Chapter 2
Job-Order Costing

Solutions to Questions

2-1 By definition, manufacturing overhead consists of costs that cannot be practically traced to jobs. Therefore, if these costs are to be assigned to jobs, they must be allocated rather than traced.

2-2 The first step is to estimate the total amount of the allocation base (the denominator) that will be required for next period's estimated level of production. The second step is to estimate the total fixed manufacturing overhead cost for the coming period and the variable manufacturing overhead cost per unit of the allocation base. The third step is to use the cost formula Y = a + bX to estimate the total manufacturing overhead cost (the numerator) for the coming period. The fourth step is to compute the predetermined overhead rate.

2-3 The job cost sheet is used to record all costs that are assigned to a particular job. These costs include direct materials costs traced to the job, direct labor costs traced to the job, and manufacturing overhead costs applied to the job. When a job is completed, the job cost sheet is used to compute the unit product cost.

2-4 Some production costs such as a factory manager's salary cannot be traced to a particular product or job, but rather are incurred as a result of overall production activities. In addition, some production costs such as indirect materials cannot be easily traced to jobs. If these costs are to be assigned to products, they must be allocated to the products.

2-5 If actual manufacturing overhead cost is applied to jobs, the company must wait until the end of the accounting period to apply overhead and to cost jobs. If the company computes actual overhead rates more frequently to get around this problem, the rates may fluctuate widely due to seasonal factors or variations in output. For this

reason, most companies use predetermined overhead rates to apply manufacturing overhead costs to jobs.

2-6 The measure of activity used as the allocation base should drive the overhead cost; that is, the allocation base should cause the overhead cost. If the allocation base does not really cause the overhead, then costs will be incorrectly attributed to products and jobs and product costs will be distorted.

2-7 Assigning manufacturing overhead costs to jobs does not ensure a profit. The units produced may not be sold and if they are sold, they may not be sold at prices sufficient to cover all costs. It is a myth that assigning costs to products or jobs ensures that those costs will be recovered. Costs are recovered only by selling to customers—not by allocating costs.

2-8 The Manufacturing Overhead account is credited when overhead cost is applied to Work in Process. Generally, the amount of overhead applied will not be the same as the amount of actual cost incurred because the predetermined overhead rate is based on estimates.

2-9 Underapplied overhead occurs when the actual overhead cost exceeds the amount of overhead cost applied to Work in Process inventory during the period. Overapplied overhead occurs when the actual overhead cost is less than the amount of overhead cost applied to Work in Process inventory during the period. Underapplied or overapplied overhead is disposed of by closing out the amount to Cost of Goods Sold. The adjustment for underapplied overhead increases Cost of Goods Sold whereas the adjustment for overapplied overhead decreases Cost of Goods Sold.

2-10 Manufacturing overhead may be underapplied for several reasons. Control over overhead spending may be poor. Or, some of the overhead may be fixed and the actual amount of the allocation base may be less than estimated at the beginning of the period. In this situation, the amount of overhead applied to inventory will be less than the actual overhead cost incurred.

2-11 Underapplied overhead implies that not enough overhead was assigned to jobs during the period and therefore cost of goods sold was understated. Therefore, underapplied overhead is added to cost of goods sold. On the other hand, overapplied overhead is deducted from cost of goods sold.

2-12 A plantwide overhead rate is a single overhead rate used throughout a plant. In a multiple overhead rate system, each production department may have its own predetermined overhead rate and its own allocation base. Some companies use multiple overhead rates rather than plantwide rates to more appropriately allocate overhead costs among products. Multiple overhead rates should be used, for example, in situations where one department is machine intensive and another department is labor intensive.

2-13 When automated equipment replaces direct labor, overhead increases and direct labor decreases. This results in an increase in the predetermined overhead rate—particularly if it is based on direct labor.

The Foundational 15

1. The estimated total manufacturing overhead cost is computed as follows:

$$Y = \$10{,}000 + (\$1.00 \text{ per DLH})(2{,}000 \text{ DLHs})$$

Estimated fixed manufacturing overhead	$10,000
Estimated variable manufacturing overhead:	
$1.00 per DLH × 2,000 DLHs	2,000
Estimated total manufacturing overhead cost	$12,000

The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a)	$12,000
Estimated total direct labor hours (DLHs) (b) .	2,000 DLHs
Predetermined overhead rate (a) ÷ (b)	$6.00 per DLH

2. The manufacturing overhead applied to Jobs P and Q is computed as follows:

	Job P	Job Q
Actual direct labor hours worked (a)	1,400	500
Predetermined overhead rate per DLH (b)	$6.00	$6.00
Manufacturing overhead applied (a) × (b)	$8,400	$3,000

3. The direct labor hourly wage rate can be computed by focusing on either Job P or Job Q as follows:

	Job P	Job Q
Direct labor cost (a)	$21,000	$7,500
Actual direct labor hours worked (b)	1,400	500
Direct labor hourly wage rate (a) ÷ (b)	$15.00	$15.00

The Foundational 15

4. Job P's unit product cost and Job Q's assigned manufacturing costs are computed as follows:

Total manufacturing cost assigned to Job P:

Direct materials	$13,000
Direct labor	21,000
Manufacturing overhead applied ($6 per DLH × 1,400 DLHs)	8,400
Total manufacturing cost	$42,400

Unit product cost for Job P:

Total manufacturing cost (a)	$42,400
Number of units in the job (b)	20
Unit product cost (a) ÷ (b)	$2,120

Total manufacturing cost assigned to Job Q:

Direct materials	$ 8,000
Direct labor	7,500
Manufacturing overhead applied ($6 per DLH × 500 DLHs)	3,000
Total manufacturing cost	$18,500

5. The journal entries are recorded as follows:

Raw Materials	22,000	
Accounts Payable		22,000
Work in Process	21,000	
Raw Materials		21,000

6. The journal entry is recorded as follows:

Work in Process	28,500	
Wages Payable		28,500

The Foundational 15

7. The journal entry is recorded as follows:

Work in Process	11,400	
Manufacturing Overhead		11,400

8. The Schedule of Cost of Goods Manufactured is as follows:

Direct materials:		
Raw materials inventory, beginning	$ 0	
Add: Purchases of raw materials	22,000	
Total raw materials available	22,000	
Deduct: Raw materials inventory, ending	1,000	
.....Rawmaterialsusedinproduction		$21,000
Direct labor		28,500
Manufacturing overhead applied to work in process inventory		11,400
Total manufacturing costs		60,900
Add: Beginning work in process inventory		0
		60,900
Deduct: Ending work in process inventory.....		18,500
.....Costofgoodsmanufactured		$42,400

9. The journal entry is recorded as follows:

Finished Goods	42,400	
Work in Process		42,400

10. The completed T-account is as follows:

Work in Process			
Beg. Bal.	0		
(a)	21,000		
(b)	28,500		
(c)	11,400	(d)	42,400
End. Bal.	18,500		

The Foundational 15

11. The Schedule of Cost of Goods Sold is as follows:

Finished goods inventory, beginning	$ 0
Add: Cost of goods manufactured	42,400
Cost of goods available for sale	42,400
Deduct: Finished goods inventory, ending	0
Unadjusted cost of goods sold	$42,400

12. The journal entry is recorded as follows:

Cost of Goods Sold	42,400	
Finished Goods		42,400

13. The amount of underapplied overhead is computed as follows:

Actual direct labor-hours (a)	1,900
Predetermined overhead rate (b)	$6.00
Manufacturing overhead applied (a) × (b)	$11,400
Actual manufacturing overhead	$12,500
Deduct: Manufacturing overhead applied	11,400
Underapplied overhead	$ 1,100

14. The journal entry is recorded as follows:

Cost of Goods Sold	1,100	
Manufacturing Overhead		1,100

15. The income statement is as follows:

Sales	$60,000
Cost of goods sold ($42,400 + $1,100)	43,500
Gross margin	16,500
Selling and administrative expenses	14,000
Net operating income	$ 2,500

Exercise 2-1 (10 minutes)

The estimated total manufacturing overhead cost is computed as follows:

Y = $466,000 + ($3.00 per DLH)(40,000 DLHs)

Estimated fixed manufacturing overhead	$466,000
Estimated variable manufacturing overhead:	
$3.00 per DLH × 40,000 DLHs	120,000
Estimated total manufacturing overhead cost	$586,000

The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a)	$586,000
Estimated total direct labor hours (DLHs) (b) ...	40,000 DLHs
Predetermined overhead rate (a) ÷ (b)	$14.65 per DLH

Exercise 2-2 (10 minutes)

Actual direct labor-hours (a)	12,600
Predetermined overhead rate (b)	$23.10
Manufacturing overhead applied (a) × (b)	$291,060

Exercise 2-3 (10 minutes)

1. Total direct labor-hours required for Job A-200:

Direct labor cost (a)	$120
Direct labor wage rate per hour (b)	$12
Total direct labor hours (a) ÷ (b)	10

Total manufacturing cost assigned to Job A-200:

Direct materials	$200
Direct labor	120
Manufacturing overhead applied ($18 per DLH × 10 DLHs)	180
Total manufacturing cost	$500

2. Unit product cost for Job A-200:

Total manufacturing cost (a)	$500
Number of units in the job (b)	50
Unit product cost (a) ÷ (b)	$10

Exercise 2-4 (15 minutes)

a.	Raw Materials	86,000	
	Accounts Payable		86,000
b.	Work in Process	72,000	
	Manufacturing Overhead	12,000	
	Raw Materials		84,000
c.	Work in Process	105,000	
	Manufacturing Overhead	3,000	
	Wages Payable		108,000
d.	Manufacturing Overhead	197,000	
	Various Accounts		197,000

Exercise 2-5 (20 minutes)

Parts 1 and 2.

Cash			Raw Materials		
	(a)	75,000	(a)	75,000	(b) 73,000
	(c)	152,000	Bal.	2,000	
	(d)	126,000			

Work in Process			Finished Goods		
(b)	67,000		(f)	379,000	(f) 379,000
(c)	134,000		Bal.0		
(e)	178,000	(f) 379,000			
Bal.	0				

Manufacturing Overhead			Cost of Goods Sold		
(b)	6,000	(e) 178,000	(f)	379,000	(g) 28,000
(c)	18,000		Bal.	351,000	
(d)	126,000				
(g)	28,000				
Bal.0					

Exercise 2-6 (20 minutes)

1. Cost of Goods Manufactured

Direct materials:		
Raw materials inventory, beginning	$24,000	
Add: Purchases of raw materials	53,000	
Total raw materials available	77,000	
Deduct: Raw materials inventory, ending	6,000	
Raw materials used in production	71,000	
Deduct: Indirect materials included in manufacturing overhead	8,000	$ 63,000
Direct labor		62,000
Manufacturing overhead applied to work in process inventory		41,000
Total manufacturing costs		166,000
Add: Beginning work in process inventory		41,000
		207,000
Deduct: Ending work in process inventory		38,000
Cost of goods manufactured		$169,000

2. Cost of Goods Sold

Finished goods inventory, beginning	$ 86,000
Add: Cost of goods manufactured	169,000
Cost of goods available for sale	255,000
Deduct: Finished goods inventory, ending	93,000
Unadjusted cost of goods sold	162,000
Add: Underapplied overhead	8,000
Adjusted cost of goods sold	$170,000

Exercise 2-7 (10 minutes)

1. Actual direct labor-hours (a)	8,250
Predetermined overhead rate (b)	$21.40
Manufacturing overhead applied (a) × (b)	$176,550
Actual manufacturing overhead cost	$172,500
Deduct: Manufacturing overhead applied	176,550
.....Manufacturingoverheadoverapplied	$ (4,050)

2. Because manufacturing overhead is overapplied, the cost of goods sold would decrease by $4,050 and the gross margin would increase by $4,050.

Exercise 2-8 (30 minutes)

1. Cost of Goods Manufactured

Direct materials:		
Raw materials inventory, beginning	$ 8,000	
Add: Purchases of raw materials	132,000	
Total raw materials available	140,000	
Deduct: Raw materials inventory, ending	10,000	
Raw materials used in production		130,000
Direct labor		90,000
Manufacturing overhead applied to work in process inventory		210,000
Total manufacturing costs		430,000
Add: Beginning work in process inventory		5,000
		435,000
Deduct: Ending work in process inventory		20,000
Cost of goods manufactured		$415,000

2. Cost of Goods Sold

Finished goods inventory, beginning	$ 70,000
Add: Cost of goods manufactured	415,000
Cost of goods available for sale	485,000
Deduct: Finished goods inventory, ending	25,000
Unadjusted cost of goods sold	460,000
Add: Underapplied overhead	10,000
Adjusted cost of goods sold	470,000

3.

Eccles Company
Income Statement

Sales		$643,000
Cost of goods sold ($460,000 + $10,000)		470,000
Gross margin		173,000
Selling and administrative expenses:		
Selling expenses	$100,000	
Administrative expense	43,000	143,000
Net operating income		$ 30,000

Exercise 2-9 (10 minutes)

Yes, overhead should be applied to value the Work in Process inventory at year-end.

Because $15,000 of overhead was applied to Job X on the basis of $10,000 of direct labor cost, the company's predetermined overhead rate must be 150% of direct labor cost.

Job Q direct labor cost (a)	$8,000
Predetermined overhead rate (b)	150%
Manufacturing overhead applied to Job Q (a) × (b)	$12,000

Exercise 2-10 (10 minutes)

Direct material	$12,000
Direct labor	8,000
Manufacturing overhead applied:	
$8,000 × 120%	9,600
Total manufacturing cost	$29,600
Unit product cost:	
$29,600 ÷ 200 units	$148

Exercise 2-11 (30 minutes)

1. a. Raw Materials Inventory	210,000	
Accounts Payable		210,000
b. Work in Process	152,000	
Manufacturing Overhead	38,000	
Raw Materials Inventory		190,000
c. Work in Process	49,000	
Manufacturing Overhead	21,000	
Salaries and Wages Payable		70,000
d. Manufacturing Overhead	105,000	
Accumulated Depreciation		105,000
e. Manufacturing Overhead	130,000	
Accounts Payable		130,000
f. Work in Process	300,000	
Manufacturing Overhead		300,000

75,000 machine-hours $4 per machine-hour = $300,000.

g. Finished Goods	510,000	
Work in Process		510,000
h. Cost of Goods Sold	450,000	
Finished Goods		450,000
Accounts Receivable	675,000	
Sales		675,000

$450,000 × 1.5 = $675,000.

2.

Manufacturing Overhead				Work in Process			
(b)	38,000	(f)	300,000	Bal.	35,000	(g)	510,000
(c)	21,000			(b)	152,000		
(d)	105,000			(c)	49,000		
(e)	130,000			(f)	300,000		
			6,000 (Overapplied overhead)	Bal.	26,000		

Exercise 2-12 (20 minutes)

1. The estimated total manufacturing overhead cost is computed as follows:

$$Y = \$750{,}000 + \$4.00 \text{ per MH} \times 150{,}000 \text{ MHs}$$

Estimated fixed manufacturing overhead	$ 750,000
Estimated variable manufacturing overhead $4.00 per MH × 150,000 MHs	600,000
Estimated total manufacturing overhead cost	$1,350,000

The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a) ..	$1,350,000
Estimated total machine-hours (MHs) (b).....	150,000 MHs
Predetermined overhead rate (a) ÷ (b)	$9.00 per MH

2. Total manufacturing cost assigned to Job 500:

Direct materials	$350
Direct labor	230
Manufacturing overhead applied $9.00 per MH × 30 MHs	270
Total manufacturing cost	$850

3. Computing underapplied/overapplied overhead:

Actual machine-hours (a)	147,000
Predetermined overhead rate (b)	$9.00
Manufacturing overhead applied (a) ×(b) ..	$1,323,000
Actual manufacturing overhead	$1,325,000
Deduct: Manufacturing overhead applied...	1,323,000
.....Underappliedoverhead	$ 2,000

The closing entry would increase cost of goods sold by $2,000 and decrease net operating income by $2,000.

Exercise 2-13 (15 minutes)

1. Actual manufacturing overhead costs	$48,000	
Deduct: Manufacturing overhead applied:		
10,000 MH × $5 per MH	50,000	
Overapplied overhead cost	$ (2,000)	
2. Direct materials:		
Raw materials inventory, beginning	$ 8,000	
Add: Purchases of raw materials	32,000	
Raw materials available for use	40,000	
Deduct: Raw materials inventory, ending	7,000	
Raw materials used in production		$ 33,000
Direct labor		40,000
Manufacturing overhead cost applied to work in process		50,000
Total manufacturing cost		123,000
Add: Work in process, beginning		6,000
		129,000
Deduct: Work in process, ending		7,500
Cost of goods manufactured		$121,500

Exercise 2-14 (30 minutes)

Note to the instructor: This exercise is a good vehicle for introducing the concept of predetermined overhead rates.

1.

	Units Produced	Manufacturing Overhead
High activity level (First quarter) ...	80,000	$228,000
Low activity level (Third quarter) ...	20,000	192,000
Change	60,000	$36,000

Variable cost = Change in cost ÷ Change in activity
= $36,000 ÷ 60,000 units
= $0.60 per unit produced

Total cost (First quarter)	$228,000
Variable cost element ($0.60 per unit × 80,000 units) .	48,000
Fixed cost element	$180,000

These fixed and variable cost estimates can be used to estimate the total manufacturing overhead cost for the fourth quarter as follows:

Y = $180,000 + ($0.60 per unit)(60,000 units)

Estimated fixed manufacturing overhead	$180,000
Estimated variable manufacturing overhead $0.60 per unit × 60,000 units	36,000
Estimated total manufacturing overhead cost	$216,000

Total manufacturing cost and unit product cost:	
Direct materials	$180,000
Direct labor	72,000
Manufacturing overhead	216,000
Total manufacturing costs (a)	$468,000
Number of units to be produced (b)	60,000
Unit product cost (a) ÷ (b)	$7.80

Exercise 2-14 (continued)

2. The fixed portion of the manufacturing overhead cost is causing the unit product costs to fluctuate. The unit product cost increases as the level of production decreases because fixed overhead is being spread over fewer units.

3. The unit product cost can be stabilized by using a predetermined overhead rate that is based on expected activity for the entire year. The cost formula created in requirement 1 can be adapted to compute the annual predetermined overhead rate. The annual fixed manufacturing overhead is $720,000 ($180,000 per quarter × 4 quarters). The variable manufacturing overhead per unit is $0.60. The cost formula is as follows:

   Y = $720,000 + $0.60 per unit × 200,000 units

Estimated fixed manufacturing overhead	$720,000
Estimated variable manufacturing overhead	
$0.60 per unit × 200,000 units	120,000
Estimated total manufacturing overhead cost	$840,000

   The annual predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a)	$840,000	
Estimated total units produced (b)	200,000	
Predetermined overhead rate (a) ÷ (b)	$4.20	per unit

   The predetermined overhead rate of $4.20 would be used throughout the entire year, thereby eliminating the impact of seasonal variations in demand on unit product costs.

Exercise 2-15 (15 minutes)

1. Milling Department:

   The estimated total manufacturing overhead cost in the Milling Department is computed as follows:

   Y = $390,000 + ($2.00 per MH)(60,000 MH)

Estimated fixed manufacturing overhead	$390,000
Estimated variable manufacturing overhead	
$2.00 per MH × 60,000 MHs	120,000
Estimated total manufacturing overhead cost	$510,000

   The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a)	$510,000	
Estimated total machine-hours (b)	60,000	MHs
Predetermined overhead rate (a) ÷ (b)	$8.50	per MH

   Assembly Department:

   The estimated total manufacturing overhead cost in the Assembly Department is computed as follows:

   Y = $500,000 + ($3.75 per DLH)(80,000 DLH)

Estimated fixed manufacturing overhead	$500,000
Estimated variable manufacturing overhead	
$3.75 per DLH × 80,000 DLHs	300,000
Estimated total manufacturing overhead cost	$800,000

   The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a)	$800,000	
Estimated total direct labor-hours (b)	80,000	DLHs
Predetermined overhead rate (a) ÷ (b)	$10.00	per DLH

Exercise 2-15 (continued)

2. Total manufacturing cost assigned to Job 407:

Direct materials ($800 + $370)		$1,17
Direct labor ($45 + $160)		205
Milling Department (90 MHs × $8.50 per MH)	$765	
Assembly Department (20 DLH × $10 per DLH) .	200	965
Total manufacturing cost		$2,34

3. Yes; if some jobs require a large amount of machine time and a small amount of labor time, they would be charged substantially less overhead cost if a plantwide rate based on direct labor hours were used. It appears, for example, that this would be true of Job 407 which required considerable machine time to complete, but required a relatively small amount of labor hours.

Exercise 2-16 (10 minutes)

1. Item (a): Actual manufacturing overhead costs for the year.
   Item (b): Overhead cost applied to work in process for the year.
   Item (c): Cost of goods manufactured for the year.
   Item (d): Cost of goods sold for the year.

2.

Manufacturing Overhead	30,000	
Cost of Goods Sold		30,000

Exercise 2-17 (30 minutes)

1. The predetermined overhead rate is computed as follows:

$$Y = \$106{,}250 + \$0.75 \text{ per MH} \times 85{,}000 \text{ MHs}$$

Estimated fixed manufacturing overhead	$106,250
Estimated variable manufacturing overhead	
$0.75 per MH × 85,000 MHs	63,750
Estimated total manufacturing overhead cost	$170,000

The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a) ..	$170,000
Estimated total machine-hours (b)	85,000 MHs
Predetermined overhead rate (a) ÷ (b)	$2.00 per MH

2. The amount of overhead cost applied to Work in Process for the year would be: 80,000 machine-hours × $2.00 per machine-hour = $160,000. This amount is shown in entry (a) below:

Manufacturing Overhead			
(Utilities)	14,000	(a)	160,000
(Insurance)	9,000		
(Maintenance)	33,000		
(Indirect materials)	7,000		
(Indirect labor)	65,000		
(Depreciation)	40,000		
Balance	8,000		

Work in Process			
(Direct materials)	530,000		
(Direct labor)	85,000		
(Overhead)	(a) 160,000		

3. Overhead is underapplied by $8,000 for the year, as shown in the Manufacturing Overhead account above. The entry to close out this balance to Cost of Goods Sold would be:

Cost of Goods Sold	8,000	
Manufacturing Overhead		8,000

Exercise 2-17 (continued)

4. When overhead is applied using a predetermined rate based on machine-hours, it is assumed that overhead cost is proportional to machine-hours. When the actual level of activity turns out to be 80,000 machine-hours, the costing system assumes that the overhead will be 80,000 machine-hours × $2.00 per machine-hour, or $160,000. This is a drop of $10,000 from the initial estimated total manufacturing overhead cost of $170,000. However, the actual total manufacturing overhead did not drop by this much. The actual total manufacturing overhead was $168,000—a drop of only $2,000 from the estimate. The manufacturing overhead did not decline by the full $10,000 because of the existence of fixed costs and/or because overhead spending was not under control. These issues will be covered in more detail in later chapters.

Exercise 2-18 (45 minutes)

1 a. The estimated total manufacturing overhead cost is computed as follows:

Y = $1,100,000 + $5.00 per MH × 50,000 MHs

Estimated fixed manufacturing overhead	$1,100,000
Estimated variable manufacturing overhead $5.00 per MH × 50,000 MHs	250,000
Estimated total manufacturing overhead cost	$1,350,000

The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a) ..	$1,350,000	
Estimated total machine-hours (MHs) (b)	50,000	MHs
.....Predeterminedoverheadrate(a)÷(b)	$27.00	per MH

1 b and 1 c. Total manufacturing cost assigned to Jobs D-75 and C-100:

	D-75	C-100
Direct materials	$ 700,000	$ 550,000
Direct labor	360,000	400,000
Manufacturing overhead applied ($27.00 per MH × 20,000 MHs; $27.00 per MH × 30,000 MHs)	540,000	810,000
Total manufacturing cost	$1,600,000	$1,760,000

Bid prices for Jobs D-75 and C-100:

	D-75	C-100
Total manufacturing cost (a)	$1,600,000	$1,760,000
Markup percentage (b)	150%	150%
Bid price (a) × (b)	$2,400,000	$2,640,000

1 d. Because the company has no beginning or ending inventories and only Jobs D-75 and C-100 were started, completed, and sold during the year, the cost of goods sold is equal to the sum of the manufacturing costs assigned to both jobs of $3,360,000 (= $1,600,000 + $1,760,000).

Exercise 2-18 (continued)

2 a. Molding Department:

The estimated total manufacturing overhead cost in the Molding Department is computed as follows:

Y = $800,000 + $5.00 per MH × 20,000 MH

Estimated fixed manufacturing overhead	$800,000
Estimated variable manufacturing overhead $5.00 per MH × 20,000 MHs	100,000
Estimated total manufacturing overhead cost	$900,000

The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a) ..	$900,000
Estimated total machine-hours (b)	20,000 MHs
Predetermined overhead rate (a) ÷ (b)	$45.00 per MH

Fabrication Department:

The estimated total manufacturing overhead cost in the Fabrication Department is computed as follows:

Y = $300,000 + $5.00 per MH × 30,000 MH

Estimated fixed manufacturing overhead	$300,000
Estimated variable manufacturing overhead $5.00 per MH × 30,000 MHs	150,000
Estimated total manufacturing overhead cost	$450,000

The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a) ..	$450,000
Estimated total direct labor-hours (b)	30,000 MHs
Predetermined overhead rate (a) ÷ (b)	$15.00 per MH

Exercise 2-18 (continued)

2b and 2c. Total manufacturing costs assigned to Jobs D-75 and C-100:

	D-75	C-100
Direct materials	$700,000	$550,000
Direct labor	360,000	400,000
Molding Department (15,000 MHs × $45 per MH; 5,000 MHs × $45 per MH).....	675,000	225,000
Fabrication Department (5,000 MH × $15 per MH; 25,000 MH × $15 per MH)	75,000	375,000
Total manufacturing cost	$1,810,000	$1,550,000

Bid prices for Jobs D-75 and C-100:

	D-75	C-100
Total manufacturing cost (a)	$1,810,000	$1,550,000
Markup percentage (b)	150%	150%
Bid price (a) × (b)	$2,715,000	$2,325,000

2 d. Because the company has no beginning or ending inventories and only Jobs D-75 and C-100 were started, completed, and sold during the year, the cost of goods sold is equal to the sum of the manufacturing costs assigned to both jobs $3,360,000 (= $1,810,000 + $1,550,000).

3. The plantwide and departmental approaches produce identical cost of goods sold figures. However, these two approaches lead to different bid prices for Jobs D-75 and C-100. The bid price for Job D-75 using the departmental approach is $315,000 higher than the bid price using the plantwide approach. This is because the departmental cost pools reflect the fact that Job D-75 is an intensive user of Molding machine-hours. The overhead rate in Molding ($45) is three times higher than the overhead rate in Fabrication ($15). Conversely, Job C-100 is an intensive user of the less-expensive Fabrication machine-hours, so its departmental bid price is $315,000 lower than the plantwide bid price.

Exercise 2-18 (continued)

Whether a job-order costing system has only one plantwide overhead cost pool or numerous departmental overhead cost pools does not usually have an important impact on the accuracy of the cost of goods sold reported for the company as a whole. However, it can have a huge impact on internal decisions with respect to individual jobs, such as establishing bid prices for those jobs. Job -order costing systems that rely on one plantwide overhead cost pool are commonly used to value ending inventories and cost of goods sold for external reporting purposes, but they can create costing inaccuracies for individual jobs that adversely influence internal decision making.

Exercise 2-19 (30 minutes)

1. a. Raw Materials	315,000	
Accounts Payable		315,000
b. Work in Process	216,000	
Manufacturing Overhead	54,000	
Raw Materials		270,000
c. Work in Process	80,000	
Manufacturing Overhead	110,000	
Wages and Salaries Payable		190,000
d. Manufacturing Overhead	63,000	
Accumulated Depreciation		63,000
e. Manufacturing Overhead	85,000	
Accounts Payable		85,000
f. Work in Process	300,000	
Manufacturing Overhead		300,000

$$\text{Predetermined overhead rate} = \frac{\text{Estimated total manufacturing overhead cost}}{\text{Estimated total amount of the allocation base}}$$

$$= \frac{\$4{,}320{,}000}{576{,}000 \text{ machine-hours}} = \$7.50 \text{ per machine-hour}$$

40,000 MHs × $7.50 per MH = $300,000.

2.

Manufacturing Overhead				Work in Process			
(b)	54,000	(f)	300,000	(b)	216,000		
(c)	110,000			(c)	80,000		
(d)	63,000			(f)	300,000		
(e)	85,000						

3. The cost of the completed job would be $596,000 as shown in the Work in Process T-account above. The entry for item (g) would be:

Finished Goods	596,000	
Work in Process		596,000

4. The unit product cost on the job cost sheet would be: $596,000 ÷ 8,000 units = $74.50 per unit.

Exercise 2-20 (30 minutes)

1. Since $320,000 of studio overhead cost was applied to Work in Process on the basis of $200,000 of direct staff costs, the apparent predetermined overhead rate was 160%:

$$\frac{\text{Studio overhead applied}}{\text{Total amount of the allocation base}} = \frac{\$320{,}000}{\$200{,}000 \text{ direct staff costs}}$$

$$= 160\% \text{ of direct staff costs}$$

2. The Krimmer Corporation Headquarters project is the only job remaining in Work in Process at the end of the month; therefore, the entire $40,000 balance in the Work in Process account at that point must apply to it. Recognizing that the predetermined overhead rate is 160% of direct staff costs, the following computation can be made:

Total cost added to the Krimmer Corporation Headquarters project		$40,000
Less: Direct staff costs	$13,500	
Studio overhead cost ($13,500 × 160%).....	21,600	35,100
Costs of subcontracted work		$ 4,900

With this information, we can now complete the job cost sheet for the Krimmer Corporation Headquarters project:

Costs of subcontracted work	$ 4,900
Direct staff costs	13,500
Studio overhead	21,600
Total cost to January 31	$40,000

Problem 2-21A (30 minutes)

1. The predetermined overhead rate was:

Y = $1,275,000 + $3.00 per hour × 85,000 hours

Estimated fixed manufacturing overhead	$1,275,000
Estimated variable manufacturing overhead $3.00 per computer hour × 85,000 hours.....	255,000
Estimated total manufacturing overhead cost	$1,530,000

The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a) ..	$1,530,000	
Estimated total computer hours (b)		85,000 hours
Predetermined overhead rate (a) ÷ (b)		$18.00 per hour

2.

Actual manufacturing overhead cost	$1,350,000
Manufacturing overhead cost applied to Work in Process during the year: 60,000 actual computer hours × $18 per computer hour	1,080,000
Underapplied overhead cost	$ 270,000

3.

Cost of Goods Sold	270,000	
Manufacturing Overhead		270,000

This entry will decrease net operating income.

Problem 2-22A (30 minutes)

1. Cost of Goods Manufactured

Direct materials:		
Raw materials inventory, beginning*	$ 50,000	
Add: Purchases of raw materials*	260,000	
Total raw materials available	310,000	
Deduct: Raw materials inventory, ending*	40,000	
Raw materials used in production		$270,000
Direct labor		65,000
Manufacturing overhead applied to work in process inventory*		340,000
Total manufacturing costs*		675,000
Add: Beginning work in process inventory		48,000
		723,000
Deduct: Ending work in process inventory*		33,000
Cost of goods manufactured		$690,000

2. Cost of Goods Sold

Finished goods inventory, beginning*	$ 30,000	
Add: Cost of goods manufactured	690,000	
Cost of goods available for sale*	720,000	
Deduct: Finished goods inventory, ending	55,000	
Unadjusted cost of goods sold*	665,000	
Add: Underapplied overhead	10,000	
Adjusted cost of goods sold	$675,000	

3.

Valenko Company
Income Statement

Sales		$1,085,000
Cost of goods sold ($665,000 + $10,000)		675,000
Gross margin		410,000
Selling and administrative expenses:		
Selling expenses*	$215,000	
Administrative expense*	160,000	375,000
Net operating income*		$ 35,000

* Given

Problem 2-23A (45 minutes)

1. The cost of raw materials put into production was:

Raw materials inventory, 1/1	$ 30,000
Debits (purchases of materials)	420,000
Materials available for use	450,000
Raw materials inventory, 12/31	60,000
Materials requisitioned for production	$390,000

2. Of the $390,000 in materials requisitioned for production, $320,000 was debited to Work in Process as direct materials. Therefore, the difference of $70,000 ($390,000 – $320,000 = $70,000) would have been debited to Manufacturing Overhead as indirect materials.

3. Total factory wages accrued during the year

(credits to the Factory Wages Payable account) ..	$175,000
Less direct labor cost (from Work in Process)	110,000
Indirect labor cost	$ 65,000

4. The cost of goods manufactured for the year was $810,000—the credits to Work in Process.

5. The Cost of Goods Sold for the year was:

Finished goods inventory, 1/1	$ 40,000
Add: Cost of goods manufactured (from Work in Process) .	810,000
Cost of goods available for sale	850,000
Deduct: Finished goods inventory, 12/31	130,000
Cost of goods sold	$720,000

6. The predetermined overhead rate was:

$$\text{Predetermined overhead rate} = \frac{\text{Manufacturing overhead cost applied}}{\text{Direct materials cost}}$$

$$= \frac{\$400,000}{\$320,000} = 125\% \text{ of direct materials cost}$$

Problem 2-23A (continued)

7. Manufacturing overhead was overapplied by $15,000, computed as follows:

Actual manufacturing overhead cost for the year (debits)	$385,000
Applied manufacturing overhead cost (from Work in Process—this would be the credits to the Manufacturing Overhead account)	400,000
Overapplied overhead	$(15,000)

8. The ending balance in Work in Process is $90,000. Direct labor makes up $18,000 of this balance, and manufacturing overhead makes up $40,000. The computations are:

Balance, Work in Process, 12/31	$90,000
Less: Direct materials cost (given)	(32,000)
Manufacturing overhead cost ($32,000 × 125%)	(40,000)
Direct labor cost (remainder)	$18,000

Problem 2-24A (60 minutes)

1. a.

$$\text{Predetermined overhead rate} = \frac{\text{Estimated total manufacturing overhead cost}}{\text{Estimated total amount of the allocation base}} = \frac{\$126{,}000}{\$84{,}000 \text{ direct labor cost}} = 150\% \text{ of direct labor cost}$$

b. Actual manufacturing overhead costs:

Insurance, factory	$ 7,000
Depreciation of equipment	18,000
Indirect labor	42,000
Property taxes	9,000
Maintenance	11,000
Rent, building	36,000
Total actual costs	123,000
Applied manufacturing overhead costs:	
$80,000 × 150%	120,000
Underapplied overhead	$ 3,000

2.

Pacific Manufacturing Company
Schedule of Cost of Goods Manufactured

Direct materials:		
Raw materials inventory, beginning	$ 21,000	
Add: Purchases of raw materials	133,000	
Total raw materials available	154,000	
Deduct: Raw materials inventory, ending	16,000	
Raw materials used in production		$138,000
Direct labor		80,000
Manufacturing overhead applied to work in process		120,000
Total manufacturing cost		338,000
Add: Work in process, beginning		44,000
		382,000
Deduct: Work in process, ending		40,000
Cost of goods manufactured		$342,000

Problem 2-24A (continued)

3. Unadjusted cost of goods sold:

Finished goods inventory, beginning	$ 68,000
Add: Cost of goods manufactured	342,000
Cost of goods available for sale	410,000
Deduct: Finished goods inventory, ending	60,000
Unadjusted cost of goods sold	$350,000

4.

Direct materials	$ 3,200
Direct labor	4,200
Overhead applied (150% × $4,200)	6,300
Total manufacturing cost	$13,700

$13,700 × 140% = $19,180 price to customer.

5. The amount of overhead cost in Work in Process was: $8,000 direct labor cost × 150% = $12,000

The amount of direct materials cost in Work in Process was:

Total ending work in process		$40,000
Deduct:		
Direct labor	$ 8,000	
Manufacturing overhead	12,000	20,000
Direct materials		$20,000

The completed schedule of costs in Work in Process was:

Direct materials	$20,000
Direct labor	8,000
Manufacturing overhead	12,000
Work in process inventory	$40,000

Problem 2-25A (120 minutes)

1. a.	Raw Materials	142,000	
	Accounts Payable		142,000
b.	Work in Process	150,000	
	Raw Materials		150,000
c.	Manufacturing Overhead	21,000	
	Accounts Payable		21,000
d.	Work in Process	216,000	
	Manufacturing Overhead	90,000	
	Salaries Expense	145,000	
	Salaries and Wages Payable		451,000
e.	Manufacturing Overhead	15,000	
	Accounts Payable		15,000
f.	Advertising Expense	130,000	
	Accounts Payable		130,000
g.	Manufacturing Overhead	45,000	
	Depreciation Expense.....	5,000	
	Accumulated Depreciation		50,000
h.	Manufacturing Overhead	72,000	
	Rent Expense	18,000	
	Accounts Payable		90,000
i.	Miscellaneous Expense	17,000	
	Accounts Payable		17,000
j.	Work in Process	240,000	
	Manufacturing Overhead		240,000

$$\frac{\text{Estimated total manufacturing overhead cost}}{\text{Estimated direct materials cost}} = \frac{\$248,000}{\$155,000} = 160\% \text{ of direct materials cost.}$$

$150,000 direct materials cost × 160% = $240,000 applied.

Problem 2-25A (continued)

k.	Finished Goods	590,000	
	Work in Process		590,000
l.	Accounts Receivable	1,000,000	
	Sales		1,000,000
	Cost of Goods Sold	600,000	
	Finished Goods		600,000

2.

Accounts Receivable

(l)	1,000,000		

Raw Materials

Bal.	18,000	(b)	150,000
(a)	142,000		
Bal.	10,000		

Work in Process

Bal.	24,000	(k)	590,000
(b)	150,000		
(d)	216,000		
(j)	240,000		
Bal.	40,000		

Finished Goods

Bal.	35,000	(l)	600,000
(k)	590,000		
Bal.	25,000		

Manufacturing Overhead

(c)	21,000	(j)	240,000
(d)	90,000		
(e)	15,000		
(g)	45,000		
(h)	72,000		
Bal.	3,000		

Accounts Payable

(a)	142,000
(c)	21,000
(e)	15,000
(f)	130,000
(h)	90,000
(i)	17,000

Accumulated Depreciation

(g)	50,000

Depreciation Expense

(g)	5,000

Salaries & Wages Payable

(d)	451,000

Salaries Expense

(d)	145,000

Miscellaneous Expense

(i)	17,000

Advertising Expense

(f)	130,000

Problem 2-25A (continued)

Rent Expense			
(h)	18,000		

Cost of Goods Sold			
(l)	600,000		

Sales		
	(l)	1,000,000

3.

Southworth Company
Schedule of Cost of Goods Manufactured

Direct materials:		
Raw materials inventory, beginning	$ 18,000	
Add: Purchases of raw materials	142,000	
Materials available for use	160,000	
Deduct: Raw materials inventory, ending	10,000	
Materials used in production		$150,000
Direct labor		216,000
Manufacturing overhead applied to work in process		240,000
Total manufacturing cost		606,000
Add: Work in process, beginning		24,000
		630,000
Deduct: Work in process, ending		40,000
Cost of goods manufactured		$590,000

4.

Cost of Goods Sold	3,000	
Manufacturing Overhead		3,000

Schedule of cost of goods sold:

Finished goods inventory, beginning	$ 35,000
Add: Cost of goods manufactured	590,000
Cost of goods available for sale	625,000
Deduct: Finished goods inventory, ending	25,000
Unadjusted cost of goods sold	600,000
Add: Underapplied overhead	3,000
Adjusted cost of goods sold	$603,000

Problem 2-25A (continued)

5.

Southworth Company
Income Statement

Sales		$1,000,000
Cost of goods sold		603,000
Gross margin		397,000
Selling and administrative expenses:		
Salaries expense	$145,000	
Advertising expense	130,000	
Depreciation expense	5,000	
Rent expense	18,000	
Miscellaneous expense	17,000	315,000
Net operating income		$ 82,000

6.

Direct materials	$ 3,600
Direct labor (400 hours × $11 per hour)	4,400
Manufacturing overhead cost applied (160% × $3,600)	5,760
Total manufacturing cost	13,760
Add markup (75% × $13,760)	10,320
Total billed price of Job 218	$24,080

$24,080 ÷ 500 units = $48.16 per unit.

Problem 2-26A (30 minutes)

1. Preparation Department:

   The estimated total manufacturing overhead cost in the Preparation Department is computed as follows:

   Y = $256,000 + $2.00 per MH × 80,000 MH

Estimated fixed manufacturing overhead	$256,000
Estimated variable manufacturing overhead:	
$2.00 per MH × 80,000 MHs	160,000
Estimated total manufacturing overhead cost	$416,000

   The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a)	$416,000	
Estimated total machine-hours (b)	80,000	MHs
Predetermined overhead rate (a) ÷ (b)	$5.20	per MH

   Fabrication Department:

   The estimated total manufacturing overhead cost in the Fabrication Department is computed as follows:

   Y = $520,000 + $4.00 per DLH × 50,000 DLH

Estimated fixed manufacturing overhead	$520,000
Estimated variable manufacturing overhead:	
$4.00 per DLH × 50,000 DLHs	200,000
Estimated total manufacturing overhead cost	$720,000

   The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a)	$720,000	
Estimated total machine-hours (b)	50,000	DLHs
Predetermined overhead rate (a) ÷ (b)	$14.40	per DLH

Problem 2-26A (continued)

2. Preparation Department overhead applied:

350 machine-hours × $5.20 per machine-hour	$1,820
Fabrication Department overhead applied:	
130 direct labor-hours × $14.40 per labor-hour	1,872
Total overhead cost	$3,692

3. Total cost of Job 127:

	Preparation	Fabrication	Total
Direct materials	$ 940	$1,200	$2,140
Direct labor	710	980	1,690
Manufacturing overhead ...	1,820	1,872	3,692
Total cost	$3,470	$4,052	$7,522

Unit product cost for Job 127:

Total manufacturing cost (a)	$7,522	
Number of units in the job (b)	25	units
Unit product cost (a) ÷ (b)	$300.88	per unit

4.

	Preparation	Fabrication
Manufacturing overhead cost incurred	$390,000	$740,000
Manufacturing overhead cost applied:		
73,000 machine-hours × $5.20 per machine-hour	379,600	
54,000 direct labor-hours × $14.40 per direct labor-hour		777,600
Underapplied (or overapplied) overhead ..	$ 10,400	$ (37,600)

Problem 2-27A (45 minutes)

1. a. Raw Materials	160,000	
Accounts Payable		160,000
b. Work in Process	120,000	
Manufacturing Overhead	20,000	
Raw Materials		140,000
c. Work in Process	90,000	
Manufacturing Overhead	60,000	
Sales Commissions Expense	20,000	
Salaries Expense	50,000	
Salaries and Wages Payable		220,000
d. Manufacturing Overhead	13,000	
Insurance Expense.....	5,000	
Prepaid Insurance		18,000
e. Manufacturing Overhead	10,000	
Accounts Payable		10,000
f. Advertising Expense	15,000	
Accounts Payable		15,000
g. Manufacturing Overhead	20,000	
Depreciation Expense	5,000	
Accumulated Depreciation		25,000
h. Work in Process	110,000	
Manufacturing Overhead		110,000

$$\frac{\text{Estimated total manufacturing overhead cost}}{\text{Estimated total amount of the allocation base}} = \frac{£99,000}{45,000 \text{ MHs}} = £2.20 \text{ per MH}$$

50,000 actual MHs × £2.20 per MH = £110,000 overhead applied.

Problem 2-27A (continued)

i.	Finished Goods	310,000	
	Work in Process		310,000
j.	Accounts Receivable	498,000	
	Sales		498,000
	Cost of Goods Sold	308,000	
	Finished Goods		308,000

2.

Raw Materials			
Bal.	10,000	(b)	140,000
(a)	160,000		
Bal.	30,000		

Work in Process			
Bal.	4,000	(i)	310,000
(b)	120,000		
(c)	90,000		
(h)	110,000		
Bal.	14,000		

Finished Goods			
Bal.	8,000	(j)	308,000
(i)	310,000		
Bal.	10,000		

Manufacturing Overhead			
(b)	20,000	(h)	110,000
(c)	60,000		
(d)	13,000		
(e)	10,000		
(g)	20,000		
Bal.	13,000		

Cost of Goods Sold	
(j)	308,000

3. Manufacturing overhead is underapplied by £13,000 for the year. The entry to close this balance to Cost of Goods Sold would be:

Cost of Goods Sold	13,000	
Manufacturing Overhead		13,000

Problem 2-27A (continued)

4.

Sovereign Millwork, Ltd.
Income Statement
For the Year Ended June 30

Sales		£498,000
Cost of goods sold (£308,000 + £13,000)		321,000
Gross margin		177,000
Selling and administrative expenses:		
Sales commissions	£20,000	
Administrative salaries	50,000	
Insurance expense	5,000	
Advertising expenses	15,000	
Depreciation expense	5,000	95,000
Net operating income		£ 82,000

Problem 2-28A (60 minutes)

1. and 2.

Cash			
Bal.	15,000	(c)	225,000
(l)	445,000	(m)	150,000
Bal.	85,000		

Accounts Receivable			
Bal.	40,000	(l)	445,000
(k)	450,000		
Bal.	45,000		

Raw Materials			
Bal.	25,000	(b)	90,000
(a)	80,000		
Bal.	15,000		

Work in Process			
Bal.	30,000	(j)	310,000
(b)	85,000		
(c)	120,000		
(i)	96,000		
Bal.	21,000		

Finished Goods			
Bal.	45,000	(k)	300,000
(j)	310,000		
Bal.	55,000		

Prepaid Insurance			
Bal.	5,000	(f)	4,800
Bal.	200		

Buildings & Equipment	
Bal.	500,000

Accumulated Depreciation	
	210,000
	30,000
	240,000

Manufacturing Overhead			
(b)	5,000	(i)*	96,000
(c)	30,000		
(d)	12,000		
(e)	25,000		
(f)	4,000		
(h)	17,000		
		Bal.	3,000

Accounts Payable			
(m)	150,000	Bal.	75,000
		(a)	80,000
		(d)	12,000
		(g)	40,000
		(h)	17,000
		Bal.	74,000

* $\frac{\$80,000}{\$100,000}$ = 80% of direct labor cost; $120,000 × 0.80 = $96,000.

Retained Earnings	
	Bal. 125,000

Common Stock	
	Bal. 250,000

Problem 2-28A (continued)

Salaries Expense			
(c)	75,000		

Depreciation Expense			
(e)	5,000		

Insurance Expense			
(f)	800		

Shipping Expense			
(g)	40,000		

Cost of Goods Sold			
(k)	300,000		

Sales			
		(k)	450,000

3. Manufacturing overhead was overapplied by $3,000 for the year. The journal entry would be recorded as follows:

Manufacturing Overhead	3,000	
Cost of Goods Sold		3,000

4.

Fantastic Props, Inc.
Income Statement
For the Year Ended December 31

Sales		$ 450,000
Cost of goods sold ($300,000 – $3,000)		297,000
Gross margin.....		153,000
Selling and administrative expenses:		
Salaries expense	$75,000	
Depreciation expense	5,000	
Insurance expense	800	
Shipping expense	40,000	120,800
Net operating income		$ 32,200

Case (60 minutes)

1. a.

$$\text{Predetermined overhead rate} = \frac{\text{Estimated total manufacturing overhead cost}}{\text{Estimated total amount of the allocation base}} = \frac{\$1{,}440{,}000}{\$900{,}000 \text{ direct labor cost}} = 160\% \text{ of direct labor cost}$$

   b. $21,200 × 160% = $33,920.

2. a.

	Cutting Department	Machining Department	Assembly Department
Estimated manufacturing overhead cost (a)	$540,000	$800,000	$100,000
Estimated direct labor cost (b)	$300,000	$200,000	$400,000
Predetermined overhead rate (a) ÷ (b)	180%	400%	25%

   b.

Cutting Department:	
$6,500 × 180%.....	$11,700
Machining Department:	
$1,700 × 400%.....	6,800
Assembly Department:	
$13,000 × 25%.....	3,250
Total applied overhead	$21,750

3. The bulk of the labor cost on the Hastings job is in the Assembly Department, which incurs very little overhead cost. The department has an overhead rate of only 25% of direct labor cost as compared to much higher rates in the other two departments. Therefore, as shown above, use of departmental overhead rates results in a relatively small amount of overhead cost charged to the job.

Case (continued)

However, use of a plantwide overhead rate in effect redistributes overhead costs proportionately between the three departments (at 160% of direct labor cost) and results in a large amount of overhead cost being charged to the Hastings job, as shown in Part 1. This may explain why the company bid too high and lost the job. Too much overhead cost was assigned to the job for the kind of work being done on the job in the plant.

If a plantwide overhead rate is being used, the company will tend to charge too little overhead cost to jobs that require a large amount of labor in the Cutting or Machining Departments. The reason is that the plantwide overhead rate (160%) is much lower than the rates if these departments were considered separately.

4. The company's bid price was:

Direct materials	$ 18,500
Direct labor	21,200
Manufacturing overhead applied (above)	33,920
Total manufacturing cost	73,620
Bidding rate	× 1.5
Total bid price	$110,430

If departmental overhead rates had been used, the bid price would have been:

Direct materials	$ 18,500
Direct labor	21,200
Manufacturing overhead applied (above)	21,750
Total manufacturing cost	61,450
Bidding rate	× 1.5
Total bid price	$ 92,175

Note that if departmental overhead rates had been used, Lenko Products would have been the low bidder on the Hastings job since the competitor underbid Lenko by only $10,000.

Case (continued)

5. a.

Actual overhead cost	$1,482,000
Applied overhead cost ($870,000 × 160%)	1,392,000
Underapplied overhead cost	$ 90,000

b.

	Department			
	Cutting	Machining	Assembly	Total Plant
Actual overhead cost	$560,000	$830,000	$92,000	$1,482,000
Applied overhead cost:				
$320,000 × 180%	576,000			
$210,000 × 400%		840,000		
$340,000 × 25%			85,000	1,501,000
Underapplied (overapplied) overhead cost	$(16,000)	$(10,000)	$ 7,000	$ (19,000)

Ethics Challenge (45 minutes)

1. Shaving 5% off the estimated direct labor-hours in the predetermined overhead rate will result in an artificially high overhead rate, which is likely to result in overapplied overhead for the year. The cumulative effect of overapplying the overhead throughout the year is all recognized in December when the balance in the Manufacturing Overhead account is closed out to Cost of Goods Sold. If the balance were closed out every month or every quarter, this effect would be dissipated over the course of the year.

2. This question may generate lively debate. Where should Cristin Madsen's loyalties lie? Is she working for the general manager of the division or for the corporate controller? Is there anything wrong with the "Christmas bonus"? How far should Cristin go in bucking her boss on a new job?

   While individuals can certainly disagree about what Cristin should do, some of the facts are indisputable. First, the practice of understating direct labor-hours results in artificially inflating the overhead rate. This has the effect of inflating the cost of goods sold figures in all months prior to December and overstating the costs of inventories. In December, the adjustment for overapplied overhead provides a big boost to net operating income. Therefore, the practice results in distortions in the pattern of net operating income over the year. In addition, since all of the adjustment is taken to Cost of Goods Sold, inventories are still overstated at year-end. This means that retained earnings is also overstated.

   While Cristin is in an extremely difficult position, her responsibilities under the IMA's Statement of Ethical Professional Practice seem to be clear. The Credibility standard states that management accountants have a responsibility to "disclose all relevant information that could reasonably be expected to influence an intended user's understanding of the reports, analyses, or recommendations." Cristin should discuss this situation with her immediate supervisor in the controller's office at corporate headquarters. This step may bring her into direct conflict with the general manager of the division, so it would be a very difficult decision for her to make.

Ethics Challenge (continued)

In the actual situation that this case is based on, the corporate controller's staff were aware of the general manager's accounting tricks, but top management of the company supported the general manager because "he comes through with the results" and could be relied on to hit the annual profit targets for his division. Personally, we would be very uncomfortable supporting a manager who will resort to deliberate distortions to achieve "results." If the manager will pull tricks in this area, what else might he be doing that is questionable or even perhaps illegal?

Teamwork in Action

1. The types of transactions that are posted to the accounts may be summarized in T-account form as follows:

Raw Materials

Beginning balance	
Purchases	Direct materials used (to Work in Process)

Accounts Payable

	Beginning balance
Payments to suppliers	Purchases of raw materials

Work in Process

Beginning balance	
Direct materials used (from Raw Materials)	Cost of goods manufactured (to Finished Goods)
Direct labor	
Manufacturing overhead applied	

Manufacturing Overhead

Actual manufacturing costs	Manufacturing overhead applied
Overhead overapplied (to COGS)	Overhead underapplied (to COGS)

Finished Goods

Beginning balance	
Cost of goods manufactured (from WIP)	Cost of goods sold

Cost of Goods Sold

Cost of goods sold	
Overhead underapplied (from Manufacturing Overhead)	Overhead overapplied (from Manufacturing Overhead)

Teamwork in Action (continued)

2. The predetermined overhead rate and overhead applied amounts are:
   Predetermined overhead rate:
   $180,000 ÷ 60,000 DLHs = $3 per DLH.
   Overhead applied:
   5,200 DLHs × $3 per DLH = $15,600

3. The balance in the work in process account is determined as follows:

Direct materials (given)	$2,600
Direct labor (300 DLHs × $6 per DLH)	1,800
Overhead applied (300 DLHs × $3 per DLH)	900
Total	$5,300

4. The completed T-accounts follow:

Accounts Payable

(c)	Payments	40,000	(c)	Balance 4/1	6,000
			(plug)	Purchases	42,000
			(given)	Balance 4/30	8,000

Work in Process

(given)	Balance 4/1	4,500	(f)	Cost of goods manufactured	89,000
(b,d)	Direct labor*	31,200			
		ed 15,600			
(above)	Overhead appli	43,000			
(plug)	Direct materials	5,300			
(above)	Balance 4/30				

* 5,200 DLHs × $6 per DLH = $31,200

Raw Materials

(given)	Balance 4/1	12,000	(a ove)	Direct materials	43,000
(above)	Purchases	42,000	b		
	Balance 4/30	11,000			

Teamwork in Action (continued)

	Manufacturing Overhead				
(given)	Actual costs for April	14,800	(above)	Overhead applied	15,600
	To cost of goods sold	800		Overapplied overhead	800

	Finished Goods				
(e)	Balance 4/1	11,000	(plug)	Cost of goods sold	84,000
(f)	Cost of goods manufactured	89,000			
(given)	Balance 4/30	16,000			

	Cost of Goods Sold				
(above)	Cost of goods sold	84,000	(above)	Overapplied overhead	800
		83,200			

Communicating in Practice

Date: Current date
To: Instructor
From: Student's Name
Subject: Talk with a Controller

The student's memorandum should address the following:

The name, title, and job affiliation of the individual interviewed. (Note: Not specifically required in problem but essential and, as such, a good topic for class discussion, if appropriate.)

A list of the company's main products.

Identification of the type of costing system in use (job-order, process, or other).

Brief description of how overhead is assigned to products (including basis for allocation and whether more than one overhead rate is in use).

Indication as to whether any changes have been made to or are being considered in relation to the company's costing system, and, if applicable, a brief description of the changes.

Chapter 2
Take Two Solutions

Exercise 2-1 (10 minutes)

The estimated total manufacturing overhead cost is computed as follows:

Y = $466,000 + ($3.00 per DLH)(50,000 DLHs)

Estimated fixed manufacturing overhead	$466,000
Estimated variable manufacturing overhead:	
$3.00 per DLH × 50,000 DLHs	150,000
Estimated total manufacturing overhead cost	$616,000

The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a)	$616,000
Estimated total direct labor hours (DLHs) (b) ..	50,000 DLHs
= Predetermined overhead rate (a) ÷ (b)	$12.32 per DLH

Note to Instructors: Ask students why this overhead rate ($12.32) is lower than the overhead rate in the original data set ($14.65). The "take two" rate is lower because the fixed overhead is being spread over more direct labor-hours.

Exercise 2-2 (10 minutes)

Actual direct labor-hours (a)	12,600
Predetermined overhead rate (b)	$23.10
Manufacturing overhead applied (a) × (b)	$291,060

Note to Instructors: Use the "take two" data to emphasize the point that the manufacturing overhead applied to jobs is unaffected by the actual manufacturing overhead costs incurred.

Exercise 2-3 (10 minutes)

1. Total direct labor-hours required for Job A-200:

Direct labor cost (a)	$120
Direct labor wage rate per hour (b)	$12
Total direct labor hours (a) ÷ (b)	10

Total manufacturing cost assigned to Job A-200:

Direct materials	$200
Direct labor	120
Manufacturing overhead applied ($24 per DLH × 10 DLHs)	240
Total manufacturing cost	$560

2. Unit product cost for Job A-200:

Total manufacturing cost (a)	$560
Number of units in the job (b)	50
Unit product cost (a) ÷ (b)	$11.20

Exercise 2-6 (20 minutes)

1. Cost of Goods Manufactured

Direct materials:		
Raw materials inventory, beginning	$24,000	
Add: Purchases of raw materials	53,000	
Total raw materials available	77,000	
Deduct: Raw materials inventory, ending	25,000	
Raw materials used in production	52,000	
Deduct: Indirect materials included in manufacturing overhead	8,000	$ 44,000
Direct labor		62,000
Manufacturing overhead applied to work in process inventory		41,000
Total manufacturing costs		147,000
Add: Beginning work in process inventory		41,000
		188,000
Deduct: Ending work in process inventory		43,000
Cost of goods manufactured		$145,000

2. Cost of Goods Sold

Finished goods inventory, beginning	$ 86,000
Add: Cost of goods manufactured	145,000
Cost of goods available for sale	231,000
Deduct: Finished goods inventory, ending	93,000
Unadjusted cost of goods sold	138,000
Add: Underapplied overhead	8,000
Adjusted cost of goods sold	$146,000

Note to Instructors: Using the "take two" data, ask students to calculate the cost of goods manufactured and cost of goods sold without preparing any schedules. They should see that there is a $24,000 increase in ending inventories and this will decrease cost of goods manufactured and cost of goods sold by $24,000. Given that the cost of goods manufactured and cost of goods sold in the original scenario were $169,000 and $170,000, respectively, the corresponding amounts in the "take two" scenario are $145,000 and $146,000, respectively.

Exercise 2-7 (10 minutes)

1. The underapplied overhead is computed as follows:

Actual direct labor-hours (a)	8,250
Predetermined overhead rate (b)	$21.40
....Manufacturingoverheadapplied(a)×(b)	$176,550
Deduct: Manufacturing overhead incurred	178,000
.....Underappliedmanufacturingoverhead	$ 1,450

2. Because manufacturing overhead is underapplied, the cost of goods sold would increase by $1,450 and the gross margin would decrease by $1,450.

   Note to Instructors: Students often erroneously believe that if the actual quantity of the allocation base exceeds the denominator volume, then manufacturing overhead must be overapplied. The "take two" data is purposely intended to dispel this notion.

Exercise 2-8 (30 minutes)

1. Cost of Goods Manufactured

Direct materials:		
Raw materials inventory, beginning	$ 8,000	
Add: Purchases of raw materials	132,000	
Total raw materials available	140,000	
Deduct: Raw materials inventory, ending	8,000	
Raw materials used in production		$132,000
Direct labor		90,000
Manufacturing overhead applied to work in process inventory		210,000
Total manufacturing costs		432,000
Add: Beginning work in process inventory		5,000
		437,000
Deduct: Ending work in process inventory		16,000
Cost of goods manufactured		$421,000

2. Cost of Goods Sold

Finished goods inventory, beginning	$ 70,000
Add: Cost of goods manufactured	421,000
Cost of goods available for sale	491,000
Deduct: Finished goods inventory, ending	25,000
Unadjusted cost of goods sold	466,000
Add: Underapplied overhead	10,000
Adjusted cost of goods sold	476,000

3.

Eccles Company
Income Statement

Sales		$643,000
Cost of goods sold ($466,000 + $10,000)		476,000
Gross margin		167,000
Selling and administrative expenses:		
Selling expenses	$100,000	
Administrative expense	43,000	143,000
Net operating income		$ 24,000

Exercise 2-8 (30 minutes)

Note to Instructors: Using the "take two" data, ask students to calculate the net operating income without preparing any schedules. They should see that there is a $6,000 decrease in ending inventories. This will increase cost of goods sold by $6,000 and decrease net operating income by $6,000. Given that the net operating income in the original scenario was $30,000, the "take two" scenario has a net operating income of $24,000.

Exercise 2-9 (10 minutes)

Yes, overhead should be applied to value the Work in Process inventory at year-end.

Because $15,000 of overhead was applied to Job X on the basis of $5,000 of direct labor cost, the company's predetermined overhead rate must be 300% of direct labor cost.

Job Q direct labor cost (a)	$8,000
Predetermined overhead rate (b)	300%
Manufacturing overhead applied to Job Q (a) × (b)	$24,000

Exercise 2-10 (10 minutes)

Direct material	$12,000
Direct labor	10,000
Manufacturing overhead applied:	
$10,000 × 120%.....	12,000
Total manufacturing cost	$34,000
Unit product cost:	
$34,000 ÷ 200 units	$170

Note to Instructors: In instances such as this, students often struggle to understand that changing the direct labor charged to the job also influences the amount of manufacturing overhead applied to the job.

Exercise 2-12 (20 minutes)

1. The estimated total manufacturing overhead cost is computed as follows:

$$Y = \$750{,}000 + \$4.00 \text{ per MH} \times 120{,}000 \text{ MHs}$$

Estimated fixed manufacturing overhead	$ 750,000
Estimated variable manufacturing overhead	
$4.00 per MH × 120,000 MHs	480,000
Estimated total manufacturing overhead cost	$1,230,000

The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a) ..	$1,230,000
Estimated total machine-hours (MHs) (b).....	120,000 MHs
Predetermined overhead rate (a) ÷ (b)	$10.25 per MH

2. Total manufacturing cost assigned to Job 500:

Direct materials	$350.00
Direct labor	230.00
Manufacturing overhead applied	
$10.25 per MH × 30 MHs	307.50
Total manufacturing cost	$887.50

3. Computing underapplied/overapplied overhead:

Actual machine-hours (a)	147,000
Predetermined overhead rate (b)	$10.25
Manufacturing overhead applied (a) × (b)	$1,506,750
Actual manufacturing overhead	$1,325,000
Manufacturing overhead applied	1,506,750
Overapplied overhead	$ (181,750)

The closing entry would decrease cost of goods sold by $181,750 and increase net operating income by $181,750.

Note to Instructors: Comparing the "take two" results to the original results enables you to discuss the concept of a death spiral. When the

Exercise 2-12 (continued)

denominator volume drops and fixed overhead remains unchanged, the predetermined overhead rate increases. This increases the amount of overhead applied to all jobs. If Kody uses cost-plus pricing, the price assigned to all jobs will increase. If some customers reject Kody's higher prices and take their business elsewhere, the denominator volume will continue to decline and the predetermined overhead rate will continue to climb; thereby, initiating a death spiral.

Exercise 2-13 (15 minutes)

1. Actual manufacturing overhead costs	$48,000	
Manufacturing overhead applied:		
10,000 MH × $5 per MH	50,000	
Overapplied overhead cost	$ (2,000)	
2. Direct materials:		
Raw materials inventory, beginning	$ 8,000	
Add: Purchases of raw materials	35,000	
Raw materials available for use	43,000	
Deduct: Raw materials inventory, ending	7,000	
Raw materials used in production		$ 36,000
Direct labor		40,000
Manufacturing overhead cost applied to work in process		50,000
Total manufacturing cost		126,000
Add: Work in process, beginning		6,000
		132,000
Deduct: Work in process, ending		7,500
Cost of goods manufactured		$124,500

Note to Instructors: Using the "take two" data, ask students to calculate the cost of goods manufactured without preparing the corresponding schedule. They should see that, if all else holds constant, a $3,000 increase in the purchase of raw materials creates a $3,000 increase in the cost of goods manufactured. Given that the cost of goods manufactured in the original data set is $121,500, the cost of goods manufactured in the "take two" scenario is $124,500.

Exercise 2-17 (30 minutes)

1. The predetermined overhead rate is computed as follows:

$$Y = \$106{,}250 + \$0.80 \text{ per MH} \times 85{,}000 \text{ MHs}$$

Estimated fixed manufacturing overhead	$106,250
Estimated variable manufacturing overhead	
$0.80 per MH × 85,000 MHs	68,000
Estimated total manufacturing overhead cost	$174,250

The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead (a) ..	$174,250
Estimated total machine-hours (b)	85,000 MHs
Predetermined overhead rate (a) × (b)	$2.05 per MH

2. The amount of overhead cost applied to Work in Process for the year would be: 80,000 machine-hours × $2.05 per machine-hour = $164,000. This amount is shown in entry (a) below:

Manufacturing Overhead			
(Utilities)	14,000	(a)	164,000
(Insurance)	9,000		
(Maintenance)	33,000		
(Indirect materials)	7,000		
(Indirect labor)	65,000		
(Depreciation)	40,000		
Balance	4,000		

Work in Process			
(Direct materials)	530,000		
(Direct labor)	85,000		
(Overhead)	(a) 164,000		

3. Overhead is underapplied by $4,000 for the year, as shown in the Manufacturing Overhead account above. The entry to close out this balance to Cost of Goods Sold would be:

Cost of Goods Sold	4,000	
Manufacturing Overhead		4,000

Exercise 2-17 (continued)

4. When overhead is applied using a predetermined rate based on machine-hours, it is assumed that overhead cost is proportional to machine-hours. When the actual level of activity turns out to be 80,000 machine-hours, the costing system assumes that the overhead will be 80,000 machine-hours × $2.05 per machine-hour, or $164,000. This is a drop of $6,000 from the initial estimated total manufacturing overhead cost of $170,000. However, the actual total manufacturing overhead did not drop by this much. The actual total manufacturing overhead was $168,000—a drop of only $2,000 from the estimate. The manufacturing overhead did not decline by the full $6,000 because of the existence of fixed costs and/or because overhead spending was not under control. These issues will be covered in more detail in later chapters.