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Chapter 14
Pie charts, Bar graphs and Line graphs

Introduction

DATA refers to the facts gathered in some way which constitutes a body of information. In order to be useful, data must not only be organized but it should also be able to be represented in some way that comparisons, trends and or relationships may easily be visualized. Graphs and charts provide such representations. There are different types of graphs and charts but the most common ones are line graphs, bar graphs, pie charts and histograms.

Line graphs

Age (years)	Height (cm)
1	75
2	86
3	91
4	99
5	105
6	110
7	117
8	121

Line graphs connect data points that are somehow related.

For example, a mother may measure the height of her child every year on that child's birthday. The age of the child and her height are data that are clearly related whereas measurements of any child at any time would not be particularly meaningful.

In our example, the mother's data have been entered in a table, shown here on the right. Each pair of values in the table, for example, the height (105 cm) at age 5, represents a **DATA POINT.**

This data point may be entered in a graph. The horizontal line is called the **HORIZONTAL AXIS**, and the vertical line is called the **VERTICAL AXIS**.

Once the data points have been entered, the points may be connected by a line. The resulting line graph is shown below.

The graph immediately suggests that the child undergoes a regular growth between the ages of 1 and 8. It also allows us to have a reasonable estimate of what the height of the child was at an intermediate age, say 4.5 years, when the height, read from the graph, would have been about 102 cm.
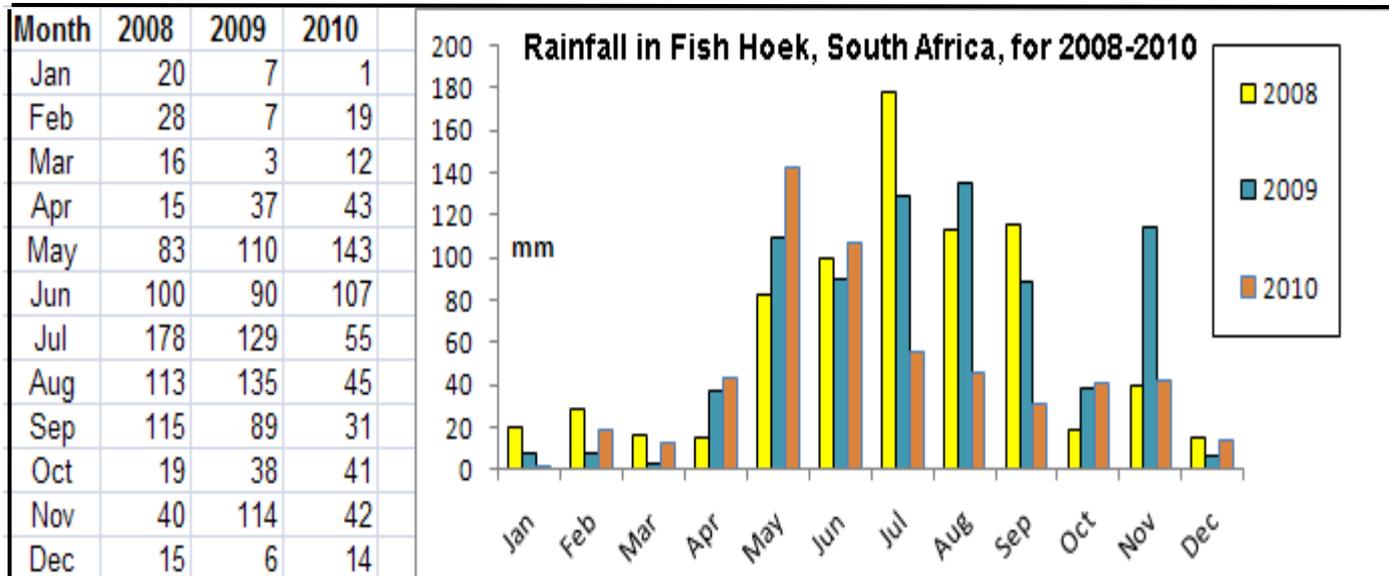
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$$y = x^2 - 3x - 1$$
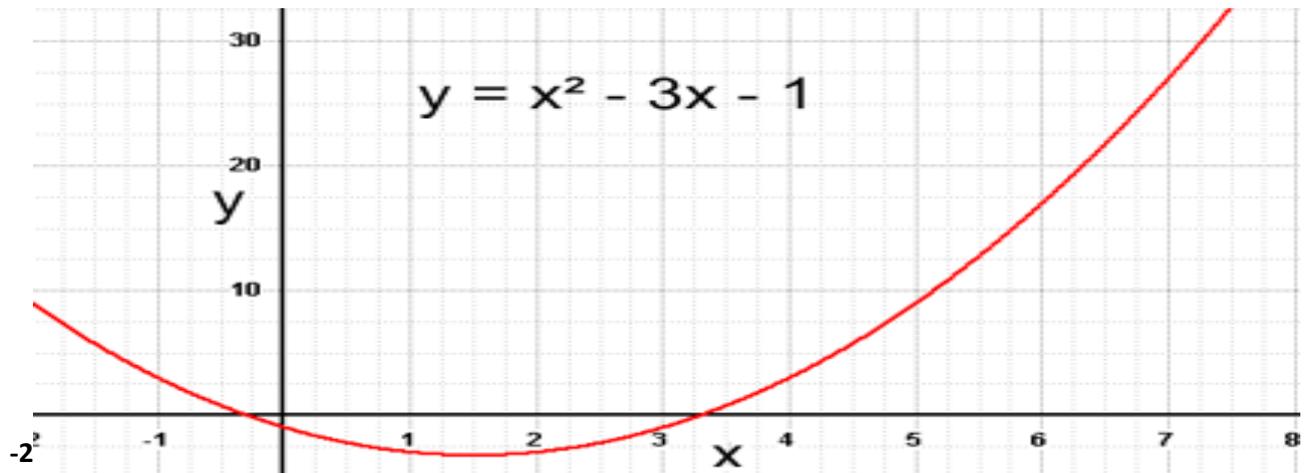
In mathematics, line graphs are routinely used to display the relationship between two variables such as **x** and **y**.

The **INDEPENDENT VARIABLE**, **x**, is plotted along the horizontal axis, while the **DEPENDENT VARIABLE**, **y** (the value of **y DEPENDS** on the value of **x**) is plotted along the vertical axis. The graph above on the left shows how the value of **y** changes with **x** according to the equation **y = x² - 3x -1** over the range -2 ≤ x ≤ 7.5.

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Bar graphs

A bar graph is a graph that can be used to compare the amounts or frequency of occurrences of different types of data. Bar graphs are helpful while comparing groups of data and comparing the data quickly.

Month	2008	2009	2010
Jan	20	7	1
Feb	28	7	19
Mar	16	3	12
Apr	15	37	43
May	83	110	143
Jun	100	90	107
Jul	178	129	55
Aug	113	135	45
Sep	115	89	31
Oct	19	38	41
Nov	40	114	42
Dec	15	6	14

Rainfall in Fish Hoek, South Africa, for 2008-2010

Bar graphs are commonly used to depict the relationship between two or more series of data points.

Example

The total rainfall for every month for three consecutive years in Fish Hoek was measured and tabulated. The results are shown above.

Using the data to construct a bar graph, the height of a bar represents the millimetres of rain that fell in a given month for each of the three years 2008-2010. By putting the bars side by side in different colours, we obtain the vertical bar graph shown above on the right. At a glance, we observe that Fish Hoek lies in a winter rainfall area and that November 2009 was an unusually wet month, while July 2010 was unusually dry. Note that when a bar graph is plotted, a legend should be included in order to relate the colours of the bars to some series of data, the year in this case.

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