Proportional Reasoning and Scientific Notation

Using numbers in Science

Variables!!

Knowing what variables you are working with is the starting point of Science

There are 2 major types of variables we will be dealing with:

Control Variables

Dependant Variables

Control Variables

The variable that the experimenter (you!!) is in control of changing. The experiment will not give us our Control variable

The most common example is **time**

We also control mass in most cases

Dependant Variable

The variable that changes as the control variable is varied; this is what is being observed / measured during the experiment

If we change the time, what **distance** does it travel?

Or if we change the **mass**, what happens to the acceleration?

Graphs

Another useful tool for understanding how are variables

The dependant variable goes on the vertical

Units and representative numbers go along each axis

The control variable goes along the horizontal

Example

Dependant Variable

(m) Y

16

4

0

4

16

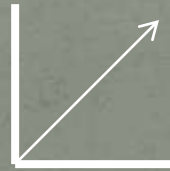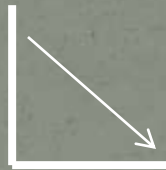Control Variable

-2   -1   0   1   2   X (m)
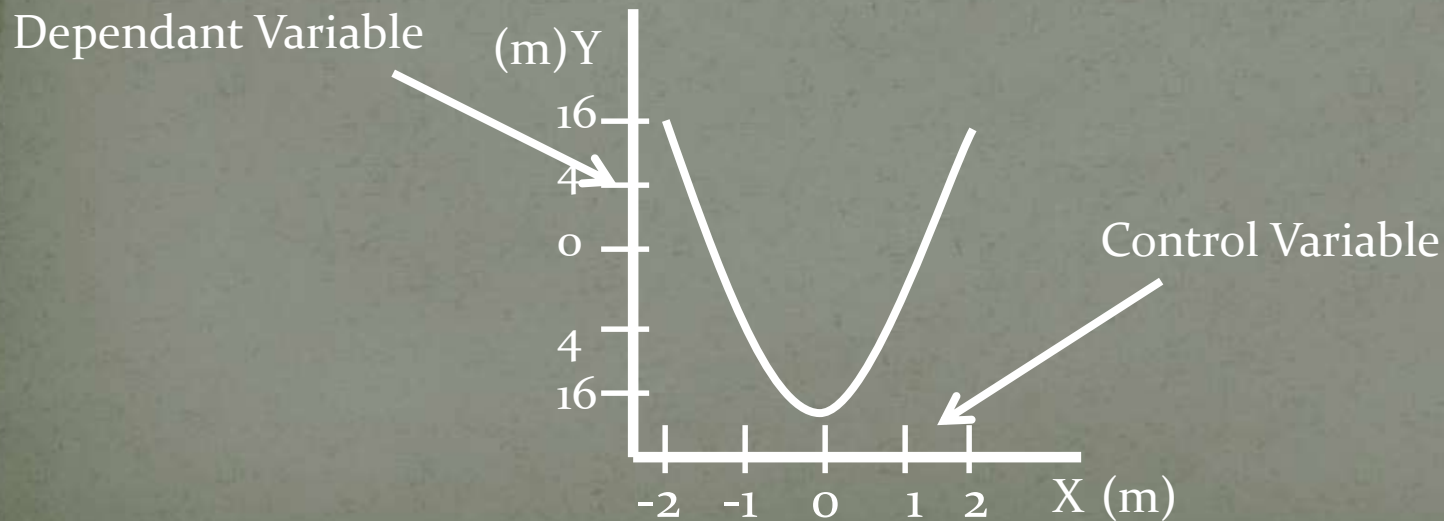
Relationships

When we compare our control and dependant variables, we will need to understand what the relationship between them is. Are they directly related or inversely related? Could they even have a square relation?

Relationships

Directly related: As the control variable increases, the dependant variable increases at the same rate

Inversely related: as the control variable increases, the dependant variable decreases

Square relation: As the control variable increases, the dependant variable increases exponentially

Scientific Notation

In Science, we often deal with very large or very small numbers:

Speed of Light: 300,000,000 m/s

Mass of an electron:
0.000000000000000000000000000910953 Kg

These numbers are hard to use so we use the scientific notation method

Scientific Notation

In the scientific notation method, all numbers are expressed as the product of a number between **1 and 10** and a whole number power of 10.

Speed of Light: 3.0×10^{8}

Mass of an electron: 9.11×10^{-31}

Conversions

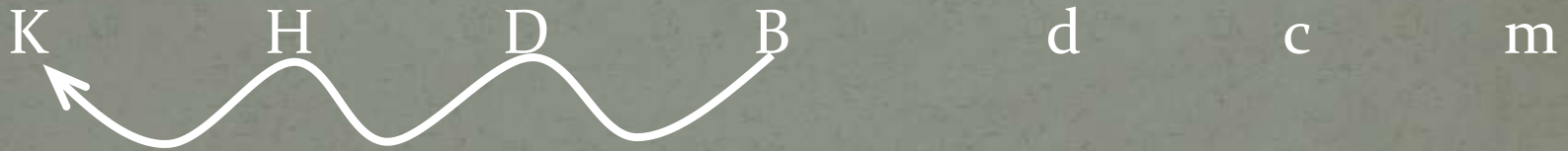Sometimes, it is easier to name large or small numbers using different prefixes (i.e. Kilo- or centi-)

To do this, we will need the king Henry Chart

K i n g	H e n r y	D i e d	B y	d r i n k i n g	c h o c o l a t e	m i l k

Conversions

K	H	D	B	d	c	m
Kilo	Hecto	Deka	gram liter meter	deci	centi	mili

Convert 2,356 grams to kilograms:

K	H	D	B	d	c	m

2.356   2,356