Test #5 Investigating Relationships

Knowledge & Understanding (KU)

1. The scatter plot shows the ages of some tractors and their values.
   a.) Identify the independent variable and the dependent variable.
   [independent -> age of tractor] [dependent -> value of tractor]
   b.) Would you consider the variables to be discrete or continuous?
   [continuous]
   c.) Does the scatter plot suggest a relationship between the age of a tractor and its value?
   [Yes, the older the tractor the less it is value]

2. This scatter plot shows the monthly profit for a car dealership when a certain number of cars are sold.
   a.) Use the graph to estimate the monthly profit in a month where 23 cars are sold.
   [56,000 (see graph)]
   b.) Use the graph to estimate the number of cars sold in a month where the profit is $67,000.
   [28 cars (see graph)]

3. Describe a situation that could match this graph.
   [Jim ran to the library to return some books. He walked to his friends, stayed and played video games. Went back home in time for dinner.]

[Out of 5]
4. In this table, \( x \) represents the number of people enrolled in various classes at a health club, and \( y \) represents the number in each class that are male.

<table>
<thead>
<tr>
<th>( x )</th>
<th>19</th>
<th>10</th>
<th>6</th>
<th>16</th>
<th>15</th>
<th>9</th>
<th>12</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>10</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>7</td>
<td>3</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

a.) Construct a scatter plot for the data.

b.) Sketch a line of best fit.

c.) Use the line of best fit to estimate the value of \( y \) when \( x = 14 \).

about 6 \( \text{(see graph)} \)

d.) Use the line of best fit to estimate the value of \( y \) when \( x = 27 \).

about 12 \( \text{(see graph)} \)

5. In order to obtain a medical image of a patient’s thyroid gland, a chemical is injected into the patient’s bloodstream. The chemical’s concentration in the blood gradually decreases with time.

<table>
<thead>
<tr>
<th>( x )</th>
<th>Time (h)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>Concentration (mg/L)</td>
<td>29.0</td>
<td>15.0</td>
<td>7.7</td>
<td>3.9</td>
<td>2.1</td>
<td>1.3</td>
<td>0.7</td>
<td>0.5</td>
<td>0.4</td>
</tr>
</tbody>
</table>

a.) Plot the data on a scatter plot.

b.) Sketch a curve of best fit.

c.) Describe the relationship between the variables.

The concentration decreases quickly and then decreases more gradually.

d.) Use your curve of best fit to estimate when the concentration of the chemical will be 6.1 mg/L.

about 2.3 h \( \text{(see graph)} \)

e.) Use your curve of best fit to estimate the concentration of the chemical after 12 h.

about 0.2 mg/L \( \text{(see graph)} \)
Application (AP)

1. Given the scatter plot and line of best fit shown below, determine the equation of the line of best fit.

\[ m = \frac{y_2 - y_1}{x_2 - x_1} \]

\[ m = \frac{(7, 13) - (2, 5)}{(7) - (2)} \]

\[ m = \frac{8}{5} \]

\[ m = 1.6 \]

\[ y = mx + b \]

\[ y = \frac{8}{5}x + \frac{2}{5} \]

\[ y = 1.6x + 1.8 \]

2. Bill’s mother sends him to the corner store for milk and tells him to be back in 30 min. The graph shown shows the relationship between his distance from home and time. Use the graph to describe Bill’s trip.

- **A** → **at home**
- **A** to **B** → walks 200m in 4 min away from home
- **B** to **C** → walks 200m in 8 min away from home
- **C** to **D** → walks 200m in 2 min away from home
- **D** to **E** → 0m for 4 min (at the store)
- **E** to **F** → walks 100m in 8 min towards home
- **F** to **G** → walks 500m in 12 min towards home
- **G** → back at home

**A** to **B** → on the way to store & walked slower from **B** to **C**

**E** to **F** → on the way home & walked slower from **E** to **F**
1. This table shows the birth rates in four provinces over the last few years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Alberta</th>
<th>British Columbia</th>
<th>Newfoundland and Labrador</th>
<th>Ontario</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>12.4</td>
<td>9.8</td>
<td>8.8</td>
<td>10.9</td>
</tr>
<tr>
<td>2002</td>
<td>12.8</td>
<td>9.9</td>
<td>8.8</td>
<td>10.8</td>
</tr>
<tr>
<td>2003</td>
<td>12.9</td>
<td>9.7</td>
<td>8.9</td>
<td>10.9</td>
</tr>
<tr>
<td>2004</td>
<td>12.9</td>
<td>9.7</td>
<td>8.6</td>
<td>10.8</td>
</tr>
<tr>
<td>2005</td>
<td>12.7</td>
<td>9.6</td>
<td>8.6</td>
<td>10.6</td>
</tr>
</tbody>
</table>

a.) Draw a scatter plot of the number of births for this five-year period for each province on a single grid.

b.) Do any provincial data show a strong pattern?

Yes. The birthrate for each province is approximately constant.

2. To help protect the environment, a steel factory is thinking about setting new standards for its carbon dioxide (CO₂) emissions. By 2012, the factory wants to emit less than 70 tonnes of CO₂ per year. If it does not change its practices, is the goal realistic?

<table>
<thead>
<tr>
<th>CO₂ (tonnes)</th>
<th>165</th>
<th>145</th>
<th>130</th>
<th>117</th>
<th>107</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>2001</td>
<td>2002</td>
<td>2003</td>
<td>2004</td>
<td>2005</td>
<td>2006</td>
</tr>
</tbody>
</table>

From the graph you can see the CO₂ emissions for 2012 is estimated to be more than 70 tonnes. This means the goal will not be met in 2012.