Chapter 1

Managerial Accounting and Cost Concepts

Questions

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

**1-2**

**a.** Direct materials are an integral part of a finished product and their costs 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 their costs can be traced to the product only at great cost or inconvenience.

**c.** Direct labor consists of labor costs that can be easily traced to particular products. Direct labor is also called “touch labor.”

**d.** Indirect labor consists of 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. Consequently, manufacturing overhead includes indirect materials and indirect labor as well as other manufacturing costs.

**1-3** 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.

**1-4**

1. Variable cost: The variable cost per unit is constant, but total variable cost changes in direct proportion to changes in volume.
2. Fixed cost: The total fixed cost is constant within the relevant range. The *average* fixed cost per unit varies inversely with changes in volume.
3. Mixed cost: A mixed cost contains both variable and fixed cost elements.

**1-5**

1. Unit fixed costs decrease as the activity level increases.
2. Unit variable costs remain constant as the activity level increases.
3. Total fixed costs remain constant as the activity level increases.
4. Total variable costs increase as the activity level increases.

**1-6**

1. Cost behavior: Cost behavior refers to the way in which costs change in response to changes in a measure of activity such as sales volume, production volume, or orders processed.
2. Relevant range: The relevant range is the range of activity within which assumptions about variable and fixed cost behavior are valid.

**1-7** An activity base is a measure of whatever causes the incurrence of a variable cost. Examples of activity bases include units produced, units sold, letters typed, beds in a hospital, meals served in a cafe, service calls made, etc.

**1-8** The linear assumption is reasonably valid providing that the cost formula is used only within the relevant range.

**1-9** A discretionary fixed cost has a fairly short planning horizon—usually a year. Such costs arise from annual decisions by management to spend on certain fixed cost items, such as advertising, research, and management development. A committed fixed cost has a long planning horizon—generally many years. Such costs relate to a company’s investment in facilities, equipment, and basic organization. Once such costs have been incurred, they are “locked in” for many years.

**1-10** Yes. As the anticipated level of activity changes, the level of fixed costs needed to support operations may also change. Most fixed costs are adjusted upward and downward in large steps, rather than being absolutely fixed at one level for all ranges of activity.**1-11** The traditional approach organizes costs by function, such as production, selling, and administration. Within a functional area, fixed and variable costs are intermingled. The contribution approach income statement organizes costs by behavior, first deducting variable expenses to obtain contribution margin, and then deducting fixed expenses to obtain net operating income.

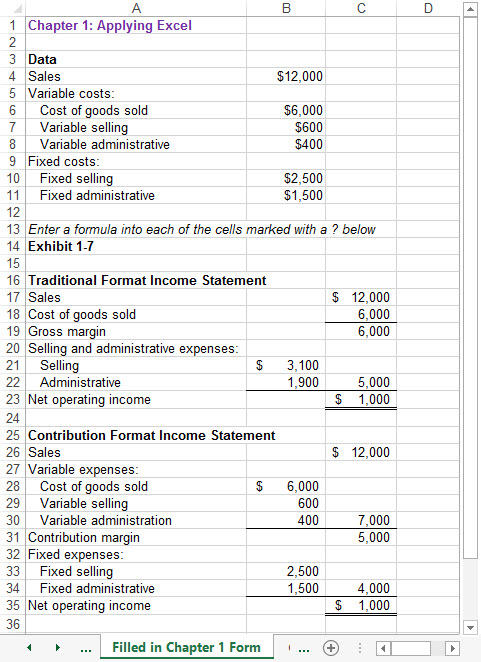
**1-12** The contribution margin is total sales revenue less total variable expenses.

**1-13** 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.

**1-14** 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 between the fixed costs of purchasing the two machines is a differential cost.

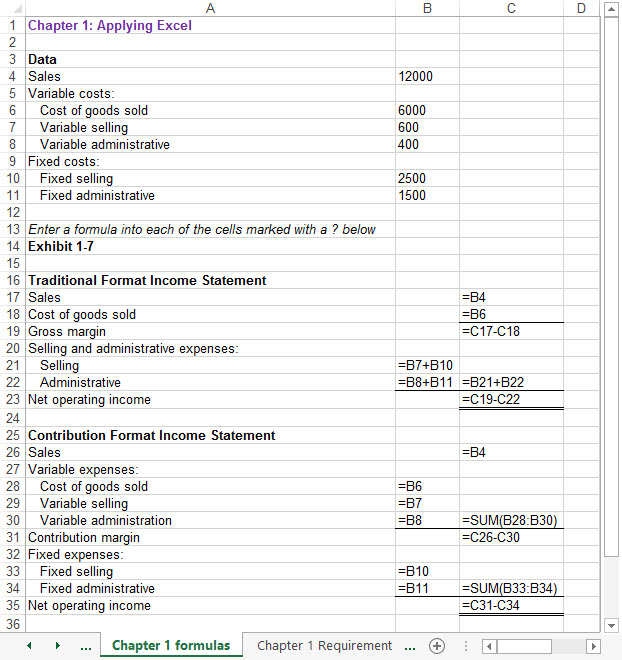
Chapter 1: Applying Excel

The completed worksheet is shown below.

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Chapter 1: Applying Excel (continued)

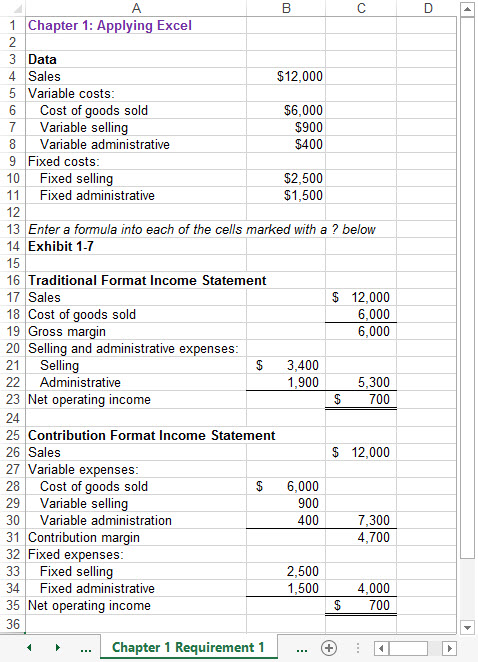
The completed worksheet, with formulas displayed, is shown below.

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[Note: To display formulas in cells instead of their calculated amounts, consult Excel Help.]

Chapter 1: Applying Excel (continued)

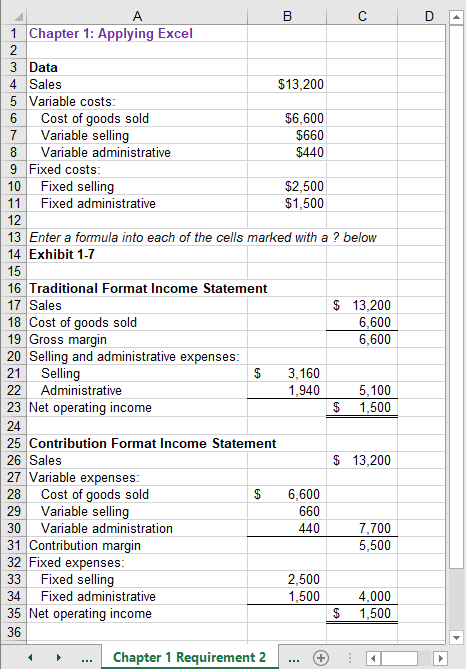
1. When the variable selling cost is changed to $900, the worksheet changes as show below:

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The gross margin is $6,000; the same as it was before. It did not change because the variable selling expense is deducted *after* the gross margin, not before it on the traditional format income statement.

Chapter 1: Applying Excel (continued)

2. The new worksheet appears below:



Chapter 1: Applying Excel (continued)

The variable costs increased by 10% when the sales increased by 10%, however the fixed costs did not increase at all. By definition, total variable cost increases in proportion to activity whereas total fixed cost is constant. (In the real world, cost behavior may be messier.)

The contribution margin also increased by 10%, from $5,000 to $5,500, because both of its components—sales and variable costs—increased by 10%.

The net operating income increased by more than 10%, from $1,000 to $1,500, because even though sales and variable expenses increased by 10%, the fixed costs did not increase by 10%.

The Foundational 15

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | Direct materials | $  6.00 |  |
|  | Direct labor | 3.50 |  |
|  | Variable manufacturing overhead | 1.50 |  |
|  | Variable manufacturing cost per unit | $11.00 |  |
|  |  |  |  |
|  | Variable manufacturing cost per unit (a) | $11.00 |  |
|  | Number of units produced (b) | 10,000 |  |
|  | Total variable manufacturing cost (a) × (b) |  | $110,000 |
|  | Average fixed manufacturing overhead per unit (c) | $4.00 |  |
|  | Number of units produced (d) | 10,000 |  |
|  | Total fixed manufacturing cost (c) × (d) |  | 40,000 |
|  | Total product (manufacturing) cost |  | $150,000 |

Note: The average fixed manufacturing overhead cost per unit of $4.00 is valid for only one level of activity—10,000 units produced.

|  |  |  |  |
| --- | --- | --- | --- |
| 2. | Sales commissions | $1.00 |  |
|  | Variable administrative expense | 0.50 |  |
|  | Variable selling and administrative per unit | $1.50 |  |
|  |  |  |  |
|  | Variable selling and admin. per unit (a) | $1.50 |  |
|  | Number of units sold (b) | 10,000 |  |
|  | Total variable selling and admin. expense  (a) × (b) |  | $15,000 |
|  | Average fixed selling and administrative expense per unit ($3 fixed selling + $2 fixed admin.) (c) | $5.00 |  |
|  | Number of units sold (d) | 10,000 |  |
|  | Total fixed selling and administrative expense (c) × (d) |  | 50,000 |
|  | Total period (nonmanufacturing) cost |  | $65,000 |

Note: The average fixed selling and administrative expense per unit of $5.00 is valid for only one level of activity—10,000 units sold.

The Foundational 15 (continued)

|  |  |  |
| --- | --- | --- |
| 3. | Direct materials | $  6.00 |
|  | Direct labor | 3.50 |
|  | Variable manufacturing overhead | 1.50 |
|  | Sales commissions | 1.00 |
|  | Variable administrative expense | 0.50 |
|  | Variable cost per unit sold | $12.50 |
| 4. | Direct materials | $  6.00 |
|  | Direct labor | 3.50 |
|  | Variable manufacturing overhead | 1.50 |
|  | Sales commissions | 1.00 |
|  | Variable administrative expense | 0.50 |
|  | Variable cost per unit sold | $12.50 |
| 5. | Variable cost per unit sold (a) | $12.50 |
|  | Number of units sold (b) | 8,000 |
|  | Total variable costs (a) × (b) | $100,000 |
| 6. | Variable cost per unit sold (a) | $12.50 |
|  | Number of units sold (b) | 12,500 |
|  | Total variable costs (a) × (b) | $156,250 |
| 7. | Total fixed manufacturing cost (see requirement 1) (a) | $40,000 |
|  | Number of units produced (b) | 8,000 |
|  | Average fixed manufacturing cost per unit produced (a) ÷ (b) | $5.00 |
| 8. | Total fixed manufacturing cost (see requirement 1) (a) | $40,000 |
|  | Number of units produced (b) | 12,500 |
|  | Average fixed manufacturing cost per unit produced (a) ÷ (b) | $3.20 |
| 9. | Total fixed manufacturing cost (see requirement 1) | $40,000 |
|  |  |  |

The Foundational 15 (continued)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 10. | Total fixed manufacturing cost (see requirement 1) | $40,000 | | | | |
| 11. | Variable overhead per unit (a) | | $1.50 | | |  | | |
|  | Number of units produced (b) | | 8,000 | | |  | | |
|  | Total variable overhead cost (a) × (b) | |  | | | $12,000 | | |
|  | Total fixed overhead (see requirement 1) | |  | | | 40,000 | | |
|  | Total manufacturing overhead cost | |  | | | $52,000 | | |
| Total manufacturing overhead cost (a) | | |  | | $52,000 | | | |
| Number of units produced (b) | | |  | | 8,000 | | | |
| Manufacturing overhead per unit (a) ÷ (b) | | |  | | $6.50 | | | |
| 12. | Variable overhead per unit (a) | | $1.50 | | |  | | |
|  | Number of units produced (b) | | 12,500 | | |  | | |
|  | Total variable overhead cost (a) × (b) | |  | | | $18,750 | | |
|  | Total fixed overhead (see requirement 1) | |  | | | 40,000 | | |
|  | Total manufacturing overhead cost | |  | | | $58,750 | | |
| Total manufacturing overhead cost (a) | | |  | | $58,750 | | | |
| Number of units produced (b) | | |  | | 12,500 | | | |
| Manufacturing overhead per unit (a) ÷ (b) | | |  | | $4.70 | | | |
| 13. | Selling price per unit | | | $22.00 | |
|  | Variable cost per unit sold (see requirement 4) | | | 12.50 | |
|  | Contribution margin per unit | | | $  9.50 | |
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The Foundational 15 (continued)

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| --- | --- | --- | --- | --- | --- |
| 14. | Direct materials per unit | $6.00 |  | | |
|  | Direct labor per unit | 3.50 |  | | |
|  | Direct manufacturing cost per unit | $9.50 |  | | |
|  |  |  |  | | |
|  | Direct manufacturing cost per unit (a) | $9.50 |  | | |
|  | Number of units produced (b) | 11,000 |  | | |
|  | Total direct manufacturing cost (a) × (b) | $104,500 |  | | |
| Variable overhead per unit (a) | | $1.50 |  | |
| Number of units produced (b) | | 11,000 |  | |
| Total variable overhead cost (a) × (b) | |  | $16,500 | | | |
| Total fixed overhead (see requirement 1) | |  | 40,000 | | | |
| Total indirect manufacturing cost | |  | $56,500 | | | |
| 15. | Direct materials per unit | $6.00 | |
|  | Direct labor per unit | 3.50 | |
|  | Variable manufacturing overhead per unit | 1.50 | |
|  | Incremental cost per unit produced | $11.00 | |

Note: Variable selling and administrative expenses are variable with respect to the number of units sold, not the number of units produced.

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Cost | Cost Object | Direct Cost | Indirect Cost |
| 1. | The wages of pediatric nurses | The pediatric department | X |  |
| 2. | Prescription drugs | A particular patient | X |  |
| 3. | Heating the hospital | The pediatric department |  | X |
| 4. | The salary of the head of pediatrics | The pediatric department | X |  |
| 5. | The salary of the head of pediatrics | A particular pediatric patient |  | X |
| 6. | Hospital chaplain’s salary | A particular patient |  | X |
| 7. | Lab tests by outside contractor | A particular patient | X |  |
| 8. | Lab tests by outside contractor | A particular department | X |  |

**Exercise 1-2** (10 minutes)

1. The cost of a hard drive installed in a computer: direct materials.

2. The cost of advertising in the *Puget Sound Computer User* newspaper: selling.

3. The wages of employees who assemble computers from components: direct labor.

4. Sales commissions paid to the company’s salespeople: selling.

5. The salary of the assembly shop’s supervisor: manufacturing overhead.

6. The salary of the company’s accountant: administrative.

7. Depreciation on equipment used to test assembled computers before release to customers: manufacturing overhead.

8. Rent on the facility in the industrial park: a combination of manufacturing overhead, selling, and administrative. The rent would most likely be prorated on the basis of the amount of space occupied by manufacturing, selling, and administrative operations.

**Exercise 1-3** (15 minutes)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Product Cost | Period Cost |
| 1. | Depreciation on salespersons’ cars |  | X |
| 2. | Rent on equipment used in the factory | X |  |
| 3. | Lubricants used for machine maintenance | X |  |
| 4. | Salaries of personnel who work in the finished goods warehouse |  | X |
| 5. | Soap and paper towels used by factory workers at the end of a shift | X |  |
| 6. | Factory supervisors’ salaries | X |  |
| 7. | Heat, water, and power consumed in the factory | X |  |
| 8. | Materials used for boxing products for shipment overseas (units are not normally boxed) |  | X |
| 9. | Advertising costs |  | X |
| 10. | Workers’ compensation insurance for factory employees | X |  |
| 11. | Depreciation on chairs and tables in the factory lunchroom | X |  |
| 12. | The wages of the receptionist in the administrative offices |  | X |
| 13. | Cost of leasing the corporate jet used by the company's executives |  | X |
| 14. | The cost of renting rooms at a Florida resort for the annual sales conference |  | X |
| 15. | The cost of packaging the company’s product | X |  |

**Exercise 1-4** (15 minutes)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. |  | Cups of Coffee Served  in a Week | | |
|  |  | *2,000* | *2,100* | *2,200* |
|  | Fixed cost | $1,200 | $1,200 | $1,200 |
|  | Variable cost | 440 | 462 | 484 |
|  | Total cost | $1,640 | $1,662 | $1,684 |
|  | Average cost per cup served \* | $0.820 | $0.791 | $0.765 |

\* Total cost ÷ cups of coffee served in a week

2. The average cost of a cup of coffee decreases as the number of cups of coffee served increases because the fixed cost is spread over more cups of coffee.

**Exercise 1-5** (15 minutes)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Item | Differential Cost | Sunk  Cost | Opportunity Cost |
| 1. | Cost of the old X-ray machine |  | X |  |
| 2. | The salary of the head of the Radiology Department |  |  |  |
| 3. | The salary of the head of the Laboratory Department |  |  |  |
| 4. | Cost of the new color laser printer | X |  |  |
| 5. | Rent on the space occupied by Radiology |  |  |  |
| 6. | The cost of maintaining the old machine | X |  |  |
| 7. | Benefits from a new DNA analyzer |  |  | X |
| 8. | Cost of electricity to run the X-ray machines | X |  |  |

Note: The costs of the salaries of the head of the Radiology Department and Laboratory Department and the rent on the space occupied by Radiology are neither differential costs, nor opportunity costs, nor sunk costs. These costs do not differ between the alternatives and therefore are irrelevant in the decision, but they are not sunk costs because they occur in the future.

**Exercise 1-6** (15 minutes)

1. Traditional income statement

|  |  |  |
| --- | --- | --- |
| Cherokee Inc.  Traditional Income Statement | | |
| Sales ($30 per unit × 20,000 units) |  | $600,000 |
| Cost of goods sold  ($24,000 + $180,000 – $44,000) |  | 160,000 |
| Gross margin |  | 440,000 |
| Selling and administrative expenses: |  |  |
| Selling expenses (($4 per unit × 20,000 units) + $40,000) | $120,000 |  |
| Administrative expenses  (($2 per unit × 20,000 units) + $30,000) | 70,000 | 190,000 |
| Net operating income |  | $250,000 |

2. Contribution format income statement

|  |  |  |
| --- | --- | --- |
| Cherokee Inc.  Contribution Format Income Statement | | |
| Sales ($30 per unit × 20,000 units) |  | $600,000 |
| Variable expenses: |  |  |
| Cost of goods sold  ($24,000 + $180,000 – $44,000) | $160,000 |  |
| Selling expenses ($4 per unit × 20,000 units) | 80,000 |  |
| Administrative expenses  ($2 per unit × 20,000 units) | 40,000 | 280,000 |
| Contribution margin |  | 320,000 |
| Fixed expenses: |  |  |
| Selling expenses | 40,000 |  |
| Administrative expenses | 30,000 | 70,000 |
| Net operating income |  | $250,000 |

Exercise 1-7 (20 minutes)

1a. The total direct manufacturing cost incurred is computed as follows:

|  |  |  |
| --- | --- | --- |
| Direct materials per unit | $7.00 |  |
| Direct labor per unit | 4.00 |  |
| Direct manufacturing cost per unit (a) |  | $11.00 |
| Number of units sold (b) |  | 20,000 |
| Total direct manufacturing cost (a) × (b) |  | $220,000 |

1b. The total indirect manufacturing cost incurred is computed as follows:

|  |  |  |
| --- | --- | --- |
| Variable manufacturing overhead per unit | $1.50 |  |
| Fixed manufacturing overhead per unit | 5.00 |  |
| Indirect manufacturing cost per unit (a) |  | $6.50 |
| Number of units sold (b) |  | 20,000 |
| Total indirect manufacturing cost (a) × (b) |  | $130,000 |

Note: The average fixed manufacturing overhead cost per unit of $5.00 is valid for only one level of activity—20,000 units produced.

2a. The total manufacturing cost that is directly traceable to the Manufacturing Department is computed as follows:

|  |  |  |
| --- | --- | --- |
| Direct materials per unit | $7.00 |  |
| Direct labor per unit | 4.00 |  |
| Variable manufacturing overhead per unit | 1.50 |  |
| Fixed manufacturing overhead per unit | 5.00 |  |
| Total manufacturing cost per unit (a) |  | $17.50 |
| Number of units sold (b) |  | 20,000 |
| Total direct costs (a) × (b) |  | $350,000 |

2b. None of the manufacturing costs should be treated as indirect costs when the cost object is the Manufacturing Department.

**Exercise 1-7** (continued)

3a. The first step in calculating the total direct selling expense is to determine the fixed portion of the sales representatives’ compensation as follows:

|  |  |  |
| --- | --- | --- |
| Fixed selling expense per unit (a) | $3.50 |  |
| Number of units sold (b) | 20,000 |  |
| Total fixed selling expense (a) × (b) |  | $70,000 |
|  |  |  |
| Total fixed selling expense (a) |  | $70,000 |
| Advertising expenditures (b) |  | $50,000 |
| Total fixed portion of the sales representatives’ compensation (a) ‒ (b) |  | $20,000 |

The second step is to calculate the total direct selling expense that is traceable to individual sales representatives as follows:

|  |  |  |
| --- | --- | --- |
| Sales commissions per unit (a) | $1.00 |  |
| Number of units sold (b) | 20,000 |  |
| Total sales commission (a) × (b) |  | $20,000 |
| Fixed portion of sales representatives’ compensation |  | 20,000 |
| Total direct selling expense |  | $40,000 |

3b. The total indirect selling expense that cannot be traced to individual sales representatives is $50,000. The advertising expenditures cannot be traced to specific sales representatives.

4. No. Kubin’s administrative expenses could be direct or indirect depending on the cost object. For example, the chief financial officer’s salary would be an indirect cost if the cost object is units of production; however, his salary would be a direct cost if the cost object is the Finance Department that he oversees.

**Exercise 1-8** (20 minutes)

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | Direct materials | $  7.00 |  |
|  | Direct labor | 4.00 |  |
|  | Variable manufacturing overhead | 1.50 |  |
|  | Variable manufacturing cost per unit | $12.50 |  |
|  |  |  |  |
|  | Variable manufacturing cost per unit (a) | $12.50 |  |
|  | Number of units produced (b) | 20,000 |  |
|  | Total variable manufacturing cost (a) × (b) |  | $250,000 |
|  | Average fixed manufacturing overhead per unit (c) | $5.00 |  |
|  | Number of units produced (d) | 20,000 |  |
|  | Total fixed manufacturing cost (c) × (d) |  | 100,000 |
|  | Total product cost |  | $350,000 |

Note: The average fixed manufacturing overhead cost per unit of $5.00 is valid for only one level of activity—20,000 units produced.

|  |  |  |  |
| --- | --- | --- | --- |
| 2. | Sales commissions | $1.00 |  |
|  | Variable administrative expense | 0.50 |  |
|  | Variable selling and administrative per unit | $1.50 |  |
|  |  |  |  |
|  | Variable selling and admin. per unit (a) | $1.50 |  |
|  | Number of units sold (b) | 20,000 |  |
|  | Total variable selling and admin. expense  (a) × (b) |  | $30,000 |
|  | Average fixed selling and administrative expense per unit ($3.50 fixed selling + $2.50 fixed administrative) (c) | $6.00 |  |
|  | Number of units sold (d) | 20,000 |  |
|  | Total fixed selling and administrative expense (c) × (d) |  | 120,000 |
|  | Total period cost |  | $150,000 |

Note: The average fixed selling and administrative expense per unit of $6.00 is valid for only one level of activity—20,000 units sold.

**Exercise 1-8** (continued)

|  |  |  |  |
| --- | --- | --- | --- |
| 3. | Direct materials | $  7.00 |  |
|  | Direct labor | 4.00 |  |
|  | Variable manufacturing overhead | 1.50 |  |
|  | Variable manufacturing cost per unit | $12.50 |  |
|  |  |  |  |
|  | Variable manufacturing cost per unit (a) | $12.50 |  |
|  | Number of units produced (b) | 22,000 |  |
|  | Total variable manufacturing cost (a) × (b) |  | $275,000 |
|  | Total fixed manufacturing cost (see requirement 1) |  | 100,000 |
|  | Total product cost |  | $375,000 |

|  |  |  |  |
| --- | --- | --- | --- |
| 4. | Sales commissions | $1.00 |  |
|  | Variable administrative expense | 0.50 |  |
|  | Variable selling and administrative per unit | $1.50 |  |
|  |  |  |  |
|  | Variable selling and admin. per unit (a) | $1.50 |  |
|  | Number of units sold (b) | 18,000 |  |
|  | Total variable selling and admin. expense  (a) × (b) |  | $27,000 |
|  | Total fixed selling and administrative expense (see requirement 2) |  | 120,000 |
|  | Total period cost |  | $147,000 |

**Exercise 1-9** (20 minutes)

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | Direct materials | $  7.00 |  |
|  | Direct labor | 4.00 |  |
|  | Variable manufacturing overhead | 1.50 |  |
|  | Sales commissions | 1.00 |  |
|  | Variable administrative expense | 0.50 |  |
|  | Variable cost per unit sold | $14.00 |  |
| 2. | Direct materials | $  7.00 |  |
|  | Direct labor | 4.00 |  |
|  | Variable manufacturing overhead | 1.50 |  |
|  | Sales commissions | 1.00 |  |
|  | Variable administrative expense | 0.50 |  |
|  | Variable cost per unit sold | $14.00 |  |
| 3. | Variable cost per unit sold (a) | $14.00 |  |
|  | Number of units sold (b) | 18,000 |  |
|  | Total variable costs (a) × (b) | $252,000 |  |
| 4. | Variable cost per unit sold (a) | $14.00 |  |
|  | Number of units sold (b) | 22,000 |  |
|  | Total variable costs (a) × (b) | $308,000 |  |

Note:The key to answering questions 5 through 8 is to calculate the total fixed manufacturing overhead costs as follows:

|  |  |
| --- | --- |
| Average fixed manufacturing overhead cost per unit (a) | $5.00 |
| Number of units produced (b) | 20,000 |
| Total fixed manufacturing overhead (a) × (b) | $100,000 |

Note: The average fixed manufacturing overhead cost per unit of $5.00 is valid for only one level of activity—20,000 units produced.

Once students understand that total fixed manufacturing overhead is $100,000, questions 5 through 8 are answered as follows:

**Exercise 1-9** (continued)

5. The average fixed manufacturing overhead per unit is:

|  |  |
| --- | --- |
| Total fixed manufacturing overhead (a) | $100,000 |
| Number of units produced (b) | 18,000 |
| Average fixed manufacturing cost per unit produced (rounded) (a) ÷ (b) | $5.56 |

6. The average fixed manufacturing overhead per unit is:

|  |  |
| --- | --- |
| Total fixed manufacturing overhead (a) | $100,000 |
| Number of units produced (b) | 22,000 |
| Average fixed manufacturing cost per unit produced (rounded) (a) ÷ (b) | $4.55 |

7. The total fixed manufacturing overhead remains unchanged at $100,000.

8. The total fixed manufacturing overhead remains unchanged at $100,000.

**Exercise 1-10** (10 minutes)

|  |  |  |
| --- | --- | --- |
| 1. | Direct materials | $  7.00 |
|  | Direct labor | 4.00 |
|  | Variable manufacturing overhead | 1.50 |
|  | Total incremental cost | $12.50 |

|  |  |  |
| --- | --- | --- |
| 2. | Direct materials | $  7.00 |
|  | Direct labor | 4.00 |
|  | Variable manufacturing overhead | 1.50 |
|  | Sales commissions | 1.00 |
|  | Variable administrative expense | 0.50 |
|  | Variable cost per unit sold | $14.00 |

3. Because the 200 units to be sold to the new customer have already been produced, the incremental manufacturing cost per unit is zero. The variable manufacturing costs incurred to make these units have already been incurred and, as such, are sunk costs.

|  |  |  |
| --- | --- | --- |
| 4. | Sales commission | $1.00 |
|  | Variable administrative expense | 0.50 |
|  | Variable cost per unit sold | $1.50 |

**Exercise 1-11** (20 minutes)

1. The company’s variable cost per unit is:



The completed schedule is as follows:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Units produced and sold | | |
|  | 30,000 | 40,000 | 50,000 |
| Total costs: |  |  |  |
| Variable cost | $180,000 | $240,000 | $300,000 |
| Fixed cost | 300,000 | 300,000 | 300,000 |
| Total costs | $480,000 | $540,000 | $600,000 |
| Cost per unit: |  |  |  |
| Variable cost | $  6.00 | $  6.00 | $  6.00 |
| Fixed cost | 10.00 | 7.50 | 6.00 |
| Total cost per unit | $16.00 | $13.50 | $12.00 |

2. The company’s contribution format income statement is:

|  |  |
| --- | --- |
| Sales (45,000 units × $16 per unit) | $720,000 |
| Variable expenses (45,000 units × $6 per unit) | 270,000 |
| Contribution margin | 450,000 |
| Fixed expense | 300,000 |
| Net operating income | $150,000 |

Exercise 1-12 (10 minutes)

1. The computations for parts 1a through 1e are as follows:

a. The cost of batteries in Raw Materials:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Beginning raw materials inventory | 0 |  |  | |
| Plus: Battery purchases | 8,000 |  |  | |
| Batteries available | 8,000 |  |  | |
| Minus: Batteries withdrawn | 7,600 |  |  | |
| Ending raw materials inventory (a) |  | 400 | |  |
| Cost per battery (b) |  | $80 | |  |
| Raw materials on April 30th (a) × (b) |  | $32,000 | |  |

b. The cost of batteries in Work in Process:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Beginning work in process inventory | 0 |  | | |
| Plus: Batteries withdrawn for production | 7,500 |  |
| Batteries available | 7,500 |  |
| Minus: Batteries transferred to finished goods (7,500 × 90%) | 6,750 |  |
| Ending work in process inventory (a) |  | 750 | |
| Cost per battery (b) |  | $80 | |
| Work in process on April 30th (a) × (b) |  | $60,000 | |

c. The cost of batteries in Finished Goods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Beginning finished goods inventory | 0 |  | | |
| Plus: Batteries transferred in from work in process (see requirement b) | 6,750 |  | | |
| Batteries available | 6,750 |  | | |
| Minus: Batteries transferred out to cost of goods sold (6,750 × (100% ‒ 30%)) | 4,725 |  |
| Ending finished goods inventory (a) |  | 2,025 | |
| Cost per battery (b) |  | $80 | |
| Finished goods on April 30th (a) × (b) |  | $162,000 | |

Exercise 1-12 (continued)

d. The cost of batteries in Cost of Goods Sold:

|  |  |
| --- | --- |
| Number of batteries (see requirement c) (a) | 4,725 |
| Cost per battery (b) | $80 |
| Cost of goods sold for April (a) × (b) | $378,000 |

e. The cost of batteries included in selling expense:

|  |  |
| --- | --- |
| Number of batteries (a) | 100 |
| Cost per battery (b) | $80 |
| Selling expense for April (a) × (b) | $8,000 |

2. Raw Materials, Work in Process and Finished Goods would appear on the balance sheet. Cost of Goods Sold and Selling Expense would appear on the income statement.

Exercise 1-13 (30 minutes)

1. True. The variable manufacturing cost per unit will remain the same within the relevant range.

2. False. The total fixed manufacturing cost will remain the same within the relevant range.

3. True. The total variable manufacturing cost will increase, so the total manufacturing cost will increase too.

4. True. The average fixed manufacturing cost per unit will decrease as the level of activity increases.

5. False. The total variable manufacturing cost will increase (rather than decrease) as the activity level increases.

6. False. The variable manufacturing cost per unit will remain the same, but the average fixed manufacturing cost per unit will decrease as the level of activity increases.

7. True. The variable manufacturing cost per unit of $28 will stay constant within the relevant range. The $28 figure is computed as follows:

|  |  |
| --- | --- |
| Total manufacturing cost per unit (a) | $70.00 |
| Variable manufacturing cost percentage (b) | 40% |
| Variable manufacturing cost per unit (a) × (b) | $28.00 |

8. False. The total fixed manufacturing cost of $420,000 does not change within the relevant range. The $420,000 figure is computed as follows:

|  |  |  |
| --- | --- | --- |
| Total manufacturing cost per unit (a) | $70.00 |  |
| Variable manufacturing cost per unit (b) | 28.00 |  |
| Average fixed manufacturing cost per unit (a) ‒ (b) |  | $42.00 |
| Number of units produced |  | × 10,000 |
| Total fixed manufacturing cost |  | $420,000 |

Exercise 1-13 (continued)

9. True. The underlying computations are as follows:

|  |  |  |
| --- | --- | --- |
| Variable manufacturing cost per unit (see requirement 7) (a) | $28.00 |  |
| Number of units produced (b) | 10,050 |  |
| Total variable manufacturing cost (a) × (b) |  | $281,400 |
| Total fixed manufacturing cost (see requirement 8) |  | 420,000 |
| Total manufacturing cost |  | $701,400 |

10. True. The underlying computations are as follows:

|  |  |
| --- | --- |
| Total fixed manufacturing cost (see requirement 8) (a) | $420,000 |
| Number of units produced (b) | 10,050 |
| Average fixed manufacturing cost per unit (a) ÷ (b) | $41.79 |

11. False. The total variable manufacturing cost will equal $281,400, computed as follows:

|  |  |
| --- | --- |
| Variable manufacturing cost per unit (see requirement 7) (a) | $28.00 |
| Number of units produced (b) | 10,050 |
| Total variable manufacturing cost (a) × (b) | $281,400 |

12. True. The underlying computations are as follows:

|  |  |
| --- | --- |
| Variable manufacturing cost per unit (see requirement 7) | $28.00 |
| Average fixed manufacturing cost per unit (see requirement 10) | 41.79 |
| Total manufacturing cost per unit | $69.79 |

**Exercise 1-14** (30 minutes)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Cost Classifications for: | | | |
| Name of the Cost | (1) Predicting Cost behavior | (2) Manufacturers | (3)  Preparing Financial Statements | (4)  Decision  Making |
| Rental revenue forgone, $30,000 per year | None | None | None | Opportunity cost |
| Direct materials cost, $80 per unit | Variable | Direct materials | Product |  |
| Rental cost of warehouse, $500 per month | Fixed | None | Period |  |
| Rental cost of equipment, $4,000 per month | Fixed | Manufacturing overhead | Product |  |
| Direct labor cost, $60 per unit | Variable | Direct labor | Product |  |
| Depreciation of the annex space, $8,000 per year | Fixed | Manufacturing overhead | Product | Sunk cost |
| Advertising cost, $50,000 per year | Fixed | None | Period |  |
| Supervisor's salary, $3,500 per month | Fixed | Manufacturing overhead | Product |  |
| Electricity for machines, $1.20 per unit | Variable | Manufacturing overhead | Product |  |
| Shipping cost, $9 per unit | Variable | None | Period |  |
| Return earned on investments, $3,000 per year | None | None | None | Opportunity cost |

**Exercise 1-15** (20 minutes)

1. Traditional income statement

|  |  |  |
| --- | --- | --- |
| The Alpine House, Inc.  Traditional Income Statement | | |
| Sales |  | $150,000 |
| Cost of goods sold  ($30,000 + $100,000 – $40,000) |  | 90,000 |
| Gross margin |  | 60,000 |
| Selling and administrative expenses: |  |  |
| Selling expenses (($50 per unit × 200 pairs of skis\*) + $20,000) | $30,000 |  |
| Administrative expenses (($10 per unit × 200 pairs of skis) + $20,000) | 22,000 | 52,000 |
| Net operating income |  | $   8,000 |
|  |  |  |

\*$150,000 sales ÷ $750 per pair of skis = 200 pairs of skis.

2. Contribution format income statement

|  |  |  |
| --- | --- | --- |
| The Alpine House, Inc.  Contribution Format Income Statement | | |
| Sales |  | $150,000 |
| Variable expenses: |  |  |
| Cost of goods sold  ($30,000 + $100,000 – $40,000) | $90,000 |  |
| Selling expenses  ($50 per unit × 200 pairs of skis) | 10,000 |  |
| Administrative expenses  ($10 per unit × 200 pairs of skis) | 2,000 | 102,000 |
| Contribution margin |  | 48,000 |
| Fixed expenses: |  |  |
| Selling expenses | 20,000 |  |
| Administrative expenses | 20,000 | 40,000 |
| Net operating income |  | $   8,000 |
|  |  |  |

**Exercise 1-15** (continued)

3. Since 200 pairs of skis were sold and the contribution margin totaled $48,000 for the quarter, the contribution margin per unit was $240 ($48,000 ÷ 200 pair of skis = $240 per pair of skis).

**Exercise 1-16** (10 minutes)

1. The differential cost is computed as follows:

|  |  |
| --- | --- |
| Cost of a new model 300 (a) | $313,000 |
| Cost of a new model 200 (b) | $275,000 |
| Differential cost (a) ‒ (b) | $38,000 |

2. The sunk cost is the cost of the machine purchased seven years ago for $319,000.

3. The opportunity cost is the $374,000 that could have been earned by pursuing the forgone option.

**Exercise 1-17** (15 minutes)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Cost Classifications for: | |
|  | Cost Item | (1)  Predicting Cost Behavior | (2)  Preparing  Financial Statements |
| 1. | Hamburger buns at a Wendy’s restaurant | Variable | Product |
| 2. | Advertising by a dental office | Fixed | Period |
| 3. | Apples processed and canned by Del Monte | Variable | Product |
| 4. | Shipping canned apples from a Del Monte plant to customers | Variable | Period |
| 5. | Insurance on a Bausch & Lomb factory producing contact lenses | Fixed | Product |
| 6. | Insurance on IBM’s corporate headquarters | Fixed | Period |
| 7. | Salary of a supervisor overseeing production of printers at Hewlett-Packard | Fixed | Product |
| 8. | Commissions paid to automobile salespersons | Variable | Period |
| 9. | Depreciation of factory lunchroom facilities at a General Electric plant | Fixed | Product |
| 10. | Steering wheels installed in BMWs | Variable | Product |

**Problem 1-18** (10 minutes)

1. The direct costs of the Apparel Department are as follows:

|  |  |
| --- | --- |
| Apparel Department cost of sales—Evendale Store | $  90,000 |
| Apparel Department sales commission—Evendale Store | 7,000 |
| Apparel Department manager’s salary—Evendale Store | 8,000 |
| Total direct costs for the Apparel Department | $105,000 |

2. The direct costs of the Evendale Store are as follows:

|  |  |
| --- | --- |
| Apparel Department cost of sales—Evendale Store | $  90,000 |
| Store manager’s salary—Evendale Store | 12,000 |
| Apparel Department sales commission—Evendale Store | 7,000 |
| Store utilities—Evendale Store | 11,000 |
| Apparel Department manager’s salary—Evendale Store | 8,000 |
| Janitorial costs—Evendale Store | 9,000 |
| Total direct costs for the Evendale Store | $137,000 |

3. The direct costs in the Apparel Department that are also variable with respect to departmental sales is computed as follows:

|  |  |
| --- | --- |
| Apparel Department cost of sales—Evendale Store | $90,000 |
| Apparel Department sales commission—Evendale Store | 7,000 |
| Total direct costs for the Apparel Department that are also variable costs | $97,000 |

**Problem 1-19** (30 minutes)

1. Contribution format income statement

|  |  |  |
| --- | --- | --- |
| Todrick Company  Contribution Format Income Statement | | |
| Sales |  | $300,000 |
| Variable expenses: |  |  |
| Cost of goods sold  ($20,000 + $200,000 – $7,000) | $213,000 |  |
| Selling expense | 15,000 |  |
| Administrative expense | 12,000 | 240,000 |
| Contribution margin |  | 60,000 |
| Fixed expenses: |  |  |
| Selling expense | 30,000 |  |
| Administrative expense | 12,000 | 42,000 |
| Net operating income |  | $  18,000 |

The variable administrative expense shown above ($12,000) is computed as follows:

|  |  |  |
| --- | --- | --- |
| Sales (a) | $300,000 |  |
| Contribution margin (b) | $60,000 |  |
| Total variable costs (a) ‒ (b) |  | $240,000 |
|  |  |  |
| Total variable costs (a) |  | $240,000 |
| Cost of goods sold | $213,000 |  |
| Variable selling expense | 15,000 |  |
| Cost of goods sold plus variable selling expense (b) |  | $228,000 |
| Variable administrative expense (a) ‒ (b) |  | $12,000 |

**Problem 1-19** (continued)

The fixed selling expense shown above ($30,000) is computed as follows:

|  |  |  |
| --- | --- | --- |
| Contribution margin (a) | $60,000 |  |
| Net operating income (b) | $18,000 |  |
| Total fixed costs (a) ‒ (b) |  | $42,000 |
|  |  |  |
| Total fixed costs (a) |  | $42,000 |
| Fixed administrative expense (b) |  | $12,000 |
| Fixed selling expense (a) ‒ (b) |  | $30,000 |

2. Traditional income statement

|  |  |  |
| --- | --- | --- |
| Todrick Company  Traditional Income Statement | | |
| Sales |  | $300,000 |
| Cost of goods sold  ($20,000 + $200,000 – $7,000) |  | 213,000 |
| Gross margin |  | 87,000 |
| Selling and administrative expenses: |  |  |
| Selling expense ($15,000 + $30,000) | $45,000 |  |
| Administrative expense  ($12,000 + $12,000) | 24,000 | 69,000 |
| Net operating income |  | $ 18,000 |

3. The selling price per unit is $300,000 ÷ 1,000 units sold = $300.

4. The variable cost per unit is $240,000 ÷ 1,000 units sold = $240.

5. The contribution margin per unit is $300 ‒ $240 = $60.

6. The contribution format is more useful because it organizes costs based on their cost behavior. The contribution format enables managers to quickly calculate how variable costs will change in response to changes in unit sales.

**Problem 1-20** (20 minutes)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Direct or Indirect Cost of the Meals-On-Wheels Program | |  | Direct or Indirect Cost of Particular Seniors Served by the Meals-On-Wheels Program | |  | Variable or Fixed with Respect to the Number of Seniors Served by the Meals-On-Wheels Program | |
| Item | Description | Direct | Indirect |  | Direct | Indirect |  | Variable | Fixed |
| a. | The cost of leasing the Meals-On-Wheels van | X |  |  |  | X |  |  | X |
| b. | The cost of incidental supplies such as salt, pepper, napkins, and so on | X |  |  |  | X\* |  | X |  |
| c. | The cost of gasoline consumed by the Meals-On-Wheels van | X |  |  |  | X |  | X |  |
| d. | The rent on the facility that houses Madison Seniors Care Center, including the Meals-On-Wheels program |  | X |  |  | X |  |  | X |
| e. | The salary of the part-time manager of the Meals-On-Wheels program | X |  |  |  | X |  |  | X |
| f. | Depreciation on the kitchen equipment used in the Meals-On-Wheels program | X |  |  |  | X |  |  | X |
| g. | The hourly wages of the caregiver who drives the van and delivers the meals | X |  |  |  | X\* |  | X |  |
| h. | The costs of complying with health safety regulations in the kitchen | X |  |  |  | X |  |  | X |
| i. | The costs of mailing letters soliciting donations to the Meals-On-Wheels program | X |  |  |  | X |  |  | X |

\*These costs could be direct costs of serving particular seniors.

**Problem 1-21** (45 minutes)

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | Marwick’s Pianos, Inc. Traditional Income Statement For the Month of August | | |
|  | Sales (40 pianos × $3,125 per piano) |  | $125,000 |
|  | Cost of goods sold  (40 pianos × $2,450 per piano) |  | 98,000 |
|  | Gross margin |  | 27,000 |
|  | Selling and administrative expenses: |  |  |
|  | Selling expenses: |  |  |
|  | Advertising | $    700 |  |
|  | Sales salaries and commissions [$950 + (8% × $125,000)] | 10,950 |  |
|  | Delivery of pianos  (40 pianos × $30 per piano) | 1,200 |  |
|  | Utilities | 350 |  |
|  | Depreciation of sales facilities | 800 |  |
|  | Total selling expenses | 14,000 |  |
|  | Administrative expenses: |  |  |
|  | Executive salaries | 2,500 |  |
|  | Insurance | 400 |  |
|  | Clerical  [$1,000 + (40 pianos × $20 per piano)] | 1,800 |  |
|  | Depreciation of office equipment | 300 |  |
|  | Total administrative expenses | 5,000 |  |
|  | Total selling and administrative expenses |  | 19,000 |
|  | Net operating income |  | $  8,000 |

**Problem 1-21** (continued)

|  |  |  |  |
| --- | --- | --- | --- |
| 2. | Marwick’s Pianos, Inc. Contribution Format Income Statement For the Month of August | | |
|  |  | Total | Per  Piano |
|  | Sales (40 pianos × $3,125 per piano) | $125,000 | $3,125 |
|  | Variable expenses: |  |  |
|  | Cost of goods sold  (40 pianos × $2,450 per piano) | 98,000 | 2,450 |
|  | Sales commissions (8% × $125,000) | 10,000 | 250 |
|  | Delivery of pianos (40 pianos × $30 per piano) | 1,200 | 30 |
|  | Clerical (40 pianos × $20 per piano) | 800 | 20 |
|  | Total variable expenses | 110,000 | 2,750 |
|  | Contribution margin | 15,000 | $  375 |
|  | Fixed expenses: |  |  |
|  | Advertising | 700 |  |
|  | Sales salaries | 950 |  |
|  | Utilities | 350 |  |
|  | Depreciation of sales facilities | 800 |  |
|  | Executive salaries | 2,500 |  |
|  | Insurance | 400 |  |
|  | Clerical | 1,000 |  |
|  | Depreciation of office equipment | 300 |  |
|  | Total fixed expenses | 7,000 |  |
|  | Net operating income | $   8,000 |  |

3. Fixed costs remain constant in total but vary on a per unit basis inversely with changes in the activity level. As the activity level increases, for example, the fixed costs will decrease on a per unit basis. Showing fixed costs on a per unit basis on the income statement might mislead management into thinking that the fixed costs behave in the same way as the variable costs. That is, management might be misled into thinking that the per unit fixed costs would be the same regardless of how many pianos were sold during the month. For this reason, fixed costs generally are shown only in totals on a contribution format income statement.

**Problem 1-22** (45 minutes)

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

|  |  |
| --- | --- |
| Direct labor cost (a) | $15,000 |
| Direct labor as a percentage of total conversion costs (b) | 30% |
| Total conversion cost (a) ÷ (b) | $50,000 |

|  |  |
| --- | --- |
| Total conversion cost (a) | $50,000 |
| Direct labor cost (b) | $15,000 |
| Total manufacturing overhead cost (a) ‒ (b) | $35,000 |

2. The total direct materials cost is computed as follows:

|  |  |
| --- | --- |
| Direct labor cost (a) | $15,000 |
| Direct labor as a percentage of total prime costs (b) | 40% |
| Total prime cost (a) ÷ (b) | $37,500 |

|  |  |
| --- | --- |
| Total prime cost (a) | $37,500 |
| Direct labor cost (b) | $15,000 |
| Total direct materials cost (a) ‒ (b) | $22,500 |

3. The total amount of manufacturing cost is computed as follows:

|  |  |
| --- | --- |
| Direct materials cost | $22,500 |
| Direct labor cost | 15,000 |
| Manufacturing overhead cost | 35,000 |
| Total manufacturing cost | $72,500 |

4. The total variable selling and administrative cost is computed as follows:

|  |  |
| --- | --- |
| Total sales (a) | $120,000 |
| Sales commission percentage (b) | 5% |
| Total variable selling and administrative cost (a) × (b) | $6,000 |

**Problem 1-22** (continued)

5. The total variable cost is computed as follows:

|  |  |
| --- | --- |
| Direct materials cost | $22,500 |
| Direct labor cost | 15,000 |
| Sales commissions | 6,000 |
| Total variable cost | $43,500 |

6. The total fixed cost is computed as follows:

|  |  |  |
| --- | --- | --- |
| Total selling and administrative expenses (a) | $18,000 |  |
| Sales commissions (b) | $6,000 |  |
| Total fixed selling and administrative expense (a) ‒ (b) |  | $12,000 |
| Total fixed manufacturing overhead |  | 35,000 |
| Total fixed cost |  | $47,000 |

7. The total contribution margin is calculated as follows:

|  |  |
| --- | --- |
| Sales (a) | $120,000 |
| Variable costs (b) | $43,500 |
| Contribution margin (a) ‒ (b) | $76,500 |

**Problem 1-23** (30 minutes)

Note to the Instructor: There may be some exceptions to the answers below. The purpose of this problem is to get the student to start *thinking* about cost behavior and cost purposes; try to avoid lengthy discussions about how a particular cost is classified.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Variable or | Selling | Administrative | Manufacturing  (Product) Cost | |
|  | Cost Item | Fixed | Cost | Cost | Direct | Indirect |
| 1. | Property taxes, factory | F |  |  |  | X |
| 2. | Boxes used for packaging detergent produced by the company | V |  |  | X |  |
| 3. | Salespersons’ commissions | V | X |  |  |  |
| 4. | Supervisor’s salary, factory | F |  |  |  | X |
| 5. | Depreciation, executive autos | F |  | X |  |  |
| 6. | Wages of workers assembling computers | V |  |  | X |  |
| 7. | Insurance, finished goods warehouses | F | X |  |  |  |
| 8. | Lubricants for production equipment | V |  |  |  | X |
| 9. | Advertising costs | F | X |  |  |  |
| 10. | Microchips used in producing calculators | V |  |  | X |  |
| 11. | Shipping costs on merchandise sold | V | X |  |  |  |
| 12. | Magazine subscriptions, factory lunchroom | F |  |  |  | X |
| 13. | Thread in a garment factory | V |  |  |  | X |
| 14. | Executive life insurance | F |  | X |  |  |

**Problem 1-23** (continued)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Variable or | Selling | Administrative | Manufacturing  (Product) Cost | |
|  | Cost Item | Fixed | Cost | Cost | Direct | Indirect |
| 15. | Ink used in textbook production | V |  |  |  | X |
| 16. | Fringe benefits, materials handling workers | V |  |  |  | X |
| 17. | Yarn used in sweater production | V |  |  | X |  |
| 18. | Wages of receptionist, executive offices | F |  | X |  |  |

**Problem 1-24** (30 minutes)

1a. The total product cost is computed as follows:

|  |  |
| --- | --- |
| Direct materials | $ 69,000 |
| Direct labor | 35,000 |
| Total manufacturing overhead | 43,000 |
| Total product cost | $147,000 |

1b. The total period cost is computed as follows:

|  |  |
| --- | --- |
| Total selling expense | $30,000 |
| Total administrative expense | 29,000 |
| Total period cost | $59,000 |

2a. The total direct manufacturing cost is computed as follows:

|  |  |
| --- | --- |
| Direct materials | $  69,000 |
| Direct labor | 35,000 |
| Total direct manufacturing cost | $104,000 |

2b. The total indirect manufacturing cost is computed as follows:

|  |  |
| --- | --- |
| Variable manufacturing overhead | $15,000 |
| Fixed manufacturing overhead | 28,000 |
| Total indirect manufacturing cost | $43,000 |

3a. The total manufacturing cost is computed as follows:

|  |  |
| --- | --- |
| Direct materials | $ 69,000 |
| Direct labor | 35,000 |
| Total manufacturing overhead | 43,000 |
| Total manufacturing cost | $147,000 |

**Problem 1-24** (continued)

3b. The total nonmanufacturing cost is computed as follows:

|  |  |
| --- | --- |
| Total selling expense | $30,000 |
| Total administrative expense | 29,000 |
| Total nonmanufacturing cost | $59,000 |

3c. The total conversion cost is computed as follows:

|  |  |
| --- | --- |
| Direct labor | $35,000 |
| Total manufacturing overhead | 43,000 |
| Total conversion cost | $78,000 |

The total prime cost is computed as follows:

|  |  |
| --- | --- |
| Direct materials | $ 69,000 |
| Direct labor | 35,000 |
| Total prime cost | $104,000 |

4a. The total variable manufacturing cost is computed as follows:

|  |  |
| --- | --- |
| Direct materials | $ 69,000 |
| Direct labor | 35,000 |
| Variable manufacturing overhead | 15,000 |
| Total variable manufacturing cost | $119,000 |

4b. The total amount of fixed cost for the company as a whole is computed as follows:

|  |  |
| --- | --- |
| Fixed manufacturing overhead | $28,000 |
| Fixed selling expense | 18,000 |
| Fixed administrative expense | 25,000 |
| Total fixed cost | $71,000 |

**Problem 1-24** (continued)

4c. The variable cost per unit produced and sold is computed as follows:

|  |  |
| --- | --- |
| Direct materials | $  69,000 |
| Direct labor | 35,000 |
| Total variable manufacturing overhead | 15,000 |
| Variable selling expense | 12,000 |
| Variable administrative expense | 4,000 |
| Total variable cost (a) | $135,000 |
| Number of units produced and sold (b) | 1,000 |
| Variable cost per unit produced and sold (a) ÷ (b) | $135 |

5a. The incremental manufacturing cost is computed as follows:

|  |  |
| --- | --- |
| Direct materials | $  69,000 |
| Direct labor | 35,000 |
| Variable manufacturing overhead | 15,000 |
| Total incremental cost (a) | $119,000 |
| Number of units produced and sold (b) | 1,000 |
| Incremental cost per unit produced (a) ÷ (b) | $119 |

**Problem 1-25** (30 minutes)

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | Milden Company Contribution Format Income Statement For the Next Quarter | | |
|  | Sales (12,000 units × $100 per unit) |  | $1,200,000 |
|  | Variable expenses: |  |  |
|  | Cost of goods sold  (12,000 units × $35 unit) | $420,000 |  |
|  | Sales commission (6% × $1,200,000) | 72,000 |  |
|  | Shipping expense  (12,000 units × $9.10 per unit) | 109,200 |  |
|  | Total variable expenses |  | 601,200 |
|  | Contribution margin |  | 598,800 |
|  | Fixed expenses: |  |  |
|  | Advertising expense | 210,000 |  |
|  | Shipping expense | 28,000 |  |
|  | Administrative salaries | 145,000 |  |
|  | Insurance expense | 9,000 |  |
|  | Depreciation expense | 76,000 |  |
|  | Total fixed expenses |  | 468,000 |
|  | Net operating income |  | $  130,800 |

**Problem 1-25** (continued)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2. | Milden Company Traditional Format Income Statement For the Next Quarter | | | | |
|  | Sales (12,000 units × $100 per unit) | |  | | $1,200,000 | |
|  | Cost of goods sold  (12,000 units × $35 per unit) | |  | | 420,000 | |
|  | Gross margin | |  | | 780,000 | |
|  | Selling and administrative expenses: | |  | |  |
|  | Advertising | $210,000 | | |  |
|  | Sales commissions (6% × $1,200,000)] | 72,000 | | |  |
|  | Shipping expense  [$28,000 + (12,000 units × $9.10 per unit)] | 137,200 | | |  |
|  | Administrative salaries | 145,000 | | |  |
|  | Insurance expense | 9,000 | | |  | |
|  | Depreciation expense | 76,000 | | |  | |
|  | Total selling and administrative expenses | |  | | 649,200 | |
|  | Net operating income | | |  | $  130,800 | |

**Case 1-26** (45 minutes)

1.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Cost Behavior | | Selling or  Administrative | Product Cost | |
| Cost Item | Variable | Fixed | Cost | Direct | Indirect |
| Direct labor | $118,000 |  |  | $118,000 |  |
| Advertising |  | $50,000 | $50,000 |  |  |
| Factory supervision |  | 40,000 |  |  | $40,000 |
| Property taxes, factory building |  | 3,500 |  |  | 3,500 |
| Sales commissions | 80,000 |  | 80,000 |  |  |
| Insurance, factory |  | 2,500 |  |  | 2,500 |
| Depreciation, administrative office equipment |  | 4,000 | 4,000 |  |  |
| Lease cost, factory equipment |  | 12,000 |  |  | 12,000 |
| Indirect materials, factory | 6,000 |  |  |  | 6,000 |
| Depreciation, factory building |  | 10,000 |  |  | 10,000 |
| Administrative office supplies | 3,000 |  | 3,000 |  |  |
| Administrative office salaries |  | 60,000 | 60,000 |  |  |
| Direct materials used | 94,000 |  |  | 94,000 |  |
| Utilities, factory | 20,000 |  |  |  | 20,000 |
| Total costs | $321,000 | $182,000 | $197,000 | $212,000 | $94,000 |

**Case 1-26** (continued)

2. The average product cost for one patio set would be:

|  |  |
| --- | --- |
| Direct | $212,000 |
| Indirect | 94,000 |
| Total | $306,000 |
| $306,000 ÷ 2,000 sets = $153 per set |  |

3. The average product cost per set would increase if the production drops. This is because the fixed costs would be spread over fewer units, causing the average cost per unit to rise.

4. a. Yes, the president may expect a minimum price of $153, which is the average cost to manufacture one set. He might expect a price even higher than this to cover a portion of the administrative costs as well. The brother-in-law probably is thinking of cost as including only direct materials, or, at most, direct materials and direct labor. Direct materials alone would be only $47 per set ($94,000 ÷ 2,000 = $47 per set), and direct materials and direct labor would be only $106 per set (($94,000 + $118,000) ÷ 2,000 = $106 per set).

b. The term is opportunity cost. The full, regular price of a set might be appropriate here, because the company is operating at full capacity, and this is the amount that must be given up (benefit forgone) to sell a set to the brother-in-law.

**Case 1-27** (30 minutes)

1. A cost that is classified as a period cost will be recognized on the income statement as an expense in the current period. A cost that is classified as a product cost will be recognized on the income statement as an expense (i.e., cost of goods sold) only when the associated units of product are sold. If some units are unsold at the end of the period, the costs of those unsold units are treated as assets. Therefore, by reclassifying period costs as product costs, the company is able to carry some costs forward in inventories that would have been treated as current expenses.

2. The discussion below is divided into two parts—Gallant’s actions to postpone expenditures and the actions to reclassify period costs as product costs.

The decision to postpone expenditures is questionable. It is one thing to postpone expenditures due to a cash bind; it is quite another to postpone expenditures in order to hit a profit target. Postponing these expenditures may have the effect of ultimately increasing future costs and reducing future profits. If orders to the company’s suppliers are changed, it may disrupt the suppliers’ operations. The additional costs may be passed on to Gallant’s company and may create ill will and a feeling of mistrust. Postponing maintenance on equipment is particularly questionable. The result may be breakdowns, inefficient and/or unsafe operations, and a shortened life for the machinery.

Gallant’s decision to reclassify period costs is not ethical—assuming that there is no intention of disclosing in the financial reports this reclassification. Such a reclassification would be a violation of the principle of consistency in financial reporting and is a clear attempt to mislead readers of the financial reports. Although some may argue that the overall effect of Gallant’s action will be a “wash”—that is, profits gained in this period will simply be taken from the next period—the trend of earnings will be affected. Hopefully, the auditors would discover any such attempt to manipulate annual earnings and would refuse to issue an unqualified opinion due to the lack of consistency. However, recent accounting scandals may lead to some skepticism about how forceful auditors have been in enforcing tight accounting standards.

Appendix 1A

Cost of Quality

**Exercise 1A-1** (10 minutes)

1. Quality of conformance

2. Quality costs

3. Quality circles

4. Prevention costs, appraisal costs

5. Internal failure costs, external failure costs

6. External failure costs

7. Appraisal costs

8. Prevention costs

9. Internal failure costs

10. External failure costs

11. Prevention costs, appraisal costs

12. Quality cost report

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

1.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Prevention Cost | Appraisal Cost | Internal Failure Cost | External Failure Cost |
| a. | Product testing |  | X |  |  |
| b. | Product recalls |  |  |  | X |
| c. | Rework labor and overhead |  |  | X |  |
| d. | Quality circles | X |  |  |  |
| e. | Downtime caused by defects |  |  | X |  |
| f. | Cost of field servicing |  |  |  | X |
| g. | Inspection of goods |  | X |  |  |
| h. | Quality engineering | X |  |  |  |
| i. | Warranty repairs |  |  |  | X |
| j. | Statistical process control | X |  |  |  |
| k. | Net cost of scrap |  |  | X |  |
| l. | Depreciation of test equipment |  | X |  |  |
| m. | Returns and allowances arising from poor quality |  |  |  | X |
| n. | Disposal of defective products |  |  | X |  |
| o. | Technical support to suppliers | X |  |  |  |
| p. | Systems development | X |  |  |  |
| q. | Warranty replacements |  |  |  | X |
| r. | Field testing at customer site |  | X |  |  |
| s. | Product design | X |  |  |  |

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

**Problem 1A-3** (60 minutes)

1. An analysis of the company’s quality cost report is presented below (dollar amounts are in thousands):

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Last Year | | |  | This Year | | | |
|  |  | Amount | Percent\* | |  | | Amount | Percent\* | |
|  | Prevention costs: |  |  |  |  | |  |  |  |
|  | Machine maintenance | $  70 | 1.7 | 10.4 |  | | $  120 | 2.5 | 20.3 |
|  | Training suppliers | 0 | 0.0 | 0.0 |  | | 10 | 0.2 | 1.7 |
|  | Quality circles | 0 | 0.0 | 0.0 |  | | 20 | 0.4 | 3.4 |
|  | Total prevention costs | 70 | 1.7 | 10.4 |  | | 150 | 3.1 | 25.4 |
|  |  |  |  |  |  | |  |  |  |
|  | Appraisal costs: |  |  |  |  | |  |  |  |
|  | Incoming inspection | 20 | 0.5 | 3.0 |  | | 40 | 0.8 | 6.8 |
|  | Final testing | 80 | 1.9 | 11.9 |  | | 90 | 1.9 | 15.3 |
|  | Total appraisal costs | 100 | 2.4 | 14.9 |  | | 130 | 2.7 | 22.0 |
|  |  |  |  |  |  | |  |  |  |
|  | Internal failure costs: |  |  |  |  | |  |  |  |
|  | Rework | 50 | 1.2 | 7.5 |  | | 130 | 2.7 | 22.0 |
|  | Scrap | 40 | 1.0 | 6.0 |  | | 70 | 1.5 | 11.9 |
|  | Total internal failure costs | 90 | 2.1 | 13.4 |  | | 200 | 4.2 | 33.9 |
|  |  |  |  |  |  | |  |  |  |
|  | External failure costs: |  |  |  |  | |  |  |  |
|  | Warranty repairs | 90 | 2.1 | 13.4 |  | | 30 | 0.6 | 5.1 |
|  | Customer returns | 320 | 7.6 | 47.8 |  | | 80 | 1.7 | 13.6 |
|  | Total external failure costs | 410 | 9.8 | 61.2 |  | | 110 | 2.3 | 18.6 |
|  |  |  |  |  |  | |  |  |  |
|  | Total quality cost | $  670 | 16.0 | 100.0 |  | | $  590 | 12.3 | 100.0 |
|  |  |  |  |  |  | |  |  |  |
|  | Total production cost | $4,200 |  |  |  | | $4,800 |  |  |

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

**Problem 1A-3** (continued)

From the above analysis it would appear that Mercury, Inc.’s program has been successful.

* Total quality costs have declined from 16.0% to 12.3% as a percentage of total production cost. In dollar amount, total quality costs went from $670,000 last year to $590,000 this year.
* External failure costs, those costs signaling customer dissatisfaction, have declined from 9.8% of total production costs to 2.3%. These declines in warranty repairs and customer returns should result in increased sales in the future.
* Appraisal costs have increased from 2.4% to 2.7% of total production cost.
* Internal failure costs have increased from 2.1% to 4.2% of production costs. This increase has probably resulted from the increase in appraisal activities. Defective units are now being spotted more frequently before they are shipped to customers.
* Prevention costs have increased from 1.7% of total production cost to 3.1% and from 10.4% of total quality costs to 25.4%. The $80,000 increase is more than offset by decreases in other quality costs.

2. The initial effect of emphasizing prevention and appraisal was to reduce external failure costs and increase internal failure costs. The increase in appraisal activities resulted in catching more defective units before they were shipped to customers. As a consequence, rework and scrap costs increased. In the future, an increased emphasis on prevention should result in a decrease in internal failure costs. And as defect rates are reduced, resources devoted to appraisal can be reduced.

3. To measure the cost of not implementing the quality program, management could assume that sales and market share would continue to decline and then calculate the lost profit. Or, management might assume that the company will have to cut its prices to hang on to its market share. The impact on profits of lowering prices could be estimated.

**Problem 1A-4** (60 minutes)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1. | Florex Company Quality Cost Report | | | | | |
|  |  | Last Year | |  | This Year | |
|  |  | Amount  (in thousands) | Percent of Sales |  | Amount  (in thousands) | Percent of Sales |
|  | Prevention costs: |  |  |  |  |  |
|  | Quality engineering | $    420 | 0.56 |  | $    570 | 0.76 |
|  | Systems development | 480 | 0.64 |  | 750 | 1.00 |
|  | Statistical process control | 0 | 0.00 |  | 180 | 0.24 |
|  | Total prevention costs | 900 | 1.20 |  | 1,500 | 2.00 |
|  |  |  |  |  |  |  |
|  | Appraisal costs |  |  |  |  |  |
|  | Inspection | 750 | 1.00 |  | 900 | 1.20 |
|  | Product testing | 810 | 1.08 |  | 1,200 | 1.60 |
|  | Supplies used in testing | 30 | 0.04 |  | 60 | 0.08 |
|  | Depreciation of testing equipment | 210 | 0.28 |  | 240 | 0.32 |
|  | Total appraisal costs | 1,800 | 2.40 |  | 2,400 | 3.20 |
|  |  |  |  |  |  |  |
|  | Internal failure costs: |  |  |  |  |  |
|  | Net cost of scrap | 630 | 0.84 |  | 1,125 | 1.50 |
|  | Rework labor | 1,050 | 1.40 |  | 1,500 | 2.00 |
|  | Disposal of defective products | 720 | 0.96 |  | 975 | 1.30 |
|  | Total internal failure costs | 2,400 | 3.20 |  | 3,600 | 4.80 |
|  |  |  |  |  |  |  |
|  | External failure costs: |  |  |  |  |  |
|  | Cost of field servicing | 1,200 | 1.60 |  | 900 | 1.20 |
|  | Warranty repairs | 3,600 | 4.80 |  | 1,050 | 1.40 |
|  | Product recalls | 2,100 | 2.80 |  | 750 | 1.00 |
|  | Total external failure costs | 6,900 | 9.20 |  | 2,700 | 3.60 |
|  |  |  |  |  |  |  |
|  | Total quality cost | $12,000 | 16.00 |  | $10,200 | 13.60 |

**Problem 1A-4** (continued)

2.

**Problem 1A-4** (continued)

3. The overall impact of the company’s increased emphasis on quality over the past year has been positive in that total quality costs have decreased from 16% of sales to 13.6% of sales. Despite this improvement, the company still has a poor distribution of quality costs. The bulk of the quality costs in both years is traceable to internal and external failure, rather than to prevention and appraisal. Although the distribution of these costs is poor, the trend this year is toward more prevention and appraisal as the company has given more emphasis on quality.

Probably due to the increased spending on prevention and appraisal activities during the past year, internal failure costs have increased by one half, going from $2.4 million to $3.6 million. The reason internal failure costs have gone up is that, through increased appraisal activity, defects are being caught and corrected before products are shipped to customers. Thus, the company is incurring more cost for scrap, rework, and so forth, but it is saving huge amounts in field servicing, warranty repairs, and product recalls. External failure costs have fallen sharply, decreasing from $6.9 million last year to just $2.7 million this year.

If the company continues its emphasis on prevention and appraisal—and particularly on prevention—its total quality costs should continue to decrease in future years. Although internal failure costs are increasing for the moment, these costs should decrease in time as better quality is designed into products. Appraisal costs should also decrease as the need for inspection, testing, and so forth decreases as a result of better engineering and tighter process control.

List of Solution Files:

