

Maths in Science - Year 9 - Variables + Graphs

Drawing Graphs:

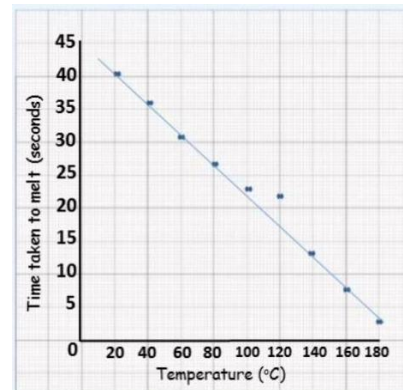
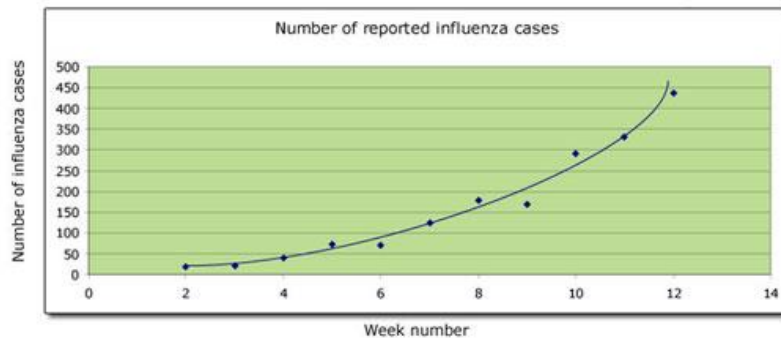
Use a ruler & pencil to ensure that straight lines are drawn straight!
If the x and y axes both have numbers, you draw a line graph. Do not play dot-to-dot with the data points!
If the x-axis is category/type and the y-axis is a number, you draw a bar chart.

Choosing a Scale for your x- and y- axes.

The scale on the x and y axes do not have to be the same.
Because graph paper is usually marked off in squares of 5 units or 10 units, it makes sense to use scales such as: 1 large square: 1 unit, OR 1 large square: 5 units, OR 1 large square: 10 units.

Line or Curve of best fit?

In this graph, the points almost lie on a smooth curve - but not exactly. In such cases the graph is completed by drawing the smoothest curve possible - a curve of best fit.



In the second graph, the points almost lie along a nice straight path. One of them doesn't, so we can ignore that one and circle it as an "anomalous result". We draw our line of best fit as a straight line that follows the trend of the data points.

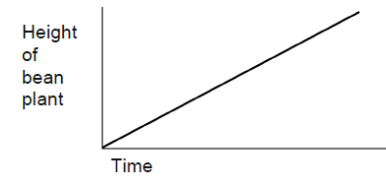
Describing What Graphs Show:

As "x" increases, "y" does what?

Graph 1:

As TIME increases, the HEIGHT OF BEAN PLANT also increases.

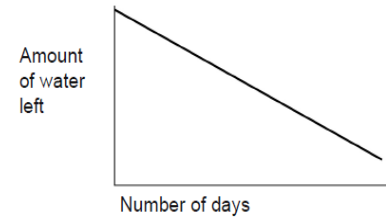
The graph is **linear** (shows a constant rate) and values plotted for y are **directly proportional** to those on the x-axis. The graph shows **positive correlation** between the values for x and y.



Graph 2:

As the NUMBER OF DAYS increases, the AMOUNT OF WATER LEFT decreases.

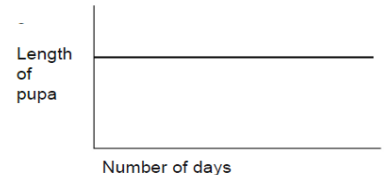
The graph is **linear** and shows **negative (inverse) correlation** between the variables for x and y.



Graph 3:

As the NUMBER OF DAYS INCREASES, the LENGTH OF PUPA remains constant (does not change).

The graph is **linear** and shows **no correlation** between the variables for x and y.



For any of these graphs, you could also speak about what value on the y-axis they start at and what value they end up at.

Maths in Science - Year 9

Averages

Mean

Add all the numbers then divide by the amount of numbers

9, 3, 1, 8, 3, 6

$$9 + 3 + 1 + 8 + 3 + 6 = 30$$

$$30 \div 6 = 5$$

The mean is 5

Median

Order the set of numbers, the median is the middle number

9, 3, 1, 8, 3, 6

1, 3, 3, 6, 8, 9

The median is 4.5

Mode

The most common number

9, 3, 1, 8, 3, 6

The mode is 3

Range

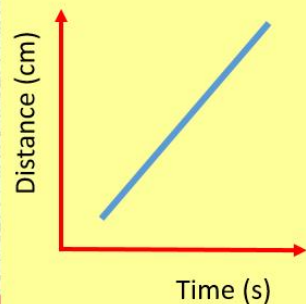
The difference between the highest number and lowest number

9, 3, 1, 8, 3, 6

$$9 - 1 = 8$$

The range is 8

Graph to show the effect of journey time on the distance a snail moves.



The graph shows a positive correlation. The longer the time a snail is moving for, the larger the distance that the snail will move.

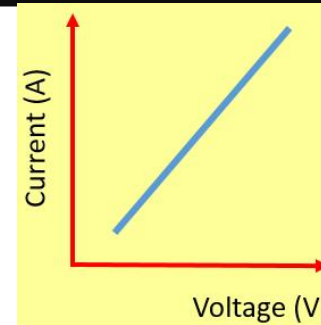
Correlation

Comparative

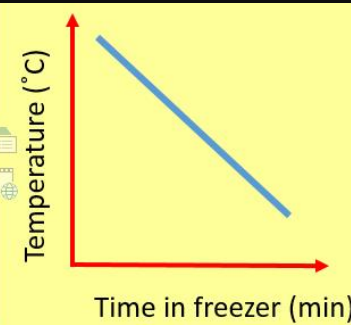
Independent variable

Correlation

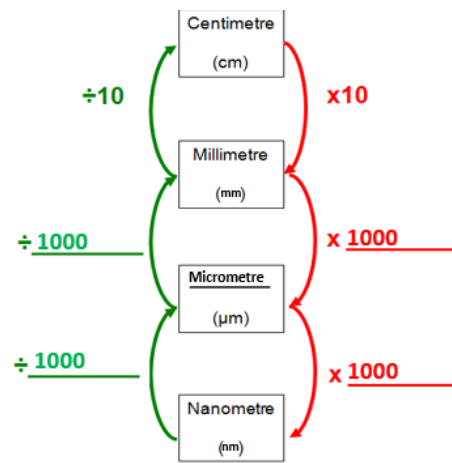
Dependent variable



As the voltage increases, the current also increases, a positive correlation.

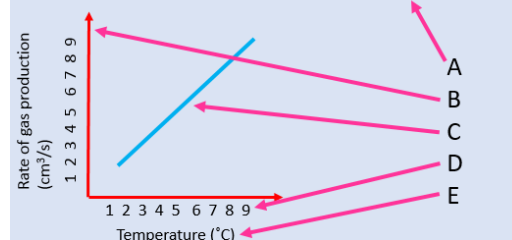


As the time in the freezer increases, the temperature decreases, a negative correlation.



Nanometre	Micrometre	Millimetre
5	0.005	0.000005
1		
	1	
	3	1
7		
		0.5

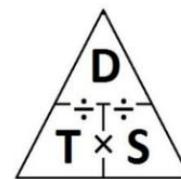
Graph to show the effect of temperature on rate of reaction



Calculating Speed

Speed is a measurement of how much time it takes to move over a distance. We can measure the distance and time and use these values to work out the speed.

We often use calculation triangles to remember how to work out speed:



D = Distance

T = Time

S = Speed

$$\text{Speed} = \text{Distance} \div \text{Time}$$

- Sharp pencil and ruler used
- X axis and y axis drawn along the darkest lines on the graph paper
- Evenly spaced numbers
- Scales rounded to be slightly larger than the biggest number in the data collected.
- Axes are as big as they can be on the page (not too small)
- Axes are labelled
- Axes have units
- Data points are plotted accurately with small, neat crosses
- Line of best fit drawn (not dot to dot)
- Title