

FACTORY OVERHEAD: DEPARTMENTALIZATION

MULTIPLE CHOICE

Question Nos. 10, 11-14, and 26 are AICPA adapted.

Question Nos. 15-28 and 23-25 are CIA adapted.

- C 1. A department that would be classified as a producing department is:
- A. Production Control
 - B. Utilities
 - C. Finishing
 - D. Medical
 - E. Shipping
- B 2. A department that would be classified as a service department is:
- A. Refining
 - B. Receiving
 - C. Mixing
 - D. Assembly
 - E. Finishing
- A 3. In determining the right method for allocating equipment depreciation to departments, the best recommendation is to:
- A. use the cost of equipment in the department as a basis for allocation
 - B. allocate on the basis of square footage used in a given department
 - C. charge the amounts to General Plant
 - D. use algebraic techniques
 - E. allocate on the basis of companywide rates
- A 4. The most reasonable basis for allocating worker's compensation insurance is:
- A. departmental payroll
 - B. building depreciation
 - C. kilowatt-hours
 - D. number of employees
 - E. materials used
- E 5. A company is attempting to allocate the costs of electricity in various departments. The variable portion of electricity expense is to be allocated using kilowatt-hours. The information needed in order to allocate the fixed portion of the current period's electricity expense is:
- A. rated horsepower of equipment
 - B. number of machines in each department
 - C. estimated materials consumption
 - D. number of employees
 - E. square footage in each department

- E 6. The method for allocating service department costs that requires the least clerical work is:
- A. use of square footage in each department
 - B. step method
 - C. allocation to other service departments only
 - D. simultaneous method
 - E. direct method
- E 7. Rapid Falls Corp. has three producing departments, A, B, and C, with 50, 30, and 20 employees, respectively, in each department. Factory payroll costs other than direct labor are accumulated in a Payroll Department account and are assigned to producing departments on the basis of number of employees. The total payroll in each department was: A, \$300,000; B, \$275,000; C, \$325,000; and Payroll, \$50,000. Other costs accumulated in the Payroll Department amounted to \$200,000. The amount of Payroll Department costs chargeable to Department C is:
- A. \$125,000
 - B. \$100,000
 - C. \$40,000
 - D. \$10,000
 - E. \$50,000

SUPPORTING CALCULATION:

$$\frac{\$50,000 + \$200,000}{50 + 30 + 20} = \$2,500/\text{employee} \times 20 = \$50,000$$

- E 8. The following statement that best describes cost allocation is:
- A. a company, as a general rule, should allocate indirect costs randomly or based on an "ability-to-bear" criterion
 - B. a company can affect total income the most strongly by using the algebraic method of allocating indirect costs
 - C. a company can maximize or minimize total company income by selecting different bases on which to allocate indirect costs
 - D. a company should select an allocation base to raise or lower reported income on given products
 - E. a company's total income will remain unchanged no matter how indirect costs are allocated

- D 9. Carmichael Manufacturing Company has two production departments (Fabrication and Assembly) and three service departments (General Factory Administration, Factory Maintenance, and Factory Cafeteria). A summary of the year's costs and other data for each department prior to allocation of service department costs appears below.

	<u>Fabrication</u>	<u>Assembly</u>	<u>General Factory Administration</u>
Labor costs	\$1,950,000	\$ 2,050,000	\$90,000
Material costs.....	\$3,130,000	\$ 950,000	---
Overhead	\$1,650,000	\$ 1,850,000	\$70,000
Direct labor hours	562,500	437,500	31,000
Number of employees.....	280	200	12
Square footage occupied.....	88,000	72,000	1,750

(	<u>Factory</u>	<u>Factory</u>
(	<u>Maintenance</u>	<u>Cafeteria</u>
(	\$82,100	\$87,000
(	\$65,000	\$91,000
(	\$56,100	\$62,000
(	27,000	42,000
(	8	20
(	2,000	4,800

The costs of the General Factory Administration Department, Factory Maintenance Department, and Factory Cafeteria are allocated on the basis of direct labor hours, square footage occupied, and number of employees, respectively. There are no manufacturing overhead variances.

Assuming that Carmichael elects to distribute service department costs under the direct method of cost allocation, the amount of Factory Maintenance Department costs that would be allocated to the Fabrication Department is (round all final calculations to the nearest dollar):

- A. \$106,091
 B. \$91,440
 C. \$0
 D. \$111,760
 E. none of the above

SUPPORTING CALCULATION:

$$\frac{\$82,100 + \$65,000 + \$56,100}{88,000 + 72,000} = \$1.27 \times 88,000 = \$111,760$$

- A 10. Carmichael Manufacturing Company has two production departments (Fabrication and Assembly) and three service departments (General Factory Administration, Factory Maintenance, and Factory Cafeteria). A summary of the year's costs and other data for each department prior to allocation of service department costs appears below.

	<u>Fabrication</u>	<u>Assembly</u>	<u>General Factory Administration</u>
Labor costs	\$1,950,000	\$2,050,000	\$90,000
Material costs.....	\$3,130,000	950,000	---
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(\$56,100	\$62,000
(27,000	42,000
(8	20
(2,000	4,800

The costs of the General Factory Administration Department, Factory Maintenance Department, and Factory Cafeteria are allocated on the basis of direct labor hours, square footage occupied, and number of employees, respectively.

The amount of General Factory Administration Department costs that would be allocated to the Assembly Department under the direct method is (round all final calculations to the nearest dollar):

- A. \$70,000
 B. \$90,000
 C. \$0
 D. \$63,636
 E. none of the above

SUPPORTING CALCULATION:

$$\frac{\$90,000 + \$70,000}{562,500 + 437,500} = \$0.16 \times 437,500 = \$70,000$$

- B 11. Carmichael Manufacturing Company has two production departments (Fabrication and Assembly) and three service departments (General Factory Administration, Factory Maintenance, and Factory Cafeteria). A summary of the year's costs and other data for each department prior to allocation of service department costs appears below.

	<u>Fabrication</u>	<u>Assembly</u>	<u>General Factory Administration</u>
Labor costs	\$1,950,000	\$2,050,000	\$90,000
Material costs.....	\$3,130,000	\$950,000	---
Overhead	\$1,650,000	\$1,850,000	\$70,000
Direct labor hours	562,500	437,500	31,000
Number of employees.....	280	200	12
Square footage occupied.....	88,000	72,000	1,750

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(<u>Maintenance</u>	<u>Cafeteria</u>
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(27,000	42,000
(8	20
(2,000	4,800

The costs of the General Factory Administration Department, Factory Maintenance Department, and Factory Cafeteria are allocated on the basis of direct labor hours, square footage occupied, and number of employees, respectively.

Assuming that Carmichael elects to distribute service department costs to other service departments using the step method of cost allocation and that the order of distribution is based on the dollar amount of costs originating in the service departments, how much of the total Factory Cafeteria cost would be allocated to the Factory Maintenance Department? (Round all final calculations to the nearest dollar.)

- A. \$96,000
 B. \$3,840
 C. \$6,124
 D. \$0
 E. none of the above

SUPPORTING CALCULATION:

$$\frac{\$87,000 + \$91,000 + \$62,000}{280 + 200 + 12 + 8} = \$480 / \text{employee} \times 8 = \$3,840$$

- B 12. Carmichael Manufacturing Company has two production departments (Fabrication and Assembly) and three service departments (General Factory Administration, Factory Maintenance, and Factory Cafeteria). A summary of the year's costs and other data for each department prior to allocation of service department costs appears below.

	<u>Fabrication</u>	<u>Assembly</u>	<u>General Factory Administration</u>
Labor costs	\$1,950,000	\$2,050,000	\$90,000
Material costs.....	\$3,130,000	\$950,000	---
Overhead	\$1,650,000	\$1,850,000	\$70,000
Direct labor hours	562,500	437,500	31,000
Number of employees.....	280	200	12
Square footage occupied.....	88,000	72,000	1,750

(<u>Factory</u>	<u>Factory</u>
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(\$56,100	\$62,000
(27,000	42,000
(8	20
(2,000	4,800

The costs of the General Factory Administration Department, Factory Maintenance Department, and Factory Cafeteria are allocated on the basis of direct labor hours, square footage occupied, and number of employees, respectively.

How much of the Factory Maintenance Department costs would be allocated to the Factory Cafeteria under the step method, assuming that the order of distribution is based on the dollar amount of costs originating in the service departments? (Round all final calculations to the nearest dollar.)

- A. \$148,910
 B. \$0
 C. \$5,787
 D. \$5,856
 E. none of the above

SUPPORTING CALCULATION:

Factory Cafeteria costs	\$240,000
Factory Maintenance costs	\$203,300
∴ Factory Cafeteria already closed out.	

- A 13. Acie Company has two service departments and three production departments, each producing a separate product. For a number of years, Acie has allocated the costs of the service departments to the production departments on the basis of the annual sales dollars. In a recent audit report, the internal auditor stated that the distribution of service department costs on the basis of annual sales dollars would lead to serious inequities. It was recommended that maintenance and engineering service hours be used as a better service cost allocation basis. For illustration purposes, the following information was appended to the audit report:

Service Departments

	<u>Maintenance</u>	<u>Engineering</u>
Maintenance hours used.....		400
Engineering hours used	400	
Department direct costs.....	\$12,000	\$54,000

	<u>Production Departments</u>		
	<u>Department A</u>	<u>Department B</u>	<u>Department C</u>
(	800	200	200
(	800	400	400
(	\$80,000	\$90,000	\$50,000

Using the simultaneous method, what would be the total Engineering Department cost after allocation of interservice department costs, but before allocation to the Maintenance and Production Departments?

- A. \$60,000
 B. \$57,000
 C. \$12,000
 D. \$54,000
 E. none of the above

SUPPORTING CALCULATION:

$$\begin{aligned}
 \text{Maintenance} &= \$12,000 + .2E \\
 \text{Engineering} &= \$54,000 + .25M \\
 E &= \$54,000 + .25(\$12,000 + .2E) \\
 E &= \$54,000 + \$3,000 + .05E \\
 .95E &= \$57,000 \\
 E &= \$60,000
 \end{aligned}$$

- D 14. Acie Company has two service departments and three production departments, each producing a separate product. For a number of years, Acie has allocated the costs of the service departments to the production departments on the basis of the annual sales dollars. In a recent audit report, the internal auditor stated that the distribution of service department costs on the basis of annual sales dollars would lead to serious inequities. It was recommended that maintenance and engineering service hours be used as a better service cost allocation basis. For illustration purposes, the following information was appended to the audit report:

Service Departments

	<u>Maintenance</u>	<u>Engineering</u>
Maintenance hours used.....		400
Engineering hours used	400	
Department direct costs.....	\$12,000	\$54,000

	<u>Production Departments</u>		
	<u>Department A</u>	<u>Department B</u>	<u>Department C</u>
(800	200	200	
(800	400	400	
(\$80,000	\$90,000	\$50,000	

Using the simultaneous method, what would be the total Maintenance Department cost after allocation of interservice department costs, but before allocation to the Engineering and Production Departments?

- A. \$72,000
 B. \$12,000
 C. \$60,000
 D. \$24,000
 E. none of the above

SUPPORTING CALCULATION:

$$\begin{aligned}
 \text{Maintenance} &= \$12,000 + .2E \\
 \text{Engineering} &= \$54,000 + .25M \\
 M &= \$12,000 + .2E \\
 M &= \$12,000 + .2(\$54,000 + .25M) \\
 M &= \$12,000 + \$10,800 + .05M \\
 .95M &= \$22,800 \\
 M &= \$24,000
 \end{aligned}$$

- C 15. Acie Company has two service departments and three production departments, each producing a separate product. For a number of years, Acie has allocated the costs of the service departments to the production departments on the basis of the annual sales dollars. In a recent audit report, the internal auditor stated that the distribution of service department costs on the basis of annual sales dollars would lead to serious inequities. It was recommended that maintenance and engineering service hours be used as a better service cost allocation basis. For illustration purposes, the following information was appended to the audit report:

Service Departments

	<u>Maintenance</u>	<u>Engineering</u>
Maintenance hours used.....		400
Engineering hours used	400	
Department direct costs.....	\$12,000	\$54,000

	<u>Production Departments</u>		
	<u>Department A</u>	<u>Department B</u>	<u>Department C</u>
	800	200	200
	800	400	400
	\$80,000	\$90,000	\$50,000

Using the step method of cost allocation, what amount of maintenance cost would be allocated to Department A, assuming that the service departments are distributed in the order of total dollars of direct departmental costs?

- A. \$0
- B. \$25,500
- C. \$15,200
- D. \$3,187.50
- E. none of the above

SUPPORTING CALCULATION:

$$\text{Maintenance} = \$12,000 + .2(\$54,000) = \$22,800$$

$$\text{Department A} = 800/1,200 \times \$22,800 = \$15,200$$

- B 16. Acie Company has two service departments and three production departments, each producing a separate product. For a number of years, Acie has allocated the costs of the service departments to the production departments on the basis of the annual sales dollars. In a recent audit report, the internal auditor stated that the distribution of service department costs on the basis of annual sales dollars would lead to serious inequities. It was recommended that maintenance and engineering service hours be used as a better service cost allocation basis. For illustration purposes, the following information was appended to the audit report:

Service Departments

	<u>Maintenance</u>	<u>Engineering</u>
Maintenance hours used.....		400
Engineering hours used	400	
Department direct costs.....	\$12,000	\$54,000

	<u>Production Departments</u>		
	<u>Department A</u>	<u>Department B</u>	<u>Department C</u>
	800	200	200
	800	400	400
	\$80,000	\$90,000	\$50,000

Using the step method of cost allocation, what amount of engineering cost would be allocated directly to Department A, assuming that the service departments are distributed in the order of total dollars of direct departmental costs?

- A. \$11,400
- B. \$21,600
- C. \$10,800
- D. \$22,800
- E. none of the above

SUPPORTING CALCULATION:

$$800/2,000 \times \$54,000 = \$21,600$$

- E 17. A factor to be considered in deciding the kinds of departments required for establishing accurate departmental overhead rates with which to control costs is:
- A. location of operations, processes, and machinery
 - B. responsibilities for production and costs
 - C. number of departments or cost centers
 - D. similarity of operations, procedures, and machinery in each department
 - E. all of the above
- E 18. Services available for the benefit of producing departments and other service departments can be organized by:
- A. establishing a separate service department for each function
 - B. combining several functions into one department
 - C. placing service costs in a department called "general factory cost pool"
 - D. none of the above
 - E. all of the above

- B 19.** Entities that have practiced departmentalization for many years, by grouping their activities into categories such as occupancy, sales promotion, purchasing, and delivery are:
- A. hospitals
 - B. retail stores
 - C. banks
 - D. insurance companies
 - E. colleges
- A 20.** An automotive company has three divisions. One division manufactures new replacement parts for automobiles; another rebuilds engines; and the third does repair and overhaul work on a line of trucks. All three divisions use the services of a central payroll department. The best method of allocating the cost of the payroll department to the various operating divisions is:
- A. total labor hours incurred in the divisions
 - B. value of production in the divisions
 - C. direct materials costs incurred in the divisions
 - D. machine hours used in the divisions
 - E. none of the above
- B 21.** The Janitorial Department provides cleaning services to all departments of a large store. Management wishes to allocate the janitorial costs to the various departments that benefit from the service. The most reasonable allocation base for janitorial costs would be:
- A. sales of each department
 - B. square footage of each department
 - C. number of employees in each department
 - D. total direct costs of each department before any allocations
 - E. none of the above
- C 22.** A hospital has a \$100,000 expected utility bill this year. The Janitorial, Accounting, and Orderlies Departments are service functions to the Operating, Hospital Rooms, and Laboratories Departments. Floor space assigned to each department is:

<u>Department</u>	<u>Square Footage</u>
Janitorial	1,000
Accounting	2,000
Orderlies	7,000
Operating	4,000
Hospital Rooms.....	30,000
Laboratories.....	6,000
.....	<u>50,000</u>

How much of the \$100,000 will eventually become the Hospital Rooms Department total costs, assuming use of the direct method of allocation based on square footage?

- A. \$60,000
- B. \$72,000
- C. \$75,000
- D. \$80,000
- E. none of the above

SUPPORTING CALCULATION:

$$\frac{30,000}{40,000} - \$100,000 = \$75,000$$

- C 23. Serpent Corp. distributes service department overhead costs directly to producing departments without allocation to the other service department. Information for the month of June is as follows:**

	<u>Service Departments</u>	
	<u>Maintenance</u>	<u>Utilities</u>
Overhead costs incurred.....	<u>\$20,000</u>	<u>\$10,000</u>
Service provided to department:		
Maintenance.....	--	10%
Utilities	20%	--
Producing—A	40%	30%
Producing—B	<u>40%</u>	<u>60%</u>
Totals.....	<u>100%</u>	<u>100%</u>

The amount of Maintenance Department costs distributed to Producing—A Department for June was:

- A. \$8,000
- B. \$8,800
- C. \$10,000
- D. \$11,000
- E. none of the above

SUPPORTING CALCULATION:

$$\frac{40\%}{80\%} - \$20,000 = \$10,000$$

- D 24. Multiple overhead rates are most commonly used when:**
- A. production consists of long runs of a single product
 - B. the company has more than one production department
 - C. manufacturing operations are labor intensive
 - D. production consists of a diverse product line
 - E. none of the above
- B 25. An example of a nonvolume-related overhead base would be:**
- A. direct materials cost
 - B. number of setups
 - C. machine hours
 - D. direct labor dollars
 - E. none of the above

- C 26. An example of a department that would be a prime candidate for multiple overhead rates would be one whose overhead was primarily:
- A. labor driven
 - B. machine related
 - C. caused by setups and production design changes
 - D. materials related
 - E. none of the above

PROBLEMS

PROBLEM

1.

Overhead Allocation and Rates. To determine an overhead application rate for its Machining and Assembly Departments, the management of Knight Co. requested the following overhead cost data for June:

<u>Item</u>	<u>Machining Department</u>	<u>Assembly Department</u>	<u>Total</u>
Number of employees.....	60	40	100
Square footage	15,000	10,000	25,000
Monthly average wage per employee (direct and indirect).....	\$ 2,000	\$ 2,500	--
Overhead directly chargeable to department (excluding indirect labor)	\$ 90,000	\$ 75,000	\$165,000
Materials used.....	60,000	90,000	150,000
Factory rent.....	?	?	33,000
Other building costs	?	?	60,000
Payroll Department cost.....	?	?	18,000
Freight-in and other Receiving Department costs	?	?	75,000

In each department, 80% of the employees are direct laborers. Overhead is charged to production on the basis of direct labor dollars. The allocation basis for other data is as follows: all building costs, square footage; Payroll Department cost, number of employees; freight-in and other Receiving Department costs, materials used.

Required:

- (1) Compute the total overhead chargeable to the Machining and Assembly Departments.
- (2) Compute the overhead application rate as a percentage of direct labor cost for each department. (Round to the nearest whole percent.)

SOLUTION

(1)

	<u>Machining Department</u>	<u>Assembly Department</u>
Overhead directly chargeable.....	\$ 90,000	\$ 75,000
Indirect labor:		
20% x 60 x \$2,000.....	24,000	
20% x 40 x \$2,500.....		20,000
Factory rent:		
15,000		
\$33,000 x -----	19,800	
25,000		
10,000		
\$33,000 x -----		13,200
25,000		
Other building costs:		
15,000		
\$60,000 x -----	36,000	
25,000		
10,000		
\$60,000 x -----		24,000
25,000		
Payroll Department cost:		
60		
\$18,000 x -----	10,800	
100		
40		
\$18,000 x -----		7,200
100		
Freight-in and other Receiving Department costs:		
\$60,000		
\$75,000 x -----	30,000	
\$150,000		
\$90,000		
\$75,000 x -----		
45,000		
\$150,000		
Total overhead	<u>\$ 210,600</u>	<u>\$ 184,400</u>

(2)

Direct labor costs:		
80% x 60 x \$2,000.....	\$ 96,000	
80% x 40 x \$2,500.....		\$ 80,000
Overhead as a percentage of direct labor cost:		
\$210,600/\$96,000	219%	
\$184,400/\$80,000		231%

PROBLEM

2.

Overhead Application; Correction of Net Profit (or Loss). Pomeroy Printers Inc. uses job order costing. Printers' wages are charged to direct labor, while typesetters' wages are charged to overhead and comprise 30% of applied overhead. Overhead is applied at the rate of 150% of direct labor cost. During July, only two jobs were started and completed. Relevant data from these jobs were:

<u>Item</u>	<u>Job 1776</u>	<u>Job 1865</u>
Materials cost.....	\$ 5,000	\$ 3,000
Direct labor	10,000	8,000
Overhead applied	<u>15,000</u>	<u>12,000</u>
Total cost of job.....	\$ 30,000	\$ 23,000
Selling price	<u>30,000</u>	<u>35,000</u>
Gross profit from job	<u>\$ 0</u>	<u>\$ 12,000</u>

Management determines that the typesetters' wages should be a direct labor cost and that Job 1776 required 1/3 of the total typesetting cost incurred, while Job 1865 required 2/3.

Required:

- (1) Determine the total typesetters' wages for July.
- (2) Determine the corrected direct labor costs for Jobs 1776 and 1865.
- (3) Determine the correct gross profit (or loss) for each job. (Round the new overhead rate to the nearest whole percent and the total overhead to the nearest dollar.)

SOLUTION

- (1) \$8,100 [30% x (\$15,000 + \$12,000)]

<u>Job 1776</u>	<u>Job 1865</u>
\$ 10,000	\$ 8,000
+ 2,700 (1/3 x \$8,100)	+ 5,400 (2/3 x \$8,100)
<u>\$ 12,700</u>	<u>\$ 13,400</u>

(3)

<u>Item</u>	<u>Job 1776</u>	<u>Job 1865</u>
Materials cost.....	\$ 5,000	\$ 3,000
Direct labor	12,700	13,400
Overhead applied ¹	<u>9,144</u>	<u>9,648</u>
Total cost of job.....	\$ 26,844	\$ 26,048
Selling price	<u>30,000</u>	<u>35,000</u>
Gross profit from job	<u>\$ 3,156</u>	<u>\$ 8,952</u>

$$\frac{^1 \text{ Total overhead}}{\text{Direct labor cost}} = \frac{\$18,900}{\$12,700 + \$13,400} = 72.41\% \text{ or } 72\% \text{ overhead applied}$$

PROBLEM

3.

Overhead Distribution Via Direct Method. Geo-trig Inc. has three producing departments (Sine, Cosine, and Tangent) and two service departments (Rhombus and Triangle). Data that summarize overhead activity for January are:

	<u>Producing Departments</u>			<u>Service Departments</u>	
	<u>Sine</u>	<u>Cosine</u>	<u>Tangent</u>	<u>Rhombus</u>	<u>Triangle</u>
Total overhead before service department allocations	\$50,000	\$80,000	\$30,000	\$40,000	\$20,000
Square footage occupied	3,000	4,000	3,000	1,000	1,500
Number of employees.....	50	30	20	10	10

Rhombus costs are distributed on the basis of square footage occupied, while Triangle costs are distributed on the basis of number of employees. The direct method is used for allocating service department costs to producing departments.

Required: Prepare a schedule indicating the detailed components of overhead costs for the producing and service departments, including the directly assigned and allocated overhead.

SOLUTION

	<u>Producing Departments</u>			<u>Service Departments</u>	
	<u>Sine</u>	<u>Cosine</u>	<u>Tangent</u>	<u>Rhombus</u>	<u>Triangle</u>
Total overhead before service					
department allocations	\$50,000	\$ 80,000	\$30,000	\$40,000	\$20,000
Allocation of Rhombus costs:					
(Base = square footage)					
3,000					
Sine: ----- x \$40,000	12,000	--	--	(12,000)	
10,000 ¹					
4,000					
Cosine: ----- x \$40,000	--	16,000	--	(16,000)	
10,000					
3,000					
Tangent: ----- x \$40,000	--	--	12,000	(12,000)	
10,000					
Allocation of Triangle costs:					
(Base = number of employees)					
50					
Sine: ----- x \$20,000.....	10,000	--	--		(10,000)
100 ²					
30					
Cosine: ---- x \$20,000	--	6,000	--		(6,000)
100					
20					
Tangent: ----- x \$20,000.....	----	----	4,000		
<u>(4,000)</u>					
100					
Total overhead	<u>\$72,000</u>	<u>\$102,000</u>	<u>\$46,000</u>		

¹Denominator = 3,000 + 4,000 + 3,000 = 10,000 square feet
or 30% + 40% + 30%

²Denominator = 50 + 30 + 20 = 100 employees
or 50% + 30% + 20%

PROBLEM

4.

Distribution of Direct and Indirect Overhead Costs to Producing Departments. Chaing Chemical Co. operates with three producing departments—Blending, Testing, and Terminal. The overhead items and amounts for the period, along with the bases for their allocation, are listed below.

<u>Item</u>	<u>Amount</u>	<u>Allocation Basis</u>
Building depreciation.....	\$ 24,000	Square footage
Janitorial cost.....	33,000	Square footage
Materials receiving cost.....	48,000	Materials usage
Payroll Department cost.....	126,000	Number of employees
Power.....	75,000	Horsepower of equipment

Other relevant data are:

	<u>Blending Department</u>	<u>Testing Department</u>	<u>Terminal Department</u>	<u>Total</u>
Number of employees.....	25	40	19	84
Direct labor hours	62,000	104,000	54,000	220,000
Horsepower of equipment	60,000	15,000	5,000	80,000
Kilowatt-hours	4,000	1,000	6,000	11,000
Square footage	2,000	2,000	2,000	6,000
Directly chargeable overhead cost	\$ 125,000	\$ 75,000	\$87,500	\$287,500
Direct materials	\$ 75,000	\$ 25,000	--	\$100,000

Required: Prepare the overhead distribution for each producing department, including the detail for each item of allocated overhead and the overhead rate based on direct labor hours for each department (rounded to the nearest cent).

SOLUTION

	<u>Blending Department</u>	<u>Testing Department</u>	<u>Terminal Department</u>
Directly chargeable cost	\$125,000	\$ 75,000	\$ 87,500
Building depreciation:			
2,000			
\$24,000 x -----	8,000	8,000	8,000
6,000			
Janitorial cost:			
2,000			
\$33,000 x -----	11,000	11,000	11,000
6,000			
Materials receiving cost:			
\$75,000			
\$48,000 x -----	36,000		
\$100,000			
\$25,000			
\$48,000 x -----	--	12,000	--
\$100,000			
Payroll Department cost:			
25			
\$126,000 x ----	37,500		
84			
40			
\$126,000 x ----	--	60,000	--
84			
19			
\$126,000 x ----	--	--	28,500
84			
Power:			
60,000			
\$75,000 x -----	56,250		
80,000			
15,000			
\$75,000 x -----	--	14,063	--
80,000			
5,000			
\$75,000 x -----	--	--	<u>4,688</u>
80,000			
Total overhead	<u>\$273,750</u>	<u>\$180,063</u>	<u>\$139,688</u>
Overhead rate per direct labor hour	4.42	1.73	2.59

PROBLEM

5.

Overhead Allocation Via the Step Method. Granny's Nut Co. operates with three producing departments (Cutting, Dividing, and Shelling that are serviced by two service departments Equipment Maintenance and General Plant). Costs are allocated using the step method with the service department servicing the greatest number of other departments allocated first. General Plant is allocated on the basis of square footage and Equipment Maintenance is allocated on the basis of direct labor hours. Relevant May data are:

	<u>Producing Departments</u>			<u>Service Departments</u>	
	<u>Cutting</u>	<u>Dividing</u>	<u>Shelling</u>	<u>Equipment Maintenance</u>	<u>General Plant</u>
Overhead before allocation of service department costs.....	\$105,000	\$93,000	\$87,000	\$56,000	\$30,000
Square footage	8,000	12,000	6,000	4,000	--
Machine hours used	6,000	2,000	7,000	--	--
Direct labor used	5,000	6,000	9,000	--	--

Required: Prepare a schedule indicating the allocation of service department costs to producing departments and the rate per machine hour for applying overhead in each producing department. (Round to the nearest cent.)

SOLUTION

	<u>Producing Departments</u>			<u>Service Departments</u>	
	<u>Cutting</u>	<u>Dividing</u>	<u>Shelling</u>	<u>Equipment Maintenance</u>	<u>General Plant</u>
Overhead before allocation of service department costs.....	\$105,000	\$93,000	\$ 87,000	\$56,000	\$30,000
Allocation of service department costs:					
General Plant:					
8,000					
----- x \$30,000	8,000	--	--	--	(8,000)
30,000					
12,000					
----- x \$30,000	--	12,000	--	--	(12,000)
30,000					
6,000					
----- x \$30,000	--	--	6,000	--	(6,000)
30,000					
4,000					
----- x \$30,000	--	--	--	4,000	(4,000)
30,000					
Equipment Maintenance:					
5,000					
----- x \$60,000	15,000	--	--	(15,000)	--
20,000					
6,000					
----- x \$60,000	--	18,000	--	(18,000)	--
20,000					
9,000					
----- x \$60,000	--	--	27,000	(27,000)	--
20,000					
Total overhead	<u>\$128,000</u>	<u>\$123,000</u>	<u>\$120,000</u>		
Machine hours	6,000	2,000	7,000		
Overhead application rate	\$21.33	\$61.50	17.14		

PROBLEM

6.

Overhead Distribution Via the Simultaneous Method. Orleans Corp. operates two producing departments, C and D, and two service departments, E and F. The overhead before allocation of service department costs, together with the usage of services from the service departments, is:

<u>Department</u>	<u>Overhead Before Allocation of Service Department Costs</u>	<u>Services Provided by</u>	
		<u>E</u>	<u>F</u>
Producing:			
C.....	\$18,000	30%	--
D.....	29,000	30%	80%
Service:			
E.....	8,000	--	20%
F.....	<u>1,400</u>	40%	--
	<u>\$56,400</u>		

Required: Prepare the overhead distribution, using the simultaneous method to allocate the service departments' costs to the producing departments.

SOLUTION

$$\begin{aligned}
 \text{Let: } E &= \$8,000 + .2F \\
 F &= \$1,400 + .4E \\
 \text{Substituting: } E &= \$8,000 + .2(\$1,400 + .4E) \\
 .92E &= \$8,280 \\
 E &= \$9,000 \\
 \text{Substituting: } F &= \$1,400 + .4E \\
 &= \$1,400 + .4(\$9,000) \\
 &= \$5,000
 \end{aligned}$$

	<u>Distribution of Overhead</u>			
	<u>Producing Departments</u>		<u>Service Departments</u>	
	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>
Overhead before allocation of service department costs.....	\$18,000	\$29,000	\$ 8,000	\$ 1,400
Distribution of Department E:				
\$9,000 x 30%.....	2,700	2,700	--	--
\$9,000 x 40%.....	--	--	--	3,600
Total distributed.....	--	--	(9,000)	--
Distribution of Department F:				
\$5,000 x 80%.....	--	4,000	--	--
\$5,000 x 20%.....	--	--	1,000	--
Total distributed.....	--	--	--	(5,000)
Overhead after distribution	<u>\$20,700</u>	<u>\$35,700</u>	<u>\$ 0</u>	<u>\$ 0</u>

Proof: \$20,700 + \$35,700 = \$56,400 total

PROBLEM

7.

Multiple Overhead Rates. American Manufacturing Inc. (AMI) has a diverse product line with some jobs requiring much labor and little machine use, and others requiring the opposite mix. Because no single base for a predetermined overhead rate will provide AMI management with reliable product cost information, overhead is classified into two cost pools, and two predetermined overhead rates are used. For 19A, it is estimated that total overhead costs will consist of \$200,000 of overhead related to the expenditure of direct labor dollars and \$800,000 of overhead related to machine usage. Total machine usage is expected to be 40,000 hours for the year, and total direct labor dollars are expected to be \$400,000.

Job 711 required \$1,500 of direct materials, 60 hours of labor at \$15 per hour, and 5 hours of machine time.

Job 727 required \$2,500 of direct materials, 45 hours of labor at \$15 per hour, and 35 hours of machine time.

Required:

- (1) Calculate AMI's predetermined overhead rates for 19A.
- (2) Determine the total cost of Job 711.
- (3) Determine the total cost of Job 727.
- (4) If AMI had used a single predetermined overhead rate based on direct labor dollars to apply all overhead costs, what would have been the predetermined rate?
- (5) Based on your computations in (1) and (4) above and considering the two jobs in (2) and (3) above, what would be the competitive implications of using the single predetermined overhead rate and quoting prices at cost plus a small markup?

SOLUTION

- (1) The dual predetermined overhead rates are:

$$\frac{\$200,000}{\$400,000 \text{ direct labor dollars}} = \$0.50 \text{ per direct labor dollar}$$

and

$$\frac{\$800,000}{40,000 \text{ machine hours}} = \$20 \text{ per machine hour}$$

(2) Job 711	
Direct material.....	\$ 1,500
Direct labor (60 x \$15)	900
Applied overhead:	
\$900 x \$0.50 = 450	
5 x \$20 = <u>100</u>	<u>550</u>
Total	<u>\$ 2,950</u>

(3) Job 727	
Direct material.....	\$ 2,500.00
Direct labor (45 x \$15)	675.00
Applied overhead:	
\$675 x \$0.50 = 337.50	
35 x \$20 = <u>700.00</u>	<u>1,037.50</u>
Total	<u>\$ 4,212.50</u>

- (4) A single predetermined overhead rate based on direct labor dollars would be:

$$\frac{\$200,000 + \$800,000}{\$400,000 \text{ direct labor dollars}} = \$2.50 \text{ per direct labor dollar}$$

- (5) The competitive implications of a single overhead rate are that on jobs requiring much labor and little machine time (e.g., Job 711), AMI will compute its costs at too high a level and will, therefore, quote too high a price to the customer. These jobs will probably be lost to competitors who know their costs better. On jobs requiring much machine time and little labor (e.g., Job 727), AMI will calculate its costs at too low a level and will, therefore, quote too low a price, but will generate less profit than expected or perhaps even a loss.