Chapter 1
Managerial Accounting and Cost Concepts

Solutions to Questions

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

1-5
a. Unit fixed costs decrease as volume
increases.
b. Unit variable costs remain constant as
volume increases.
c. Total fixed costs remain constant as volume
increases.
d. Total variable costs increase as volume
increases.

1-6
a. 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.
b. 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.
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.

The high-low method uses only two points to determine a cost formula. These two points are likely to be less than typical because they represent extremes of activity.

The formula for a mixed cost is \( Y = a + bX \). In cost analysis, the "a" term represents the fixed cost and the "b" term represents the variable cost per unit of activity.

The term "least-squares regression" means that the sum of the squares of the deviations from the plotted points on a graph to the regression line is smaller than could be obtained from any other line that could be fitted to the data.

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. 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 margin is total sales revenue less total variable expenses.

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.

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.
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) \times (b) ..... $110,000
   Average fixed manufacturing overhead per unit (c) ........................................ $4.00
   Number of units produced (d) ....................... 10,000
   Total fixed manufacturing cost (c) \times (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) \times (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) \times (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
14. Direct materials per unit ...................... $6.00  
    Direct labor per unit ............................. 3.50  
    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)

<table>
<thead>
<tr>
<th>Cost</th>
<th>Cost Object</th>
<th>Direct Cost</th>
<th>Indirect Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The wages of pediatric nurses</td>
<td>The pediatric department</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2. Prescription drugs</td>
<td>A particular patient</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3. Heating the hospital</td>
<td>The pediatric department</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4. The salary of the head of pediatrics</td>
<td>The pediatric department</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5. The salary of the head of pediatrics</td>
<td>A particular pediatric patient</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6. Hospital chaplain’s salary</td>
<td>A particular patient</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>7. Lab tests by outside contractor</td>
<td>A particular patient</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>8. Lab tests by outside contractor</td>
<td>A particular department</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**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 wages of the assembly shop’s supervisor: manufacturing overhead.

6. The wages 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)**

<table>
<thead>
<tr>
<th>Product Cost</th>
<th>Period Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

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

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10 Introduction to Managerial Accounting, 7th edition
Exercise 1-4 (15 minutes)

1. 

<table>
<thead>
<tr>
<th>Cups of Coffee Served in a Week</th>
<th>2,000</th>
<th>2,100</th>
<th>2,200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed cost</td>
<td>$1,200</td>
<td>$1,200</td>
<td>$1,200</td>
</tr>
<tr>
<td>Variable cost</td>
<td>440</td>
<td>462</td>
<td>484</td>
</tr>
<tr>
<td>Total cost</td>
<td>$1,640</td>
<td>$1,662</td>
<td>$1,684</td>
</tr>
<tr>
<td>Average cost per cup served *..</td>
<td>$0.820</td>
<td>$0.791</td>
<td>$0.765</td>
</tr>
</tbody>
</table>

* Total cost ÷ cups of coffee served in a week

2. The average cost of a cup of coffee declines as the number of cups of coffee served increases because the fixed cost is spread over more cups of coffee.
Exercise 1-5 (20 minutes)

1.

<table>
<thead>
<tr>
<th></th>
<th>Occupancy-</th>
<th>Electrical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Days</td>
<td>Costs</td>
</tr>
<tr>
<td>High activity level (August).</td>
<td>2,406</td>
<td>$5,148</td>
</tr>
<tr>
<td>Low activity level (October)</td>
<td>124</td>
<td>1,588</td>
</tr>
<tr>
<td>Change</td>
<td>2,282</td>
<td>$3,560</td>
</tr>
</tbody>
</table>

Variable cost = Change in cost ÷ Change in activity
= $3,560 ÷ 2,282 occupancy-days
= $1.56 per occupancy-day

Total cost (August).......................................................... $5,148

Variable cost element
($1.56 per occupancy-day × 2,406 occupancy-days). 3,753

Fixed cost element ....................................................... $1,395

2. Electrical costs may reflect seasonal factors other than just the variation in occupancy days. For example, common areas such as the reception area must be lighted for longer periods during the winter than in the summer. This will result in seasonal fluctuations in the fixed electrical costs.

   Additionally, fixed costs will be affected by the number of days in a month. In other words, costs like the costs of lighting common areas are variable with respect to the number of days in the month, but are fixed with respect to how many rooms are occupied during the month.

   Other, less systematic, factors may also affect electrical costs such as the frugality of individual guests. Some guests will turn off lights when they leave a room. Others will not.
### 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 .......................................................... $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 (15 minutes)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Differential Cost</th>
<th>Opportunity Cost</th>
<th>Sunk Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cost of the old X-ray machine</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2. The salary of the head of the Radiology Department</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. The salary of the head of the Pediatrics Department</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Cost of the new color laser printer</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5. Rent on the space occupied by Radiology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. The cost of maintaining the old machine</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>7. Benefits from a new DNA analyzer</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>8. Cost of electricity to run the X-ray machines</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Note: The costs of the salaries of the head of the Radiology Department and Pediatrics 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 1-8** (20 minutes)

1. **Kilometers Driven**  
   **Total Annual Cost***
   - High level of activity ...................... 105,000 $11,970
   - Low level of activity ...................... 70,000  9,380
   - Change ........................................ 35,000 $ 2,590

* 105,000 kilometers × $0.114 per kilometer = $11,970  
  70,000 kilometers × $0.134 per kilometer = $9,380

Variable cost per kilometer:

\[
\frac{\text{Change in cost}}{\text{Change in activity}} = \frac{2,590}{35,000 \text{ kilometers}} = 0.074 \text{ per kilometer}
\]

Fixed cost per year:

- Total cost at 105,000 kilometers ...................... $11,970
- Less variable portion:
  - 105,000 kilometers × $0.074 per kilometer .......... 7,770
  - Fixed cost per year ................................ $ 4,200

2. \( Y = 4,200 + 0.074X \)

3. Fixed cost .................................................. $ 4,200
   Variable cost:
   - 80,000 kilometers × $0.074 per kilometer ........ 5,920
   - Total annual cost .................................... $10,120
Exercise 1-9 (10 minutes)

1. Product costs:

   Direct materials.................................  $ 80,000
   Direct labor ....................................  42,000
   Manufacturing overhead .......................  19,000
   Total product costs............................  $141,000

2. Period costs:

   Selling expenses...............................  $22,000
   Administrative expenses ......................  35,000
   Total period costs.............................  $57,000

3. Conversion costs:

   Direct labor .....................................  $42,000
   Manufacturing overhead .......................  19,000
   Total conversion costs .......................  $61,000

4. Prime costs:

   Direct materials...............................  $ 80,000
   Direct labor ....................................  42,000
   Total prime costs.............................  $122,000
Exercise 1-10 (20 minutes)

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

$$\frac{\$180,000}{30,000\text{ units}} = \$6\text{ per unit.}$$

In accordance with the behavior of variable and fixed costs, the completed schedule is:

<table>
<thead>
<tr>
<th>Units produced and sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>30,000</td>
</tr>
<tr>
<td>Total costs:</td>
</tr>
<tr>
<td>Variable costs ........ $180,000 $240,000 $300,000</td>
</tr>
<tr>
<td>Fixed costs .......... 300,000 300,000 300,000</td>
</tr>
<tr>
<td>Total costs .......... $480,000 $540,000 $600,000</td>
</tr>
<tr>
<td>Cost per unit:</td>
</tr>
<tr>
<td>Variable cost .......... $ 6.00 $ 6.00 $ 6.00</td>
</tr>
<tr>
<td>Fixed cost ............ 10.00 7.50 6.00</td>
</tr>
<tr>
<td>Total cost per unit .... $16.00 $13.50 $12.00</td>
</tr>
</tbody>
</table>

2. The company’s income statement in the contribution format 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 1-11 (45 minutes)

1. The scattergraph appears below:

Yes, there is an approximately linear relationship between the number of units shipped and the total shipping expense.
2. The high-low estimates and cost formula are computed as follows:

<table>
<thead>
<tr>
<th>Units Shipped</th>
<th>Shipping Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>High activity level (June)</td>
<td>8</td>
</tr>
<tr>
<td>Low activity level (July)</td>
<td>2</td>
</tr>
<tr>
<td>Change</td>
<td>6</td>
</tr>
</tbody>
</table>

Variable cost element:

\[
\frac{\text{Change in expense}}{\text{Change in activity}} = \frac{\$1,500}{6 \text{ units}} = $250 \text{ per unit.}
\]

Fixed cost element:

- Shipping expense at high activity level: $2,700
- Less variable cost element ($250 per unit \times 8 units): $2,000
- Total fixed cost: $700

The cost formula is $700 per month plus $250 per unit shipped or

\[
Y = $700 + $250X,
\]

where X is the number of units shipped.

The scattergraph on the following page shows the straight line drawn through the high and low data points.
3. The high-low estimate of fixed costs is $210.71 lower than the estimate provided by least-squares regression. The high-low estimate of the variable cost per unit is $32.14 higher than the estimate provided by least-squares regression. A straight line that minimized the sum of the squared errors would intersect the Y-axis at $910.71 instead of $700. It would also have a flatter slope because the estimated variable cost per unit is lower than the high-low method.

4. The cost of shipping units is likely to depend on the weight and volume of the units shipped and the distance traveled as well as on the number of units shipped. In addition, higher cost shipping might be necessary to meet a deadline.
**Exercise 1-12** (30 minutes)

<table>
<thead>
<tr>
<th>Name of the Cost</th>
<th>Variable Cost</th>
<th>Fixed Cost</th>
<th>Direct Materials</th>
<th>Direct Labor</th>
<th>Manufacturing Overhead Cost</th>
<th>Opportunity Cost</th>
<th>Sunk Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rental revenue forgone, $30,000 per year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Direct materials cost, $80 per unit</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rental cost of warehouse, $500 per month</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rental cost of equipment, $4,000 per month</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct labor cost, $60 per unit</td>
<td>X</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation of the annex space, $8,000 per year</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Advertising cost, $50,000 per year</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervisor’s salary, $1,500 per month</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity for machines, $1.20 per unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Shipping cost, $9 per unit</td>
<td>X</td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>Return earned on investments, $3,000 per year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Exercise 1-13 (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
2. Since 200 pairs of skis were sold and the contribution margin totaled $48,000 for the quarter, the contribution of each pair of skis toward fixed expenses and profits was $240 ($48,000 ÷ 200 pair of skis = $240 per pair of skis).
Exercise 1-14 (30 minutes)

1.  

<table>
<thead>
<tr>
<th>Custodial Supplies Expense</th>
<th>Guest Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>High activity level (July)</td>
<td>12,000</td>
</tr>
<tr>
<td>Low activity level (March)</td>
<td>4,000</td>
</tr>
<tr>
<td>Change</td>
<td>8,000</td>
</tr>
</tbody>
</table>

Variable cost per guest-day:

\[
\text{Change in expense} \div \text{Change in activity} = \frac{6,000}{8,000 \text{ guest-days}} \approx 0.75 \text{ per guest-day}
\]

Fixed cost per month:

\[
\text{Custodial supplies expense at high activity level} = 13,500
\]

\[
\text{Less variable cost element:}
\]

\[
12,000 \text{ guest-days} \times 0.75 \text{ per guest-day} = 9,000
\]

\[
\text{Total fixed cost} = 4,500
\]

The cost formula is $4,500 per month plus $0.75 per guest-day or

\[Y = 4,500 + 0.75X\]

2. Custodial supplies expense for 11,000 guest-days:

Variable cost:

\[
11,000 \text{ guest-days} \times 0.75 \text{ per guest-day} = 8,250
\]

Fixed cost:

\[
4,500
\]

Total cost:

\[
12,750
\]
3. The scattergraph appears below.

![Scattergraph](image)

4. The high-low estimate of fixed costs is $526.90 higher than the estimate provided by least-squares regression. The high-low estimate of the variable cost per unit is $0.02 lower than the estimate provided by least-squares regression. A straight line that minimized the sum of the squared errors would intersect the Y-axis at $3,973.10 instead of $4,500. It would also have a steeper slope because the estimated variable cost per unit is higher than the high-low method.

5. Expected custodial supplies expense for 11,000 guest-days:

   Variable cost: 11,000 guest-days × $0.77 per day..... $ 8,470.00  
   Fixed cost ................................................................. 3,973.10  
   Total cost................................................................. $12,443.10
### Exercise 1-15 (15 minutes)

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Cost Behavior</th>
<th>Selling and Administrative Cost</th>
<th>Product Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Variable</td>
<td>Fixed</td>
<td></td>
</tr>
<tr>
<td>1. Hamburger buns at a Wendy’s outlet</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2. Advertising by a dental office</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3. Apples processed and canned by Del Monte</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4. Shipping canned apples from a Del Monte plant to customers</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5. Insurance on a Bausch &amp; Lomb factory producing contact lenses</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6. Insurance on IBM’s corporate headquarters</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7. Salary of a supervisor overseeing production of printers at Hewlett-Packard</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>8. Commissions paid to automobile salespersons</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>9. Depreciation of factory lunchroom facilities at a General Electric plant</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10. Steering wheels installed in BMWs</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

**Problem 1-16A (45 minutes)**

1. Cost of goods sold................... Variable
   Advertising expense ............... Fixed
   Shipping expense.................. Mixed
   Salaries and commissions ....... Mixed
   Insurance expense ............... Fixed
   Depreciation expense ........... Fixed

2. Analysis of the mixed expenses:

<table>
<thead>
<tr>
<th>Units</th>
<th>Shipping Expense</th>
<th>Salaries and Commissions Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>High level of activity</td>
<td>5,000</td>
<td>$38,000</td>
</tr>
<tr>
<td>Low level of activity</td>
<td>4,000</td>
<td>34,000</td>
</tr>
<tr>
<td>Change</td>
<td>1,000</td>
<td>$4,000</td>
</tr>
</tbody>
</table>

   Variable cost element:
   
   \[
   \text{Variable rate} = \frac{\text{Change in cost}}{\text{Change in activity}}
   \]
   
   Shipping expense: \[\frac{4,000}{1,000 \text{ units}} = $4 \text{ per unit}\]
   
   Salaries and commissions expense: \[\frac{12,000}{1,000 \text{ units}} = $12 \text{ per unit}\]

   Fixed cost element:

   \[
   \begin{align*}
   \text{Cost at high level of activity} & \quad \text{Shipping Expense} \quad \text{Salaries and Commissions Expense} \\
   \text{Less variable cost element:} & \quad $38,000 \quad $90,000 \\
   5,000 \text{ units} \times $4 \text{ per unit} & \quad 20,000 \\
   5,000 \text{ units} \times $12 \text{ per unit} & \quad 60,000 \\
   \text{Fixed cost element} & \quad $18,000 \quad $30,000
   \end{align*}
   \]
**Problem 1-16A (continued)**

The cost formulas are:
- **Shipping expense:**
  - $18,000 per month plus $4 per unit
  - \( Y = 18,000 + 4X \)
- **Salaries and commissions expense:**
  - $30,000 per month plus $12 per unit
  - \( Y = 30,000 + 12X \)

3.

**Morrisey & Brown, Ltd.**

**Income Statement**

**For the Month Ended September 30**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales (5,000 units × $100 per unit)..............</td>
<td>$500,000</td>
</tr>
<tr>
<td><strong>Variable expenses:</strong></td>
<td></td>
</tr>
<tr>
<td>Cost of goods sold</td>
<td>$300,000</td>
</tr>
<tr>
<td>(5,000 units × $60 per unit)..........................</td>
<td></td>
</tr>
<tr>
<td>Shipping expense</td>
<td>20,000</td>
</tr>
<tr>
<td>(5,000 units × $4 per unit)..........................</td>
<td></td>
</tr>
<tr>
<td>Salaries and commissions expense</td>
<td>60,000</td>
</tr>
<tr>
<td>(5,000 units × $12 per unit)..........................</td>
<td>380,000</td>
</tr>
<tr>
<td><strong>Contribution margin</strong></td>
<td>120,000</td>
</tr>
<tr>
<td><strong>Fixed expenses:</strong></td>
<td></td>
</tr>
<tr>
<td>Advertising expense</td>
<td>21,000</td>
</tr>
<tr>
<td>Shipping expense</td>
<td>18,000</td>
</tr>
<tr>
<td>Salaries and commissions expense</td>
<td>30,000</td>
</tr>
<tr>
<td>Insurance expense</td>
<td>6,000</td>
</tr>
<tr>
<td>Depreciation expense</td>
<td>15,000</td>
</tr>
<tr>
<td><strong>Net operating income</strong></td>
<td>$30,000</td>
</tr>
</tbody>
</table>
Problem 1-17A (30 minutes)

1. Maintenance cost at the 75,000 direct labor-hour level of activity can be isolated as follows:

<table>
<thead>
<tr>
<th>Level of Activity</th>
<th>50,000 DLHs</th>
<th>75,000 DLHs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total factory overhead cost</td>
<td>$14,250,000</td>
<td>$17,625,000</td>
</tr>
<tr>
<td>Deduct:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect materials @ $100 per DLH*</td>
<td>5,000,000</td>
<td>7,500,000</td>
</tr>
<tr>
<td>Rent</td>
<td>6,000,000</td>
<td>6,000,000</td>
</tr>
<tr>
<td>Maintenance cost</td>
<td>$3,250,000</td>
<td>$4,125,000</td>
</tr>
</tbody>
</table>

* $5,000,000 ÷ 50,000 DLHs = $100 per DLH

2. High-low analysis of maintenance cost:

<table>
<thead>
<tr>
<th>Direct Labor-Hours</th>
<th>Maintenance Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>High level of activity</td>
<td>75,000</td>
</tr>
<tr>
<td>Low level of activity</td>
<td>50,000</td>
</tr>
<tr>
<td>Change</td>
<td>25,000</td>
</tr>
</tbody>
</table>

Variable cost element:

\[
\frac{\text{Change in cost}}{\text{Change in activity}} = \frac{875,000}{25,000 \text{ DLH}} = $35 \text{ per DLH}
\]

Fixed cost element:

Total cost at the high level of activity | $4,125,000
Less variable cost element
(75,000 DLHs × $35 per DLH) | 2,625,000
Fixed cost element | $1,500,000

Therefore, the cost formula for maintenance is $1,500,000 per year plus $35 per direct labor-hour or

\[
Y = 1,500,000 + 35X
\]
Problem 1-17A (continued)

3. Total factory overhead cost at 70,000 direct labor-hours is:

   Indirect materials
   \[ (70,000 \text{ DLHs} \times $100 \text{ per DLH}) \] ............ $7,000,000
   Rent .................................................. 6,000,000
   Maintenance:
   Variable cost element
   \[ (70,000 \text{ DLHs} \times $35 \text{ per DLH}) \] ............ $2,450,000
   Fixed cost element ............................. 1,500,000 3,950,000
   Total factory overhead cost ...................... $16,950,000
**Problem 1-18A (20 minutes)**

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

*These costs could be direct costs of serving particular seniors.*
Problem 1-19A (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
2. Marwick’s Pianos, Inc.
Contribution Format Income Statement
For the Month of August

<table>
<thead>
<tr>
<th>Description</th>
<th>Total</th>
<th>Per Piano</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$125,000</td>
<td>$3,125</td>
</tr>
<tr>
<td>Variable expenses:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of goods sold</td>
<td>$98,000</td>
<td>$2,450</td>
</tr>
<tr>
<td>Sales commissions (8% × $125,000)</td>
<td>$10,000</td>
<td>$250</td>
</tr>
<tr>
<td>Delivery of pianos (40 pianos × $30 per piano)</td>
<td>$1,200</td>
<td>$30</td>
</tr>
<tr>
<td>Clerical (40 pianos × $20 per piano)</td>
<td>$800</td>
<td>$20</td>
</tr>
<tr>
<td>Total variable expenses</td>
<td>$110,000</td>
<td>$2,750</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$15,000</td>
<td>$375</td>
</tr>
<tr>
<td>Fixed expenses:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advertising</td>
<td>$700</td>
<td></td>
</tr>
<tr>
<td>Sales salaries</td>
<td>$950</td>
<td></td>
</tr>
<tr>
<td>Utilities</td>
<td>$350</td>
<td></td>
</tr>
<tr>
<td>Depreciation of sales facilities</td>
<td>$800</td>
<td></td>
</tr>
<tr>
<td>Executive salaries</td>
<td>$2,500</td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td>$400</td>
<td></td>
</tr>
<tr>
<td>Clerical</td>
<td>$1,000</td>
<td></td>
</tr>
<tr>
<td>Depreciation of office equipment</td>
<td>$300</td>
<td></td>
</tr>
<tr>
<td>Total fixed expenses</td>
<td>$7,000</td>
<td></td>
</tr>
<tr>
<td>Net operating income</td>
<td>$8,000</td>
<td></td>
</tr>
</tbody>
</table>

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 1-20A** (45 minutes)

1. Maintenance cost at the 90,000 machine-hour level of activity can be isolated as follows:

<table>
<thead>
<tr>
<th>Level of Activity</th>
<th>60,000 MHs</th>
<th>90,000 MHs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total factory overhead cost</td>
<td>$174,000</td>
<td>$246,000</td>
</tr>
<tr>
<td>Deduct: Utilities cost @ $0.80 per MH*</td>
<td>48,000</td>
<td>72,000</td>
</tr>
<tr>
<td>Supervisory salaries</td>
<td>21,000</td>
<td>21,000</td>
</tr>
<tr>
<td>Maintenance cost</td>
<td>$105,000</td>
<td>$153,000</td>
</tr>
</tbody>
</table>

*$48,000 ÷ 60,000 MHs = $0.80 per MH

2. High-low analysis of maintenance cost:

<table>
<thead>
<tr>
<th>Machine- Hours</th>
<th>Maintenance Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>High activity level</td>
<td>90,000</td>
</tr>
<tr>
<td>Low activity level</td>
<td>60,000</td>
</tr>
<tr>
<td>Change</td>
<td>30,000</td>
</tr>
</tbody>
</table>

Variable rate:

\[
\text{Variable rate} = \frac{\text{Change in cost}}{\text{Change in activity}} = \frac{$48,000}{30,000 \text{ MHs}} = $1.60 \text{ per MH}
\]

Total fixed cost:

Total maintenance cost at the high activity level | $153,000
Less variable cost element
(90,000 MHs × $1.60 per MH) | 144,000
Fixed cost element | $9,000

Therefore, the cost formula for maintenance is $9,000 per month plus $1.60 per machine-hour or

\[Y = $9,000 + 1.60X.\]
Problem 1-20A (continued)

3.  | **Variable Cost per** |  | **Fixed Cost** |
    | **Machine-Hour** |  |  |
    | Utilities cost | $0.80 |  |
    | Supervisory salaries cost | $21,000 |  |
    | Maintenance cost | 1.60 | 9,000 |
    | Total overhead cost | $2.40 | $30,000 |

Thus, the cost formula would be: \( Y = 30,000 + 2.40X \).

4. Total overhead cost at an activity level of 75,000 machine-hours:

- Fixed costs: $30,000
- Variable costs: 75,000 MHs \( \times \) $2.40 per MH: $180,000
- Total overhead costs: $210,000
**Problem 1-21A** (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.

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Variable or Fixed</th>
<th>Selling Cost</th>
<th>Administrative Cost</th>
<th>Manufacturing (Product) Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Property taxes, factory</td>
<td>F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Boxes used for packaging detergent produced by the company</td>
<td>V</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3. Salespersons’ commissions</td>
<td>V</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4. Supervisor’s salary, factory</td>
<td>F</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5. Depreciation, executive autos</td>
<td>F</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>6. Wages of workers assembling computers</td>
<td>V</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>7. Insurance, finished goods warehouses</td>
<td>F</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>8. Lubricants for production equipment</td>
<td>V</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>9. Advertising costs</td>
<td>F</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>10. Microchips used in producing calculators</td>
<td>V</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>11. Shipping costs on merchandise sold</td>
<td>V</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>12. Magazine subscriptions, factory lunchroom</td>
<td>F</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>13. Thread in a garment factory</td>
<td>V</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>14. Billing costs</td>
<td>V</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>15. Executive life insurance</td>
<td>F</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Problem 1-21A (continued)

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Variable or Fixed Cost</th>
<th>Selling Cost</th>
<th>Administrative Cost</th>
<th>Manufacturing (Product) Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. Ink used in textbook production</td>
<td>V</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>17. Fringe benefits, assembly-line workers</td>
<td>V</td>
<td></td>
<td></td>
<td>X**</td>
</tr>
<tr>
<td>18. Yarn used in sweater production</td>
<td>V</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>19. Wages of receptionist, executive offices</td>
<td>F</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

* Could be administrative cost.
** Could be indirect cost.
Problem 1-22A (45 minutes)

1. High-low method:

<table>
<thead>
<tr>
<th>Number of Scans</th>
<th>Utilities Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>High level of activity</td>
<td>150</td>
</tr>
<tr>
<td>Low level of activity</td>
<td>60</td>
</tr>
<tr>
<td>Change</td>
<td>90</td>
</tr>
</tbody>
</table>

Variable rate: \[
\text{Variable rate} = \frac{\text{Change in cost}}{\text{Change in activity}} = \frac{1,800}{90 \text{ scans}} = \$20 \text{ per scan}
\]

Fixed cost: Total cost at high level of activity = $4,000
Less variable element:
\[
150 \text{ scans} \times \$20 \text{ per scan} = 3,000
\]
Fixed cost element = $1,000

Therefore, the cost formula is: \[Y = 1,000 + 20X\].

2. The scattergraph plot appears as follows:
Problem 1-22A (continued)

3. The high-low estimate of fixed costs is $170.90 lower than the estimate provided by least-squares regression. The high-low estimate of the variable cost per unit is $1.82 higher than the estimate provided by least-squares regression. A straight line that minimized the sum of the squared errors would intersect the Y-axis at $1,170.90 instead of $1,000. It would also have a flatter slope because the estimated variable cost per unit is lower than the high-low method.
**Problem 1-23A** (45 minutes)

1. High-low method:

<table>
<thead>
<tr>
<th>Units Sold</th>
<th>Shipping Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>High activity level</td>
<td>20,000</td>
</tr>
<tr>
<td>Low activity level</td>
<td>10,000</td>
</tr>
<tr>
<td>Change</td>
<td>10,000</td>
</tr>
</tbody>
</table>

Variable cost per unit = \( \frac{\text{Change in cost}}{\text{Change in activity}} \)

\[ \frac{\$91,000}{10,000 \text{ units}} = \$9.10 \text{ per unit} \]

Fixed cost element:

Total shipping expense at high activity level \( \$210,000 \)

Less variable element:

\[ 20,000 \text{ units} \times \$9.10 \text{ per unit} = 182,000 \]

Fixed cost element \( \$28,000 \)

Therefore, the cost formula is: \( Y = \$28,000 + \$9.10X \).

Problem 1-23A (continued)

2. Milden Company
Budgeted Contribution Format Income Statement
For the First Quarter, Year 3

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 1-24A (45 minutes)

1.  

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Cost Behavior</th>
<th>Selling or Administrative Cost</th>
<th>Product Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Variable</td>
<td>Fixed</td>
<td>Direct</td>
</tr>
<tr>
<td>Direct labor</td>
<td>$118,000</td>
<td></td>
<td>$118,000</td>
</tr>
<tr>
<td>Advertising</td>
<td>$50,000</td>
<td>$50,000</td>
<td></td>
</tr>
<tr>
<td>Factory supervision</td>
<td>40,000</td>
<td></td>
<td>$40,000</td>
</tr>
<tr>
<td>Property taxes, factory building</td>
<td>3,500</td>
<td></td>
<td>3,500</td>
</tr>
<tr>
<td>Sales commissions</td>
<td>80,000</td>
<td>80,000</td>
<td></td>
</tr>
<tr>
<td>Insurance, factory</td>
<td>2,500</td>
<td></td>
<td>2,500</td>
</tr>
<tr>
<td>Depreciation, administrative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>office equipment</td>
<td>4,000</td>
<td>4,000</td>
<td></td>
</tr>
<tr>
<td>Lease cost, factory equipment</td>
<td>12,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect materials, factory</td>
<td>6,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation, factory building</td>
<td>10,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative office supplies</td>
<td>3,000</td>
<td>3,000</td>
<td></td>
</tr>
<tr>
<td>Administrative office salaries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct materials used</td>
<td>94,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utilities, factory</td>
<td>20,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total costs</td>
<td>$321,000</td>
<td>$182,000</td>
<td>$197,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$94,000</td>
</tr>
</tbody>
</table>
2. The average product cost for one patio set would be:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>$212,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Indirect</td>
<td>94,000</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$306,000</td>
<td></td>
</tr>
</tbody>
</table>

$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, and direct materials and direct labor would be only $106.

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.
**Ethics Challenge** (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.
Analytical Thinking (30 minutes)

1. The scattergraph of direct labor cost versus the number of units produced is presented below:
Analytical Thinking (continued)

2. The scattergraph of the direct labor cost versus the number of paid days is presented below:
Analytical Thinking (continued)

3. The number of paid days should be used as the activity base rather than the number of units produced. The scattergraphs reveal a much stronger relation (i.e., higher correlation) between direct labor costs and number of paid days than between direct labor costs and number of units produced. Variations in the direct labor costs apparently occur because of the number of paid days in the month and have little to do with the number of units that are produced. It appears that the direct labor costs are basically fixed with respect to how many units are produced in a month. This would happen if the direct labor workers are treated as full-time employees who are paid even if there is insufficient work to keep them busy. Moreover, for planning purposes, the company is likely to be able to predict the number of paid days in the month with much greater accuracy than the number of units that will be produced.
Teamwork in Action

1. Student answers will vary concerning what is the best overall measure of activity in each business. Some possibilities are:
   a. Dental clinic: number of patient-visits; total patient revenues
   b. Fast-food restaurant: total sales
   c. Auto repair shop: hours of service provided; total sales

Again, student answers will vary for examples of fixed and variable costs, but some possibilities are:

<table>
<thead>
<tr>
<th>Business</th>
<th>Measure of Activity</th>
<th>Examples of Fixed Costs</th>
<th>Examples of Variable Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Dental clinic</td>
<td>Number of patient-visits</td>
<td>Receptionist’s wages; office rent or depreciation; insurance</td>
<td>Supplies such as mouthwash, cavity filling material, dental floss, etc.</td>
</tr>
<tr>
<td>b. Fast-food restaurant</td>
<td>Total sales</td>
<td>Depreciation or rent on the building; wages; most utilities</td>
<td>Cost of food supplies; some electrical costs</td>
</tr>
<tr>
<td>c. Auto repair shop</td>
<td>Hours of service provided</td>
<td>Building depreciation or rent; repair shop manager’s salary; utilities</td>
<td>Wages of mechanics; supplies; some depreciation on equipment</td>
</tr>
</tbody>
</table>
2. Within the relevant range, changes in activity have these effects:

<table>
<thead>
<tr>
<th></th>
<th>Increases in activity</th>
<th>Decreases in activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total fixed cost</td>
<td>Constant</td>
<td>Constant</td>
</tr>
<tr>
<td>Fixed cost per unit</td>
<td>Decrease</td>
<td>Increase</td>
</tr>
<tr>
<td>Total variable costs</td>
<td>Increase</td>
<td>Decrease</td>
</tr>
<tr>
<td>Variable cost per</td>
<td>Constant</td>
<td>Constant</td>
</tr>
<tr>
<td>Total cost</td>
<td>Increase</td>
<td>Decrease</td>
</tr>
<tr>
<td>Average total cost</td>
<td>Decrease</td>
<td>Increase</td>
</tr>
</tbody>
</table>

3. The dental clinic probably has the lowest ratio of variable to fixed costs. Very little of the costs of a dental clinic are variable with respect to the number of patient-visits. Because of its high fixed costs and low variable costs, the dental clinic’s profits are likely to be the most sensitive among the four businesses to changes in the level of demand. If demand declines, the clinic must still incur most of its costs (wages and salaries, facility rent and depreciation) and hence its profits will suffer most.
Chapter 1
Take Two Solutions

Exercise 1-4 (15 minutes)

1. 

<table>
<thead>
<tr>
<th>Cups of Coffee Served</th>
<th>2,000</th>
<th>2,100</th>
<th>2,200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed cost</td>
<td>$1,000</td>
<td>$1,000</td>
<td>$1,000</td>
</tr>
<tr>
<td>Variable cost</td>
<td>600</td>
<td>630</td>
<td>660</td>
</tr>
<tr>
<td>Total cost</td>
<td>$1,600</td>
<td>$1,630</td>
<td>$1,660</td>
</tr>
<tr>
<td>Average cost per cup served *</td>
<td>$0.800</td>
<td>$0.776</td>
<td>$0.755</td>
</tr>
</tbody>
</table>

* Total cost ÷ cups of coffee served in a week

2. The average cost of a cup of coffee declines as the number of cups of coffee served increases because the fixed cost is spread over more cups of coffee.
Exercise 1-5 (20 minutes)

1. 

<table>
<thead>
<tr>
<th>Occupancy-Days</th>
<th>Electrical Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>High activity level (August)</td>
<td>2,406</td>
</tr>
<tr>
<td>Low activity level (May)</td>
<td>360</td>
</tr>
<tr>
<td>Change</td>
<td>2,046</td>
</tr>
</tbody>
</table>

Variable cost = Change in cost ÷ Change in activity
= $3,277 ÷ 2,046 occupancy-days
= $1.60 (rounded) per occupancy-day

Total cost (August) = $5,148.00
Variable cost element = ($1.60 per occupancy-day × 2,406 occupancy-days) = 3,849.60
Fixed cost element = $1,298.40

2. Electrical costs may reflect seasonal factors other than just the variation in occupancy days. For example, common areas such as the reception area must be lighted for longer periods during the winter than in the summer. This will result in seasonal fluctuations in the fixed electrical costs.

   Additionally, fixed costs will be affected by the number of days in a month. In other words, costs like the costs of lighting common areas are variable with respect to the number of days in the month, but are fixed with respect to how many rooms are occupied during the month.

   Other, less systematic, factors may also affect electrical costs such as the frugality of individual guests. Some guests will turn off lights when they leave a room. Others will not.
**Exercise 1-6 (15 minutes)**

1. Traditional income statement

   Cherokee Inc.
   Traditional Income Statement

   Sales ($30 per unit × 24,000 units) ....................... $720,000
   Cost of goods sold
   ($24,000 + $212,000 – $44,000) ....................... 192,000
   Gross margin ........................................... 528,000
   Selling and administrative expenses:
   Selling expenses
   (($4 per unit × 24,000 units) + $40,000) ...... 136,000
   Administrative expenses
   (($2 per unit × 24,000 units) + $30,000) ...... 78,000 214,000
   Net operating income ................................... $314,000

2. Contribution format income statement

   Cherokee Inc.
   Contribution Format Income Statement

   Sales ......................................................... $720,000
   Variable expenses:
   Cost of goods sold
   ($24,000 + $212,000 – $44,000) ............... $192,000
   Selling expenses ($4 per unit × 24,000 units)... 96,000
   Administrative expenses
   ($2 per unit × 24,000 units) ...................... 48,000 336,000
   Contribution margin ................................... 384,000
   Fixed expenses:
   Selling expenses ........................................... 40,000
   Administrative expenses ......................... 30,000 70,000
   Net operating income .................................. $314,000
Exercise 1-8 (20 minutes)

1. Kilometers Driven | Total Annual Cost*
----------------------|------------------
High level of activity | 105,000 | $10,500
Low level of activity | 70,000 | 9,380
Change | 35,000 | $1,120

* 105,000 kilometers × $0.100 per kilometer = $10,500
70,000 kilometers × $0.134 per kilometer = $9,380

Variable cost per kilometer:
\[
\frac{\text{Change in cost}}{\text{Change in activity}} = \frac{$1,120}{35,000 \text{ kilometers}} = $0.032 \text{ per kilometer}
\]

Fixed cost per year:
- Total cost at 105,000 kilometers: $10,500
- Less variable portion:
  - 105,000 kilometers × $0.032 per kilometer: $3,360
- Fixed cost per year: $7,140

2. \[Y = $7,140 + $0.032X\]

3. Fixed cost: $7,140
Variable cost:
- 80,000 kilometers × $0.032 per kilometer: 2,560
- Total annual cost: $9,700
Exercise 1-13 (20 minutes)

1. Traditional income statement

The Alpine House, Inc.
Traditional Income Statement

Sales .......................................................... $165,000
Cost of goods sold
($30,000 + $135,000 − $40,000) .................... 125,000
Gross margin .................................................. 40,000
Selling and administrative expenses:
Selling expenses (($50 per unit × 220 pairs of skis*) + $20,000) ........................................ 31,000
Administrative expenses (($10 per unit × 220 pairs of skis) + $20,000) ......................... 22,200 53,200
Net operating income (loss) ............................ $ (13,200)

*$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 .......................................................... $165,000
Variable expenses:
Cost of goods sold
($30,000 + $135,000 − $40,000) .................... $125,000
Selling expenses
($50 per unit × 220 pairs of skis)..................... 11,000
Administrative expenses
($10 per unit × 220 pairs of skis)................... 2,200 138,200
Contribution margin........................................ 26,800
Fixed expenses:
Selling expenses ........................................... 20,000
Administrative expenses ............................... 20,000 40,000
Net operating income (loss) ............................ $ (13,200)
Exercise 1-13 (continued)

2. Since 220 pairs of skis were sold and the contribution margin totaled $26,800 for the quarter, the contribution of each pair of skis toward fixed expenses and profits was $121.82 ($26,800 ÷ 220 pair of skis = $121.82 per pair of skis).

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