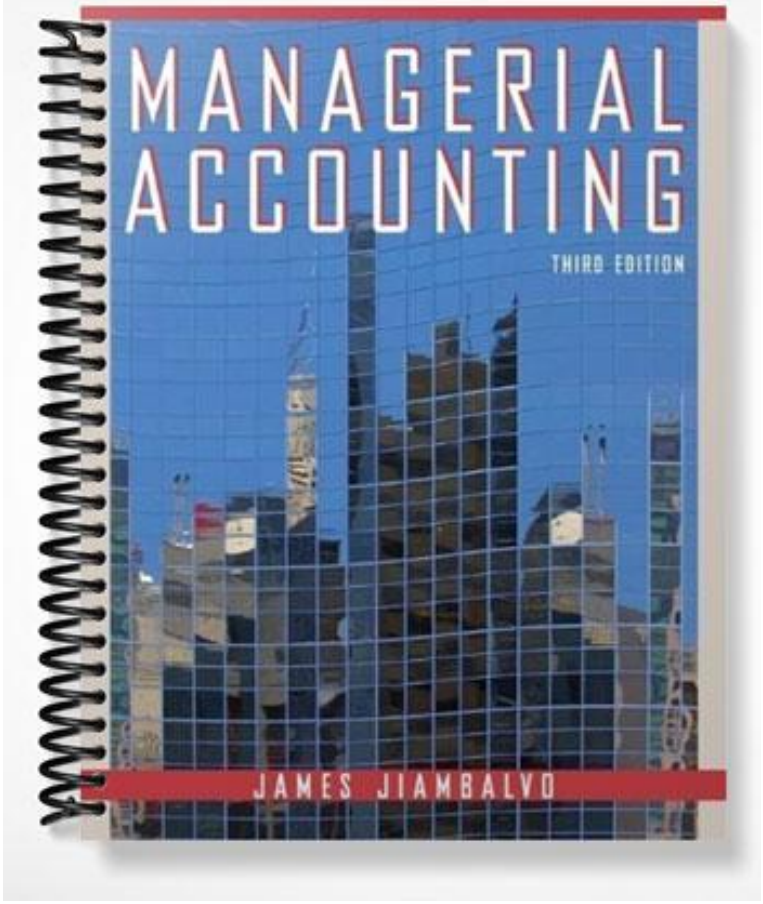
SOLUTIONS MANUAL



Chapter 2
Job-Order Costing for Manufacturing and Service Companies

QUESTIONS

1. Manufacturing costs include all costs associated with the production of goods. Examples of manufacturing costs are: labor costs of workers directly involved with manufacturing goods, cost of all materials directly traced to products, indirect factory labor, indirect materials used in production, depreciation of production equipment, and depreciation of the manufacturing facility.

   Nonmanufacturing costs are all costs that are not associated with the productions of goods. These typically include selling costs and general and administrative costs.

2. Product costs are assigned to goods produced. Product costs are assigned to inventory and become an expense when inventory is sold. Period costs are not assigned to goods produced. Period costs are identified with accounting periods and are expensed in the period incurred.

3. Two common types of product costing systems are (1) job-order costing systems and (2) process costing systems.

   Job-order costing systems are generally used by companies that produce individual products or batches of unique products. Companies that use job-order costing systems include custom home builders, airplane manufacturers, and ship-building companies.

   Process costing is used by companies that produce large numbers of identical items that pass through uniform and continuous production operations. Process costing tends to be used by beverage companies and producers of chemicals, paints, and plastics.

4. A job cost sheet is a form that is used to accumulate the cost of producing a job. The job cost sheet contains detailed information on direct materials, direct labor, and manufacturing overhead used on the job.

5. Actual overhead is not known until the end of the accounting period. If managers used actual overhead rates to apply overhead to jobs, they would have to wait until the end of the period to determine the cost of jobs. In order to make timely decisions, managers may need to know the cost of jobs before the end of the accounting period.

6. An important characteristic of a good overhead allocation base is that it should be strongly related to overhead cost. Assume that setup costs are classified as factory overhead. The number of setups that a job requires would be a better allocation base for setup costs than would the number of direct labor hours worked on that job. Number of setups is more closely related to setup costs than is the number of direct labor hours and, therefore, number of setups is a better allocation base.

7. In highly automated companies where direct labor cost is a small part of total manufacturing costs, it is unlikely that overhead costs vary with direct labor. Further, in such companies, predetermined overhead rates based on direct labor may be quite large. Thus, even a small change in labor (the allocation base) could have a large effect on the overhead cost allocated to a job.

   Companies that are capital-intensive should consider using machine hours as an allocation base (or better still, they should consider use of an activity-based costing system, which is discussed in more detail in Chapter 5).

8. It is necessary to apportion underapplied or overapplied overhead among Work in Process, Finished Goods, and Cost of Goods Sold accounts if the amount in the Factory Overhead account is material whether a debit or credit balance.

9. An unexpected increase in production would result in overhead being overapplied. Overhead is applied using a predetermined rate which equals estimated total overhead cost divided by the estimated level of the allocation base. Overhead applied equals the predetermined rate times the actual use of the allocation base. An unexpected increase in production means that the actual amount of allocation base used will exceed the budgeted amount (all else held constant). Since the predetermined overhead rate will not change, this results in overhead being overapplied.

   In other words, when production increases compared to original estimates, the predetermined overhead rate will exceed the actual overhead rate resulting in overapplied overhead.

10. As companies move to computer-controlled manufacturing systems, direct labor will likely decrease (due to decreased need for workers) and manufacturing overhead will likely increase (due to higher depreciation costs associated with the computer-controlled systems).

EXERCISES

E1. *LO 6*

Managers at Company A will perceive that overhead cost allocated to jobs increases with the amount of direct labor used. If they are evaluated on how well they control the cost of jobs, they will try to cut back on labor, which not only reduces labor costs but also overhead allocated to jobs they supervise. Following similar logic, managers at Company B will cut back on machine time and managers at Company C will make a special effort to control material costs (by reducing waste, searching for lower prices, etc). Note that the measure of performance (reduction in job costs) combined with the approach to allocating overhead drives managers to focus on different factors—this is a good example of "You get what you measure!"

E2. *LO 10*

If over- or under-applied overhead is large, we typically allocate it to work in process, finished goods and cost of goods sold based on the relative balances in these accounts. However, if a company uses JIT, the balances in work in process and finished goods are likely to be quite small compared to the balance in cost of goods sold. Thus, there will be only a small difference between assigning all of the over- or under-applied overhead to cost of goods sold versus apportioning it among the three accounts based on their relative balances.

E3. *LO 10*

a. Six Sigma is a vision of quality that equates with only 3.4 defects per million opportunities for each product or service transaction. Essentially, a six sigma program strives for perfection.

b. Pareto principle: 20% of the problem sources cause 80% of the problems.

c. Design for Six Sigma means designing to meet customer needs within the capability of the company's processes.

E4. *LO 4*

a. P
b. P
c. J
d. J
e. P
f. J

E5. *LO 1, 2*

a. Y
b. N
c. Y
d. Y
e. Y
f. Y
g. Y
h. N

E6. *LO 3, 6*

Note that direct materials are charged to Work in Process while indirect materials are charged to Manufacturing Overhead.

Work in Process	250,000	
Raw Materials		250,000
Manufacturing Overhead	20,000	
Raw Materials		20,000

E7. *LO 3, 6*

Note that direct materials are charged to Work in Process while indirect materials are charged to Manufacturing Overhead.

Work in Process	1,700	
Raw Materials		1,700
(300 + 400 + 450 + 550 = 1,700)		
Manufacturing Overhead	110	
Raw Materials		110

E8. *LO 3, 6*

Note that direct labor is charged to Work in Process while indirect labor is charged to Manufacturing Overhead.

Work in Process	75,000	
Wages Payable		75,000
Manufacturing Overhead	52,000	
Wages Payable		52,000

E9. *LO 3, 6*

a. **Job No. 201**

120 hrs. × $9/hr	$ 1,080
80 hrs. × $20/hr.	1,600
50 hrs. × $10/hr.	500
Total	$3,180

Job No. 202

40 hrs. × $18 /hr.	$720

Job No. 203

60 hrs. × $16/hr.	$960

b. Labor Report for the month of February (by job):

Job	Time Ticket	Hours	Rate	Cost
201	2101	120	9.00	$ 1,080
201	2102	80	20.00	1,600
201	2103	50	10.00	500
		240		3,180
202	2104	40	18.00	720
203	2105	60	16.00	960
			Total labor charges	$4,860

Work in Process	4,860	
Wages Payable		4,860

E10. *LO 6, 7*

(1) Predetermined overhead allocation rate based on direct labor hours:
$800,000 / 50,000 DLH = $16.00 per direct labor hour

(2) Predetermined overhead allocation rate based on direct labor costs:
$800,000 / $1,600,000 = $0.50 per dollar of direct labor

(3) Predetermined overhead allocation rate based on machine hours:
$800,000 / 25,000 machine hours = $32.00 per machine hour

E11. *LO 6, 7*

a. The use of predetermined overhead rates makes it possible to cost jobs immediately after they are completed. If a company used an actual overhead rate, then job costs would not be available until the end of the accounting period. If Franklin Computer Repair charges customers based on actual job cost, it would be unacceptable to have to wait until the end of the accounting period to bill customers.

b. The overhead rate is:
$400,000 ÷ $600,000 = $0.67 per dollar of technician wages.

Total job cost = $200 + $100 + ($100 × 0.67) = $367

E12. *LO 6, 7*

a. Overhead allocation rates:

Allocation base	Allocation Rate
Direct labor hours	$900,000 / 40,000 DLH = $22.50 per direct labor hour
Direct labor cost	$900,000 / $600,000 = $1.50 per dollar of direct labor cost
Machine hours	$900,000 / 15,000 MH = $60 per machine hour
Direct material cost	$900,000 / $800,000 = $1.125 per dollar of direct material

b. Cost of Job No. 253 using different allocation bases:

Cost	DLH	DL cost	MH	DM cost
Direct Materials	$2,500	$2,500	$2,500	$2,500.00
Direct labor	1,540	1,540	1,540	1,540.00
Manufacturing Overhead	3,150	2,310	6,000	2,812.50
Total	$7,190	$6,350	$10,040	$6,852.50

E13. *LO 3, 6*

a. Overhead applied is equal to $4 × $75,000 of direct labor = $300,000.

Work in Process	300,000	
Manufacturing Overhead		300,000

b. Actual overhead is $250,000

Manufacturing Overhead	250,000	
Raw Materials		35,000
Wages Payable		75,000
Utilities Payable		20,000
Accumulated Depreciation		80,000
Repair Expense		40,000

E14. *LO 8*

a. Overhead applied is $300,000 while actual overhead is $250,000. Thus, Manufacturing Overhead has a $50,000 credit balance. The journal entry to close the account to Cost of Goods Sold is:

Manufacturing Overhead	50,000	
Cost of Goods Sold		50,000

b. Closing the balance in Manufacturing Overhead leads to product costs that are consistent with actual overhead costs rather than estimated overhead costs.

c. If the amount of underapplied or overapplied overhead is small, income will not be significantly distorted even if the entire balance is assigned to Cost of Goods Sold.

E15. *LO 3, 6*

Cost Summary: Job 325	
Direct Material	$ 8,000
Direct Labor (200 hours × $18/hour)	3,600
Manufacturing Overhead:	
($20 per direct labor hour × 20 hours)	4,000
Total	$15,600

E16. *LO 6*

Estimated overhead = $200,000 which is allocated based on cost of attorney and paraprofessional time.

Budgeted salaries: (5 × $90,000) + (9 × $45,000) = $855,000

Predetermined overhead rate = $200,000 / $855,000 = $0.2339181 per dollar of attorney and paraprofessional time.

If client services require $35,000 in salaries, then indirect costs assigned are:

$35,000 × $0.2339181 = $8,187.13

E17. *LO 8*

Since the Manufacturing Overhead account has an ending credit balance (before adjustment), manufacturing overhead for the period is overapplied. The problem states that the balance is material—this suggests that we prorate the balance among Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold.

Accounts	Balance	% of Total	Total Overapplied	Adjustment
Work in Process	$ 400,000	22.222	$90,000	$20,000
Finished Goods	600,000	33.333	90,000	30,000
Cost of Goods Sold	800,000	44.444	90,000	40,000
Total	$1,800,000			$90,000

Manufacturing Overhead	90,000	
Work in Process		20,000
Finished Goods		30,000
Cost of Goods Sold		40,000

E18. *LO: General chapter information*

Student answers will vary. See below for possible ideas.

One concept is the calculation of cost of goods manufactured and cost of goods sold. This concept is very important to someone who is an accountant for a manufacturing company. Accountants will need accurate information about direct materials, direct labor, and manufacturing overhead in determining the cost of manufacturing products. From there, accountants can calculate the company's cost of goods sold. It is important for these numbers to be calculated correctly since an overstatement of cost of goods sold will lead to an understatement of net income and vice versa. Accountants have a responsibility to gather correct information and communicate this information to others who rely on it. Thus, accountants must make sure that accurate cost records are kept in order throughout each year.

PROBLEMS

P1. *LO 3*

a.

Satterfield's Custom Glass
Schedule of Cost of Goods Manufactured
For the Year Ended December 31, 2008

Beginning balance in work in process		$ 200,000
Add current manufacturing costs:		
Direct material	$2,000,000	
Direct labor	2,500,000	
Manufacturing overhead	1,500,000	6,000,000
Total		6,200,000
Less ending balance in work in process		275,000
Cost of goods manufactured		$5,925,000

b.

Satterfield's Custom Glass
Income Statement
For the Year Ended December 31, 2008

Sales		$8,000,000
Less cost of goods sold:		
Beginning finished goods	$ 450,000	
Add cost of goods manufactured	5,925,000	
Cost of goods available for sale	6,375,000	
Less ending finished goods	300,000	6,075,000
Gross profit		1,925,000
Less nonmanufacturing expenses:		
Selling expenses	200,000	
General & admin. expenses	400,000	600,000
Net income		$1,325,000

P2. *LO 3*

a.

Terra Cotta Designs
Schedule of Cost of Goods Manufactured
For the Year Ended December 31, 2008

Beginning balance in work in process			$ 500,000
Add current manufacturing costs:			
Direct material:			
Beginning balance	$ 300,000		
Purchases	900,000		
Ending balance	(100,000)	$1,100,000	
Direct labor		2,000,000	
Manufacturing Overhead		500,000	3,600,000
Total			4,100,000
Less ending balance in work in process			250,000
Cost of goods manufactured			$3,850,000

b.

Terra Cotta Designs
Income Statement
For the Year Ended December 31, 2008

Sales		$6,000,000
Less cost of goods sold:		
Beginning finished goods	$ 600,000	
Add cost of goods manufactured	3,850,000	
Cost of goods available for sale	4,450,000	
Less ending finished goods	250,000	4,200,000
Gross profit		1,800,000
Less nonmanufacturing expenses:		
Selling expenses	300,000	
General & admin. expenses	750,000	1,050,000
Net income		$ 750,000

P3. *LO 6*

a.

Cost of Jobs:

	1005	**1006**	**1007**	**1008**	**1009**	**1010**
Material	560	730	1,480	540	370	285
Labor	1,420	1,840	3,220	1,200	720	560
Overhead	2,556	3,312	5,796	2,160	1,296	1,008
Total	4,536	5,882	10,496	3,900	2,386	1,853

b.

Raw Material Inventory	4,800	
Accounts Payable		4,800
(To record purchase of steel)		
Raw Material Inventory	2,200	
Cash		2,200
(To record purchase of supplies)		
Work in Process Inventory	3,965	
Manufacturing Overhead	799	
Raw Material Inventory		4,764
(To record materials used in production)		
Work in Process Inventory	8,960	
Manufacturing Overhead	6,400	
Wages Payable		15,360
(To record labor)		
Work in Process Inventory	16,128	
Manufacturing Overhead		16,128
(To record overhead applied to production)		
Finished Goods Inventory	24,814	
Work in Process Inventory		24,814
(To record jobs completed)		

Accounts Receivable	37,221	
Cost of Goods Sold	24,814	
Sales		37,221
Finished Goods Inventory		24,814

(To record the sale of finished goods)

P4. *LO 3, 6*

a. The beginning balance in Work in Process is $11,500:

Job 258	$ 4,000
Job 259	5,000
Job 260	2,500
Total	$11,500

The ending balance in Work in Process is $7,000:

Job 345	$2,000
Job 346	5,000
Total	$7,000

b. The beginning balance in Finished Goods is $8,000:

Job 257	$8,000

The ending balance in Finished Goods is $10,000:

Job 341	$ 1,000
Job 342	3,000
Job 343	2,000
Job 344	4,000
Total	$10,000

c. Cost of goods sold is determined as follows:

Beginning balance in work in process		$ 11,500
Add current manufacturing costs:		
Direct material	$ 600,000	
Direct labor	1,500,000	
Manufacturing overhead	2,000,000	4,100,000
Total		4,111,500
Less ending balance in work in process		7,000
Cost of goods manufactured		$4,104,500

Beginning finished goods	$ 8,000
Add cost of goods manufactured	4,104,500
Cost of goods available for sale	4,112,500
Less ending finished goods	10,000
Cost of goods sold	$4,102,500

Job 257 through Job 340 likely relate to the balance of Cost of Goods Sold.

P5. *LO 6, 7*

a. Overhead rate based on labor hours:

$10,000,000 ÷ 250,000 hours = $40.00 per labor hour

Overhead assigned to the model K25 shoe based on labor hours:

$40.00 × 10,000 hours = $400,000

Overhead rate based on labor cost:

$10,000,000 ÷ $4,000,000 = $2.50 per labor dollar

Overhead assigned to the model K25 shoe based on labor cost:

$2.50 × $14,000 = $35,000

b. Direct labor cost is the preferred allocation base because workers paid a higher rate work on more complex jobs, and more complex jobs lead to more overhead cost.

P6. *LO 6, 7*

a. Overhead rate based on direct labor cost:

$136,000 ÷ $240,000 labor cost = $0.57

Overhead rate based on direct labor hours:

$136,000 ÷ 20,000 hours = $6.80

Overhead rate based on machine hours:

$136,000 ÷ 6,000 machine hours = $22.67

b.

Overhead based on labor cost

	Job 9823	Job 9824
Material	$ 855.00	$1,650.00
Labor	1,020.00	1,020.00
Overhead	581.40	581.40
Total	$2,456.40	$3,251.40

Overhead based on labor hours

	Job 9823	Job 9824
Material	$ 855.00	$1,650.00
Labor	1,020.00	1,020.00
Overhead	578.00	462.40
Total	$2,453.00	$3,132.40

Overhead based on machine hours

	Job 9823	Job 9824
Material	$ 855.00	$1,650.00
Labor	1,020.00	1,020.00
Overhead	2,267.00	4,534.00
Total	$4,142.00	$7,204.00

c. Given that depreciation on equipment accounts for 75 percent of applied overhead costs, an allocation based on machine hours seems reasonable. However, users of the job cost information should keep in mind that the applied overhead portion of job cost is not an incremental cost.

P7. *LO 7, 8*

a. Net Income if overapplied overhead is immaterial and assigned to Cost of Goods Sold:

Overhead applied = 0.60 × $500,000 = $300,000
Actual overhead = $250,000
Therefore, overhead was overapplied by $50,000.

Sales	$ 2,000,000	
Cost of goods sold	750,000	(i.e., $800,000 - 50,000)
Gross profit	1,250,000	
Selling expenses	200,000	
Admin. expenses	400,000	
Net Income	$ 650,000	

b. Net Income if overapplied overhead is material and prorated among appropriate accounts.

	Balance	Proportion	Adjustment	Adjusted Balance
WIP	$ 60,000	0.067	$ 3,350	$ 56,650
FG	30,000	0.034	1,700	28,300
COGS	800,000	0.899	44,950	755,050
Total	$890,000	1.000	$50,000	$840,000

Sales	$2,000,000	
Cost of goods sold	755,050	(i.e., 800,000 - 44,950)
Gross profit	1,244,950	
Selling expenses	200,000	
Admin. expenses	400,000	
Net Income	$ 644,950	

c. Charging the entire amount of overapplied overhead to Cost of Goods Sold results in higher net income than prorating overapplied overhead among Work in Process, Finished Goods, and Cost of Goods Sold.

P8. *LO 7, 8*

a. If overapplied overhead is assigned to Cost of Goods Sold, the adjusted balance will be:

$400,000 - $48,000 = $352,000.

b. If overapplied overhead is assigned to Work in Process, Finished Goods, and Cost of Goods Sold, the adjusted balances will be:

	Balance	Proportion	Adjustment	Adjusted Balance
WIP	$ 50,000	0.105	$ 5,040	$ 44,960
FG	25,000	0.053	2,544	22,456
COGS	400,000	0.842	40,416	359,584
Total	$475,000	1.000	$48,000	$427,000

P9. *LO 6, 7, 9*

a. Indirect cost per hour of service is $62.50:

50 professionals × 1,600 hours = 80,000 hours per year.

$5,000,000 indirect cost ÷ 80,000 hours = $62.50 per hour.

b. Estimated cost of services for a potential client:

Average salary per billable hour = $115,000 per year ÷ 1,600 hours = $71.88.

Professional service (100 hours × $71.88* per hour)	$ 7,188
Indirect costs (100 hours × $62.50)	6,250
Total	$13,438

P10. *LO 3, 6, 7, 8*

a. The overhead rate of $2.74 per hour is calculated as follows:

	Annual Indirect Costs
Linens ($1,000 ÷ 10 yrs.)	$ 100
Silver ($800 ÷ 10 yrs.)	80
Plates and cups ($1,200 ÷ 10 yrs.)	120
Cake-decorating tools and accessories ($400 ÷ 10 yrs.)	40
Utilities	1,200
Liability insurance	1,200
Total	$2,740

Overhead rate = $2,740 ÷ 1,000 annual hours = $2.74 per hour

Redfern wedding	
Materials	$350
Labor (20 hours × $25)	500
Overhead (20 hours × $2.74)	55
Total	$905

Miller wedding	
Materials	$ 700
Labor (35 hours × $25)	875
Overhead (35 hours × $2.74)	96
Total	$1,671

Walker wedding	
Materials	$425
Labor (18 hours × $25)	450
Overhead (18 hours × $2.74)	49
Total	$924

DeSilva wedding	
Materials	$1,500
Labor (80 hours × $25)	2,000
Overhead (80 hours × $2.74)	219
Total	$3,719

Estes wedding	
Materials	$550
Labor (28 hours × $25)	700
Overhead (28 hours × $2.74)	77
Total	$1,327

b. Sales [(905 + 1,671 + 924 + 3,719 + 1,327) × 1.2]	$10,255
Less cost of jobs (905 + 1,671 + 924 + 3,719 + 1,327)	8,546
Income	$ 1,709

P11. *LO 3, 6*

a. $20,000 + $30,000 -$10,000 = $40,000

b. $70,000 + $40,000 +$50,000 + $60,000 - $90,000 = $130,000

c. $100,000 + $130,000 - $120,000 = $110,000

d. $65,000 - $60,000 = $5,000

P12. *LO 6, 7, 8*

a. The predetermined overhead rate is $2 per direct labor dollar ($8,000,000 ÷ 4,000,000 = $2).

b. Work in process	5,000,000	
Raw materials inventory		5,000,000

c. Work in process	3,000,000	
Wages payable		3,000,000

d. Work in process	6,000,000	
Manufacturing overhead		6,000,000

($3,000,000 × $2 = 6,000,000)

e. Cost of Goods Sold	500,000	
Manufacturing overhead		500,000

(6,500,000 - 6,000,000 = 500,000)

P13. *LO 6, 7*

a.

Job 201	$14,000 × $3 =	$ 42,000
Job 202	$18,000 × $35 =	4,000
Job 203	$6,000 × $3 =	18,000
		$ 114,000

b.

Job 201	$8,000 × $2 =	$ 16,000
	$2,000 × $4 =	8,000
	$4,000 × $3 =	12,000
		$ 36,000
Job 202	$4,000 × $2 =	$ 8,000
	$6,000 × $4 =	24,000
	$8,000 × $3 =	24,000
		$ 56,000
Job 203	$1,000 × $2 =	$ 2,000
	$4,000 × $4 =	16,000
	$1,000 × $3 =	3,000
		$ 21,000
Total		$ 113,000

c. It appears that the relation between overhead and labor cost is different in the three production departments. Thus, it is preferable to use separate overhead rates for each.

P14. *LO 3, 6, 7*

a.

Confectioners' sugar (1,900 lbs. × $0.80)	$1,520.00
Granulated sugar (2,100 lbs. × $0.80)	1,680.00
Chocolate (750 lbs. × $3.25)	2,437.50
Caramel (250 lbs. × $1.30)	325.00
Eggs (60 doz. × $0.75)	45.00
Paraffin (80 lbs. × $0.50)	40.00
	$6,047.50

Raw materials Inventory	6,047.50	
Accounts Payable (various)		5,962.50
Cash		85.00
(To record purchase of sugar, chocolate, caramel, eggs, & wax)		
Work in Process Inventory	4,500	
Wages Payable		4,500
(To record direct labor expenses incurred)		
Manufacturing Overhead	2,000	
Wages Payable		2,000
(To record indirect labor expenses incurred)		
Manufacturing Overhead	5,850	
Utilities Payable		400
Rent Payable		650
Misc. Payables		4,800
(To record overhead costs incurred)		
Work in Process Inventory	5,247.50	
Raw Materials		5,247.50
(To record raw materials used: $2,400 + 6,047.50 - $3,200 = $5,247.50)		
Work in Process Inventory	6,750	
Manufacturing Overhead		6,750
(To record overhead cost applied to jobs = $15 × 450 hours)		

Finished Goods Inventory	18,097.50	
Work in Process Inventory		18,097.50
(To record production of finished goods: $6,400 + $4,500 + $6,750 + $5,247.5 – $4,800 = $18,097.50)		

Accounts Receivable	25,750	
Sales Revenue		25,750
(To record sales)		

Selling & Admin. Expenses	9,000	
"Various" Payables		9,000
(To record nonmanufacturing expenses incurred)		

Cost of Goods Sold	21,297.50	
Finished Goods Inventory		21,297.50
(To record sales)		

Beginning raw materials	$2,400.00
Plus purchases	6,047.50
Less ending raw materials	3,200.00
Material added to production	$5,247.50

Beginning work in process	$ 6,400.00
Plus:	
Material	5,247.50
Labor	4,500.00
Overhead	6,750.00
Less: ending work in process	4,800.00
Cost of goods manufactured	$18,097.50

Beginning finished goods	$ 8,600.00
Plus: cost of goods manufactured	18,097.50
Less: ending finished goods	5,400.00
Cost of goods sold	$21,297.50

Cost of Goods Sold	1,100	
Manufacturing Overhead		1,100
(To record allocation of underapplied overhead to CGS) (5,850 + 2,000 - 6,750 = 1,100)		

b. Income statement for March

Revenue	$25,750.00	
Cost of goods sold	22,397.50	($21,297.50 + $1,100)
Gross margin	3,352.50	
Selling & Admin. Exp.	9,000.00	
Net income (loss)	($ 5,647.50)	

P15. *LO 6, 7*

Approximately 66 percent of overhead costs are related to machinery. Without additional information, it appears that machine hours would be an appropriate overhead allocation base.

The predetermined overhead allocation rate = $400,000 ÷ 12,500 machine hours = $32.00 per machine hour.

P16. *LO 1, 4*

The following is an example of a possible virtual plant tour taken by students:

a. The product is the Hershey's Milk Chocolate Bar. The bar consists of solid chocolate. The company that manufactures the product is the Hershey Foods Corporation. Hershey Foods produce over a billion chocolate products a year. In addition to Hershey's Milk Chocolate Bars, the company produces Reese's peanut butter cups, Twizzlers, Payday bars, and York peppermint patties among other products.

b. At the start of the production process, cocoa beans are transported to the Hershey factory. The cocoa beans are cleaned and later heated at a temperature of over four hundred degrees Fahrenheit. Next, a hulling machine separates the shell and interior of each cocoa bean. The interior, known as the nib, is used to make chocolate. The nibs are grinded into a chocolate liquid, also called chocolate liquor, in a process called milling. In the next step, fresh milk is tested, pasteurized, and mixed with sugar. This mixture is slowly dried into a thick material. The milk and sugar are combined with the chocolate liquor, and the mixture is dried into a brown powder called chocolate crumb. This chocolate crumb is used to produce milk chocolate. Cocoa butter is added to the crumb, which then becomes smoother by traveling through steel rollers. At this stage, the crumb is now a thick liquid known as chocolate paste. The paste is poured into vats called conches where granite rollers ensure that the paste is smooth. Typically, the

chocolate paste stays inside the conches for one to three days. After this process, the paste is cooled and poured into moulds. In one minute, over one thousand molds can be filled with chocolate. The liquid chocolate then enters a cooling tunnel and becomes a solid candy bar. Finally, the candy bar is wrapped, and the Hershey's Milk Chocolate Bar is complete!

c. Raw materials are those materials that can be directly traced to the product. The raw materials used to make a Hershey's Milk Chocolate Bar are cocoa beans, milk, sugar, and cocoa butter. Paper is used to manufacture the wrapper for the candy bar.

d. Indirect materials are those materials that cannot be traced directly to the product. No indirect materials are used to make the candy bar. This is because all materials are conveniently traced to the finished product.

e. Direct labor is the labor that can be conveniently traced to the product. The workers who are considered direct labor perform a number of jobs. Some workers clean the cocoa beans upon entry into the Hershey factory and then place the beans in storage. Other people operate the heating and hulling machines. In addition, employees work the machines that grind nibs from the cocoa beans into chocolate liquor. More workers test the milk upon arrival and mix it with sugar. Furthermore, employees are used to operate the machines that smooth the chocolate mixture near the end of the production process. As the process nears completion, some workers operate the molding machines.

f. Indirect labor is the labor that cannot be conveniently traced to the product. A lot of employees are likely used to maintain the cleanliness of the factory. I think these workers clean the machines used to produce the candy bars as well as the factory floors and storage areas for the cocoa beans. All the supervisors in the production department are part of the product's indirect labor, too. In addition, I believe there are some workers who are responsible for checking in the cocoa beans, milk, and other raw materials upon arrival at the factory. Others watch over the raw materials while in storage. These security workers are also considered indirect labor.

g. Manufacturing overhead includes costs of indirect materials, indirect labor, and other miscellaneous activities used in production. The factory building and all the equipment used to make the candy bars are long-term assets. Thus, the depreciation of these assets is considered an overhead expense.

Also, the property taxes paid on the factory building are expenses. The factory has a number of utilities, including electricity and water, which are considered part of manufacturing overhead. Any insurance paid on the factory for fires or other catastrophes would be classified as overhead as well. Furthermore, overhead expenses at the Hershey factory include overtime premiums paid to employees who work over forty hours in a week. If a machine breaks down or a power failure occurs, then some employees are engaged in unproductive time. This idle time is another example of manufacturing overhead expenses at the factory.

h. For this production process, a process costing system would be used. The candy bars are produced in an automated continuous production process. They are also small, identical products of low costs. Plus, these costs cannot be traced directly to each candy bar that is produced.

P17. *LO 7, 8, 9*

Applied overhead ($5 x 32,000)	$160,000
Actual overhead	160,000
Overapplied overhead	$ -0-

Overhead is neither over- nor under-applied

P18. *LO 7 ,8, 9*

a. The predetermined overhead rate is $20 per repair technician hour ($120,000 ÷ 6,000 = 20).

b. Overhead applied = $20 × 4,800 = 96,000
Overhead applied is $96,000 while actual overhead is $102,000. Thus, overhead is underapplied by $6,000
($102,000 – $96,000 = 6,000)

c. The journal entry to close the account to Cost of Goods Sold is:

Cost of Goods Sold	6,000	
Manufacturing Overhead		6,000