversion costs, 25,000 units started and completed, and 3,000 units in ending work in process, 30% complete as to conversion costs. All units are 100% complete as to materials. Equivalent units for materials and conversion costs are, respectively:
- 28,000 and 26,600.
 - 28,000 and 27,500.
 - 27,000 and 26,200.
 - 27,000 and 29,600.

- (SO 8) *15. KLM Company uses the FIFO method to compute equivalent units. It has no beginning work in process; 9,000 units are started and completed and 3,000 units in ending work in process are one-third completed. All material is added at the beginning of the process. If total materials cost is \$60,000, the unit materials cost is:
- \$5.00.
 - \$6.00.

- \$6.67 (rounded).
- No correct answer given.

- *16. Toney Company uses the FIFO method to compute equivalent units. It has unit costs of \$10 for materials and \$30 for conversion costs. If there are 2,500 units in ending work in process, 100% complete as to materials and 40% complete as to conversion costs, the total cost assignable to the ending work in process inventory is:
- \$45,000.
 - \$55,000.
 - \$75,000.
 - \$100,000.

Go to the book's companion website,
www.wiley.com/college/weygandt,
 for Additional Self-Study Questions.



Questions

- Identify which costing system—job order or process cost—the following companies would primarily use: (a) Quaker Oats, (b) Ford Motor Company, (c) Kinko's Print Shop, and (d) Warner Bros. Motion Pictures.
- Contrast the primary focus of job order cost accounting and of process cost accounting.
- What are the similarities between a job order and a process cost system?
- Your roommate is confused about the features of process cost accounting. Identify and explain the distinctive features for your roommate.
- Mel Storrrer believes there are no significant differences in the flow of costs between job order cost accounting and process cost accounting. Is Storrrer correct? Explain.
- (a) What source documents are used in assigning (1) materials and (2) labor to production in a process cost system?
 (b) What criterion and basis are commonly used in allocating overhead to processes?
- At Ace Company, overhead is assigned to production departments at the rate of \$5 per machine hour. In July, machine hours were 3,000 in the Machining Department and 2,400 in the Assembly Department. Prepare the entry to assign overhead to production.
- Gary Weiss is uncertain about the steps used to prepare a production cost report. State the procedures that are required in the sequence in which they are performed.
- Rich Mordica is confused about computing physical units. Explain to Rich how physical units to be accounted for and physical units accounted for are determined.
- What is meant by the term “equivalent units of production”?
- How are equivalent units of production computed?
- Mason Company had zero units of beginning work in process. During the period, 9,000 units were completed, and there were 600 units of ending work in process. What were the units started into production?
- Mendle Co. has zero units of beginning work in process. During the period 12,000 units were completed, and there were 800 units of ending work in process one-fifth complete as to conversion cost and 100% complete as to materials cost. What were the equivalent units of production for (a) materials and (b) conversion costs?
- Reyes Co. started 3,000 units for the period. Its beginning inventory is 500 units one-fourth complete as to conversion costs and 100% complete as to materials costs. Its ending inventory is 200 units one-fifth complete as to conversion costs and 100% complete as to materials costs. How many units were transferred out this period?
- Kiner Company transfers out 14,000 units and has 2,000 units of ending work in process that are 25% complete. Materials are entered at the beginning of the process and there is no beginning work in process.

Assuming unit materials costs of \$3 and unit conversion costs of \$6, what are the costs to be assigned to units (a) transferred out and (b) in ending work in process?

16. (a) Eve Adams believes the production cost report is an external report for stockholders. Is Eve correct? Explain.

(b) Identify the sections in a production cost report.

17. What purposes are served by a production cost report?

18. At Frank Company, there are 800 units of ending work in process that are 100% complete as to materials and 40% complete as to conversion costs. If the unit cost of materials is \$4 and the costs assigned to the 800 units is \$6,000, what is the per-unit conversion cost?

19. What is the difference between operations costing and a process costing system?

20. How does a company decide whether to use a job order or a process cost system?

***21.** Silva Co. started and completed 2,000 units for the period. Its beginning inventory is 600 units 25% complete and its ending inventory is 400 units 20% complete. Silva uses the FIFO method to compute equivalent units. How many units were transferred out this period?

***22.** Ortiz Company transfers out 12,000 units and has 2,000 units of ending work in process that are 25% complete. Materials are entered at the beginning of the process and there is no beginning work in process. Ortiz uses the FIFO method to compute equivalent units. Assuming unit materials costs of \$3 and unit conversion costs of \$9, what are the costs to be assigned to units (a) transferred out and (b) in ending work in process?

Brief Exercises



Journalize entries for accumulating costs.

(SO 4)

Journalize the assignment of materials and labor costs.

(SO 4)

Journalize the assignment of overhead costs.

(SO 4)

Compute physical units of production.

(SO 6)

BE3-1 Altex Manufacturing purchases \$45,000 of raw materials on account, and it incurs \$50,000 of factory labor costs. Journalize the two transactions on March 31 assuming the labor costs are not paid until April.

BE3-2 Data for Altex Manufacturing are given in BE3-1. Supporting records show that (a) the Assembly Department used \$24,000 of raw materials and \$30,000 of the factory labor, and (b) the Finishing Department used the remainder. Journalize the assignment of the costs to the processing departments on March 31.

BE3-3 Factory labor data for Altex Manufacturing are given in BE3-2. Manufacturing overhead is assigned to departments on the basis of 200% of labor costs. Journalize the assignment of overhead to the Assembly and Finishing Departments.

BE3-4 Ayala Manufacturing Company has the following production data for selected months.

Month	Beginning Work in Process	Ending Work in Process		
		Units Transferred Out	Units	% Complete as to Conversion Cost
January	-0-	30,000	10,000	40%
March	-0-	40,000	8,000	75
July	-0-	40,000	16,000	25

Compute the physical units for each month.

BE3-5 Using the data in BE3-4, compute equivalent units of production for materials and conversion costs, assuming materials are entered at the beginning of the process.

BE3-6 In Gomez Company, total material costs are \$32,000, and total conversion costs are \$54,000. Equivalent units of production are materials 10,000 and conversion costs 12,000. Compute the unit costs for materials, conversion costs, and total manufacturing costs.

BE3-7 Elle Company has the following production data for April: units transferred out 40,000, and ending work in process 5,000 units that are 100% complete for materials and 40% complete for conversion costs. If unit materials cost is \$4 and unit conversion cost is \$9, determine the costs to be assigned to the units transferred out and the units in ending work in process.

Compute equivalent units of production.

(SO 5)

Compute unit costs of production.

(SO 6)

Assign costs to units transferred out and in process.

(SO 6)

BE3-8 Production costs chargeable to the Finishing Department in June in Perdon Company are materials \$15,000, labor \$29,500, overhead \$18,000. Equivalent units of production are materials 20,000 and conversion costs 19,000. Compute the unit costs for materials and conversion costs.

Compute unit costs.
(SO 6)

BE3-9 Data for Perdon Company are given in BE3-8. Production records indicate that 18,000 units were transferred out, and 2,000 units in ending work in process were 50% complete as to conversion cost and 100% complete as to materials. Prepare a cost reconciliation schedule.

Prepare cost reconciliation schedule.
(SO 6)

BE3-10 The Smelting Department of Wilkins Manufacturing Company has the following production and cost data for November.

Compute equivalent units of production.
(SO 5)

Production: Beginning work in process 2,000 units that are 100% complete as to materials and 20% complete as to conversion costs; units transferred out 8,000 units; and ending work in process 5,000 units that are 100% complete as to materials and 40% complete as to conversion costs.

Compute the equivalent units of production for (a) materials and (b) conversion costs for the month of November.

***BE3-11** Fontillas Company has the following production data for March: no beginning work in process, units started and completed 30,000, and ending work in process 5,000 units that are 100% complete for materials and 40% complete for conversion costs. Fontillas uses the FIFO method to compute equivalent units. If unit materials cost is \$8 and unit conversion cost is \$12, determine the costs to be assigned to the units transferred out and the units in ending work in process. The total costs to be assigned are \$664,000.

Assign costs to units transferred out and in process.
(SO 8)

***BE3-12** Using the data in BE3-11, prepare the cost section of the production cost report for Fontillas Company.

Prepare a partial production cost report.
(SO 7, 8)

***BE3-13** Production costs chargeable to the Finishing Department in May at Lim Company are materials \$8,000, labor \$20,000, overhead \$18,000, and transferred-in costs \$62,000. Equivalent units of production are materials 20,000 and conversion costs 19,000. Lim uses the FIFO method to compute equivalent units. Compute the unit costs for materials and conversion costs. Transferred-in costs are considered materials costs.

Compute unit costs.
(SO 8)

Do it! Review



Do it! 3-1 Indicate whether each of the following statements is true or false.

Compare job order and process cost systems.
(SO 1)

1. Many hospitals use job order costing for small, routine medical procedures.
2. A manufacturer of computer flash drives would use a job order cost system.
3. A process cost system uses multiple work in process accounts.
4. A process cost system keeps track of costs on job cost sheets.

Do it! 3-2 Boaz Company manufactures CH-21 through two processes: Mixing and Packaging. In July, the following costs were incurred.

Assign and journalize manufacturing costs.
(SO 4)

	<u>Mixing</u>	<u>Packaging</u>
Raw Materials used	\$10,000	\$24,000
Factory Labor costs	8,000	36,000
Manufacturing Overhead costs	12,000	54,000

Units completed at a cost of \$21,000 in the Mixing Department are transferred to the Packaging Department. Units completed at a cost of \$102,000 in the Packaging Department are transferred to Finished Goods. Journalize the assignment of these costs to the two processes and the transfer of units as appropriate.

Do it! 3-3 The assembly department has the following production and cost data for the current month.

Compute equivalent units.
(SO 5)

<u>Beginning Work in Process</u>	<u>Units Transferred Out</u>	<u>Ending Work in Process</u>
-0-	20,000	16,000

Materials are entered at the beginning of the process. The ending work in process units are 70% complete as to conversion costs. Compute the equivalent units of production for (a) materials and (b) conversion costs.

Prepare cost reconciliation schedule.
(SO 6, 7)

Do it! 3-4 In March, Lasso Manufacturing had the following unit production costs: materials \$10 and conversion costs \$8. On March 1, it had zero work in process. During March, Lasso transferred out 22,000 units. As of March 31, 2,000 units that were 40% complete as to conversion costs and 100% complete as to materials were in ending work in process.

- Compute the total units to be accounted for.
- Compute the equivalent units of production.
- Prepare a cost reconciliation schedule, including the costs of materials transferred out and the costs of materials in process.

Exercises



Understand process cost accounting.

(SO 1, 2)

E3-1 Allen Labinski has prepared the following list of statements about process cost accounting.

- Process cost systems are used to apply costs to similar products that are mass-produced in a continuous fashion.
- A process cost system is used when each finished unit is indistinguishable from another.
- Companies that produce soft drinks, motion pictures, and computer chips would all use process cost accounting.
- In a process cost system, costs are tracked by individual jobs.
- Job order costing and process costing track different manufacturing cost elements.
- Both job order costing and process costing account for direct materials, direct labor, and manufacturing overhead.
- Costs flow through the accounts in the same basic way for both job order costing and process costing.
- In a process cost system, only one work in process account is used.
- In a process cost system, costs are summarized in a job cost sheet.
- In a process cost system, the unit cost is total manufacturing costs for the period divided by the units produced during the period.

Instructions

Identify each statement as true or false. If false, indicate how to correct the statement.

Journalize transactions.
(SO 4)

E3-2 Mendocino Company manufactures pizza sauce through two production departments: Cooking and Canning. In each process, materials and conversion costs are incurred evenly throughout the process. For the month of April, the work in process accounts show the following debits.

	<u>Cooking</u>	<u>Canning</u>
Beginning work in process	\$ -0-	\$ 4,000
Materials	21,000	6,000
Labor	8,500	7,000
Overhead	29,500	25,800
Costs transferred in		53,000

Instructions

Journalize the April transactions.

Answer questions on costs and production.
(SO 3, 5, 6)

E3-3 The ledger of Schultz Company has the following work in process account.

<u>Work in Process—Painting</u>			
5/1	Balance	3,590	5/31 Transferred out ?
5/31	Materials	5,160	
5/31	Labor	2,740	
5/31	Overhead	1,650	
5/31	Balance	?	

Production records show that there were 400 units in the beginning inventory, 30% complete, 1,100 units started, and 1,200 units transferred out. The beginning work in process had materials cost of \$2,040 and conversion costs of \$1,550. The units in ending inventory were 40% complete. Materials are entered at the beginning of the painting process.

Instructions

- How many units are in process at May 31?
- What is the unit materials cost for May?
- What is the unit conversion cost for May?
- What is the total cost of units transferred out in May?
- What is the cost of the May 31 inventory?

E3-4 Greivell Manufacturing Company has two production departments: Cutting and Assembly. July 1 inventories are Raw Materials \$4,200, Work in Process—Cutting \$2,900, Work in Process—Assembly \$10,600, and Finished Goods \$31,000. During July, the following transactions occurred.

- Purchased \$62,500 of raw materials on account.
- Incurred \$56,000 of factory labor. (Credit Wages Payable.)
- Incurred \$70,000 of manufacturing overhead; \$40,000 was paid and the remainder is unpaid.
- Requisitioned materials for Cutting \$15,700 and Assembly \$8,900.
- Used factory labor for Cutting \$29,000 and Assembly \$27,000.
- Applied overhead at the rate of \$15 per machine hour. Machine hours were Cutting 1,680 and Assembly 1,720.
- Transferred goods costing \$67,600 from the Cutting Department to the Assembly Department.
- Transferred goods costing \$134,900 from Assembly to Finished Goods.
- Sold goods costing \$150,000 for \$200,000 on account.

Journalize transactions for two processes.

(SO 4)

Instructions

Journalize the transactions. (Omit explanations.)

E3-5 In Kagan Company, materials are entered at the beginning of each process. Work in process inventories, with the percentage of work done on conversion costs, and production data for its Sterilizing Department in selected months during 2011 are as follows.

Compute physical units and equivalent units of production.

(SO 5, 6)

Month	Beginning Work in Process		Units Transferred Out	Ending Work in Process	
	Units	Conversion Cost%		Units	Conversion Cost%
January	–0–	—	7,000	2,000	60
March	–0–	—	12,000	3,000	30
May	–0–	—	16,000	5,000	80
July	–0–	—	10,000	1,500	40

Instructions

- Compute the physical units for January and May.
- Compute the equivalent units of production for (1) materials and (2) conversion costs for each month.

E3-6 The Cutting Department of Thakur Manufacturing has the following production and cost data for July.

Determine equivalent units, unit costs, and assignment of costs.

(SO 5, 6)

Production	Costs
1. Transferred out 9,000 units.	Beginning work in process \$ –0–
2. Started 3,000 units that are 60% complete as to conversion costs and 100% complete as to materials at July 31.	Materials 45,000
	Labor 16,200
	Manufacturing overhead 18,900

Materials are entered at the beginning of the process. Conversion costs are incurred uniformly during the process.

Instructions

- Determine the equivalent units of production for (1) materials and (2) conversion costs.
- Compute unit costs and prepare a cost reconciliation schedule.

Prepare a production cost report.

(SO 5, 6, 7)



Determine equivalent units, unit costs, and assignment of costs.

(SO 5, 6)

Instructions

Prepare a production cost report.

- E3-7** The Sanding Department of Castillo Furniture Company has the following production and manufacturing cost data for March 2011, the first month of operation.

Production: 12,000 units finished and transferred out; 3,000 units started that are 100% complete as to materials and 20% complete as to conversion costs.

Manufacturing costs: Materials \$33,000; labor \$27,000; overhead \$36,000.

Instructions

- E3-8** The Blending Department of Machulak Company has the following cost and production data for the month of April.

Costs:

Work in process, April 1		
Direct materials: 100% complete	\$100,000	
Conversion costs: 20% complete	70,000	
Cost of work in process, April 1	<u>\$170,000</u>	
Costs incurred during production in April		
Direct materials	\$ 800,000	
Conversion costs	362,000	
Costs incurred in April	<u>\$1,162,000</u>	

Units transferred out totaled 14,000. Ending work in process was 1,000 units that are 100% complete as to materials and 40% complete as to conversion costs.

Instructions

- Compute the equivalent units of production for (1) materials and (2) conversion costs for the month of April.
- Compute the unit costs for the month.
- Determine the costs to be assigned to the units transferred out and in ending work in process.

- E3-9** Cederholm Company has gathered the following information.

Determine equivalent units, unit costs, and assignment of costs.

(SO 5, 6)

Units in beginning work in process	-0-
Units started into production	36,000
Units in ending work in process	6,000
Percent complete in ending work in process:	
Conversion costs	40%
Materials	100%
Costs incurred:	
Direct materials	\$72,000
Direct labor	\$81,000
Overhead	\$97,200

Instructions

- Compute equivalent units of production for materials and for conversion costs.
- Determine the unit costs of production.
- Show the assignment of costs to units transferred out and in process.

E3-10 Kinnaird Company has gathered the following information.

Units in beginning work in process	20,000
Units started into production	72,000
Units in ending work in process	24,000
Percent complete in ending work in process:	
Conversion costs	60%
Materials	100%
Costs incurred:	
Direct materials	\$101,200
Direct labor	\$164,800
Overhead	\$123,600

Determine equivalent units, unit costs, and assignment of costs.

(SO 5, 6)

Instructions

- (a) Compute equivalent units of production for materials and for conversion costs.
- (b) Determine the unit costs of production.
- (c) Show the assignment of costs to units transferred out and in process.

E3-11 The Polishing Department of Schofield Manufacturing Company has the following production and manufacturing cost data for September. Materials are entered at the beginning of the process.

Production: Beginning inventory 1,600 units that are 100% complete as to materials and 30% complete as to conversion costs; units started during the period are 18,400; ending inventory of 5,000 units 10% complete as to conversion costs.

Compute equivalent units, unit costs, and costs assigned.

(SO 5, 6)



Manufacturing costs: Beginning inventory costs, comprised of \$20,000 of materials and \$43,180 of conversion costs; materials costs added in Polishing during the month, \$177,200; labor and overhead applied in Polishing during the month, \$102,680 and \$257,140, respectively.

Instructions

- (a) Compute the equivalent units of production for materials and conversion costs for the month of September.
- (b) Compute the unit costs for materials and conversion costs for the month.
- (c) Determine the costs to be assigned to the units transferred out and in process.

E3-12 Tracy Brigham has recently been promoted to production manager, and so he has just started to receive various managerial reports. One of the reports he has received is the production cost report that you prepared. It showed that his department had 2,000 equivalent units in ending inventory. His department has had a history of not keeping enough inventory on hand to meet demand. He has come to you, very angry, and wants to know why you credited him with only 2,000 units when he knows he had at least twice that many on hand.

Explain the production cost report.

(SO 7)

Instructions

► Explain to him why his production cost report showed only 2,000 equivalent units in ending inventory. Write an informal memo. Be kind and explain very clearly why he is mistaken.

E3-13 The Welding Department of Kraiss Manufacturing Company has the following production and manufacturing cost data for February 2011. All materials are added at the beginning of the process.

Prepare a production cost report.

(SO 5, 6, 7)

Manufacturing Costs			Production Data		
Beginning work in process			Beginning work in process	15,000 units	
Materials	\$18,000			1/10 complete	
Conversion costs	14,175	\$ 32,175	Units transferred out	49,000	
Materials		180,000	Units started	60,000	
Labor		32,780	Ending work in process	26,000 units	
Overhead		61,445		1/5 complete	

Instructions

Prepare a production cost report for the Welding Department for the month of February.

Compute physical units and equivalent units of production.
(SO 5, 6)



Determine equivalent units, unit costs, and assignment of costs.
(SO 5, 6)



Compute equivalent units, unit costs, and costs assigned.
(SO 6, 8)



Determine equivalent units, unit costs, and assignment of costs.
(SO 6, 8)

E3-14 Debrazzo Shipping, Inc. is contemplating the use of process costing to track the costs of its operations. The operation consists of three segments (departments): receiving, shipping, and delivery. Containers are received at Debrazzo's docks and sorted according to the ship they will be carried on. The containers are loaded onto a ship, which carries them to the appropriate port of destination. The containers are then off-loaded and delivered to the receiving company.

Debrazzo Shipping wants to begin using process costing in the shipping department. Direct materials represent the fuel costs to run the ship, and "Containers in transit" represents work in process. Listed below is information about the shipping department's first month's activity.

Containers in transit, April 1	0
Containers loaded	800
Containers in transit, April 30	350, 40% of direct materials and 30% of conversion costs

Instructions

- Determine the physical flow of containers for the month.
- Calculate the equivalent units for direct materials and conversion costs.

E3-15 Verber Mortgage Company uses a process costing system to accumulate costs in its loan application department. When an application is completed it is forwarded to the loan department for final processing. The following processing and cost data pertain to September.

- Applications in process on September 1, 100
- Applications started in September, 900
- Completed applications during September, 800
- Applications still in process at September 30 were 100% complete as to materials (forms) and 60% complete as to conversion costs.

Beginning WIP:	
Direct materials	\$ 1,000
Conversion costs	4,000
September costs:	
Direct materials	\$ 4,000
Direct labor	12,000
Overhead	9,400

Materials are the forms used in the application process, and these costs are incurred at the beginning of the process. Conversion costs are incurred uniformly during the process.

Instructions

- Determine the equivalent units of service (production) for materials and conversion costs.
- Compute the unit costs and prepare a cost reconciliation schedule.

***E3-16** Using the data in E3-15, assume Verber Mortgage Company uses the FIFO method. Also assume that the applications in process on September 1 were 100% complete as to materials (forms) and 40% complete as to conversion costs.

Instructions

- Determine the equivalent units of service (production) for materials and conversion costs.
- Compute the unit costs and prepare a cost reconciliation schedule.

***E3-17** The Cutting Department of Riehl Manufacturing has the following production and cost data for August.

Production	Costs
1. Started and completed 8,000 units.	Beginning work in process \$ -0-
2. Started 1,000 units that are 40% completed at August 31.	Materials 45,000
	Labor 14,700
	Manufacturing overhead 18,900

Materials are entered at the beginning of the process. Conversion costs are incurred uniformly during the process. Riehl Manufacturing uses the FIFO method to compute equivalent units.

Instructions

- Determine the equivalent units of production for (1) materials and (2) conversion costs.
- Compute unit costs and show the assignment of manufacturing costs to units transferred out and in work in process.

***E3-18** The Smelting Department of Zirtzlaff Manufacturing Company has the following production and cost data for September.

Production: Beginning work in process 2,000 units that are 100% complete as to materials and 20% complete as to conversion costs; units started and finished 11,000 units; and ending work in process 1,000 units that are 100% complete as to materials and 40% complete as to conversion costs.

Manufacturing costs: Work in process, September 1, \$15,200; materials added \$60,000; labor and overhead \$143,000.

Zirtzlaff uses the FIFO method to compute equivalent units.

Instructions

- Compute the equivalent units of production for (1) materials and (2) conversion costs for the month of September.
- Compute the unit costs for the month.
- Determine the costs to be assigned to the units transferred out and in process.

***E3-19** The ledger of Giese Company has the following work in process account.

Compute equivalent units, unit costs, and costs assigned.

(SO 6, 8)

Answer questions on costs and production.

(SO 6, 8)

Work in Process—Painting				
3/1	Balance	3,680	3/31	Transferred out ?
3/31	Materials	6,600		
3/31	Labor	2,500		
3/31	Overhead	1,280		
3/31	Balance	?		

Production records show that there were 800 units in the beginning inventory, 30% complete, 1,000 units started, and 1,300 units transferred out. The units in ending inventory were 40% complete. Materials are entered at the beginning of the painting process. Giese uses the FIFO method to compute equivalent units.

Instructions

Answer the following questions.

- How many units are in process at March 31?
- What is the unit materials cost for March?
- What is the unit conversion cost for March?
- What is the total cost of units started in February and completed in March?
- What is the total cost of units started and finished in March?
- What is the cost of the March 31 inventory?

***E3-20** The Welding Department of Mortellaro Manufacturing Company has the following production and manufacturing cost data for February 2011. All materials are added at the beginning of the process. Mortellaro uses the FIFO method to compute equivalent units.

Prepare a production cost report for a second process.

(SO 8)

Manufacturing Costs		Production Data	
Beginning work in process	\$ 32,175	Beginning work in process	15,000 units, 10% complete
Costs transferred in	135,000	Units transferred out	50,000
Materials	57,000	Units transferred in	60,000
Labor	35,100	Ending work in process	25,000, 20% complete
Overhead	71,900		

Instructions

Prepare a production cost report for the Welding Department for the month of February. Transferred-in costs are considered materials costs.



Exercises: Set B

Visit the book's companion website at www.wiley.com/college/weygandt, and choose the Student Companion site, to access Exercise Set B.



Problems: Set A

Journalize transactions.
(SO 3, 4)

P3-1A Sonsalla Company manufactures its product, Vitadrink, through two manufacturing processes: Mixing and Packaging. All materials are entered at the beginning of each process. On October 1, 2011, inventories consisted of Raw Materials \$26,000, Work in Process—Mixing \$0, Work in Process—Packaging \$250,000, and Finished Goods \$289,000. The beginning inventory for Packaging consisted of 10,000 units that were 50% complete as to conversion costs and fully complete as to materials. During October, 50,000 units were started into production in the Mixing Department and the following transactions were completed.

1. Purchased \$300,000 of raw materials on account.
2. Issued raw materials for production: Mixing \$210,000 and Packaging \$45,000.
3. Incurred labor costs of \$248,900.
4. Used factory labor: Mixing \$182,500 and Packaging \$66,400.
5. Incurred \$790,000 of manufacturing overhead on account.
6. Applied manufacturing overhead on the basis of \$22 per machine hour. Machine hours were 28,000 in Mixing and 6,000 in Packaging.
7. Transferred 45,000 units from Mixing to Packaging at a cost of \$979,000.
8. Transferred 53,000 units from Packaging to Finished Goods at a cost of \$1,315,000.
9. Sold goods costing \$1,604,000 for \$2,500,000 on account.

Instructions

Journalize the October transactions.

Complete four steps necessary to prepare a production cost report.
(SO 5, 6, 7)

P3-2A Harrington Company manufactures bowling balls through two processes: Molding and Packaging. In the Molding Department, the urethane, rubber, plastics, and other materials are molded into bowling balls. In the Packaging Department, the balls are placed in cartons and sent to the finished goods warehouse. All materials are entered at the beginning of each process. Labor and manufacturing overhead are incurred uniformly throughout each process. Production and cost data for the Molding Department during June 2011 are presented below.

Production Data	June
Beginning work in process units	-0-
Units started into production	20,000
Ending work in process units	2,000
Percent complete—ending inventory	60%
Cost Data	
Materials	\$198,000
Labor	50,400
Overhead	<u>112,800</u>
Total	<u>\$361,200</u>

Instructions

(c) Materials	\$9.00
CC	\$8.50
(d) Transferred	
out	\$331,200
WIP	\$ 30,000

Complete four steps necessary to prepare a production cost report.
(SO 5, 6, 7)

- (a) Prepare a schedule showing physical units of production.
- (b) Determine the equivalent units of production for materials and conversion costs.
- (c) Compute the unit costs of production.
- (d) Determine the costs to be assigned to the units transferred and in process for June.
- (e) Prepare a production cost report for the Molding Department for the month of June.

P3-3A Mallett Industries Inc. manufactures in separate processes furniture for homes. In each process, materials are entered at the beginning, and conversion costs are incurred uniformly. Production and cost data for the first process in making two products in two different manufacturing plants are as follows.

Cutting Department		
	Plant 1 T12-Tables	Plant 2 C10-Chairs
Production Data—July		
Work in process units, July 1	-0-	-0-
Units started into production	20,000	16,000
Work in process units, July 31	3,000	500
Work in process percent complete	60	80
Cost Data—July		
Work in process, July 1	\$ -0-	\$ -0-
Materials	380,000	288,000
Labor	234,400	125,900
Overhead	104,000	96,700
Total	<u><u>\$718,400</u></u>	<u><u>\$510,600</u></u>

Instructions

- (a) For each plant:
- (1) Compute the physical units of production.
 - (2) Compute equivalent units of production for materials and for conversion costs.
 - (3) Determine the unit costs of production.
 - (4) Show the assignment of costs to units transferred out and in process.
- (b) Prepare the production cost report for Plant 1 for July 2011.

P3-4A Cortez Company has several processing departments. Costs charged to the Assembly Department for November 2011 totaled \$2,229,000 as follows.

Work in process, November 1		
Materials	\$69,000	
Conversion costs	<u>48,150</u>	\$ 117,150
Materials added		1,548,000
Labor		225,920
Overhead		337,930

Production records show that 35,000 units were in beginning work in process 30% complete as to conversion costs, 700,000 units were started into production, and 25,000 units were in ending work in process 40% complete as to conversion costs. Materials are entered at the beginning of each process.

Instructions

- (a) Determine the equivalent units of production and the unit production costs for the Assembly Department.
- (b) Determine the assignment of costs to goods transferred out and in process.
- (c) Prepare a production cost report for the Assembly Department.

P3-5A Ghose Company manufactures basketballs. Materials are added at the beginning of the production process and conversion costs are incurred uniformly. Production and cost data for the month of July 2011 are as follows.

Production Data—Basketballs	Units	Percent Complete
Work in process units, July 1	500	60%
Units started into production	1,000	
Work in process units, July 31	600	30%

Cost Data—Basketballs

Work in process, July 1		
Materials	\$750	
Conversion costs	<u>600</u>	\$1,350
Direct materials		2,400
Direct labor		1,580
Manufacturing overhead		1,060

(a) (3) T12:	
Materials	\$19
CC	\$18
(4) T12:	
Transferred	
out	\$629,000
WIP	\$ 89,400

*Assign costs and prepare production cost report.
(SO 5, 6, 7)*

(b) Transferred	
out	\$2,165,500
WIP	\$ 63,500

*Determine equivalent units and unit costs and assign costs.
(SO 5, 6, 7)*

Instructions

- (a) Calculate the following.
- (1) The equivalent units of production for materials and conversion costs.
 - (2) The unit costs of production for materials and conversion costs.
 - (3) The assignment of costs to units transferred out and in process at the end of the accounting period.
- (b) Prepare a production cost report for the month of July for the basketballs.

P3-6A Kluender Processing Company uses a weighted-average process costing system and manufactures a single product—a premium rug shampoo and cleaner. The manufacturing activity for the month of October has just been completed. A partially completed production cost report for the month of October for the mixing and cooking department is shown below.

(SO 5, 7)

(a) Materials	\$1.50
(b) Transferred out	\$286,000
WIP	\$ 59,000

Compute equivalent units and complete production cost report.

Instructions

- (a) Prepare a schedule that shows how the equivalent units were computed so that you can complete the “Quantities: Units accounted for” equivalent units section shown in the production cost report, and compute October unit costs.
- (b) Complete the “Cost Reconciliation Schedule” part of the production cost report below.

KLUENDER PROCESSING COMPANY**Mixing and Cooking Department****Production Cost Report****For the Month Ended October 31**

Quantities	Physical Units	Equivalent Units	
		Materials	Conversion Costs
Units to be accounted for			
Work in process, October 1 (all materials, 70% conversion costs)	20,000		
Started into production	160,000		
Total units	180,000		
Units accounted for			
Transferred out	130,000	?	?
Work in process, October 31 (60% materials, 40% conversion costs)	50,000	?	?
Total units accounted for	180,000	?	?
Costs			
Unit costs			
Costs in October	\$240,000	\$105,000	\$345,000
Equivalent units	?	?	
Unit costs	\$?	\$?	= \$?
Costs to be accounted for			
Work in process, October 1			\$ 30,000
Started into production			315,000
Total costs			\$345,000
Cost Reconciliation Schedule			
Costs accounted for			
Transferred out			\$?
Work in process, October 31			
Materials		?	
Conversion costs		?	
Total costs			?

***P3-7A** Pacocha Company manufactures bicycles and tricycles. For both products, materials are added at the beginning of the production process, and conversion costs are incurred uniformly. Pacocha Company uses the FIFO method to compute equivalent units. Production and cost data for the month of March are as follows.

Determine equivalent units and unit costs and assign costs for processes; prepare production cost report.
(SO 8)

Production Data—Bicycles	Units	Percent Complete
Work in process units, March 1	200	80%
Units started into production	1,000	
Work in process units, March 31	200	40%

Cost Data—Bicycles	Units	Percent Complete
Work in process, March 1	\$19,280	
Direct materials	50,000	
Direct labor	25,200	
Manufacturing overhead	30,000	

Production Data—Tricycles	Units	Percent Complete
Work in process units, March 1	100	75%
Units started into production	800	
Work in process units, March 31	60	25%

Cost Data—Tricycles	
Work in process, March 1	\$ 6,125
Direct materials	38,400
Direct labor	15,100
Manufacturing overhead	20,000

Instructions

- (a) Calculate the following for both the bicycles and the tricycles.
 - (1) The equivalent units of production for materials and conversion costs.
 - (2) The unit costs of production for materials and conversion costs.
 - (3) The assignment of costs to units transferred out and in process at the end of the accounting period.
- (b) Prepare a production cost report for the month of March for the bicycles only.

(a) Bicycles:	
(1) Materials	1,000
(2) Materials	\$50
(3) Transferred	
out	\$109,680
WIP	\$ 14,800

Problems: Set B

P3-1B Buehler Company manufactures a nutrient, Everlife, through two manufacturing processes: Blending and Packaging. All materials are entered at the beginning of each process. On August 1, 2011, inventories consisted of Raw Materials \$5,000, Work in Process—Blending \$0, Work in Process—Packaging \$3,945, and Finished Goods \$7,500. The beginning inventory for Packaging consisted of 500 units, two-fifths complete as to conversion costs and fully complete as to materials. During August, 9,000 units were started into production in Blending, and the following transactions were completed.

Journalize transactions.
(SO 3, 4)

1. Purchased \$25,000 of raw materials on account.
2. Issued raw materials for production: Blending \$18,930 and Packaging \$9,140.
3. Incurred labor costs of \$23,770.
4. Used factory labor: Blending \$13,320 and Packaging \$10,450.
5. Incurred \$41,500 of manufacturing overhead on account.

6. Applied manufacturing overhead at the rate of \$25 per machine hour. Machine hours were Blending 900 and Packaging 300.
7. Transferred 8,200 units from Blending to Packaging at a cost of \$44,940.
8. Transferred 8,600 units from Packaging to Finished Goods at a cost of \$67,490.
9. Sold goods costing \$62,000 for \$90,000 on account.

Instructions

Journalize the August transactions.

Complete four steps necessary to prepare a production cost report.
(SO 5, 6, 7)

P3-2B Walters Corporation manufactures water skis through two processes: Molding and Packaging. In the Molding Department fiberglass is heated and shaped into the form of a ski. In the Packaging Department, the skis are placed in cartons and sent to the finished goods warehouse. Materials are entered at the beginning of both processes. Labor and manufacturing overhead are incurred uniformly throughout each process. Production and cost data for the Molding Department for January 2011 are presented below.

Production Data	January
Beginning work in process units	–0–
Units started into production	42,500
Ending work in process units	2,500
Percent complete—ending inventory	40%

Cost Data	
Materials	\$510,000
Labor	96,000
Overhead	<u>150,000</u>
Total	<u>\$756,000</u>

Instructions

- (a) Compute the physical units of production.
- (b) Determine the equivalent units of production for materials and conversion costs.
- (c) Compute the unit costs of production.
- (d) Determine the costs to be assigned to the units transferred out and in process.
- (e) Prepare a production cost report for the Molding Department for the month of January.

(c) Materials \$12
CC \$6
(d) Transferred out \$720,000
WIP \$ 36,000

Complete four steps necessary to prepare a production cost report.
(SO 5, 6, 7)

P3-3B Slocum Corporation manufactures in separate processes refrigerators and freezers for homes. In each process, materials are entered at the beginning and conversion costs are incurred uniformly. Production and cost data for the first process in making two products in two different manufacturing plants are as follows.

Stamping Department		
Production Data—June	Plant A	Plant B
	R12 Refrigerators	F24 Freezers
Work in process units, June 1	–0–	–0–
Units started into production	21,000	20,000
Work in process units, June 30	4,000	2,500
Work in process percent complete	75	60

Cost Data—June	Plant A	Plant B
Work in process, June 1	\$ –0–	\$ –0–
Materials	840,000	720,000
Labor	220,000	221,000
Overhead	<u>420,000</u>	<u>292,000</u>
Total	<u>\$1,480,000</u>	<u>\$1,233,000</u>

Instructions

- (a) For each plant:
- (1) Compute the physical units of production.
 - (2) Compute equivalent units of production for materials and for conversion costs.
 - (3) Determine the unit costs of production.
 - (4) Show the assignment of costs to units transferred out and in process.
- (b) Prepare the production cost report for Plant A for June 2011.

(a) (3) R12:	Materials \$40
	CC \$32
(4) R12:	Transferred out \$1,224,000
	WIP \$ 256,000

P3-4B McNair Company has several processing departments. Costs charged to the Assembly Department for October 2011 totaled \$1,249,500 as follows.

Assign costs and prepare production cost report.
(SO 5, 6, 7)

Work in process, October 1		
Materials	\$29,000	
Conversion costs	<u>16,500</u>	\$ 45,500
Materials added		1,006,000
Labor		90,000
Overhead		108,000

Production records show that 25,000 units were in beginning work in process 40% complete as to conversion cost, 425,000 units were started into production, and 35,000 units were in ending work in process 40% complete as to conversion costs. Materials are entered at the beginning of each process.

Instructions

- (a) Determine the equivalent units of production and the unit production costs for the Assembly Department.
- (b) Determine the assignment of costs to goods transferred out and in process.
- (c) Prepare a production cost report for the Assembly Department.

(b) Transferred out \$1,162,000
WIP \$ 87,500

P3-5B Marte Company manufactures bicycles. Materials are added at the beginning of the production process, and conversion costs are incurred uniformly. Production and cost data for the month of May are as follows.

Determine equivalent units and unit costs and assign costs.
(SO 5, 7)

Production Data—Bicycles	Units	Percent Complete	
		80%	25%
Work in process units, May 1	500		
Units started in production	1,500		
Work in process units, May 31	800		

Cost Data—Bicycles			
Work in process, May 1			
Materials	\$15,000		
Conversion costs	<u>18,000</u>	\$33,000	
Direct materials		50,000	
Direct labor		18,320	
Manufacturing overhead		33,680	

Instructions

- (a) Calculate the following.
- (1) The equivalent units of production for materials and conversion.
 - (2) The unit costs of production for materials and conversion costs.
 - (3) The assignment of costs to units transferred out and in process at the end of the accounting period.
- (b) Prepare a production cost report for the month of May for the bicycles.

(2) Materials \$32.50
CC \$50.00
(3) Transferred out \$99,000
WIP \$ 36,000

Compute equivalent units and complete production cost report.

(SO 5, 7)

P3-6B Guthrie Cleaner Company uses a weighted-average process costing system and manufactures a single product—an all-purpose liquid cleaner. The manufacturing activity for the month of March has just been completed. A partially completed production cost report for the month of March for the mixing and blending department is shown below.

GUTHRIE CLEANER COMPANY
Mixing and Blending Department
Production Cost Report
For the Month Ended March 31

<u>QUANTITIES</u>	<u>Physical Units</u>	<u>Equivalent Units</u>	
		<u>Materials</u>	<u>Conversion Costs</u>
Units to be accounted for			
Work in process, March 1	10,000		
Started into production	<u>100,000</u>		
Total units	<u>110,000</u>		
Units accounted for			
Transferred out	95,000	?	?
Work in process, March 31 (60% materials, 20% conversion costs)	<u>15,000</u>	<u>?</u>	<u>?</u>
Total units	<u>110,000</u>	<u>?</u>	<u>?</u>
<u>COSTS</u>			
Unit costs			
Costs in March	<u>\$156,000</u>	<u>\$98,000</u>	<u>\$254,000</u>
Equivalent units	<u>?</u>	<u>?</u>	
Unit costs	<u>\$?</u>	<u>\$?</u>	<u>= \$?</u>
Costs to be accounted for			
Work in process, March 1			\$ 8,700
Started into production			<u>245,300</u>
Total costs			<u>\$254,000</u>
<u>COST RECONCILIATION SCHEDULE</u>			
Costs accounted for			
Transferred out			\$?
Work in process, March 31			
Materials		?	
Conversion costs		?	<u>?</u>
Total costs			<u>?</u>

Instructions

(a) Materials \$1.50

(b) Transferred out \$237,500
 WIP \$ 16,500

Determine equivalent units and unit costs and assign costs for processes; prepare production cost report.

(SO 8)

- (a) Prepare a schedule that shows how the equivalent units were computed so that you can complete the “Quantities: Units accounted for” equivalent units section shown in the production cost report above, and compute March unit costs.

- (b) Complete the “Cost Reconciliation Schedule” part of the production cost report above.

- ***P3-7B** Stangel Company manufactures basketballs and soccer balls. For both products, materials are added at the beginning of the production process and conversion costs are incurred uniformly. Stangel uses the FIFO method to compute equivalent units. Production and cost data for the month of August are as shown on page 145.

Production Data—Basketballs	Units	Percent Complete
Work in process units, August 1	500	60%
Units started into production	1,600	
Work in process units, August 31	600	50%
Cost Data—Basketballs		
Work in process, August 1	\$1,125	
Direct materials	1,600	
Direct labor	1,175	
Manufacturing overhead	1,000	
Production Data—Soccer Balls		
Work in process units, August 1	200	80%
Units started into production	2,000	
Work in process units, August 31	150	70%
Cost Data—Soccer Balls		
Work in process, August 1	\$ 450	
Direct materials	2,600	
Direct labor	1,000	
Manufacturing overhead	995	

Instructions

- (a) Calculate the following for both the basketballs and the soccer balls.
- (1) The equivalent units of production for materials and conversion costs.
 - (2) The unit costs of production for materials and conversion costs.
 - (3) The assignment of costs to units transferred out and in process at the end of the accounting period.
- (b) Prepare a production cost report for the month of August for the basketballs only.

(a) **Basketballs:**
(1) Materials 1,600
(2) Materials \$1
(3) Transferred out \$3,865
WIP \$1,035

Problems: Set C

Visit the book's companion website at www.wiley.com/college/weygandt, and choose the Student Companion site, to access Problem Set C.

**Waterways Continuing Problem**

(Note: This is a continuation of the Waterways Problem from Chapters 1 and 2.)

WCP3 Because most of the parts for its irrigation systems are standard, Waterways handles the majority of its manufacturing as a process cost system. There are multiple process departments. Three of these departments are the Molding, Cutting, and Welding departments. All items eventually end up in the Packaging department which prepares items for sale in kits or individually. This problem asks you to help Waterways calculate equivalent units and prepare a production cost report.



Go to the book's companion website,
www.wiley.com/college/weygandt,
to find the remainder of this problem.

broadening your perspective



Decision Making Across the Organization



BYP3-1 Sunshine Beach Company manufactures suntan lotion, called Surtan, in 11-ounce plastic bottles. Surtan is sold in a competitive market. As a result, management is very cost-conscious. Surtan is manufactured through two processes: mixing and filling. Materials are entered at the beginning of each process, and labor and manufacturing overhead occur uniformly throughout each process. Unit costs are based on the cost per gallon of Surtan using the weighted-average costing approach.

On June 30, 2011, Jill Ritzman, the chief accountant for the past 20 years, opted to take early retirement. Her replacement, Sid Benili, had extensive accounting experience with motels in the area but only limited contact with manufacturing accounting. During July, Sid correctly accumulated the following production quantity and cost data for the Mixing Department.

Production quantities: Work in process, July 1, 8,000 gallons 75% complete; started into production 91,000 gallons; work in process, July 31, 5,000 gallons 20% complete. Materials are added at the beginning of the process.

Production costs: Beginning work in process \$88,000, comprised of \$21,000 of materials costs and \$67,000 of conversion costs; incurred in July: materials \$573,000, conversion costs \$769,000.

Sid then prepared a production cost report on the basis of physical units started into production. His report showed a production cost of \$15.71 per gallon of Surtan. The management of Sunshine Beach was surprised at the high unit cost. The president comes to you, as Jill's top assistant, to review Sid's report and prepare a correct report if necessary.

Instructions

With the class divided into groups, answer the following questions.

- Show how Sid arrived at the unit cost of \$15.71 per gallon of Surtan.
- What error(s) did Sid make in preparing his production cost report?
- Prepare a correct production cost report for July.

Managerial Analysis

BYP3-2 Guion Furniture Company manufactures living room furniture through two departments: Framing and Upholstering. Materials are entered at the beginning of each process. For May, the following cost data are obtained from the two work in process accounts.

	<u>Framing</u>	<u>Upholstering</u>
Work in process, May 1	\$ -0-	\$?
Materials	420,000	?
Conversion costs	280,000	330,000
Costs transferred in	-0-	600,000
Costs transferred out	600,000	?
Work in process, May 31	100,000	?

Instructions

Answer the following questions.

- If 3,000 sofas were started into production on May 1 and 2,500 sofas were transferred to Upholstering, what was the unit cost of materials for May in the Framing Department?
- Using the data in (a) above, what was the per unit conversion cost of the sofas transferred to Upholstering?
- Continuing the assumptions in (a) above, what is the percentage of completion of the units in process at May 31 in the Framing Department?

Real-World Focus

BYP3-3 The May 10, 2004, edition of the *Wall Street Journal* includes an article by Evan Ramstad titled “A Tight Squeeze” (page R9).

Instructions

Read the article and answer the following questions.

- What is Proview’s profit margin on computer monitors? Why is the profit margin so thin on computer monitors?
- What are some of the steps that Proview International has taken to control costs?
- Why does the company continue to build tube-based monitors even as many consumers are moving away from them?
- Mr. Wang’s final comment is, “Every aspect of the business is important, but the most important is cost.” Why does he feel this way?

Exploring the Web

BYP3-4 Paintball is now played around the world. The process of making paintballs is actually quite similar to the process used to make certain medical pills. In fact, paintballs were previously often made at the same factories that made pharmaceuticals.

Address: <http://video.google.com/videoplay?docid=6864066340713942400>, or go to www.wiley.com/college/weygandt



Instructions

View that video at the site listed above and then answer the following questions.

- Describe in sequence the primary steps used to manufacture paintballs.
- Explain the costs incurred by the company that would fall into each of the following categories: materials, labor, and overhead. Of these categories, which do you think would be the greatest cost in making paintballs?
- Discuss whether a paintball manufacturer would use job order costing or process costing.

Communication Activity

BYP3-5 Carol Gorden was a good friend of yours in high school and is from your home town. While you chose to major in accounting when you both went away to college, she majored in marketing and management. You have recently been promoted to accounting manager for the Snack Foods Division of Koonce Enterprises, and your friend was promoted to regional sales manager for the same division of Koonce. Carol recently telephoned you. She explained that she was familiar with job cost sheets, which had been used by the Special Projects division where she had formerly worked. She was, however, very uncomfortable with the production cost reports prepared by your division. She emailed you a list of her particular questions:

- Since Koonce occasionally prepares snack foods for special orders in the Snack Foods Division, why don’t we track costs of the orders separately?
- What is an equivalent unit?
- Why am I getting four production cost reports? Isn’t there one Work in Process account?

Instructions

Prepare a memo to Carol. Answer her questions, and include any additional information you think would be helpful. You may write informally, but do use proper grammar and punctuation.

Ethics Case

BYP3-6 R. B. Patrick Company manufactures a high-tech component that passes through two production processing departments, Molding and Assembly. Department managers are partially compensated on the basis of units of products completed and transferred out relative to units of product put into production. This was intended as encouragement to be efficient and to minimize waste.

Sue Wooten is the department head in the Molding Department, and Fred Barando is her quality control inspector. During the month of June, Sue had three new employees who were not yet technically skilled. As a result, many of the units produced in June had minor molding defects. In order to maintain the department's normal high rate of completion, Sue told Fred to pass through inspection and on to the Assembly Department all units that had defects nondetectable to the human eye. "Company and industry tolerances on this product are too high anyway," says Sue. "Less than 2% of the units we produce are subjected in the market to the stress tolerance we've designed into them. The odds of those 2% being any of this month's units are even less. Anyway, we're saving the company money."

Instructions

- (a) Who are the potential stakeholders involved in this situation?
- (b) What alternatives does Fred have in this situation? What might the company do to prevent this situation from occurring?

 **Answers to *Insight and Accounting Across the Organization* Questions**

Choosing a Cost Driver, p. 105

Q: What is the result if a company uses the wrong "cost driver" to assign manufacturing overhead?

A: Incorrect assignment of manufacturing overhead will result in some products receiving too much overhead and others receiving too little.

Keeping Score for the Xbox, p. 109

Q: In what ways has cost accounting probably become more critical for Microsoft in recent years?

A: In the past Microsoft enjoyed very high profit margins on its software sales. As a consequence, it could afford to be less cost-conscious than most companies. In addition, in producing software, manufacturing costs represented a very small part of its total product cost. But the video-game hardware market is very competitive. In order to achieve its profitability goals, Microsoft will have to manufacture its product efficiently in order to meet its cost targets to ensure adequate margins. The information provided by process cost accounting will be critical to its efforts.

Answers to *Self-Study Questions*

1. b 2. d 3. d 4. b 5. c 6. b 7. b 8. a 9. c 10. a 11. b 12. b 13. d *14. b
 *15. a *16. b



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

