

# Chapter 2

## Cost Terms, Concepts, and Classifications

### Solutions to Questions

**2-1** The three major elements of product costs in a manufacturing company are direct materials, direct labor, and manufacturing overhead.

**2-2**

**a.** Direct materials are an integral part of a finished product and can be conveniently traced to it.

**b.** Indirect materials are generally small items of material such as glue and nails. They may be an integral part of a finished product but can be traced to the product only at great cost or inconvenience. Indirect materials are ordinarily classified as manufacturing overhead.

**c.** Direct labor includes those labor costs that can be easily traced to particular products. Direct labor is also called "touch labor."

**d.** Indirect labor includes the labor costs of janitors, supervisors, materials handlers, and other factory workers that cannot be conveniently traced to particular products. These labor costs are incurred to support production, but the workers involved do not directly work on the product.

**e.** Manufacturing overhead includes all manufacturing costs except direct materials and direct labor.

**2-3** A product cost is any cost involved in purchasing or manufacturing goods. In the case of manufactured goods, these costs consist of direct materials, direct labor, and manufacturing overhead. A period cost is a cost that is taken directly to the income statement as an expense in the period in which it is incurred.

**2-4** The income statement of a manufacturing company differs from the income statement of a merchandising company in the cost of goods sold section. The merchandising

company sells finished goods that it has purchased from a supplier. These goods are listed as "Purchases" in the cost of goods sold section. Since the manufacturing company produces its goods rather than buying them from a supplier, it lists "Cost of Goods Manufactured" in place of "Purchases." Also, the manufacturing company identifies its inventory in this section as "Finished Goods Inventory," rather than as "Merchandise Inventory."

**2-5** The schedule of cost of goods manufactured lists the manufacturing costs that have been incurred during the period. These costs are organized under the three major categories of direct materials, direct labor, and manufacturing overhead. The total costs incurred are adjusted for any change in the Work in Process inventory to determine the cost of goods manufactured (i.e. finished) during the period.

The schedule of cost of goods manufactured ties into the income statement through the Cost of Goods Sold section. The cost of goods manufactured is added to the beginning Finished Goods inventory to determine the goods available for sale. In effect, the cost of goods manufactured takes the place of the "Purchases" account in a merchandising firm.

**2-6** A manufacturing company has three inventory accounts: Raw Materials, Work in Process, and Finished Goods. A merchandising company generally identifies its inventory account simply as Merchandise Inventory.

**2-7** Since product costs follow units of product into inventory, they are sometimes called inventoriable costs. The flow is from direct materials, direct labor, and manufacturing overhead to Work in Process. As goods are

completed, their cost is removed from Work in Process and transferred to Finished Goods. As goods are sold, their cost is removed from Finished Goods and transferred to Cost of Goods Sold. Cost of Goods Sold is an expense on the income statement.

**2-8** Yes, costs such as salaries and depreciation can end up as assets on the balance sheet if these are manufacturing costs. Manufacturing costs are inventoried until the associated finished goods are sold. Thus, such costs may be part of either Work in Process inventory or Finished Goods inventory at the end of a period if there are unsold units.

**2-9** Cost behavior refers to how a cost will react or respond to changes in the level of business activity.

**2-10** No. A variable cost is a cost that varies, in total, in direct proportion to changes in the level of activity. A variable cost is constant per unit of product. A fixed cost is fixed in total, but will vary inversely on an average per-unit basis with changes in the level of activity.

**2-11** When fixed costs are involved, the average cost of a unit of product will depend on the number of units being manufactured. As production increases, the average cost per unit will fall as the fixed cost is spread over more units. Conversely, as production declines, the average cost per unit will rise as the fixed cost is spread over fewer units.

**2-12** Manufacturing overhead is an indirect cost since these costs cannot be easily and conveniently traced to particular products.

**2-13** A differential cost is a cost that differs between alternatives in a decision. An opportunity cost is the potential benefit that is given up when one alternative is selected over another. A sunk cost is a cost that has already been incurred and cannot be altered by any decision taken now or in the future.

**2-14** No; differential costs can be either variable or fixed. For example, the alternatives might consist of purchasing one machine rather than another to make a product. The difference in the fixed costs of purchasing the two machines would be a differential cost.

**2-15**

Direct labor cost	\$510
(34 hours × \$15 per hour) .....	
Manufacturing overhead cost	
(6 hours × \$15 per hour) .....	<u>90</u>
Total wages earned .....	<u>\$600</u>

**2-16**

Direct labor cost	\$630
(45 hours × \$14 per hour) .....	
Manufacturing overhead cost	
(5 hours × \$7 per hour) .....	<u>35</u>
Total wages earned .....	<u>\$665</u>

**2-17** Costs associated with the quality of conformance can be broken down into prevention costs, appraisal costs, internal failure costs, and external failure costs. Prevention costs are incurred in an effort to keep defects from occurring. Appraisal costs are incurred to detect defects before they can create further problems. Internal and external failure costs are incurred as a result of producing defective units.

**2-18** Total quality costs are usually minimized by *increasing* prevention and appraisal costs in order to reduce internal and external failure costs. Total quality costs usually decrease as prevention and appraisal costs increase.

**2-19** Shifting the focus to prevention and away from appraisal is usually the most effective way to reduce total quality costs. It is usually more effective to prevent defects than to attempt to fix them after they have already occurred.

**2-20** First, a quality cost report helps managers see the financial consequences of defects. Second, the report may help managers identify the most important areas for improvement. Third, the report helps managers see whether their quality costs are appropriately distributed among prevention, appraisal, internal failure, and external failure costs.

**2-21** Most accounting systems do not track and accumulate the costs of quality. It is particularly difficult to get a feel for the magnitude of quality costs since they are incurred in many departments throughout the organization.

**Exercise 2-1** (15 minutes)

1. Product; variable
2. Opportunity
3. Prime
4. Period
5. Product; period; fixed
6. Product
7. Conversion
8. Period; variable
9. Sunk
10. Fixed; product;  
conversion

**Exercise 2-2** (15 minutes)

	<i>Product (Inventoriable) Cost</i>	<i>Period Cost</i>
1. The cost of the memory chips used in a radar set.....	X	
2. Factory heating costs .....	X	
3. Factory equipment maintenance costs.....	X	
4. Training costs for new administrative employees .....		X
5. The cost of the solder that is used in assembling the radar sets .....	X	
6. The travel costs of the company's salespersons .....		X
7. Wages and salaries of factory security personnel.....	X	
8. The cost of air-conditioning executive offices.....		X
9. Wages and salaries in the department that handles billing customers.....		X
10. Depreciation on the equipment in the fitness room used by factory workers .....	X	
11. Telephone expenses incurred by factory management.....	X	
12. The costs of shipping completed radar sets to customers .....		X
13. The wages of the workers who assemble the radar sets.....	X	
14. The president's salary.....		X
15. Health insurance premiums for factory personnel.....	X	

**Exercise 2-3** (15 minutes)

<i>Cost</i>	<i>Cost Behavior</i>	
	<i>Variable</i>	<i>Fixed</i>
1. Small glass plates used for lab tests in a hospital.....	X	
2. Straight-line depreciation of a building .....		X
3. Top management salaries.....		X
4. Electrical costs of running machines.....	X	
5. Advertising of products and services* .....		X
6. Batteries used in manufacturing trucks.....	X	
7. Commissions to salespersons.....	X	
8. Insurance on a dentist's office .....		X
9. Leather used in manufacturing footballs .....	X	
10. Rent on a medical center.....		X

- \* This particular item may cause some debate. Hopefully, advertising results in more demand for products and services by customers. So advertising costs are correlated with the amount of products and services provided. However, note the direction of causality. Advertising causes an increase in the amount of goods and services provided, but an increase in the amount of goods and services demanded by customers does not necessarily result in a proportional increase in advertising costs. Hence, advertising costs are fixed in the classical sense that the total amount spent on advertising is not proportional to what the unit sales turn out to be.

## Exercise 2-4 (15 minutes)

<i>Cost Item</i>	<i>Cost Behavior</i>		<i>Selling and Administrative Cost</i>	<i>Product Cost</i>
	<i>Variable</i>	<i>Fixed</i>		
1. The costs of turn signal switches used at the General Motors Saginaw, Michigan, plant.....	X			X
2. Interest expense on CBS's long-term debt .....		X	X	
3. Salesperson's commissions at Avon Products .....	X		X	
4. Insurance on one of Cincinnati Milacron's factory buildings .....		X		X
5. The costs of shipping brass fittings to customers in California .....	X		X	
6. Depreciation on the bookshelves at Reston Bookstore.....		X	X	
7. The costs of X-ray film at the Mayo Clinic's radiology lab.....	X			X
8. The cost of leasing an 800 telephone number at L.L. Bean.....		X	X	
9. The depreciation on the playground equipment at a McDonald's outlet .....		X	X	
10. The cost of the mozzarella cheese used at a Pizza Hut outlet.....	X			X

## Exercise 2-5 (15 minutes)

1.	<i>Prevention Costs</i>	<i>Appraisal Costs</i>	<i>Internal Failure Costs</i>	<i>External Failure Costs</i>
a. Repairs of goods still under warranty .....				X
b. Customer returns due to defects .....				X
c. Statistical process control .....	X			
d. Disposal of spoiled goods .....			X	
e. Maintaining testing equipment .....		X		
f. Inspecting finished goods .....		X		
g. Downtime caused by quality problems			X	
h. Debugging errors in software .....			X	
i. Recalls of defective products .....				X
j. Training quality engineers.....	X			
k. Re-entering data due to typing errors .....			X	
l. Inspecting materials received from suppliers...		X		
m. Audits of the quality system.....	X			
n. Supervision of testing personnel.....		X		
o. Rework labor .....			X	

2. Prevention costs and appraisal costs are incurred to keep poor quality of conformance from occurring. Internal and external failure costs are incurred because poor quality of conformance has occurred.

**Exercise 2-6** (30 minutes)

1. a. Emblems purchased .....	35,000
Emblems drawn from inventory .....	<u>31,000</u>
Emblems remaining in inventory .....	4,000
Cost per emblem .....	<u>× \$2</u>
Cost in Raw Materials Inventory at May 31 .....	<u>\$ 8,000</u>
 b. Emblems used in production (31,000 – 1,000) .....	30,000
Units completed and transferred to Finished Goods (90% × 30,000) .....	<u>27,000</u>
Units still in Work in Process at May 31 .....	3,000
Cost per emblem .....	<u>× \$2</u>
Cost in Work in Process Inventory at May 31 .....	<u>\$ 6,000</u>
 c. Units completed and transferred to Finished Goods (above).....	27,000
Units sold during the month (75% × 27,000) .....	<u>20,250</u>
Units still in Finished Goods at May 31 .....	6,750
Cost per emblem .....	<u>× \$2</u>
Cost in Finished Goods Inventory at May 31 .....	<u>\$13,500</u>
 d. Units sold during the month (above) .....	20,250
Cost per emblem .....	<u>× \$2</u>
Cost in Cost of Goods Sold at May 31.....	<u>\$40,500</u>
 e. Emblems used in advertising .....	1,000
Cost per emblem .....	<u>× \$2</u>
Cost in Advertising Expense at May 31 .....	<u>\$ 2,000</u>
 2. Raw Materials Inventory—balance sheet	
Work in Process Inventory—balance sheet	
Finished Goods Inventory—balance sheet	
Cost of Goods Sold—income statement	
Advertising Expense—income statement	



**Exercise 2-7** (30 minutes)

1.

ECCLES COMPANY  
Schedule of Cost of Goods Manufactured

## Direct materials:

Raw materials inventory, beginning .....	\$ 8,000	
Add: Purchases of raw materials .....	<u>132,000</u>	
Raw materials available for use .....	140,000	
Deduct: Raw materials inventory, ending .....	<u>10,000</u>	
Raw materials used in production .....		\$130,000
Direct labor .....		90,000
Manufacturing overhead:		
Rent, factory building .....	80,000	
Indirect labor .....	56,300	
Utilities, factory .....	9,000	
Maintenance, factory equipment .....	24,000	
Supplies, factory .....	700	
Depreciation, factory equipment .....	<u>40,000</u>	
Total overhead costs .....		<u>210,000</u>
Total manufacturing costs .....		430,000
Add: Work in process, beginning .....		<u>5,000</u>
		435,000
Deduct: Work in process, ending .....		<u>20,000</u>
Cost of goods manufactured .....		<u><u>\$415,000</u></u>

2. The cost of goods sold section would be:

Finished goods inventory, beginning .....	\$ 70,000
Add: Cost of goods manufactured .....	<u>415,000</u>
Goods available for sale .....	485,000
Deduct: Finished goods inventory, ending .....	<u>25,000</u>
Cost of goods sold .....	<u><u>\$460,000</u></u>

**Exercise 2-8** (15 minutes)

1. No. It appears that the overtime spent completing the job was simply a matter of how the job happened to be scheduled. Under these circumstances, an overtime premium probably should not be charged to a customer whose job happens to fall at the tail end of the day's schedule.
2. 

Direct labor cost: 9 hours × \$20 per hour.....	\$180
General overhead cost: 1 hour × \$10 per hour ...	<u>10</u>
Total labor cost .....	<u><u>\$190</u></u>
3. A charge for an overtime premium might be justified if the customer requested that the work be done on a "rush" basis.

**Exercise 2-9** (15 minutes)

1. Quality
2. Quality of conformance
3. Prevention costs, appraisal costs
4. Internal failure costs, external failure costs
5. External failure costs
6. Appraisal costs
7. Prevention costs
8. Internal failure costs
9. External failure costs
10. Prevention costs, appraisal costs
11. Quality circles
12. Quality cost report

**Exercise 2-10** (15 minutes)

- |  |              |
|--|--------------|
| 1. Direct labor cost: 34 hours × \$12 per hour.....        | \$408        |
| Manufacturing overhead cost: 6 hours × \$12 per hour ..... | <u>72</u>    |
| Total cost .....   | <u>\$480</u> |
- 
- |  |              |
|--|--------------|
| 2. Direct labor cost: 50 hours × \$12 per hour.....        | \$600        |
| Manufacturing overhead cost: 10 hours × \$6 per hour ..... | <u>60</u>    |
| Total cost .....   | <u>\$660</u> |
3. The company could treat the cost of fringe benefits relating to direct labor workers as part of manufacturing overhead. This approach spreads the cost of such fringe benefits over all units of output. Alternatively, the company could treat the cost of fringe benefits relating to direct labor workers as additional direct labor cost. This latter approach charges the costs of fringe benefits to specific jobs rather than to all units of output.

## Problem 2-11 (30 minutes)

Name of the Cost	Variable Cost	Fixed Cost	Product Cost			Period (Selling and Admin.) Cost	Opportunity Cost	Sunk Cost
			Direct Materials	Direct Labor	Mfg. Overhead			
Rental revenue forgone, \$40,000 per year .....							X	
Direct materials cost, \$40 per unit ..	X		X					
Supervisor's salary, \$2,500 per month .....		X			X			
Direct labor cost, \$18 per unit .....	X			X				
Rental cost of warehouse, \$1,000 per month .....		X				X		
Rental cost of equipment, \$3,000 per month .....		X			X			
Depreciation of the building, \$10,000 per year .....		X			X			X
Advertising cost, \$50,000 per year .....		X				X		
Shipping cost, \$10 per unit.....	X					X		
Electrical costs, \$2 per unit.....	X				X			
Return earned on investments, \$6,000 per year .....							X	

**Problem 2-12** (20 minutes)

<i>Cost Item</i>	<i>Cost Behavior</i>		<i>To Units of Product</i>	
	<i>Variable</i>	<i>Fixed</i>	<i>Direct</i>	<i>Indirect</i>
1. Plastic washers used in auto production* ...	X			X
2. Production superintendent's salary .....		X		X
3. Laborers assembling a product .....	X		X	
4. Electricity for operation of machines .....	X			X
5. Janitorial salaries .....		X		X
6. Clay used in brick production .....	X		X	
7. Rent on a factory building .....		X		X
8. Wood used in ski production.....	X		X	
9. Screws used in furniture production* .....	X			X
10. A supervisor's salary.....		X		X
11. Cloth used in suit production .....	X		X	
12. Depreciation of cafeteria equipment.....		X		X
13. Glue used in textbook production* .....	X			X
14. Lubricants for machines .....	X			X
15. Paper used in textbook production.....	X		X	

\* These materials would usually be considered indirect materials because their costs are relatively insignificant. It would not be worth the effort to trace their costs to individual units of product and therefore they would usually be classified as indirect materials.

**Problem 2-13** (30 minutes)

1. Total wages for the week:

Regular time: 40 hours × \$24 per hour.....	\$ 960
Overtime: 5 hours × \$36 per hour.....	180
Total wages .....	<u>\$1,140</u>

Allocation of total wages:

Direct labor: 45 hours × \$24 per hour .....	\$1,080
Manufacturing overhead: 5 hours × \$12 per hour ...	60
Total wages .....	<u>\$1,140</u>
2. Total wages for the week:

Regular time: 40 hours × \$24 per hour.....	\$ 960
Overtime: 10 hours × \$36 per hour .....	360
Total wages .....	<u>\$1,320</u>

Allocation of total wages:

Direct labor: 46 hours × \$24 per hour .....	\$1,104
Manufacturing overhead:	
Idle time: 4 hours × \$24 per hour .....	\$ 96
Overtime premium: 10 hours × \$12 per hour .....	<u>120</u> 216
Total wages .....	<u>\$1,320</u>
3. Total wages and fringe benefits for the week:

Regular time: 40 hours × \$24 per hour.....	\$ 960
Overtime: 8 hours × \$36 per hour.....	288
Fringe benefits: 48 hours × \$8 per hour .....	384
Total wages and fringe benefits .....	<u>\$1,632</u>

Allocation of wages and fringe benefits:

Direct labor: 45 hours × \$24 per hour .....	\$1,080
Manufacturing overhead:	
Idle time: 3 hours × \$24 per hour .....	\$ 72
Overtime premium: 8 hours × \$12 per hour .....	96
Fringe benefits: 48 hours × \$8 per hour.....	<u>384</u> 552
Total wages and fringe benefits .....	<u>\$1,632</u>

**Problem 2-13** (continued)

## 4. Allocation of wages and fringe benefits:

## Direct labor:

Wage cost: 45 hours × \$24 per hour .....	\$1,080	
Fringe benefits: 45 hours × \$8 per hour .....	<u>360</u>	\$1,440

## Manufacturing overhead:

Idle time: 3 hours × \$24 per hour .....	72	
Overtime premium: 8 hours × \$12 per hour .....	96	
Fringe benefits: 3 hours × \$8 per hour .....	<u>24</u>	<u>192</u>
Total wages and fringe benefits .....		<u><u>\$1,632</u></u>



**Problem 2-14** (60 minutes)

1.

Yedder Enterprises  
Quality Cost Report (in thousands of dollars)

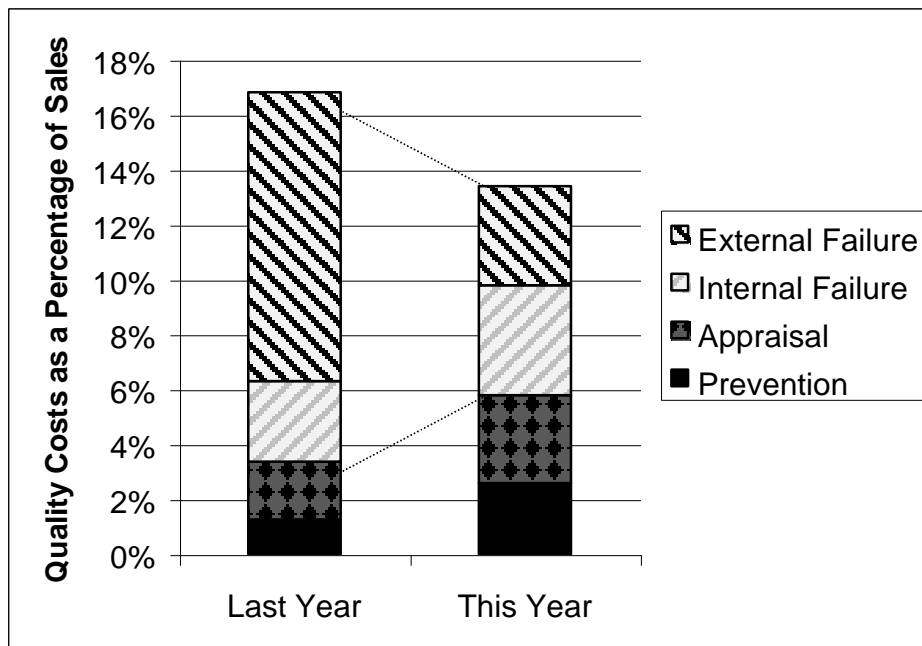
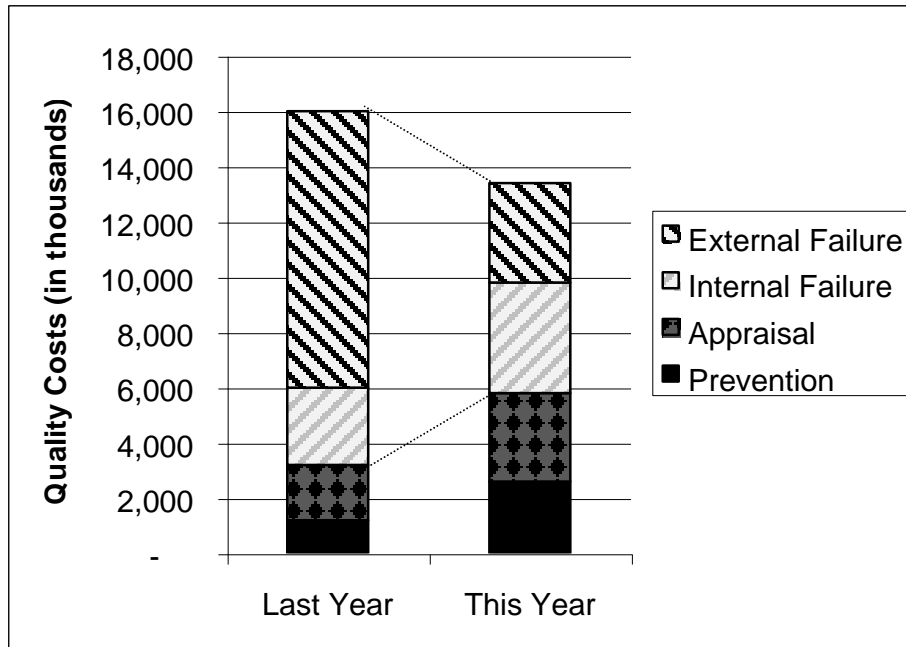
	<u><i>This Year</i></u>		<u><i>Last Year</i></u>	
	<i>Amount</i>	<i>Percent</i>	<i>Amount</i>	<i>Percent</i>
Prevention costs:				
Systems development .....	\$ 680	0.68 %	\$ 120	0.13 %
Statistical process control .....	270	0.27 %	—	0.00 %
Quality engineering .....	<u>1,650</u>	<u>1.65 %</u>	<u>1,080</u>	<u>1.14 %</u>
Total .....	<u>2,600</u>	<u>2.60 %</u>	<u>1,200</u>	<u>1.27 %</u>
Appraisal costs:				
Inspection .....	2,770	2.77 %	1,700	1.79 %
Supplies used in testing .....	40	0.04 %	30	0.03 %
Cost of testing equipment .....	<u>390</u>	<u>0.39 %</u>	<u>270</u>	<u>0.28 %</u>
Total .....	<u>3,200</u>	<u>3.20 %</u>	<u>2,000</u>	<u>2.10 %</u>
Internal failure costs:				
Net cost of scrap .....	1,300	1.30 %	800	0.84 %
Rework labor .....	1,600	1.60 %	1,400	1.47 %
Downtime due to quality problems .....	<u>1,100</u>	<u>1.10 %</u>	<u>600</u>	<u>0.63 %</u>
Total .....	<u>4,000</u>	<u>4.00 %</u>	<u>2,800</u>	<u>2.94 %</u>
External failure costs:				
Product recalls .....	600	0.60 %	3,500	3.68 %
Warranty repairs .....	2,800	2.80 %	3,300	3.47 %
Customer returns of defective goods .....	<u>200</u>	<u>0.20 %</u>	<u>3,200</u>	<u>3.37 %</u>
Total .....	<u>3,600</u>	<u>3.60 %</u>	<u>10,000</u>	<u>10.52 %</u>
Total quality cost .....	<u>\$13,400</u>	<u>13.40 %</u>	<u>\$16,000</u>	<u>16.84 %</u>

\* As a percentage of total sales in each year.

Note: The figures in the last column on the right are subject to rounding error.

2. See the graph on the following page.

## Problem 2-14 (continued)



### **Problem 2-14** (continued)

3. During the past year the company has more than doubled its spending on prevention and it has increased its spending on appraisal activities by 60%. This increased emphasis on prevention and appraisal has resulted in a decline of total quality costs from 16.84% of sales last year to 13.4% of sales this year. While the situation has improved, internal and external failure costs still constitute the majority of the quality costs—and this does not include the lost sales due to customer perceptions of poor quality. However, if the company continues to emphasize prevention and appraisal, the internal and external failure costs should further decline until they are no longer dominant.

Probably due to the increased emphasis on appraisal activities, internal failure costs have actually increased. This is because the increased appraisal activities catch more defects before they are shipped to customers. Thus, the company is incurring more costs for scrap and rework, but it is saving large amounts on external failure costs as a consequence of not releasing defective goods to customers. As better quality is built into products and better defect prevention systems are developed, defects should decrease and appraisal and internal failure costs should also fall.

## Problem 2-15 (30 minutes)

Note to the Instructor: Some of the answers below are debatable.

<i>Cost Item</i>	<i>Variable or Fixed</i>	<i>Selling Cost</i>	<i>Adminis- trative Cost</i>	<i>Manufacturing (Product) Cost</i>	
				<i>Direct</i>	<i>Indirect</i>
1. Depreciation, executive jet.....	F		X		
2. Costs of shipping finished goods to customers .....	V	X			
3. Wood used in furniture manufacturing .....	V			X	
4. Sales manager's salary .....	F	X			
5. Electricity used in furniture manufacturing .....	V				X
6. Secretary to the company president.....	F		X		
7. Aerosol attachment placed on a spray can produced by the company .....	V			X	
8. Billing costs .....	V	X*			
9. Packing supplies for shipping products overseas .....	V	X			
10. Sand used in concrete manufacturing .....	V			X	
11. Supervisor's salary, factory.....	F				X
12. Executive life insurance .....	F		X		
13. Sales commissions.....	V	X			
14. Fringe benefits, assembly line workers .....	V			X**	
15. Advertising costs .....	F	X			
16. Property taxes on finished goods warehouses.....	F	X			
17. Lubricants for machines.....	V				X

\*Could be an administrative cost.

\*\*Could be an indirect cost.

**Problem 2-16** (15 minutes)

1. The controller is correct in his viewpoint that the salary cost should be classified as a selling (marketing) cost. The duties described in the problem have nothing to do with the manufacture of a product, but rather deal with order-taking and shipping finished goods to customers. As stated in the text, selling costs include all costs necessary to secure customer orders and get the finished product into the hands of customers.
2. No, the president is not correct; from the point of view of the reported net operating income for the year, it does make a difference how the salary cost is classified. If the salary cost is classified as a selling expense all of it will appear on the income statement as a period cost. However, if the salary cost is classified as a manufacturing (product) cost, then it will be added into Work in Process Inventory along with other manufacturing costs for the period. To the extent that goods are still in process at the end of the period, part of the salary cost will remain with these goods in the Work in Process Inventory account. Only that portion of the salary cost that has been assigned to finished units will leave the Work in Process Inventory account and be transferred into the Finished Goods Inventory account. In like manner, to the extent that goods are unsold at the end of the period, part of the salary cost will remain with these goods in the Finished Goods Inventory account. Only that portion of the salary that has been assigned to finished units *that are sold during the period* will appear on the income statement as an expense (part of Cost of Goods Sold) for the period.

## Problem 2-17 (30 minutes)

1.

Name of the Cost	Variable Cost	Fixed Cost	Product Cost			Period (Selling and Admin.) Cost	Opportunity Cost	Sunk Cost
			Direct Materials	Direct Labor	Mfg. Overhead			
Frieda's present salary of \$4,000 per month .....							X	
Rent on the garage, \$150 per month ...		X			X			
Rent of production equipment, \$500 per month .....		X			X			
Materials for producing fly swatters, at \$0.30 each .....	X		X					
Labor cost of producing fly swatters, at \$0.50 each .....	X			X				
Rent of room for a sales office, \$75 per month .....		X				X		
Answering device attachment, \$20 per month .....		X				X		
Interest lost on savings account, \$1,000 per year .....							X	
Advertising cost, \$400 per month .....		X				X		
Sales commission, at \$0.10 per fly swatter.....	X					X		
Legal and filing fees, \$600.....								X

**Problem 2-17** (continued)

2. The \$600 legal and filing fees are not a differential cost. These legal and filing fees have already been paid and are a sunk cost. Thus, the cost will not differ depending on whether Frieda decides to produce fly swatters or to stay with the computer firm. All other costs listed above are differential costs since they will be incurred only if Frieda leaves the computer firm and produces the fly swatters.

**Problem 2-18** (45 minutes)

1.

<i>Cost Item</i>	<i>Cost Behavior</i>		<i>Selling or Administrative Cost</i>	<i>Product Cost</i>	
	<i>Variable</i>	<i>Fixed</i>		<i>Direct</i>	<i>Indirect</i>
Direct materials used (wood, glass) .....	\$430,000			\$430,000	
General office salaries .....		\$110,000	\$110,000		
Factory supervision .....		70,000			\$ 70,000
Sales commissions .....	60,000		60,000		
Depreciation, factory building .....		105,000			105,000
Depreciation, office equipment .....		2,000	2,000		
Indirect materials, factory .....	18,000				18,000
Factory labor (cutting and assembly) .....	90,000			90,000	
Advertising .....		100,000	100,000		
Insurance, factory .....		6,000			6,000
General office supplies .....	4,000		4,000		
Property taxes, factory .....		20,000			20,000
Utilities, factory .....	45,000				45,000
Total costs .....	<u>\$647,000</u>	<u>\$413,000</u>	<u>\$276,000</u>	<u>\$520,000</u>	<u>\$264,000</u>



**Problem 2-18** (continued)

2. Only the product costs will be included in the cost of a bookcase. The cost per bookcase will be:

Direct product costs.....	\$520,000
Indirect product costs.....	<u>264,000</u>
Total product costs.....	<u>\$784,000</u>

$$\$784,000 \div 4,000 \text{ bookcases} = \$196 \text{ per bookcase}$$

3. The cost per bookcase would increase. This is because the fixed costs would be spread over fewer units, causing the cost per unit to rise.
4. a. Yes, there probably would be a disagreement. The president is likely to want a price of at least \$196, which is the average cost per unit to manufacture 4,000 bookcases. He may expect an even higher price than this to cover a portion of the administrative costs as well. The neighbor will probably be thinking of cost as including only materials used, or perhaps materials and direct labor.
- b. The term is opportunity cost. Since the company is operating at full capacity, the president must give up the full, regular price of a set to sell a bookcase to the neighbor. Therefore, the president's cost is really the full, regular price of a set.

**Problem 2-19** (60 minutes)

1.

MEDCO, INC.  
Schedule of Cost of Goods Manufactured

Direct materials:

Raw materials inventory, beginning .....	\$ 10,000	
Add: Purchases of raw materials.....	<u>90,000</u>	
Raw materials available for use .....	100,000	
Deduct: Raw materials inventory, ending .....	<u>17,000</u>	
Raw materials used in production .....		\$ 83,000
Direct labor .....		60,000
Manufacturing overhead:		
Depreciation, factory.....	42,000	
Insurance, factory.....	5,000	
Maintenance, factory.....	30,000	
Utilities, factory .....	27,000	
Supplies, factory .....	1,000	
Indirect labor.....	<u>65,000</u>	
Total overhead costs .....		<u>170,000</u>
Total manufacturing costs.....		313,000
Add: Work in process inventory, beginning .....		<u>7,000</u>
		320,000
Deduct: Work in process inventory, ending .....		<u>30,000</u>
Cost of goods manufactured .....		<u><u>\$290,000</u></u>

**Problem 2-19** (continued)

2.

MEDCO, INC.  
Income Statement

Sales .....		\$450,000
Less cost of goods sold:		
Finished goods inventory, beginning .....	\$ 10,000	
Add: Cost of goods manufactured .....	<u>290,000</u>	
Goods available for sale .....	300,000	
Deduct: Finished goods inventory, ending .....	<u>40,000</u>	<u>260,000</u>
Gross margin .....		190,000
Less operating expenses:		
Selling expenses .....	80,000	
Administrative expenses .....	<u>70,000</u>	<u>150,000</u>
Net operating income .....		<u>\$ 40,000</u>

3. Direct materials:  $\$83,000 \div 10,000 \text{ units} = \$8.30 \text{ per unit}$ .

Depreciation:  $\$42,000 \div 10,000 \text{ units} = \$4.20 \text{ per unit}$ .

4. Direct materials:

    Unit cost: \$8.30 (unchanged)

    Total cost:  $15,000 \text{ units} \times \$8.30 \text{ per unit} = \$124,500$ .

Depreciation:

    Unit cost:  $\$42,000 \div 15,000 \text{ units} = \$2.80 \text{ per unit}$ .

    Total cost: \$42,000 (unchanged)

5. Unit cost for depreciation dropped from \$4.20 to \$2.80, because of the increase in production between the two years. Since fixed costs do not change *in total* as the activity level changes, they will decrease on a unit basis as the activity level rises.

**Problem 2-20** (60 minutes)

1.

SKYLER COMPANY  
Schedule of Cost of Goods Manufactured  
For the Month Ended June 30

Direct materials:		
Raw materials inventory, June 1 .....	\$ 17,000	
Add: Purchases of raw materials.....	<u>190,000</u>	
Raw materials available for use .....	207,000	
Deduct: Raw materials inventory, June 30.....	<u>42,000</u>	
Raw materials used in production .....		\$165,000
Direct labor .....		90,000
Manufacturing overhead:		
Rent on facilities (80% × \$40,000) .....	32,000	
Insurance (75% × \$8,000) .....	6,000	
Utilities (90% × \$50,000) .....	45,000	
Indirect labor.....	108,000	
Maintenance, factory.....	7,000	
Depreciation, factory equipment.....	<u>12,000</u>	
Total overhead costs .....		<u>210,000</u>
Total manufacturing costs.....		465,000
Add: Work in process inventory, June 1 .....		<u>70,000</u>
		535,000
Deduct: Work in process inventory, June 30 .....		<u>85,000</u>
Cost of goods manufactured .....		<u><u>\$450,000</u></u>

**Problem 2-20** (continued)

2.

SKYLER COMPANY  
Income Statement  
For the Month Ended June 30

Sales .....		\$600,000
Less cost of goods sold:		
Finished goods inventory, June 1 .....	\$ 20,000	
Add: Cost of goods manufactured .....	<u>450,000</u>	
Goods available for sale .....	470,000	
Deduct: Finished goods inventory, June 30 ....	<u>60,000</u>	<u>410,000</u>
Gross margin .....		190,000
Less operating expenses:		
Selling and administrative salaries.....	35,000	
Rent on facilities (20% × \$40,000) .....	8,000	
Depreciation, sales equipment.....	10,000	
Insurance (25% × \$8,000) .....	2,000	
Utilities (10% × \$50,000) .....	5,000	
Advertising .....	<u>80,000</u>	<u>140,000</u>
Net operating income .....		<u>\$ 50,000</u>

3. In preparing the income statement shown in the text, the accountant failed to distinguish between product costs and period costs, and also failed to recognize the change in inventories between the beginning and end of the month. Once these errors have been corrected, the financial condition of the company looks much better and selling the company may not be advisable.

**Problem 2-21** (60 minutes)

1.

VALENKO COMPANY  
Schedule of Cost of Goods Manufactured

Direct materials:

Raw materials inventory, beginning ..... \$ 50,000

Add: Purchases of raw materials..... 260,000

Raw materials available for use ..... 310,000

Deduct: Raw materials inventory, ending .. 40,000

Raw materials used in production ..... \$270,000

Direct labor ..... 65,000 \*

Manufacturing overhead:

Insurance, factory..... 8,000

Rent, factory building..... 90,000

Utilities, factory ..... 52,000

Cleaning supplies, factory..... 6,000

Depreciation, factory equipment..... 110,000

Maintenance, factory..... 74,000

Total overhead costs ..... 340,000

Total manufacturing costs..... 675,000 (given)

Add: Work in process inventory, beginning .. 48,000 \*

723,000

Deduct: Work in process inventory, ending .. 33,000

Cost of goods manufactured ..... \$690,000

## Problem 2-21 (continued)

The cost of goods sold section of the income statement follows:

Finished goods inventory, beginning .....	\$ 30,000	
Add: Cost of goods manufactured .....	<u>690,000</u>	*
Goods available for sale .....	720,000	(given)
Deduct: Finished goods inventory, ending .....	<u>85,000</u>	*
Cost of goods sold .....	<u>\$635,000</u>	(given)

\*These items must be computed by working backwards up through the statements. An effective way of doing this is to place the form and known balances on the chalkboard, and then work toward the unknown figures.

2. Direct materials:  $\$270,000 \div 30,000 \text{ units} = \$9.00 \text{ per unit}$ .  
Rent, factory building:  $\$90,000 \div 30,000 \text{ units} = \$3.00 \text{ per unit}$ .
3. Direct materials:  
Per unit: \$9.00 (unchanged)  
Total:  $50,000 \text{ units} \times \$9.00 \text{ per unit} = \$450,000$ .  
Rent, factory building:  
Per unit:  $\$90,000 \div 50,000 \text{ units} = \$1.80 \text{ per unit}$ .  
Total: \$90,000 (unchanged).
4. The unit cost for rent dropped from \$3.00 to \$1.80, because of the increase in production between the two years. Since fixed costs do not change *in total* as the activity level changes, they will decrease on a unit basis as the activity level rises.

## Problem 2-22 (30 minutes)

1. Mr. Richart's first action was to direct that discretionary expenditures be delayed until the first of the new year. Providing that these "discretionary expenditures" can be delayed without hampering operations, this is a good business decision. By delaying expenditures, the company can keep its cash a bit longer and thereby earn a bit more interest. There is nothing unethical about such an action. The second action was to ask that the order for the parts be cancelled. Since the clerk's order was a mistake, there is nothing unethical about this action either.

The third action was to ask the accounting department to delay recognition of the delivery until the bill is paid in January. This action is dubious. Asking the accounting department to ignore transactions strikes at the heart of the integrity of the accounting system. If the accounting system cannot be trusted, it is very difficult to run a business or obtain funds from outsiders. However, in Mr. Richart's defense, the purchase of the raw materials really shouldn't be recorded as an expense. He has been placed in an extremely awkward position because the company's accounting policy is flawed.

2. The company's accounting policy with respect to raw materials is incorrect. Raw materials should be recorded as an asset when delivered rather than as an expense. If the correct accounting policy were followed, there would be no reason for Mr. Richart to ask the accounting department to delay recognition of the delivery of the raw materials. This flawed accounting policy creates incentives for managers to delay deliveries of raw materials until after the end of the fiscal year. This could lead to raw materials shortages and poor relations with suppliers who would like to record *their* sales before the end of the year.

The company's "manage-by-the-numbers" approach does not foster ethical behavior—particularly when managers are told to "do anything so long as you hit the target profits for the year." Such "no excuses" pressure from the top too often leads to unethical behavior when managers have difficulty meeting target profits.



**Problem 2-23** (45 minutes)

1. A percentage analysis of the company's quality cost report is presented below:

	<i>Year 2</i>			<i>Year 1</i>		
	<i>Amount</i>	<i>Percentage*</i>		<i>Amount</i>	<i>Percentage*</i>	
Prevention costs:						
Machine maintenance .....	\$ 160	3.5 %	27.1 %	\$ 215	5.2 %	22.3 %
Training suppliers .....	15	0.3	2.5	5	0.1	0.5
Design reviews .....	<u>95</u>	<u>2.1</u>	<u>16.1</u>	<u>20</u>	<u>0.5</u>	<u>2.1</u>
Total.....	<u>270</u>	<u>6.0</u>	<u>45.7</u>	<u>240</u>	<u>5.8</u>	<u>24.9</u>
Appraisal costs:						
Incoming inspection.....	22	0.5	3.7	45	1.1	4.7
Final testing.....	<u>94</u>	<u>2.1</u>	<u>15.9</u>	<u>160</u>	<u>3.9</u>	<u>16.6</u>
Total.....	<u>116</u>	<u>2.6</u>	<u>19.6</u>	<u>205</u>	<u>5.0</u>	<u>21.3</u>
Internal failure costs:						
Rework .....	62	1.4	10.5	120	2.9	12.4
Scrap .....	<u>40</u>	<u>0.9</u>	<u>6.8</u>	<u>68</u>	<u>1.7</u>	<u>7.1</u>
Total.....	<u>102</u>	<u>2.3</u>	<u>17.3</u>	<u>188</u>	<u>4.6</u>	<u>19.5</u>
External failure costs:						
Warranty repairs.....	23	0.5	3.9	69	1.7	7.2
Customer returns.....	<u>80</u>	<u>1.8</u>	<u>13.5</u>	<u>262</u>	<u>6.4</u>	<u>27.2</u>
Total.....	<u>103</u>	<u>2.3</u>	<u>17.4</u>	<u>331</u>	<u>8.0</u>	<u>34.3</u>
Total quality cost.....	<u>\$ 591</u>	<u>13.1 %</u>	<u>100.0 %</u>	<u>\$ 964</u>	<u>23.4 %</u>	<u>100.0 %</u>
Total production cost.....	<u>\$4,510</u>			<u>\$4,120</u>		

\*Percentage figures may not add down due to rounding.

### **Problem 2-23** (continued)

From the above analysis it would appear that Bergen, Inc.'s program has been successful, since:

- total quality costs as a percentage of total production have declined from 23.4% to 13.1%.
  - external failure costs, those costs signaling customer dissatisfaction, have declined from 8% of total production to 2.3%. These declines in warranty repairs and customer returns should translate into increased sales in the future.
  - internal failure costs have been reduced from 4.6% to 2.3% of production costs, which represents a 50% drop.
  - appraisal costs have decreased from 5.0% to 2.6% of total production—a drop of 48%. Higher quality is reducing the demand for final testing.
  - quality costs have shifted to the area of prevention where problems are solved before the customer becomes involved. Maintenance, training, and design reviews have increased from 5.8% of total production cost to 6% and from 24.9% of total quality costs to 45.7%. The \$30,000 increase is more than offset by decreases in other quality costs.
2. Tony Reese's current reaction to the quality improvement program is more favorable as he is seeing the benefits of having the quality problems investigated and solved before they reach the production floor. Because of improved designs, quality training, and additional pre-production inspections, scrap and rework costs have declined. Consequently, fewer resources are now required for customer service. Throughput has increased and throughput time has decreased; work is now moving much faster through the department.
3. To measure the opportunity cost of not implementing the quality program, Bergen Inc. could assume that:
- sales and market share would continue to decline and then calculate the revenue and income lost.
  - the company would have to compete on price rather than quality and calculate the impact of having to lower product prices.

**Problem 2-24** (15 minutes)

Item	Description	Direct or Indirect Cost of the Immunization Center		Direct or Indirect Cost of Particular Patients		Variable or Fixed with Respect to the Number of Immunizations Administered	
		Direct	Indirect	Direct	Indirect	Variable	Fixed
a.	The salary of the head nurse in the Immunization Center .....	X			X		X
b.	Costs of incidental supplies consumed in the Immunization Center such as paper towels .....	X			X	X	
c.	The cost of lighting and heating the Immunization Center .....	X			X		X
d.	The cost of disposable syringes used in the Immunization Center .....	X		X		X	
e.	The salary of the Central Area Well-Baby Clinic's Information Systems manager .....		X		X		X
f.	The costs of mailing letters soliciting donations to the Central Area Well-Baby Clinic .....		X		X		X
g.	The wages of nurses who work in the Immunization Center* .....	X			X		X
h.	The cost of medical malpractice insurance for the Central Area Well-Baby Clinic .....		X		X		X
i.	Depreciation on the fixtures and equipment in the Immunization Center .....	X			X		X

\* The wages of the nurses could be variable and a direct cost of serving particular patients.

**Problem 2-25** (45 minutes)

	<i>Case 1</i>	<i>Case 2</i>	<i>Case 3</i>	<i>Case 4</i>
Direct materials .....	\$ 7,000	\$ 9,000	\$ 6,000	\$ 8,000
Direct labor .....	2,000	4,000	5,000 *	3,000
Manufacturing overhead.....	<u>10,000</u>	<u>12,000</u> *	<u>7,000</u>	<u>21,000</u>
Total manufacturing costs .....	19,000 *	25,000	18,000	32,000 *
Beginning work in process inventory .....	3,000 *	1,000	2,000	1,500 *
Ending work in process inventory .....	<u>(4,000)</u>	<u>(3,500)</u>	<u>(4,000)</u> *	<u>(2,000)</u>
Cost of goods manufactured.....	<u>\$18,000</u>	<u>\$22,500</u> *	<u>\$16,000</u>	<u>\$31,500</u> *
Sales.....	\$25,000	\$40,000	\$30,000	\$50,000
Beginning finished goods inventory.....	6,000	8,000 *	7,000	9,000
Cost of goods manufactured.....	<u>18,000</u> *	<u>22,500</u> *	<u>16,000</u> *	<u>31,500</u>
Goods available for sale .....	24,000 *	30,500 *	23,000 *	40,500 *
Ending finished goods inventory .....	<u>9,000</u>	<u>4,000</u>	<u>5,000</u> *	<u>7,000</u>
Cost of goods sold .....	<u>15,000</u> *	<u>26,500</u>	<u>18,000</u>	<u>33,500</u> *
Gross margin.....	10,000 *	13,500 *	12,000 *	16,500 *
Operating expenses .....	<u>6,000</u>	<u>8,000</u> *	<u>9,000</u> *	<u>10,000</u>
Net operating income .....	<u>\$ 4,000</u> *	<u>\$ 5,500</u>	<u>\$ 3,000</u>	<u>\$ 6,500</u> *

\*Missing data in the problem.

**Problem 2-26** (45 minutes)

1.

HICKEY COMPANY  
Schedule of Cost of Goods Manufactured

## Direct materials:

Raw materials inventory, beginning .....	\$ 20,000	
Add: Purchases of raw materials.....	<u>160,000</u>	
Raw materials available for use .....	180,000	
Deduct: Raw materials inventory, ending .....	<u>10,000</u>	
Raw materials used in production .....		\$170,000
Direct labor .....		80,000
Manufacturing overhead:		
Indirect labor.....	60,000	
Building rent (80% × \$50,000) .....	40,000	
Utilities, factory .....	35,000	
Royalty on patent (\$1 per unit × 30,000 units) .....	30,000	
Maintenance, factory.....	25,000	
Rent on equipment: \$6,000 + (\$0.10 per unit × 30,000 units) ....	9,000	
Other factory overhead costs.....	<u>11,000</u>	
Total overhead costs .....		<u>210,000</u>
Total manufacturing costs.....		460,000
Add: Work in process inventory, beginning .....		<u>30,000</u>
		490,000
Deduct: Work in process inventory, ending .....		<u>40,000</u>
Cost of goods manufactured .....		<u>\$450,000</u>

**Problem 2-26** (continued)

2. a. To compute the number of units in the finished goods inventory at the end of the year, we must first compute the number of units sold during the year.

$$\frac{\text{Total sales}}{\text{Unit selling price}} = \frac{\$650,000}{\$25 \text{ per unit}} = 26,000 \text{ units sold}$$

Units in the finished goods inventory, beginning .....	0
Units produced during the year .....	<u>30,000</u>
Units available for sale .....	30,000
Units sold during the year (above) .....	<u>26,000</u>
Units in the finished goods inventory, ending .....	<u>4,000</u>

- b. The average production cost per unit during the year would be:

$$\frac{\text{Cost of goods manufactured}}{\text{Number of units produced}} = \frac{\$450,000}{30,000 \text{ units}} = \$15 \text{ per unit.}$$

Thus, the cost of the units in the finished goods inventory at the end of the year would be: 4,000 units × \$15 per unit = \$60,000.

3.

**HICKEY COMPANY**  
Income Statement

Sales .....		\$650,000
Less cost of goods sold:		
Finished goods inventory, beginning .....	\$ 0	
Add: Cost of goods manufactured .....	<u>450,000</u>	
Goods available for sale .....	450,000	
Finished goods inventory, ending .....	<u>60,000</u>	<u>390,000</u>
Gross margin .....		260,000
Less operating expenses:		
Advertising .....	50,000	
Building rent (20% × \$50,000) .....	10,000	
Selling and administrative salaries .....	140,000	
Other selling and administrative expense .....	<u>20,000</u>	<u>220,000</u>
Net operating income .....		<u>\$ 40,000</u>

**Case 2-27** (60 minutes)

1. No distinction has been made between period expenses and product costs on the income statement prepared by Louganis. Product costs (e.g., direct materials, direct labor, and manufacturing overhead) should be assigned to inventory accounts and flow through to the income statement as cost of goods sold only when finished products are sold. Since there were ending inventories, some of the product costs should appear on the balance sheet as assets rather than on the income statement as expenses.

2.

MEDICAL TECHNOLOGY, INC.  
Schedule of Cost of Goods Manufactured  
For the Quarter Ended June 30

Direct materials:

Raw materials inventory, beginning .....	\$ 0	
Add: Purchases of raw materials.....	<u>310,000</u>	
Raw materials available for use .....	310,000	
Deduct: Raw materials inventory, ending .....	<u>40,000</u>	
Raw materials used in production .....		\$270,000
Direct labor .....		80,000
Manufacturing overhead:		
Cleaning supplies, production .....	6,000	
Indirect labor cost.....	135,000	
Maintenance, production .....	47,000	
Rental cost, facilities (80% × \$65,000) .....	52,000	
Insurance, production .....	9,000	
Utilities (90% × \$40,000).....	36,000	
Depreciation, production equipment .....	<u>75,000</u>	
Total overhead costs .....		<u>360,000</u>
Total manufacturing costs.....		710,000
Add: Work in process inventory, beginning .....		<u>0</u>
		710,000
Deduct: Work in process inventory, ending .....		<u>30,000</u>
Cost of goods manufactured .....		<u>\$680,000</u>

**Case 2-27** (continued)

3. Before an income statement can be prepared, the cost of the 4,000 monitors in the ending finished goods inventory must be determined. Altogether, the company produced 20,000 units during the quarter; thus, the production cost per unit would be:

$$\frac{\text{Cost of goods manufactured}}{\text{Units produced during the quarter}} = \frac{\$680,000}{20,000 \text{ units}} = \$34 \text{ per unit}$$

Since 4,000 monitors (20,000 – 16,000 = 4,000) were in the ending finished goods inventory, the total cost of this inventory would be:

$$4,000 \text{ units} \times \$34 \text{ per unit} = \$136,000.$$

With this figure and other data from the case, the company's income statement for the quarter can be prepared as follows:

MEDICAL TECHNOLOGY, INC.  
Income Statement  
For the Quarter Ended June 30

Sales.....		\$975,000
Less cost of goods sold:		
Finished goods inventory, beginning .....	\$ 0	
Add: Cost of goods manufactured .....	<u>680,000</u>	
Goods available for sale .....	680,000	
Deduct: Finished goods inventory, ending .....	<u>136,000</u>	<u>544,000</u>
Gross margin.....		431,000
Less operating expenses:		
Selling and administrative salaries.....	90,000	
Advertising .....	200,000	
Rental cost, facilities (20% × \$65,000) .....	13,000	
Depreciation, office equipment .....	18,000	
Utilities (10% × \$40,000).....	4,000	
Travel, salespersons.....	<u>60,000</u>	<u>385,000</u>
Net operating income .....		<u>\$ 46,000</u>



**Case 2-27** (continued)

4. No, the insurance company probably does not owe Medical Technology \$227,000. The key question is how “cost” was defined in the insurance contract. It is most likely that the insurance contract limits reimbursement for losses to those costs that would normally be considered product costs—in other words, direct materials, direct labor, and manufacturing overhead. The \$227,000 figure is overstated since it includes elements of selling and administrative expenses as well as all of the product costs. The \$227,000 figure also does not recognize that some costs incurred during the period are in the ending Raw Materials and Work in Process inventory accounts, as explained in part (1) above. The insurance company’s liability is probably just \$136,000, which is the amount of cost associated with the ending Finished Goods inventory as shown in part (3) above.

**Case 2-28** (60 minutes)

The following cost items are needed before any schedules or statements can be prepared:

Direct labor cost:

$$\frac{1}{4} \times \text{Manufacturing overhead} = \text{Direct labor cost}$$

$$\frac{1}{4} \times \$520,000 = \$130,000$$

Materials used in production:

Direct labor and direct materials .....	\$510,000
Less direct labor cost .....	<u>130,000</u>
Direct materials cost .....	<u>\$380,000</u>

Cost of goods manufactured:

Goods available for sale .....	\$960,000
Less finished goods inventory, beginning .....	<u>90,000</u>
Cost of goods manufactured .....	<u>\$870,000</u>

The easiest way to proceed from this point is to place all known amounts on the chalkboard in a partially completed schedule of cost of goods manufactured and a partially completed income statement. Then fill in the missing amounts by analysis of the available data.

Direct materials:

Raw materials inventory, beginning .....	\$ 30,000
Add: Purchases of raw materials .....	<u>420,000</u>
Raw materials available for use .....	450,000
Deduct: Raw materials inventory, ending .....	<u>A</u>
Raw materials used in production (see above) .....	380,000
Direct labor cost (see above) .....	130,000
Manufacturing overhead cost .....	<u>520,000</u>
Total manufacturing costs .....	1,030,000
Add: Work in process inventory, beginning .....	<u>50,000</u>
	1,080,000
Deduct: Work in process inventory, ending .....	<u>B</u>
Cost of goods manufactured (see above) .....	<u>\$ 870,000</u>

**Case 2-28** (continued)

Therefore, "A" (Raw materials inventory, ending) would be \$70,000; and "B" (Work in process inventory, ending) would be \$210,000.

Sales .....		\$1,350,000
Less cost of goods sold:		
Finished goods inventory, beginning .....	\$ 90,000	
Add: Cost of goods manufactured (see above) .....	<u>870,000</u>	
Goods available for sale .....	960,000	
Deduct: Finished goods inventory, ending...	<u>    C    </u>	<u>810,000</u> *
Gross margin .....		<u>\$ 540,000</u>

$$*\$1,350,000 \times (100\% - 40\%) = \$810,000.$$

Therefore, "C" (Finished goods inventory, ending) would be \$150,000. The procedure outlined above is just one way in which the solution to the case can be approached. Some students may wish to start at the bottom of the income statement (with gross margin) and work upwards from that point. Also, the solution can be obtained by use of T-accounts.

## Group Exercise 2-29

1. This statement reflects Ford's focus on keeping costs down. Producing cars in different colors adds to costs and reduces output in a variety of ways. First, changing colors on the production line involves considerable setups, during which time nothing can be painted. The old color must be purged from paint lines before the new color can be applied. And different colors mean larger paint inventories and—perhaps most importantly—larger inventories of finished autos. By producing the Model T in only one color, Ford was able to keep costs low and to keep throughput up—thus keeping its costs low. However, the market was eventually willing to pay for more colors and Ford was slow to adapt to this change.
2. As stated in the problem, further efficiencies could be achieved by implementing standardized work procedures, specializing work, and using machines to enhance the productivity of individual workers.
3. There are indeed limits to lowering costs—they can't go below zero. One might think that the lowest limit is the cost of raw materials used in production. However, even this cost can be pushed down over time as more efficient means of producing raw materials are developed.
4. The most obvious application of mass production concepts to university education has been the increase in the number of students in classes—with large lecture classes now being the norm in many introductory courses. Hospitals have applied the concepts of mass production by developing standardized procedures and by specializing in certain areas such as cardiac care or cancer treatment. Airlines have applied mass production concepts by increasing the size of the jets they fly and by reducing the time required to service a jet between flights.

## Group Exercise 2-30

1. A fixed cost is normally defined as a cost that remains constant, in total, regardless of changes in the level of activity. A variable cost is normally defined as a cost that varies, in total, in direct proportion to changes in the level of activity.
2. The relevant measure of activity for a steel company is probably the volume of steel produced. Fixed costs for a steel company include factory rent and depreciation, property taxes, many administrative costs, salaries, and periodic depreciation of equipment. Variable costs include the cost of raw materials, some energy costs, some labor costs, and some supply costs.

3. A number of different measures of activity could be used at a hospital. Some hospitals use a measure called patient-days, which counts a patient in the hospital for one day as a patient-day. Fixed costs at a hospital include the rental and depreciation of buildings, administrative salaries, utilities, insurance, and the costs of equipment. Variable costs include the costs of drugs and supplies and some labor costs.

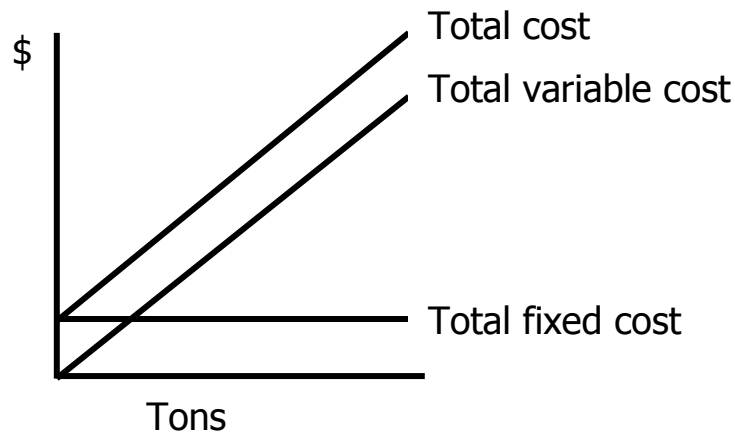
Universities often use credit-hours or the total number of students enrolled as the measure of activity. Fixed costs for a university include the costs of buildings, salaries, utilities, grounds maintenance, and so on. Variable costs are minimal.

A measure of activity at an auto manufacturer might be the number of cars produced. Fixed costs for an auto manufacturer include the costs of buildings and equipment, insurance, salaries, and utilities. Variable costs include raw materials and perhaps some labor.

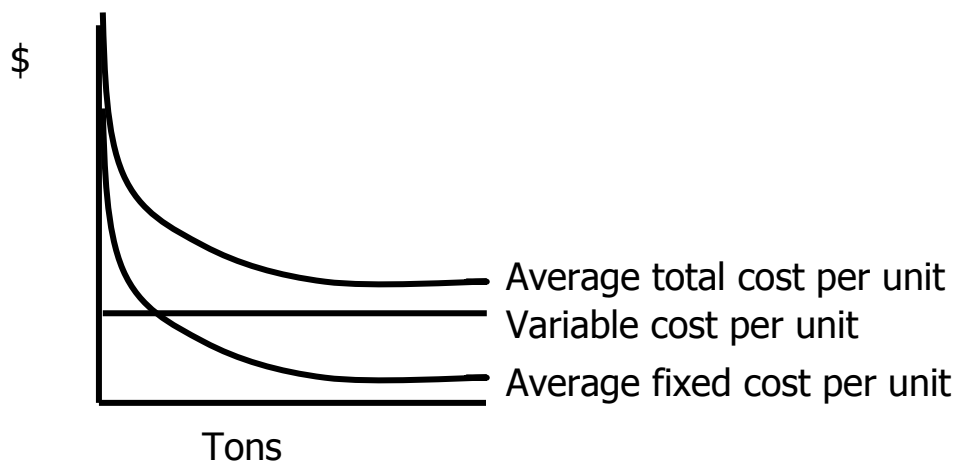
4. As the volume of steel produced increases, total fixed costs remain the same; the fixed cost per unit decreases; total variable costs increase; the variable cost per unit remains the same; total cost increases (due to the increase in total variable cost); and the average unit cost decreases (because of the decline in the fixed cost per unit).

### Group Exercise 2-30 (continued)

5. The following graph depicts how total costs behave as a function of how many tons of steel are produced.



6. The following graph depicts how average costs per unit behave as a function of how many tons of steel are produced.



7. Once capacity has been set, total fixed costs and variable costs per unit remain the same while the average fixed cost per unit drops and the total variable cost increases as demand (output) increases.