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JOB-ORDER COSTING

DISCUSSION QUESTIONS

1. Job-order costing accumulates costs by jobs, and process costing accumulates costs by processes. Job-order costing is suitable for operations that produce custom-made products that receive different doses of manufacturing costs. Process costing, on the other hand, is suitable for operations that produce homogeneous products that receive equal amounts of manufacturing costs in each process.
2. Job-order costing is appropriate for many service firms. The key factor is that differing amounts of resources must be used for different jobs. Examples of service firms that use job-order costing are law firms, accounting firms, dental offices, automobile repair, and architectural firms. The key point is that the costs of each job are unique to the job and must be tracked by job.
3. Normal costing defines product cost as the sum of actual direct materials, actual direct labor, and applied overhead. The difference between actual costing and normal costing lies in the treatment of overhead. Actual costing uses actual overhead; normal costing uses applied overhead.
4. Actual overhead rates are rarely used because managers cannot wait until the end of the year to obtain product costs. Information on product costs is needed as the year unfolds for planning, control, and decision making.
5. Overhead is assigned to production using the predetermined rate. The predetermined overhead rate is equal to estimated overhead divided by estimated activity level. The predetermined overhead rate is multiplied by the actual activity level or the cost driver on which the rate is based.
6. Underapplied overhead means that the applied overhead is less than the actual overhead. As a result, the unadjusted cost of goods is too small (because too little overhead has been applied). So, Cost of Goods Sold will increase by the amount of underapplied overhead.
7. Overapplied overhead means that the applied overhead is more than the actual overhead. As a result, the unadjusted cost of goods is too large (because too much overhead has been applied). So, Cost of Goods Sold will decrease by the amount of overapplied overhead.
8. Unless all your jobs (lawns) are the same size and require the same services, you will need to use a job-order costing system. At a minimum, you will need job-order cost sheets for each customer. You will need labor time tickets to record the amount of time spent on each job, both to cost the job and to pay the individual doing the work. A materials requisition form may be needed if fertilizer or weed control products are used (alternatively, it may be possible to just list the amount of product used directly on the job-order cost sheet). The more complicated your business becomes (e.g., mowing, trimming, fertilizing, trimming shrubbery, planting shrubs and trees), the more source documents will be needed to keep track of time, materials, and use of capital equipment (e.g., trimmers, brush hogs). Basically, as the business grows, the need for more formal accounting and source documentation grows.

9. Multiple overhead rates often produce a more accurate assignment of overhead costs to jobs. This can be true if the departments through which products pass have different amounts of overhead and if the various products spend differing amounts of time in the departments. For example, a company may have two departments, but some products only go through one department. It would be more accurate to assign less overhead cost to the products using only one department. This can be easily accomplished using departmental overhead rates.
10. Materials requisition forms serve as the source document for posting materials usage and costs to individual jobs. Time tickets serve a similar function for labor. Predetermined overhead rates are used to assign overhead costs to individual jobs.
11. Because the overhead rate is based on direct labor cost, the amount of overhead applied will increase. As a result, the total cost of each job will go up.
12. The overhead variance is the difference between applied overhead and actual overhead. Typically, that variance is relatively small, and it is closed to Cost of Goods Sold. If overhead is underapplied, the variance is added to Cost of Goods Sold. If overhead is overapplied, the variance is subtracted from Cost of Goods Sold.
13. The cost of a job is often strongly related to the price charged. Logically enough, the higher the cost of the job, the higher the price charged to the customer. This relationship makes sense not only to the business but also to the customer. By comparing the cost of the individual job with the price charged, the firm can determine the profit attributable to each job. Then, the firm can decide whether the profit is sufficient to continue offering the product or service under the current terms.
14. Because advertising expense is a period expense, it has no effect on overhead—either applied or actual. Therefore, changes in advertising expense cannot affect manufacturing cost or cost of goods sold.
15. A departmental overhead rate application can be easily converted to a plantwide rate. First, the estimated overhead for all departments is totaled, and a single plantwide driver is chosen. The plantwide overhead rate is simply the estimated plantwide overhead divided by the plantwide driver. When overhead is applied, the predetermined plantwide rate is multiplied by the actual amount of driver used in the factory.
16. Producing departments work directly on the products and services being made, whereas support departments provide indirect support to the producing departments.
17. Without any allocation of support department costs, users may view services as a free good and consume more of the service than is optimal. Allocating support department costs would encourage managers to use the service until such time as the marginal cost of the service is equal to the marginal benefit.

- 18.** The identification and use of causal factors ensures that support department costs are accurately assigned to users. This increases the legitimacy of the control function and enhances product-costing accuracy.
- 19.** a. Number of employees
b. Square footage
c. Pounds of laundry
d. Orders processed
e. Maintenance hours worked
f. Number of employees
g. Number of transactions processed
- 20.** The direct method allocates the direct costs of each support department directly to the producing departments. No consideration is given to the fact that other support departments may use services. The sequential method allocates support department costs sequentially. First, the costs of the center providing the greatest service to all user departments, including other support departments, are allocated. Next, the costs of the second greatest provider of services are allocated to all user departments, excluding any department(s) that has already allocated costs. This continues until all support department costs have been allocated. The principal difference in the two methods is the fact that the sequential method considers some interactions among support departments and the direct method ignores interactions.

MULTIPLE-CHOICE EXERCISES

- 5-1. d
- 5-2. c
- 5-3. a
- 5-4. b
- 5-5. e
- 5-6. a
- 5-7. b
- 5-8. c
- 5-9. a
- 5-10. b
- 5-11. c
- 5-12. e
- 5-13. a

Direct materials	\$ 7,500
Direct labor	10,000
Applied overhead (\$5 × 500 DLH)	2,500
Total job cost	<u>\$20,000</u>
÷ Number of units	<u>1,000</u>
Unit cost	<u><u>\$ 20</u></u>

5-14. c

5-15. b

5-16. b

5-17. d

5-18. e

5-19. d

5-20. a

5-21. c

CORNERSTONE EXERCISES

CE 5-22

$$\begin{aligned}
 1. \text{ Predetermined overhead rate} &= \frac{\text{Estimated overhead}}{\text{Estimated direct labor cost}} \\
 &= \$416,000 / \$520,000 \\
 &= 0.80 \text{ or } 80\% \text{ of direct labor cost}
 \end{aligned}$$

$$2. \text{ Overhead applied to December production} = 0.80 \times \$43,700 = \$34,960$$

CE 5-23

$$\begin{aligned}
 1. \text{ Applied overhead} &= \text{Overhead rate} \times \text{Actual direct labor cost} \\
 &= 0.80 \times \$532,000 = \$425,600
 \end{aligned}$$

Actual overhead	\$423,600	
Applied overhead	425,600	
Overhead variance	<u>\$ 2,000</u>	overapplied

2. Unadjusted COGS	\$1,890,000
Less: Overapplied overhead	<u>(2,000)</u>
Adjusted COGS	<u>\$1,888,000</u>

CE 5-24

$$\begin{aligned}
 1. \text{ Cutting department overhead rate} &= \$240,000 / 150,000 \text{ mhrs} \\
 &= \$1.60 \text{ per machine hour} \\
 \text{Sewing department overhead rate} &= \$350,000 / 100,000 \text{ DLH} \\
 &= \$3.50 \text{ per direct labor hour}
 \end{aligned}$$

$$2. \text{ Overhead applied to cutting in June} = \$1.60 \times 13,640 = \$21,824$$

$$\text{Overhead applied to sewing in June} = \$3.50 \times 8,600 = \$30,100$$

3.	<u>Cutting Department</u>	<u>Sewing Department</u>
Actual overhead	\$20,610	\$35,750
Less: Applied overhead	<u>21,824</u>	<u>30,100</u>
Overhead variance	<u>\$ 1,214</u> overapplied	<u>\$ 5,650</u> underapplied

CE 5-25

1. Predetermined plantwide overhead rate = $\$590,000/131,200 \text{ DLH}$
= $\$4.50$ per direct labor hour
2. Overhead applied in June = $\$4.50 \times 11,400 = \$51,300$
3. Overhead variance = Applied overhead – Actual overhead
= $\$51,300 - \$56,360$
= $\$5,060$ underapplied

CE 5-26

1. Since the predetermined overhead rate is not given, it must be calculated from BWIP amounts using either Job 44 or Job 45. Using Job 44,

$$\begin{aligned} \text{Predetermined overhead rate} &= \frac{\text{Applied overhead}}{\text{Direct labor cost}} \\ &= \$780/\$1,200 \\ &= 0.650 \text{ or } 65.0\% \end{aligned}$$

(The predetermined overhead rate using Job 45 is identical.)

	Job 44	Job 45	Job 46	Job 47
Beginning balance, June 1	\$ 7,080	\$ 6,450	\$ 0	\$ 0
Direct materials	2,500	\$ 7,110	1,800	1,700
Direct labor	800	6,400	900	560
Applied overhead	520	4,160	585	364
Total, June 30	<u>\$10,900</u>	<u>\$24,120</u>	<u>\$3,285</u>	<u>\$2,624</u>

3. By the end of June, Jobs 44, 45, and 47 have been transferred out of Work in Process. Thus, the ending balance in Work in Process consists of Job 46.

Work in process, June 30 \$3,285

While three jobs (44, 45, and 47) were transferred out of Work in Process and into Finished Goods during June, only two jobs remain (Jobs 44 and 47).

Finished goods, June 1	\$ 0
Job 44	10,900
Job 47	2,624
Finished goods, June 30	<u>\$13,524</u>

4. One job, Job 45, was sold during June.
Cost of goods sold \$24,120

CE 5-27

1. Allocation ratios for S1 based on number of employees:

$$\text{Cutting} = 63/(63 + 147) = 0.30$$

$$\text{Sewing} = 147/(63 + 147) = 0.70$$

Allocation ratios for S2 based on number of maintenance hours:

$$\text{Cutting} = 16,000/(16,000 + 4,000) = 0.80$$

$$\text{Sewing} = 4,000/(16,000 + 4,000) = 0.20$$

2.	Support Departments		Producing Departments	
	S1	S2	Cutting	Sewing
Direct costs	\$ 180,000	\$ 150,000	\$122,000	\$ 90,500
Allocate:				
S1	(180,000)	-	54,000	126,000
S2	-	(150,000)	120,000	30,000
Total	\$ 0	\$ 0	\$296,000	\$246,500

CE 5-28

1. Allocation ratios for S1 based on number of employees:

$$\text{S2} = 30/(30 + 63 + 147) = 0.1250$$

$$\text{Cutting} = 63/(30 + 63 + 147) = 0.2625$$

$$\text{Sewing} = 147/(30 + 63 + 147) = 0.6125$$

Allocation ratios for S2 based on number of maintenance hours:

$$\text{Cutting} = 16,000/(16,000 + 4,000) = 0.80$$

$$\text{Sewing} = 4,000/(16,000 + 4,000) = 0.20$$

2.	Support Departments		Producing Departments	
	S1	S2	Cutting	Sewing
Allocate:				
Direct costs	\$ 180,000	\$ 150,000	\$122,000	\$ 90,500
S1	(180,000)	22,500	47,250	110,250
S2	-	(172,500)	138,000	34,500
Total	\$ 0	\$ 0	\$307,250	\$235,250

EXERCISES**E 5-29**

- a. Hospital services—job order
- b. Custom cabinet making—job order
- c. Toy manufacturing—process
- d. Soft-drink bottling—process
- e. Airplane manufacturing (e.g., 767s)—job order
- f. Personal computer assembly—process
- g. Furniture making—process
- h. Custom furniture making—job order
- i. Dental services—job order
- j. Paper manufacturing—process
- k. Nut and bolt manufacturing—process
- l. Auto repair—job order
- m. Architectural services—job order
- n. Landscape design services—job order
- o. Flashlight manufacturing—process

E 5-30

- a. Auto manufacturing—a shop that builds autos from scratch (the way Rolls Royce used to build cars, or a car that can be built from kits) would use job-order costing. Large automobile manufacturers use process costing. (While the customer may think the car is being built to order when selecting among options, actually, the manufacturer waits until enough of the same orders are received to build a run of virtually identical cars.)
- b. Dental services—basic dental services use job-order costing, but denturists (who make only dentures) can use process costing. (It is important to recognize that while the dentures themselves are uniquely shaped to fit each patient, the costs involved do not differ from patient to patient.)
- c. Auto repair—a general automobile repair shop uses job-order costing. However, a shop devoted to only one type of service or repair (e.g., oil change) can use process costing yet price the cost of the number of quarts of oil used for each customer.
- d. Costume making—a small tailor shop would use job-order costing. However, a large costume manufacturer that sews a certain number of costume designs would use process costing.

E 5-31

1. Predetermined overhead rate = $\$621,600/84,000 \text{ DLH}$
= $\$7.40 \text{ per direct labor hour}$
2. Applied overhead = $\$7.40 \times 7,400 \text{ DLH} = \$54,760$

E 5-32

1. Predetermined overhead rate = $\$432,000/90,000 \text{ DLH}$
= $\$4.80 \text{ per direct labor hour}$
2. Applied overhead = $\$4.80 \times 7,650 \text{ DLH} = \$36,720$
3. Applied overhead = $\$4.80 \times 89,600 \text{ DLH}$
= $\$430,080$

Actual overhead	\$436,000
Applied overhead	430,080
Underapplied overhead	<u>\$ 5,920</u>

4. Adjusted Cost of Goods Sold = $\$707,000 + \$5,920 = \$712,920$

E 5-33

1. Assembly department overhead rate = $\$435,000/145,000 \text{ DLH}$
= $\$3.00 \text{ per direct labor hour}$

Testing department overhead rate = $\$720,000/120,000 \text{ mhr}$
= $\$6.00 \text{ per machine hour}$

2. Assembly department applied overhead = $\$3.00 \times 13,000 = \$39,000$
Testing department applied overhead = $\$6.00 \times 13,050 = \$78,300$

3.

	<u>Assembly Department</u>	<u>Testing Department</u>
Actual overhead	\$38,500	\$76,500
Applied overhead	39,000	78,300
Overhead variance	<u>\$ (500)</u>	<u>\$ (1,800)</u>

Assembly department has overapplied overhead of \$500.

Testing department has overapplied overhead of \$1,800.

E 5-34

1. Ending balance = Beginning balance + Prime costs + Applied overhead
 $\$1,550 = \$710 + \$640 + \text{Applied overhead}$
 $\text{Applied overhead} = \$1,550 - \$710 - \$640 = \$200$
2. Direct materials = 3 × Direct labor
 $\text{Prime cost} = \text{Direct materials} + \text{Direct labor}$
 $\$640 = (3 \times \text{Direct labor}) + \text{Direct labor}$
 $\text{Direct labor} = \$640/4 = \160
 $\text{Direct materials} = 3 \times \text{Direct labor} = 3(\$160) = \$480$
3. Applied overhead = Direct labor × Overhead rate
 $\$200 = \$160 \times \text{Overhead rate}$
 $\text{Overhead rate} = \$200/\$160 = 1.25 \text{ or } 125\%$

E 5-35

1. Materials requisition form
2. Time ticket
3. Mileage log
4. Job-order cost sheet

E 5-36

1. Job 547 direct labor hours = $\$2,700/\$15 = 180 \text{ DLH}$
 Job 548 direct labor hours = $\$6,000/\$15 = 400 \text{ DLH}$
 Job 549 direct labor hours = $\$2,100/\$15 = 140 \text{ DLH}$
 Job 550 direct labor hours = $\$900/\$15 = 60 \text{ DLH}$

2. August applied overhead for:

Job 547 = 180 DLH × \$9 = \$1,620
 Job 548 = 400 DLH × \$9 = \$3,600
 Job 549 = 140 DLH × \$9 = \$1,260
 Job 550 = 60 DLH × \$9 = \$540

3.	Job 547	Job 548	Job 549	Job 550
Beginning balance	\$ 9,300	\$ 7,800	\$ 0	\$ 0
Direct materials	950	4,500	3,300	1,300
Direct labor	2,700	6,000	2,100	900
Applied overhead	1,620	3,600	1,260	540
Total	<u>\$14,570</u>	<u>\$21,900</u>	<u>\$6,660</u>	<u>\$2,740</u>

4. Work in Process, August 31, consists of unfinished jobs:

Job 548	\$21,900
Job 549	6,660
Job 550	2,740
Total	<u>\$31,300</u>

E 5-36 (Continued)

5. Price of Job 547 = $\$14,570 + 0.30(\$14,570) = \$18,941$
6. Rector could treat the acquisition and use of the bulldozer as a separate department and create a departmental overhead rate for it based on the hours used. That is, the overhead rate would be the total budgeted cost of the bulldozer (depreciation, fuel, maintenance, and so on) divided by the anticipated annual hours of use. In this way, only the jobs requiring the use of the heavier equipment would be charged for it.

E 5-37

	<u>Job 877</u>	<u>Job 878</u>	<u>Job 879</u>	<u>Job 880</u>
1. Beginning balance	\$18,640	\$ 0	\$ 0	\$ 0
Direct materials	14,460	\$6,000	\$3,500	\$1,800
Direct labor	14,800	8,500	1,750	2,150

2. Applied overhead in October for:

$$\text{Job 877} = \$14,800 \times 0.80 = \$11,840$$

$$\text{Job 878} = \$8,500 \times 0.80 = \$6,800$$

$$\text{Job 879} = \$1,750 \times 0.80 = \$1,400$$

$$\text{Job 880} = \$2,150 \times 0.80 = \$1,720$$

3. Work in Process, October 31:

Job 878*	\$21,300
Job 879**	6,650
Job 880***	5,670
Total	<u>\$33,620</u>

4. Cost of Job 877 = $\$18,640 + \$14,460 + \$14,800 + \$11,840 = \$59,740$

$$\text{Price of Job 877} = \$59,740 + 0.50(\$59,740) = \$89,610$$

$$* \$6,000 + \$8,500 + \$6,800 = \$21,300$$

$$** \$3,500 + \$1,750 + \$1,400 = \$6,650$$

$$*** \$1,800 + \$2,150 + \$1,720 = \$5,670$$

E 5-38

1. Balance in Work in Process (all incomplete jobs):

Job 303	\$ 550
Job 306	280
Job 308	780
Job 309	1,200
Job 310	260
Total	<u>\$3,070</u>

E 5-38 (Continued)**2. Balance in Finished Goods (all jobs completed but not sold):**

Beginning balance	\$ 300
Job 301	730
Job 304	2,300
Job 305	4,560
Total	<u>\$7,890</u>

- 3. Cost of Goods Sold** = Job 302 + Job 307
= \$1,560 + \$360 = \$1,920

E 5-39

	Job 94	Job 95	Job 96
1. Balance, July 1	\$18,450	\$ 0	\$ 0
Direct materials	10,450	12,300	16,150
Direct labor	16,000	12,200	24,000
Applied overhead	10,000	6,000	20,000
Total	<u>\$54,900</u>	<u>\$30,500</u>	<u>\$60,150</u>

- 2. Work in Process, July 31** = Job 95 = \$30,500

3. Finished Goods:

Beginning balance	\$ 49,000
Job 96 (transferred in)	60,150
Job 90 (sold)	(25,600)
Ending balance, July 31	<u>\$ 83,550</u>

- 4. Cost of Goods Sold** = Job 90 + Job 94
= \$25,600 + \$54,900
= \$80,500

5. Sales [\$80,500 + (0.20 × \$80,500)]	\$96,600
Cost of goods sold	<u>80,500</u>
Gross margin	\$16,100
Less:	
Variable marketing expenses (0.05 × \$96,600)	\$4,830
Fixed marketing expenses	2,000
Administrative expenses	<u>4,800</u>
Operating income	<u>\$ 4,470</u>

E 5-40**Job 213:**

1. Number of units = $\frac{\text{Total manufacturing cost}}{\text{Unit cost}}$
 = \$855/\$8.55
 = 100 units
2. Total sales revenue = Price per unit × Number of units
 = \$12 × 100 units
 = \$1,200
3. Direct labor hours, Department 1 = $\frac{\text{Overhead applied, Department 1}}{\$6}$
 = \$90/\$6
 = 15 DLH
 Direct labor cost, Department 1 = 15 direct labor hours × \$10 = \$150
4. Overhead applied, Department 2 = 25 machine hours × \$8
 = \$200

Job 214:

1. Price per unit = $\frac{\text{Total sales revenue}}{\text{Number of units}}$
 = \$4,375/350 units
 = \$12.50
2. Direct labor hours, Department 1 = $\frac{\text{Direct labor cost, Department 1}}{\$10}$
 = \$700/\$10
 = 70 DLH
 Overhead applied, Department 1 = Direct labor hours, Department 1 × \$6
 = 70 DLH × \$6
 = \$420
3. Materials used in production = Total manufacturing cost – Direct labor cost, Department 1 – Direct labor cost, Department 2 – Overhead applied, Department 1 – Overhead applied, Department 2
 = \$3,073 – \$700 – \$100 – \$420 – \$400
 = \$1,453

E 5-40 (Continued)

$$\begin{aligned}
 4. \text{ Unit cost} &= \frac{\text{Total manufacturing cost}}{\text{Number of units}} \\
 &= \$3,073/350 \text{ units} \\
 &= \$8.78
 \end{aligned}$$

Job 217:

$$\begin{aligned}
 1. \text{ Machine hours, Department 2} &= \frac{\text{Overhead applied, Department 2}}{\text{Overhead rate}} \\
 &= \$160/\$8 \\
 &= 20 \text{ mhrs} \\
 2. \text{ Total manufacturing cost} &= \text{Unit cost} \times \text{Number of units} \\
 &= \$9.87 \times 400 \text{ units} \\
 &= \$3,948 \\
 3. \text{ Direct labor cost, Department 2} &= \text{Total manufacturing cost} - \text{Materials used in production} - \text{Direct labor cost, Department 1} - \text{Overhead applied, Department 1} - \text{Overhead applied, Department 2} \\
 &= \$3,948 - \$488 - \$2,000 - \$1,200 - \$160 \\
 &= \$100
 \end{aligned}$$

Job 225:

$$\begin{aligned}
 1. \text{ Number of units} &= \frac{\text{Total sales revenue}}{\text{Price per unit}} \\
 &= \$1,150/\$5 = 230 \text{ units} \\
 2. \text{ Unit cost} &= \frac{\text{Total manufacturing cost}}{\text{Number of units}} \\
 &= \$575/230 \text{ units} \\
 &= \$2.50 \\
 3. \text{ Machine hours, Department 2} &= \frac{\text{Overhead applied, Department 2}}{\text{Overhead rate}} \\
 &= \$0/\$8 \\
 &= 0 \text{ mhrs}
 \end{aligned}$$

E 5-41

1. Direct materials.....		\$12,000
Direct labor:		
Department A.....	\$8,100	
Department B.....	2,160	10,260
Overhead (\$10 × 570 DLH).....		5,700
Total manufacturing costs.....		<u>\$27,960</u>

2. Unit cost = \$27,960/1,000 units = \$27.96

3. Direct materials.....		\$12,000
Direct labor:		
Department A.....	\$8,100	
Department B.....	2,160	10,260
Overhead:		
Department A (\$3 × 450).....		1,350
Department B (\$7 × 800).....		5,600
Total manufacturing costs.....		<u>\$29,210</u>

4. Unit cost = \$29,210/1,000 units = \$29.21

E 5-42

	Job 39	Job 40	Job 41	Job 42	Job 43
1. Balance, April 1	\$ 540	\$3,400	\$2,990	\$ 0	\$ 0
Direct materials	700	560	375	\$3,500	\$ 6,900
Direct labor	500	600	490	2,500	3,000
Applied overhead	550	660	539	2,750	3,300
Total cost	<u>\$2,290</u>	<u>\$5,220</u>	<u>\$4,394</u>	<u>\$8,750</u>	<u>\$13,200</u>

2. Ending balance in Work in Process = Job 39 + Job 42
= \$2,290 + \$8,750 = \$11,040

Cost of Goods Sold for April = Job 40 + Job 41 + Job 43
= \$5,220 + \$4,394 + \$13,200 = \$22,814

3. Ensign Landscape Design Income Statement For the Month Ended April 30	
Sales [\$22,814 + 0.30(\$22,814)].....	\$29,658
Cost of goods sold.....	<u>22,814</u>
Gross margin.....	\$6,844
Less: Operating expenses.....	4,575
Operating income.....	<u>\$2,269</u>

E 5-43

1. Journal				
	Date	Account & Explanation	Debit	Credit
a.		Raw Materials	24,550	
		Accounts Payable		24,550
b.		Work in Process	23,130	
		Raw Materials		23,130
c.		Work in Process	36,000	
		Wages Payable		36,000
d.		Overhead Control	17,880	
		Various Payables		17,880
e.		Work in Process	8,640	
		Overhead Control		8,640
		Total direct labor hours = $\$36,000/\$20 = 1,800$ DLH		
		Applied overhead = $1,800 \text{ DLH} \times \$4.80 = \$8,640$		
f.		Finished Goods	52,420	
		Work in Process		52,420
g.		Cost of Goods Sold	56,140	
		Finished Goods		56,140
		Accounts Receivable	78,596	
		Sales Revenue		78,596

2.	Job 58	Job 59	Job 60
Direct materials.....	\$ 8,900	\$ 8,800	\$ 5,430
Direct labor.....	16,000	12,000	8,000
Applied overhead.....	3,840	2,880	1,920
Total cost.....	<u>\$28,740</u>	<u>\$23,680</u>	<u>\$15,350</u>

3. Raw Materials:	
Beginning balance.....	\$ 2,500
Purchases.....	24,550
Direct materials.....	(23,130)
Ending balance.....	<u>\$ 3,920</u>

E 5-43 (Continued)**4. Work in Process:**

Beginning balance.....		\$0
Direct materials.....		23,130
Direct labor.....		36,000
Applied overhead.....		8,640
Jobs completed:		
Job 58.....	\$28,740	
Job 59.....	23,680	(52,420)
Ending balance.....		<u>\$15,350</u>

5. Finished Goods:

Beginning balance.....		\$27,400
Jobs transferred in:		
Job 58.....	\$28,740	
Job 59.....	23,680	52,420
Jobs sold:		
Job 57.....	\$27,400	
Job 58.....	28,740	(56,140)
Ending balance.....		<u>\$23,680</u>

E 5-44**1. Allocation ratios for Power based on number of machine hours:**

$$\text{Battery} = 7,000 / (7,000 + 1,000) = 0.8750$$

$$\text{Small Motors} = 1,000 / (7,000 + 1,000) = 0.1250$$

Allocation ratios for Human Resources based on number of employees:

$$\text{Battery} = 10 / (10 + 30) = 0.2500$$

$$\text{Small Motors} = 30 / (10 + 30) = 0.7500$$

	Support Departments		Operating Divisions	
	Power	Human Resources	Battery	Small Motors
Direct costs	\$ 160,000	\$ 205,000	\$176,000	\$ 93,500
Allocate:				
Power	(160,000)	-	140,000	20,000
Human Resources	-	(205,000)	51,250	153,750
Total	<u>\$ 0</u>	<u>\$ 0</u>	<u>\$367,250</u>	<u>\$267,250</u>

3. Battery overhead rate = \$367,250/18,000 DLH = \$20.40

$$\text{Small Motors overhead rate} = \$267,250/60,000 \text{ DLH} = \$4.45$$

E 5-45**1. Allocation ratios for Human Resources based on number of employees:**

$$\text{Power} = 10/(10 + 10 + 30) = 0.2000$$

$$\text{Battery} = 10/(10 + 10 + 30) = 0.2000$$

$$\text{Small Motors} = 30/(10 + 10 + 30) = 0.6000$$

Allocation ratios for Power based on number of machine hours:

$$\text{Battery} = 7,000/(7,000 + 1,000) = 0.8750$$

$$\text{Small Motors} = 1,000/(7,000 + 1,000) = 0.1250$$

2.

	Support Departments		Operating Divisions	
	Power	Human Resources	Battery	Small Motors
Direct costs	\$ 160,000	\$ 205,000	\$176,000	\$ 93,500
Allocate:				
Power	41,000	(205,000)	41,000	123,000
Human Resources	(201,000)	-	175,875	25,125
Total	\$ 0	\$ 0	\$392,875	\$241,625

3. Battery overhead rate = \$392,875/18,000 DLH = \$21.83

$$\text{Small Motors overhead rate} = \$241,625/60,000 \text{ DLH} = 4.03$$

PROBLEMS

P 5-46

1. Overhead rate = $\$789,000 / 100,000 \text{ DLH} = \7.89 per DLH

2.	Job 741	Job 742	Job 743	Job 744	Job 745
Balance, July 1	\$ 29,870	\$ 55,215	\$27,880	\$ 0	\$ 0
Direct materials	25,500	39,800	14,450	13,600	8,420
Direct labor	61,300	48,500	28,700	24,500	21,300
Applied overhead	31,560	26,826	15,622	12,624	11,046
Total cost	<u>\$148,230</u>	<u>\$170,341</u>	<u>\$86,652</u>	<u>\$50,724</u>	<u>\$40,766</u>

3. Ending balance in Work in Process = Job 742 + Job 744 + Job 745
 = $\$170,341 + \$50,724 + \$40,766$
 = $\$261,831$

4. Cost of Goods Sold = Job 741 + Job 743
 = $\$148,230 + \$86,652 = \$234,882$

P 5-47

1. Cost of Alban job:

Professional time (85 hours @ \$120)	\$10,200
Mileage (510 miles @ \$0.50)	255
Photographs	120
Total	<u>\$10,575</u>

2. Overhead is included in the rate for professional time. This is easier for professionals than to calculate a separate overhead rate and charge it to clients. In effect, Spade Millhone charges a conversion cost rate, not a labor rate, to its clients.

P 5-47 (Continued)

3. Answers may vary. The following is one example.

Rex Spade Mileage Log

Date	Client	Beginning Mileage	Ending Mileage	Destination	Total Miles
7/8	Alban	56,780	56,815	Ofc. to claimant #1, to Dr. Phony, to claimant #2, to ofc.	35
7/9	Alban	56,815	56,903	Ofc. to claimant #3, to claimant #4, to ofc.	88
7/10	Alban	56,903	57,078	Ofc. to witness #3, to client, to ofc.	175
7/11	Alban	57,078	57,290	Ofc. to claimant #2, to claimant #4, to ofc.	212

Note: Separate mileage logs are kept by Rex Spade and Victoria Millhone. Then, relevant amounts are transferred to cost sheets (or folders) for each client.

P 5-48

1. Overhead rate = $\$374/\$440 = 0.8500$ times direct labor cost

(This rate was calculated using information from the Carter job; however, the Pelham and Tillson jobs would give the same answer.)

2.	<u>Carter</u>	<u>Pelham</u>	<u>Tillson</u>	<u>Jasper</u>	<u>Dashell</u>
Beginning WIP	\$1,024	\$1,910	\$3,621	\$ 0	\$ 0
Direct materials	600	550	770	2,310	190
Direct labor	300	200	240	2,100	240
Applied overhead	255	170	204	1,785	204
Total	<u>\$2,179</u>	<u>\$2,830</u>	<u>\$4,835</u>	<u>\$6,195</u>	<u>\$634</u>

Note: This is just one way of setting up the job-order cost sheets. You might prefer to keep the details on the materials, labor, and overhead in beginning inventory costs.

3. Since the Tillson and Jasper jobs were completed, the others must still be in process. Therefore, the ending balance in Work in Process is the sum of the costs of the Carter, Pelham, and Dashell jobs.

P 5-48 (Continued)

Carter	\$2,179
Pellham	2,830
Dashell	634
Ending WIP	<u>\$5,643</u>

Cost of Goods Sold = Tillson Job + Jasper Job = \$4,835 + \$6,195 = \$11,030

4. Pavlovich Prosthetics Company Income Statement For the Month Ended January 31	
Sales ($1.30 \times \$11,030$).....	\$14,339
Cost of goods sold.....	<u>11,030</u>
Gross margin.....	\$ 3,309
Marketing and administrative expenses.....	<u>2,635</u>
Operating income.....	<u>\$ 674</u>

P 5-49

1. OH rate = $\$108,000/18,000 \text{ mhrs} = \$6.00 \text{ per machine hour}$
2. Department A: $\$75,000/10,000 \text{ mhrs} = \$7.500 \text{ per machine hour}$
Department B: $\$33,000/8,000 \text{ mhrs} = \$4.125 \text{ per machine hour}$

3.	<u>Job 73</u>		<u>Job 74</u>	
	Plantwide:			
	70 mhrs × \$6.00 = \$420		70 mhrs × \$6.00 = \$420	
	Departmental:			
	20 mhrs × \$7.500	\$150.00	50 mhrs × \$7.500	\$375.00
	50 mhrs × \$4.125	206.25	20 mhrs × \$4.125	82.50
		<u>\$356.25</u>		<u>\$457.50</u>

Department A appears to be more overhead intensive, so jobs spending more time in Department A ought to receive more overhead. Thus, departmental rates provide more accuracy.

4. Plantwide rate: $\$135,000/18,000 \text{ mhrs} = \7.50
Department B: $\$60,000/8,000 \text{ mhrs} = \7.50

P 5-49 (Continued)**Job 73****Job 74****Plantwide:**

$$70 \text{ mhrs} \times \$7.50 = \$525$$

$$70 \text{ mhrs} \times \$7.50 = \$525$$

Departmental:

20 mhrs × \$7.50	\$150
50 mhrs × \$7.50	375
	<u>\$525</u>

50 mhrs × \$7.50	\$375
20 mhrs × \$7.50	150
	<u>\$525</u>

Assuming that machine hours is a good cost driver, the departmental rates reveal that overhead consumption is the same in each department. In this case, there is no need for departmental rates, and a plantwide rate is sufficient.

P 5-50

1. Overhead rate = $\$432,000/8,000 \text{ mhrs} = \$54.00 \text{ per machine hour}$

	<u>Job 1</u>	<u>Job 2</u>
Direct materials.....	\$ 6,725	\$ 9,340
Direct labor.....	1,800	3,100
Overhead (\$54.00 × 200 machine hours).....	10,800	10,800
Total manufacturing cost.....	\$19,325	\$23,240
Plus 35% markup.....	6,764	8,134
Bid price.....	<u>\$26,089</u>	<u>\$31,374</u>

2. Welding overhead rate = $\$220,000/5,000 \text{ mhrs} = \$44.00 \text{ per machine hour}$

Assembly overhead rate = $\$62,000/10,000 \text{ mhrs} = \$6.20 \text{ per direct labor hour}$

Finishing overhead rate = $\$150,000/2,000 \text{ mhrs} = \$75.00 \text{ per machine hour}$

	<u>Job 1</u>	<u>Job 2</u>
Direct materials.....	\$ 6,725	\$ 9,340
Direct labor.....	1,800	3,100
Overhead:		
Welding (\$44.00 × 50); (\$44.00 × 50).....	2,200	2,200
Assembly (\$6.20 × 60); (\$6.20 × 25).....	372	155
Finishing (\$75.00 × 90); (\$75.00 × 125).....	6,750	9,375
Total manufacturing cost.....	\$17,847	\$24,170
Plus 35% markup.....	6,246	8,460
Bid price.....	<u>\$24,093</u>	<u>\$32,630</u>

P 5-51

	<u>Jan's Job</u>	<u>Ed's Job</u>
1. Materials	\$ 50	\$ 75
Direct labor	60	120
Applied overhead:		
$0.20 \times (\$50 + \$60)$	22	
$0.20 \times (\$75 + \$120)$		39
Total	<u>\$132</u>	<u>\$234</u>

2. Since Jan's job is more like the jobs Steve is used to doing, her costs are likely to be more accurate. Clearly, Steve is unsure just how to cost Ed's job. If he expects to get more use from the tools he buys for Ed's job, then he can absorb them into his overhead rate. If not, perhaps they should be added to the cost of Ed's job as a part of materials.

P 5-52

1. Job 64:

Direct materials	\$ 3,560
Direct labor	6,720
Overhead ($\$11 \times 410$ DLH)	4,510
Total cost	<u>\$14,790</u>

Unit cost = $\$14,790 / 50$ units = \$295.80

2. Ending Work in Process = Cost of Job 65
 = $\$785 + \$9,328 + (\$11 \times 583 \text{ DLH}) = \$16,526$

Journal			
Date	Account & Explanation	Debit	Credit
	Finished Goods	14,790	
	Work in Process		14,790
	Cost of Goods Sold	14,790	
	Finished Goods		14,790
	Accounts Receivable	25,883	
	Sales Revenue		25,883
	($175\% \times \$14,790$) = \$25,883		

P 5-53

Journal				
	Date	Account & Explanation	Debit	Credit
1. a.		Raw Materials	4,610	
		Accounts Payable		4,610
b.		Work in Process	4,800	
		Raw Materials		4,800
c.		Work in Process [$\$14 \times (65 \text{ DLH} + 90 \text{ DLH})$]	2,170	
		Wages Payable		2,170
d.		Work in Process ($\$6.20 \times 155 \text{ DLH}$)	961	
		Overhead Control		961
e.		Overhead Control	973	
		Cash		973

Job 518		Job 519	
Direct materials	\$3,170	Direct materials	\$1,630
Direct labor	910	Direct labor	1,260
Applied overhead	403	Applied overhead	558
Total	<u>\$4,483</u>	Total	<u>\$3,448</u>

Journal				
	Date	Account & Explanation	Debit	Credit
f.		Finished Goods	4,483	
		Work in Process		4,483
g.		Cost of Goods Sold	2,770	
		Finished Goods		2,770
		Accounts Receivable	3,463	
		Sales		3,463

P 5-53 (Continued)

3.

Nelson Company			
Schedule of Cost of Goods Manufactured			
For the Month Ended April 30			
Direct materials:			
Beginning raw materials inventory.....	\$1,025		
Purchases of raw materials.....	4,610		
Total raw materials available.....	\$5,635		
Ending raw materials.....	835		
Raw materials used.....			\$4,800
Direct labor.....			2,170
Overhead.....	\$ 973		
Less: Underapplied overhead.....	12		
Overhead applied.....			961
Current manufacturing costs.....			\$7,931
Add: Beginning work in process.....			0
Total manufacturing costs.....			\$7,931
Less: Ending work in process.....			3,448
Cost of goods manufactured.....			\$4,483

P 5-54

1.	Applied overhead = Direct labor cost × Overhead rate	
	\$140,000 = \$80,000 × Overhead rate	
	Overhead rate = 1.75 or 175% of direct labor cost	
2.	Applied overhead	\$140,000
	Actual overhead	138,500
	Overapplied overhead	<u>\$ 1,500</u>
3.	Direct materials.....	\$ 40,000
	Direct labor.....	80,000
	Overhead applied.....	<u>140,000</u>
		\$260,000
	Add: Beginning WIP.....	17,000
	Less: Ending WIP.....	<u>(32,000)</u>
	Cost of goods manufactured.....	<u><u>\$245,000</u></u>

P 5-54 (Continued)

4. Journal			
Date	Account & Explanation	Debit	Credit
	Overhead Control	1,500	
	Cost of Goods Sold		1,500

Adjusted Cost of Goods Sold:

\$210,000
(1,500)
<u>\$208,500</u>

5. Direct materials (\$32,000 – \$10,000 – \$17,500).....	\$ 4,500
Direct labor (1,000 × \$10).....	10,000
Overhead applied (175% × \$10,000).....	17,500
Ending work in process.....	<u>\$32,000</u>

P 5-55

1. Overhead rate = \$129,600/13,500 DLH = \$9.60 per direct labor hour

2. Direct materials.....	\$ 2,750
Direct labor.....	5,355
Applied overhead*.....	3,024
Total cost of Job K456.....	<u>\$11,129</u>

*\$3,024 = \$9.60 × (\$5,355/\$17)

3. Journal			
Date	Account & Explanation	Debit	Credit
	Overhead Control	172,500	
	Lease Payable		6,800
	Accumulated Depreciation		19,340
	Wages Payable		90,400
	Utilities Payable		14,560
	Other Payables		41,400
	Work in Process (\$9.60 × 18,100 DLH)	173,760	
	Overhead Control		173,760

4. Actual overhead.....	\$172,500
Applied overhead.....	173,760
Overapplied overhead.....	<u>\$ 1,260</u>

P 5-55 (Continued)

Normal cost of goods sold.....	\$635,600
Less: Overapplied overhead.....	(1,260)
Adjusted cost of goods sold.....	<u>\$634,340</u>

P 5-56

1.

Journal			
Date	Account & Explanation	Debit	Credit
a.	Raw Materials	42,630	
	Accounts Payable		42,630
b.	Work in Process	27,000	
	Raw Materials		27,000
c.	Work in Process	26,320	
	Wages Payable		26,320
d.	Overhead Control	19,950	
	Cash		19,950
e.	Work in Process $[(\$26,320/\$14) \times \$10]$	18,800	
	Overhead Control		18,800

2. Job 703:

Beginning balance, WIP	\$10,000
Direct materials	12,500
Direct labor ($\$14 \times 780$ DLH)	10,920
Overhead applied ($\$10 \times 780$ DLH)	7,800
Total	<u>\$41,220</u>

Job 704:

Direct materials	\$14,500
Direct labor ($\$14 \times 1,100$ DLH)	15,400
Overhead applied ($\$10 \times 1,100$ DLH)	11,000
Total	<u>\$40,900</u>

P 5-56 (Continued)

Journal			
Date	Account & Explanation	Debit	Credit
f.	Finished Goods	41,220	
	Work in Process		41,220
h.	Cost of Goods Sold	6,240	
	Finished Goods		6,240
	Accounts Receivable	8,112	
	Sales		8,112

4. a. Raw Materials:

Beginning balance	\$ 6,070
Add: Purchases	42,630
Less: Materials requisitioned	(27,000)
Ending balance	<u>\$ 21,700</u>

b. Work in Process:

Beginning balance	\$ 10,000
Add: Materials requisitioned	27,000
Direct labor	26,320
Overhead applied	18,800
Less: Jobs completed	(41,220)
Ending balance	<u>\$ 40,900</u>

c. Finished Goods:

Beginning balance	\$ 6,240
Add: Jobs completed	41,220
Less: Jobs sold	(6,240)
Ending balance	<u>\$41,220</u>

P 5-57**1. Direct method:**

Proportion of:	<u>Laboratory</u>	<u>Pathology</u>
Number of samples	0.6000	0.4000
Transactions processed	0.6500	0.3500
Direct costs	\$345,000	\$456,000
Delivery:		
(0.60 × \$240,000)	144,000	
(0.40 × \$240,000)		96,000
Accounting:		
(0.65 × \$270,000)	175,500	
(0.35 × \$270,000)		94,500
Total	<u>\$664,500</u>	<u>\$646,500</u>

2.	<u>Delivery</u>	<u>Accounting</u>	<u>Laboratory</u>	<u>Pathology</u>
Transactions	0.0500	-	0.6175	0.3325
Number of samples	-	-	0.6000	0.4000
Direct costs	\$ 240,000	\$270,000	\$345,000	\$456,000
Accounting:				
(0.0500 × \$270,000)	13,500	(13,500)		
(0.6175 × \$270,000)		(166,725)	166,725	
(0.3325 × \$270,000)		(89,775)		89,775
Delivery:				
(0.6000 × \$253,500)	(152,100)		152,100	
(0.4000 × \$253,500)	(101,400)			101,400
Total	<u>\$ 0</u>	<u>\$ 0</u>	<u>\$663,825</u>	<u>\$647,175</u>

P 5-58**1. a. Direct method:**

	<u>Drilling</u>	<u>Assembly</u>
Machine hours	0.80	0.20
Kilowatt-hours	0.10	0.90
Maintenance:		
(0.80 × \$320,000)	\$256,000	
(0.20 × \$320,000)		\$ 64,000
Power:		
(0.10 × \$400,000)	40,000	
(0.90 × \$400,000)		360,000
Direct costs	163,000	90,000
Total	<u>\$459,000</u>	<u>\$514,000</u>

P 5-58 (Continued)

Drilling: $\$459,000/30,000 \text{ mhrs} = \$15.30 \text{ per machine hour}$

Assembly: $\$514,000/40,000 \text{ DLH} = \$12.85 \text{ per direct labor hour}$

Prime costs	\$1,817.00
Drilling ($\$15.30 \times 2 \text{ mhrs}$)	30.60
Assembly ($\$12.85 \times 50 \text{ DLH}$)	642.50
Total cost	<u>\$2,490.10</u>
Markup (15%)	373.52
Bid price	<u><u>\$2,863.62</u></u>

b. Sequential method: Allocate Power first, then Maintenance

	<u>Maintenance</u>	<u>Power</u>	<u>Drilling</u>	<u>Assembly</u>
Machine hours	—	—	0.80	0.20
Kilowatt-hours	0.10	—	0.09	0.81
Direct costs	\$ 320,000	\$ 400,000	\$163,000	\$ 90,000
Power:				
($0.10 \times \$400,000$)	40,000	(40,000)		
($0.09 \times \$400,000$)		(36,000)	36,000	
($0.81 \times \$400,000$)		(324,000)		324,000
Maintenance:				
($0.80 \times \$360,000$)	(288,000)	-	288,000	
($0.20 \times \$360,000$)	(72,000)			72,000
Total	<u>\$ 0</u>	<u>\$ 0</u>	<u>\$487,000</u>	<u>\$486,000</u>

Drilling: $\$487,000/30,000 \text{ mhrs} = \$16.23 \text{ per machine hour}$

Assembly: $\$486,000/40,000 \text{ DLH} = \$12.15 \text{ per direct labor hour}$

Prime costs	\$1,817.00
Drilling ($\$16.23 \times 2 \text{ mhrs}$)	32.46
Assembly ($\$12.15 \times 50 \text{ DLH}$)	607.50
Total cost	<u>\$2,456.96</u>
Markup (15%)	368.54
Bid price	<u><u>\$2,825.50</u></u>

2. The sequential method is the more accurate because it considers some of the support department interactions.

CASES

Case 5-59

1. Mrs. Lucky won't like being charged more for one job when the same number and type of announcements were produced in each job.
2. May: Actual rate = $\$20,000/500 \text{ hours} = \40 per hour
 Overhead assigned: $\$40 \times 5 \text{ hours} = \200
 June and July: Actual rate = $\$20,000/250 \text{ hours} = \80 per hour
 Overhead assigned: $\$80 \times 5 \text{ hours} = \400
3. Predetermined rate = $\$240,000/(500 \text{ hours} \times 12) = \40 per hour

Cost and price of each job:

Direct materials	\$250.00
Direct labor	25.00
Overhead (5 hours \times \$40)	200.00
Total cost	<u>\$475.00</u>
Plus 25% markup	118.75
Price	<u><u>\$593.75</u></u>

Using a predetermined rate will avoid the nonuniform production problem revealed in the first two requirements and result in a more accurate application of overhead and fairer costing of the summer jobs.

Case 5-60

- 1. The solution Doug proposes is not ethical. Although maintaining the current plantwide rate is probably not illegal, its continuation has one purpose: to extract extra profits from government business. Doug knows the plantwide rate is not accurately assigning overhead costs to the various jobs and is willing to alter the assignments on an “unofficial basis” for purposes of bidding on private-sector jobs. Fundamentally, ethical behavior is concerned with choosing right over wrong. To knowingly overcharge the government for future business certainly seems wrong. To continue overpricing knowing the new overhead rates would more than make up for any lost profits from the government sector (through more competitive bidding in the private sector) is a clear indication of greed. While managers have an obligation to maximize profits, this obligation must be within ethical boundaries.**
- 2. Tonya should first determine whether or not Gunderson has a corporate code of conduct. She can pursue the avenues suggested by the code. For example, if Tonya cannot persuade Doug to refrain from implementing his scheme, she could present her objections to Doug’s immediate supervisor. If a resolution cannot be realized at this level, then Tonya should go to the next higher management level. If no resolution is possible after appealing to all higher levels, then resignation may be the only remaining option.**