Lesson 8: Broken Line Graphs

In this section you will learn about broken line graphs. Broken line graphs are usually used to show change over time. A broken line graph is a visual representation of data that usually uses dots on a grid that are joined using straight lines. They can be used to show trends over time. Broken line graphs are often used in Business to help inform people/clients of financial changes.

Example 1: The graph below shows the average snowfall in Regina, Saskatchewan, by month.

a) What month has the highest average snowfall? How much snow fell that month?

December
21 cm

b) During what three months is there no snowfall in Regina?

June/July
August

Cc) During what month is the average snowfall approximately twice as much as the average October snowfall?

February/November
Example 2: Jacob owns a small appliance repair company. He tracked the company’s net profits over a 10-year period. He is examining the data to see if there is a trend and to decide if he can increase the salaries of his employees.

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit (thousands of dollars)</td>
<td>5</td>
<td>15</td>
<td>18</td>
<td>35</td>
<td>40</td>
<td>38</td>
<td>42</td>
<td>20</td>
<td>58</td>
<td>65</td>
</tr>
</tbody>
</table>

a) Graph the data on a broken line graph. Clearly label and scale the axes and include a title.

![Company's Net Profit Graph](image)

b) Is there a general trend in the data? If so, what is it? Are there any exceptions to the trend?

Yes, generally increasing exceptions: 2005, 2007
Discussing Trends and Estimating Values

A broken line graph may help you discover a regular pattern in the data. It may show a generally increasing or decreasing trend, which can allow you to ________ or ________ a value.

**Interpolating** means to estimate a value ________ two values shown on the graph.

**Extrapolating** means to predict a value ________ the given data shown on the graph.

Example 3: The following graph shows the growth rate of a bean plant that David planted in his vegetable garden.

a) David forgot to record the height of the bean plant in Week 4. Use the graph to interpolate the height of the plant that week.

**22 cm**

b) What might the height of the plant be in Week 12?

**38 cm (extrapolation)**

c) Write a statement describing trends in the bean plant’s growth rate from Week 0 to Week 11.

The bean grew steadily. From weeks 2-5 it grew the fastest. Growth seemed to max out around 38 cm.
Broken Line Graphs Assignment

Show all your work.

1. Lumber is often priced in board feet. A board foot is a piece of lumber 1 foot long by 1 foot wide by 1 inch thick. The graph below represents the cost per board foot of kiln-dried spruce over a period of one year.

   a. What is the general trend in cost of kiln-dried spruce?

   b. The graph does not show the cost in August. Use the graph to interpolate the cost of kiln-dried spruce that month.

   c. Based on the general trend in the data, what would you estimate the cost of kiln-dried spruce to be the following month, March?

   d. Between which 2 months was there the greatest increase in price?

   e. Which month saw the lowest price for kiln-dried spruce?
2. The following graph shows Tom’s spending on lunches for the past week.

a. How much did he spend on lunch on Wednesday? Friday?

b. On what day did he spend the most on lunch, and how much was it? Give one possible reason why he might have spent so much that day.

3. The graph at the right shows the value of a particular stock that Vince bought, over a 10-week period. If Week 1 is when Vince bought the stock, use the graph to answer the following questions.
a. At what price did Vince buy the stock?

b. When was the stock worth the most? If Vince had sold it then, what would have been his profit?

4. A long-distance truck driver recorded the distances he drove each day for two weeks. Graph the data using a broken line graph

<table>
<thead>
<tr>
<th>DISTANCE DRIVEN PER DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day</td>
</tr>
<tr>
<td>Distance (km)</td>
</tr>
</tbody>
</table>

a. Are there any data points that seem unusual? What might have caused them?

b. Do you think this graph is a good representation of the data? Explain
Lesson 8: Bar Graphs

A bar graph is another way to visually represent data. It is great for ____________, but usually has nothing to do with ____________. A bar graph is used to plot ___________________________ using rectangular bars, the lengths of which are proportional to the values represented.

Discrete data is data that can only have __________________________; an example is the number of students in your class: the answer must be a whole number since you cannot have half a student in your class. Think of data that can be easily _____________________________.

The bars on a bar graph can be either ____________________________, and have ___________________________ between them. Set the scale, label the axes, and give the graph a title the same way you would for a broken line graph.

Example 1: The 2001 Canadian census data listed the following approximate populations of various cities, to the nearest thousand.

<table>
<thead>
<tr>
<th>City</th>
<th>Population (in thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver</td>
<td>1967</td>
</tr>
<tr>
<td>Calgary</td>
<td>951</td>
</tr>
<tr>
<td>Victoria</td>
<td>312</td>
</tr>
<tr>
<td>Edmonton</td>
<td>938</td>
</tr>
<tr>
<td>Saskatoon</td>
<td>197</td>
</tr>
<tr>
<td>Winnipeg</td>
<td>671</td>
</tr>
</tbody>
</table>

Display the data on a bar graph.
New Skills: Working with different representations of data:

Some data that can be represented using either a \textit{vertical} bar graph or a \textit{horizontal} bar graph. Each type of graph has its advantages for displaying certain kinds of data.

Example 2: The following table shows the approximate population of Moose Jaw Saskatchewan, from 1980 to 2005.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (in thousands)</td>
<td>33.5</td>
<td>34.3</td>
<td>33.4</td>
<td>32.8</td>
<td>32.0</td>
<td>32.0</td>
</tr>
</tbody>
</table>

a) Display the data on both a horizontal and a vertical bar graph.

b) Which graph is a better representation of the data? Why?

\textit{Horizontal} if change scale but be careful

\textbf{Very little change}

c) What is the trend in population size in Moose Jaw?

\textbf{Very little change}

d) Here is a broken line graph of the data. Is the vertical bar graph or the broken line graph a better representation of the data?

\textbf{Vertical - not much change}
Example 3: Consider the horizontal bar graph below and answer the questions that follow.

![Pay for Animal Actors Bar Graph]

- **a)** What is the highest paid animal other than human main character? 
  *Venomous Snake*

- **b)** Which animal(s) receives half as much as venomous snake?  
  *Pig, cat, dog*

- **c)** What is missing in the title making the information difficult to interpret?  
  *Per Day?*

Note: Bar graphs can also be drawn as a double bar graph which allows an individual to compare data easier. A key must be included with the graph. See example below.

![Minutes of homework Bar Graph]

**KEY**
- Red: Wednesday
- Blue: Thursday
Bar Graphs Assignment

Show all your work.

1. A company tracked how new software was obtained and installed on their computers. The results are given in the table below. Draw a bar graph to represent the data.

<table>
<thead>
<tr>
<th>SOFTWARE INSTALLATIONS</th>
<th>Percentage of total software installations</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-house IT was obtained and installed</td>
<td>58</td>
</tr>
<tr>
<td>In-house IT with help from provider</td>
<td>16</td>
</tr>
<tr>
<td>Outsourced to service provider</td>
<td>10</td>
</tr>
<tr>
<td>Outsourced to development partner</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
</tr>
</tbody>
</table>

Blank bar graph grid
2. Carbon dioxide ($CO_2$) emissions contribute to climate change, and so they are closely monitored by governments and environmental groups. The following two graphs represent $CO_2$ emissions worldwide from 1995 to 2005.

![Graphs showing CO2 emissions from 1995 to 2005.]

a) Which graph is a better representation of worldwide $CO_2$ emissions? Why?

b) What were the emissions in 1999?  

c) What were they in 2005?

3. Given the vertical bar graph below, draw a broken line graph depicting the same data.

![Bar graph showing Will's test results.]

Which graph seems to be the better representation of the data? Why?
4. The following table shows average weekly household expenses of all Canadian households with children compared to the expenses of households in the lowest income range in the country.

<table>
<thead>
<tr>
<th>Item</th>
<th>Food &amp; drink</th>
<th>Clothing</th>
<th>Heat &amp; electricity</th>
<th>Health</th>
<th>Transportation</th>
<th>Communication</th>
<th>Recreation &amp; culture</th>
<th>Education</th>
<th>Eating out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest income households</td>
<td>104</td>
<td>44</td>
<td>124</td>
<td>2</td>
<td>70</td>
<td>22</td>
<td>78</td>
<td>6</td>
<td>56</td>
</tr>
<tr>
<td>All households with children</td>
<td>140</td>
<td>62</td>
<td>130</td>
<td>4</td>
<td>176</td>
<td>26</td>
<td>160</td>
<td>30</td>
<td>104</td>
</tr>
</tbody>
</table>

a) Draw a double bar graph to represent the data.

b) Explain the trends in spending of the lowest income families compared to all families.