Exercise 5-7 (30 minutes)

1. | Custodial Supplies Expense | Guest-Days |
<table>
<thead>
<tr>
<th></th>
<th></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 element:
   \[
   \frac{\text{Change in expense}}{\text{Change in activity}} = \frac{\$6,000}{8,000 \text{ guest-days}} = \$0.75 \text{ per guest-day}
   \]

   Fixed cost element:
   - Custodial supplies expense at high activity level: $13,500
   - Less variable cost element:
     \[
     12,000 \text{ guest-days} \times \$0.75 \text{ per guest-day} = \$9,000
     \]
   - Total fixed cost: $4,500

   The cost formula is $4,500 per month plus $0.75 per guest-day or
   \[
   Y = 4,500 + 0.75X
   \]
   where \( X \) is the number of guest-days.

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
Exercise 5-8 (45 minutes)

1. The scattergraph appears below:
Exercise 5-8 (continued)

2. (Note: Students’ answers will vary considerably due to the inherent lack of precision and subjectivity of the quick-and-dirty method.)

Total costs at 7,500 guest-days per month [a point falling on the line in (1)] ........................................... $9,750
Less fixed cost element (intersection of the Y axis) ....... 3,750
Variable cost element .................................................. $6,000

$6,000 ÷ 7,500 guest-days = $0.80 per guest-day.
The cost formula is therefore $3,750 per month, plus $0.80 per guest-day or

\[ Y = 3,750 + 0.80X, \]

where X is the number of guest-days.

3. The high-low method would not provide an accurate cost formula in this situation since a line drawn through the high and low points would have a slope that is too flat and would be placed too high, cutting the cost axis at about $4,500 per month. The high and low points are not representative of all of the data in this situation.
Exercise 5-9 (30 minutes)

1. The company’s variable cost per unit would be:

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

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

<table>
<thead>
<tr>
<th>Units produced and sold</th>
<th>30,000</th>
<th>40,000</th>
<th>50,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total costs:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable costs</td>
<td>$180,000</td>
<td>$240,000</td>
<td>$300,000</td>
</tr>
<tr>
<td>Fixed costs</td>
<td>$300,000</td>
<td>$300,000</td>
<td>$300,000</td>
</tr>
<tr>
<td>Total costs</td>
<td>$480,000</td>
<td>$540,000</td>
<td>$600,000</td>
</tr>
<tr>
<td>Cost per unit:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable cost</td>
<td>$6.00</td>
<td>$6.00</td>
<td>$6.00</td>
</tr>
<tr>
<td>Fixed cost</td>
<td>$10.00</td>
<td>$7.50</td>
<td>$6.00</td>
</tr>
<tr>
<td>Total cost per unit</td>
<td>$16.00</td>
<td>$13.50</td>
<td>$12.00</td>
</tr>
</tbody>
</table>

2. The company’s income statement in the contribution format would be:

Sales (45,000 units × $16 per unit) .................................. $720,000
Less variable expenses (45,000 units × $6 per unit) .. 270,000
Contribution margin .................................................. 450,000
Less fixed expense .................................................. 300,000
Net operating income .................................................. $150,000
Problem 5-17A (60 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: \[
   \frac{\text{Change in cost}}{\text{Change in activity}} = \frac{1,800}{90 \text{ scans}} = $20 \text{ per scan}
   \]

   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. Scattergraph method (see the scattergraph on the following page):

   (Note: Students’ answers will vary due to the inherent imprecision of the quick-and-dirty method.)

   The line intersects the cost axis at about $1,200. The variable cost can be estimated as follows:

   Total cost at 100 scans (a point that falls on the line) = $3,000

   Less the fixed cost element = $1,200

   Variable cost element (total) = $1,800

   $1,800 ÷ 100 scans = $18 per scan.

   Therefore, the cost formula is: \[Y = $1,200 + $18X.\]
Problem 5-17A (continued)

The completed scattergraph:
Problem 5-21A (60 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 Commission Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>High level of activity ....... 5,000</td>
<td>A$38,000</td>
<td>A$90,000</td>
</tr>
<tr>
<td>Low level of activity......... 4,000</td>
<td>34,000</td>
<td>78,000</td>
</tr>
<tr>
<td>Change .......................... 1,000</td>
<td>A$ 4,000</td>
<td>A$12,000</td>
</tr>
</tbody>
</table>

Variable cost element:

\[
\text{Variable rate} = \frac{\text{Change in cost}}{\text{Change in activity}}
\]

Shipping expense: \( \frac{\text{A$4,000}}{1,000 \text{ units}} = \text{A$4 per unit.} \)

Salaries and Commission Expense: \( \frac{\text{A$12,000}}{1,000 \text{ units}} = \text{A$12 per unit.} \)

Fixed cost element:

<table>
<thead>
<tr>
<th>Shipping Expense</th>
<th>Salaries and Commission Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost at high level of activity..... A$38,000</td>
<td>A$90,000</td>
</tr>
<tr>
<td>Less variable cost element: 5,000 units × A$4 per unit.... 20,000</td>
<td>60,000</td>
</tr>
<tr>
<td>5,000 units × A$12 per unit..</td>
<td>60,000</td>
</tr>
<tr>
<td>Fixed cost element ............... A$18,000</td>
<td>A$30,000</td>
</tr>
</tbody>
</table>
Problem 5-21A (continued)

The cost formulas are:

Shipping expense:
A$18,000 per month plus A$4 per unit
or
\[ Y = A$18,000 + A$4 \times X. \]

Salaries and commissions expense:
A$30,000 per month plus A$12 per unit
or
\[ Y = A$30,000 + A$12 \times X. \]

3.

Morrisey & Brown, Ltd.
Income Statement
For the Month Ended September 30

Sales revenue
(5,000 units × A$100 per unit) ..................  A$500,000

Less variable expenses:
Cost of goods sold
(5,000 units × A$60 per unit) ................. A$300,000
Shipping expense
(5,000 units × A$4 per unit) ................. 20,000
Salaries and commissions expense
(5,000 units × A$12 per unit) ................. 60,000 380,000

Contribution margin ............................  120,000

Less fixed expenses:
Advertising expense ......................... 21,000
Shipping expense .............................. 18,000
Salaries and commissions expense ......... 30,000
Insurance expense ............................  6,000
Depreciation expense ......................... 15,000 90,000

Net operating income ........................ A$ 30,000