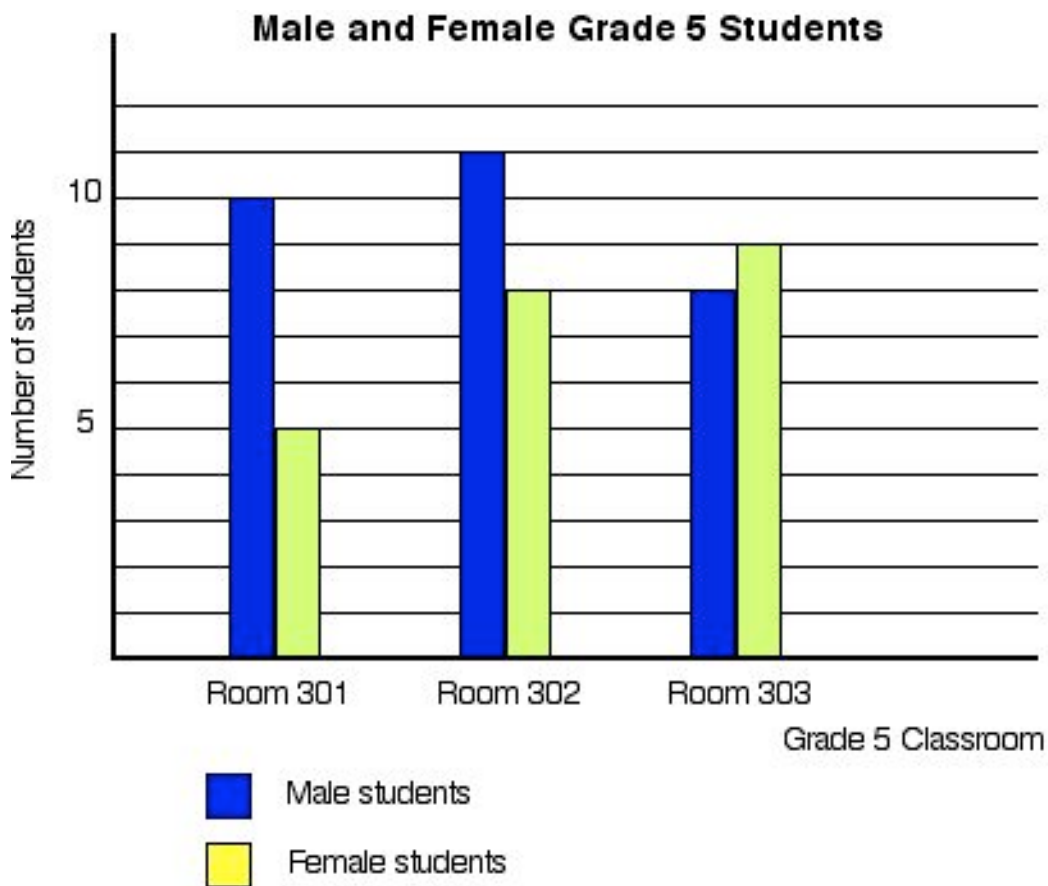


Middle Years Data Analysis Display Methods

Double Bar Graph

A double bar graph is an extension of a single bar graph. Any bar graph involves categories and counts of the number of people or things (frequency) in a category. A bar (filled-in rectangle) is used to display the count in each category. The bars are separated from each other to indicate that the categories are discrete (separate and non-continuous). The layout of the graph can be horizontal or vertical. The layout here is vertical.

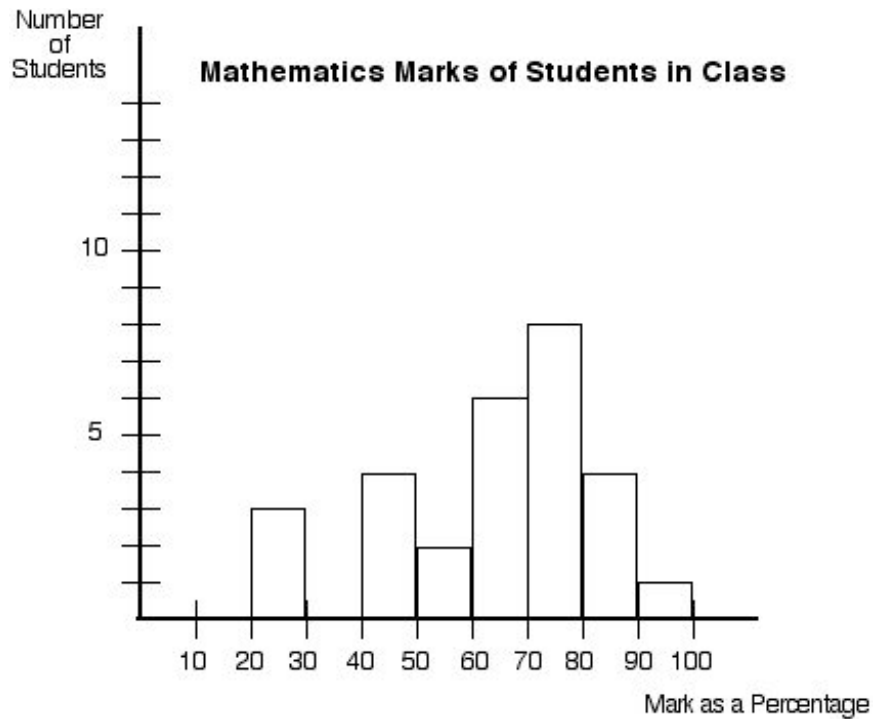


Histogram

A histogram involves two sets of numerical data. One set concerns a count (frequency) of numerical data. The other set involves continuous or presumed continuous numerical data (e.g. measurement of length, percentage, measurement of mass).

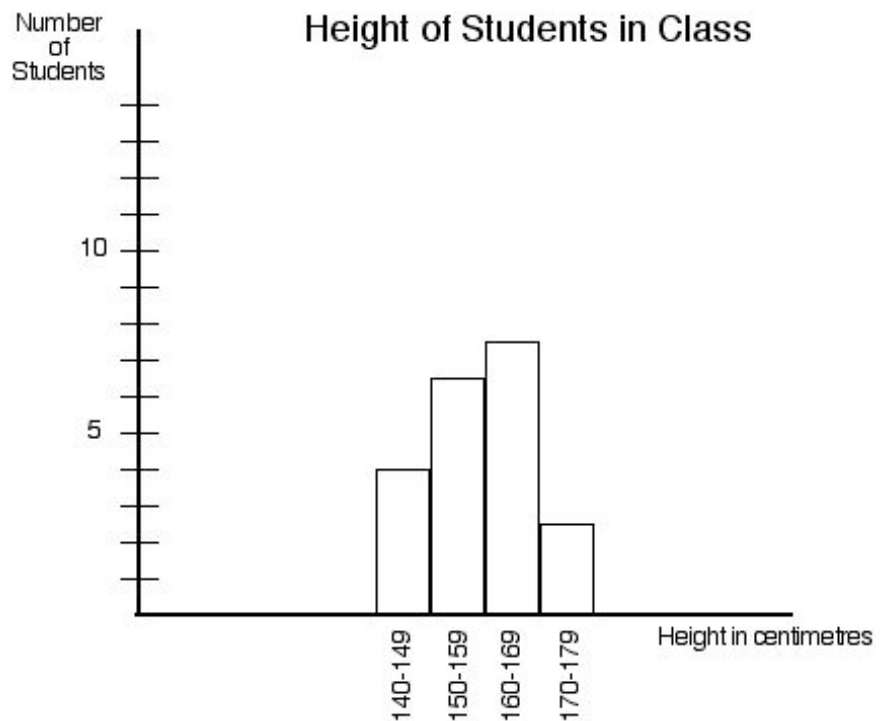
Continuous numerical data means that there is always a possible value between any two values that occur.

Continuous does not mean that the in-between value must be present in the data; it just means that it can occur.



Of necessity, histograms involve intervals. Otherwise rectangles (the bars) cannot be used for making a histogram because a rectangle has width, and width only results from an interval.

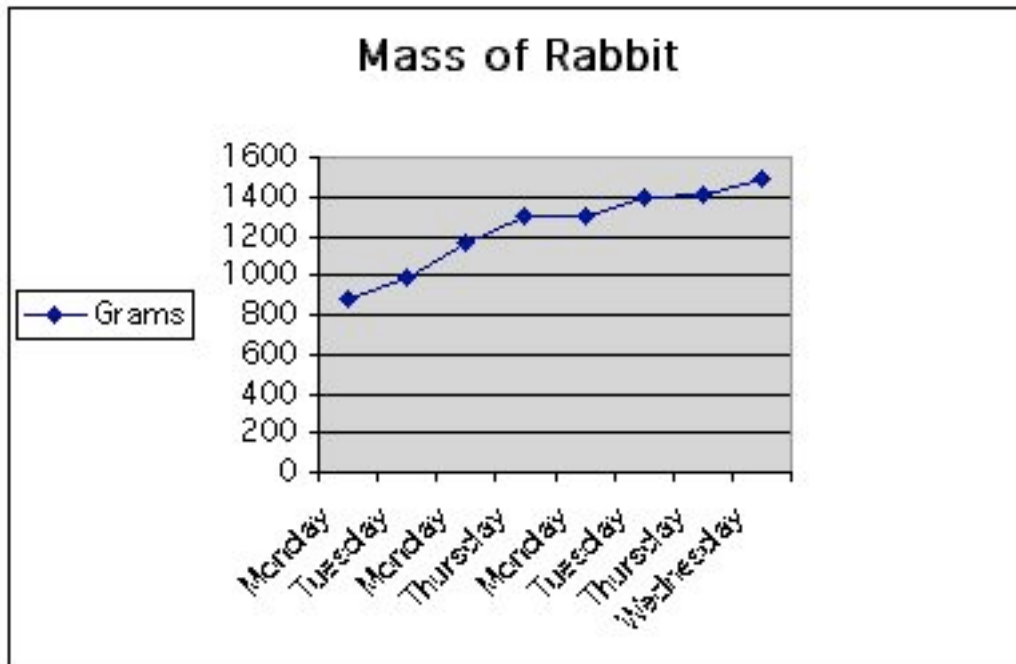
Because the numerical data is continuous, the bars are placed next to each other. This is different from a bar graph (involves discrete categories and frequency). Two examples are shown here.



Line Graph

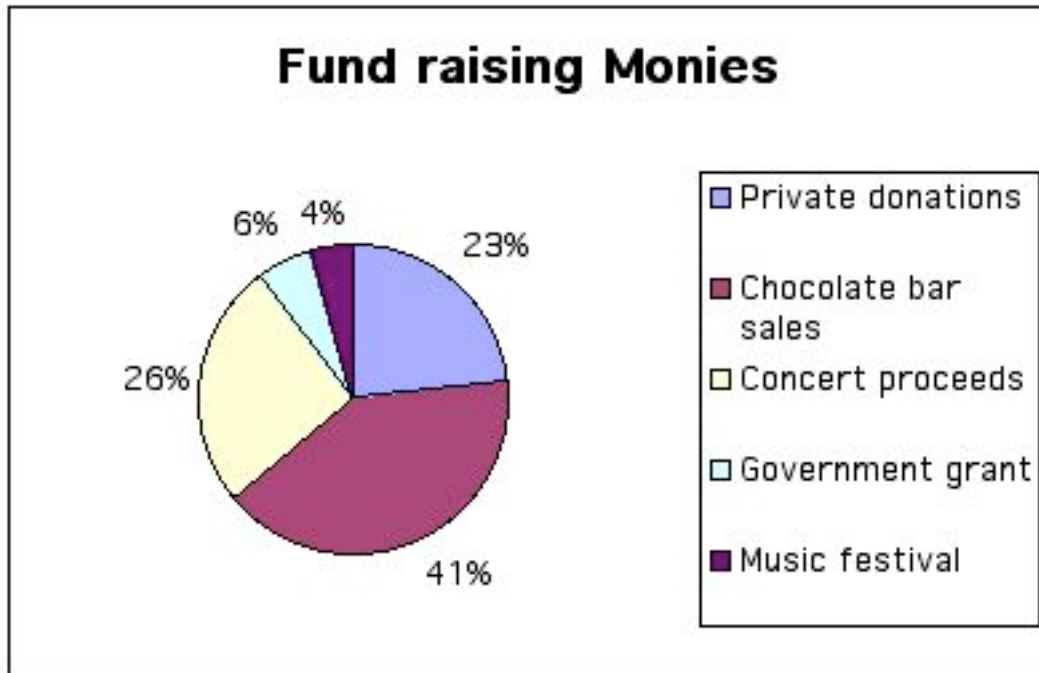
A line graph involves at least one set of continuous numerical data (e.g. temperature). The vertical axis should involve continuous data. The horizontal axis could involve continuous (e.g. weight of person) or discrete data (e.g. day of week). A line graph can be useful for indicating trends.

Normally we do not join the dots when one of the axis involves discrete data (as does the example here). However, the dots can be joined to provide a better VISUAL of what is going on - as is done in the example here.



Circle Graph

A circle graph displays percentages of a whole. Each section of the circle represents a part or percentage of the entire data set.



Stem-and Leaf Plot

A stem-and-leaf plot involves numerical data organized into rows according to place value designations.

The data: 12, 15, 17, 21, 34, 22, 16, 18, 12, 13, 12, 28, 15, 15

For the above data, the tens place value position is a useful place value designation. A stem-and-leaf plot of the data is shown on the right.

The tens digits of the 2-digit numbers form the stems. The leaves are the ones digits. Note that the values in the leaves do not have to be listed in order of size.



This plot gives a quick impression of distribution. In this case, data in the zone from 10 to 20 occurs most frequently.

Stem-and-leaf plots are not restricted to 2-digit numbers. A back-to-back plot is also possible.

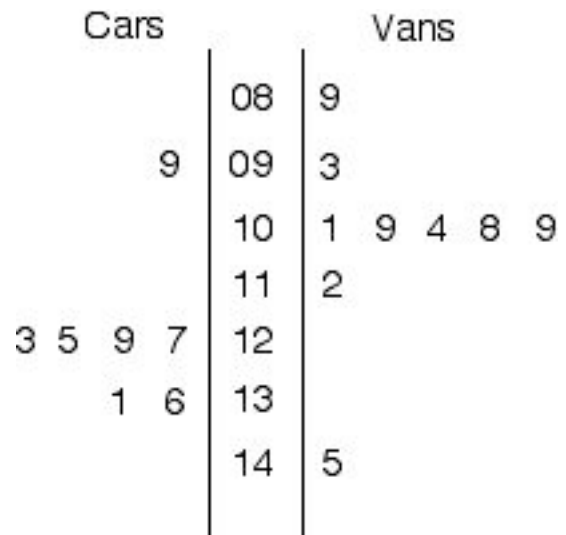
The data:

Cars: 123, 125, 129, 131, 127, 99, 136

Vans: 89, 93, 101, 112, 109, 145, 104, 108, 109

A stem-and-leaf plot of this data is shown here.

Notice that the stem is tens: from 8 tens (08) to 14 tens (14).



Box-and-Whisker Plot (also called a box plot)

A box-and-whisker plot provides a quick picture of the range and distribution of numerical data (continuous or non-continuous). Making a box-and-whisker plot requires finding three medians (middle values): the median of all the data, the median of the lower half of the data (the lower quartile), and the median of the upper half of the data (the upper quartile). It also involves finding the lowest value (lower extreme) and the highest value (upper extreme).

The data arranged in order are: 23, 29, 38, 41, 42, 49, 51, 51, 52, 59, 68

The median of the data is 49.

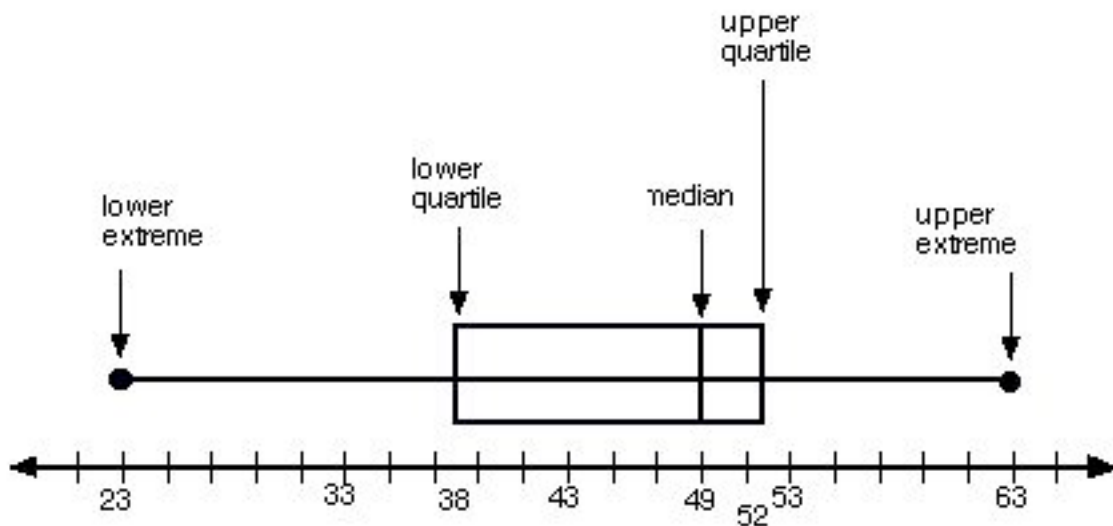
The lower quartile [median of the lower half of the data: 23, 29, 38, 41, 42] is 38.

The upper quartile [median of the upper half of the data: 51, 51, 52, 59, 68] is 52.

The lower extreme is 23.

The upper extreme is 68.

The medians and extremes are plotted above a number line and a box is drawn as shown here.



Note that the box contains half the data (the middle half) and that each whisker contains one quarter of the data (the lower quartile and the upper quartile).

Frequency Table

A frequency table of numerical data indicates the number of times each number occurs (the frequency) in a data set. All the lines of the table do not have to be indicated.

An example of a frequency table is shown here (the data is a die thrown 20 times).

NUMBER	TALLY	FREQUENCY
1		4
2	 	5
3		3
4		3
5		2
6		3