Numeracy Reference Book

Name……………………………….

Class……………………………….

Numeracy is a vital skill for learning, life and work.
It is about being confident when solving problems, making decisions and analysing situations that involve numbers.

Topic	What's Involved	Pages(s)
Estimation and Rounding	Rounding to whole numbers and decimal places Working with and rounding to Significant Figures.	3 - 5
Number And Number Processes	The four operations including working with multiples of 10, decimals, and negative numbers.	6 - 9
Fractions, Decimals & Percentages	Converting between fractions, decimals and percentages. Percentage problems. Ratio and Proportion.	10 - 17
Money	Finding 'best buy'. Currency conversion.	19
Time	Using 12 and 24-hour time. Time intervals and usits of time. Speed distance time problems.	20 - 21
Measurement	Estimating length, mass, area and capacity. Converting between units. Calculating perimeter, area and volume.	22 - 24
Data Analysis	Drawing, reading and understanding graphs and charts. Misleading data. Averages.	25 - 31
Probability	Language of probability. Calculating probabilities.	32 - 33
Using Your Calculator	Addressing some key issues when using a scientific calculator.	34
Numeracy Dictionary	Key mathematical words and their meanings.	35-38
Extra help	A list of helpful websites for extra practice.	39

Estimation and Rounding

Rounding whole numbers

Example: The population of the UK is 66, 306, 524
(based on UN estimates Oct 17)
This number can be rounded to make it
less accurate but easier to use.

Eg rounding to the nearest thousand.
Step 1 – locate the digit to be rounded 66, 306, 525
Step 2 – look to the digit **after** that one to decide if rounding up or down
66, 306, **5**25

Since **5** is '5 or above' then the number is rounding up.
66, 306, **5**25 ⟶ 66, 307, 000

Rounding the same number to the nearest hundred, we follow the same rules but start with the hundreds column
6 6, 3 0 6, 5 **2** 5 ⟶ 6 6, 3 0 6, 5 0 0
This time the number (5) stays the same since **the number after it** is 'less than 5'.

More Examples

59,312 to the nearest hundred is 59,300
4,374,109 to the nearest ten thousand is 4,380,000
3,897 to the nearest ten is 3,900

Rounding decimal numbers

This is very similar but, unlike with whole numbers, we don't need to add zeros at the end to keep place value – we can already see which columns the numbers are in.

569 → 570 (because 57 would be a much smaller number)

BUT

0.569 → 0.57 (since the 5 is still in the tenths column and the 7 is in the hundredths)

<u>More Examples</u>

0.3782 → 0.378 to 3 d.ps (since the number after is less than 5)

21.359 → 21.36 to 2 d.ps (since the number after is 5 or above)

3.23515 → 3.2 to 1 d.p (since the number after is less than 5)

We only look at the <u>one</u> digit after the place to be rounded.

- ## Recurring Decimals

Some decimal values have repeating digits.

Eg 1 ÷ 3 gives 0.3333333… This is often written as $0.\dot{3}$

2 ÷ 3 gives 0.6666666… This is often written as $0.\dot{6}$

NOTE – This number has not been rounded and this will not be accepted as correct for the final answer in many subjects.

Rounded, 1 ÷ 3 gives 0.33 (to 2 decimal places) and 2 ÷ 3 gives 0.67 (to 2 decimal places)

Significant Figures

Whether we want to round to the nearest thousand or nearest thousandth often depends on the size of the number. For this reason, significant figures are often used.

Significant means giving us important information about the number.

The speed of light is 299,792,458 metres per second.

This is usually rounded to 300,000,000 (one significant figure).

*The zeros here are **only** there to show the place value.*

π is an irrational number which goes on forever, beginning with 3.1415926……… which we usually round to 3.14 (3 sig figs)

Zeros at the beginning or end of a number *which only show place value* are not significant.

5437 has 4 sig figs.

Rounding to one significant figures gives 5,000.

> These zeros are **only** there to show the 5 is in the thoursands column

49,063 has 5 sig figs.

> This zero **is** significant because it's within an accurate number – not just at beginning or end to show position.

Rounding to 4 sig figs gives 49,060

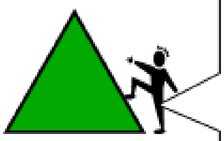
> The zero at the end is there through rounding so it **not** significant. It is **only** there to fill the units column.

0.06205 has 4 sig figs.

Rounding to 1 sig fig gives 0.06

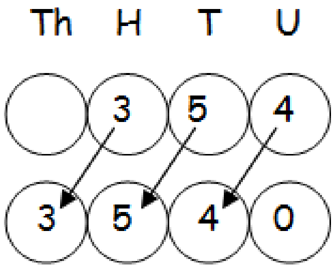
> Zeros at the beginning of a number are not significant.

Multiplying by multiples of 10 and 100

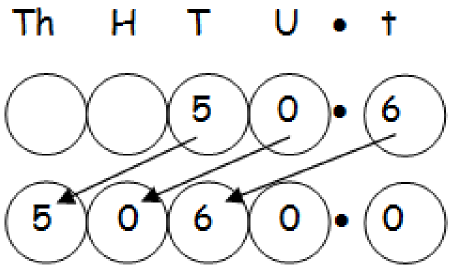


To multiply by **10** you move every digit ***one*** place to the left.
To multiply by **100** you move every digit ***two*** places to the left.

Example 1 (a) Multiply 354 by 10 (b) Multiply 50.6 by 100



354 x 10 = 3540



50.6 x 100 = 5060

We can then multiply by multiples of 10, 100 etc.

To multiply by 30 you can multiply by 3 and multiply by 10

(x30 is equivalent to x3x10)

Example 2 (a) 2.36 x 20

2.36 x 2 = 4.72
4.72 x 10 = 47.2

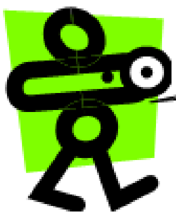
so 2.36 x 20 = 47.2

(b) 38.4 x 50

38.4 x 5 = 192.0
192.0x 10 = 1920

so 38.4 x 50 = 1920

Division



You should be able to divide by a single digit or by a multiple of 10 or 100 without a calculator.

Written Method

Example 1 There are 192 pupils in first year, shared equally between 8 classes. How many pupils are in each class?

$$8 \overline{)1\ 9\ {}^{3}2} = 2\ 4$$

There are 24 pupils in each class

Example 2 Divide 4.74 by 3

$$3 \overline{)4\ .\ {}^{1}7\ {}^{2}4} = 1\ .\ 5\ 8$$

When dividing a decimal number by a whole number, the decimal points must stay in line.

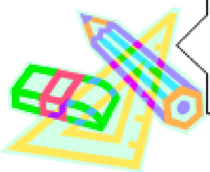
Example 3 A jug contains 2.2 litres of juice. If it is poured evenly into 8 glasses, how much juice is in each glass?

$$8 \overline{)2\ .\ {}^{2}2\ {}^{6}0\ {}^{4}0} = 0\ .\ 2\ 7\ 5$$

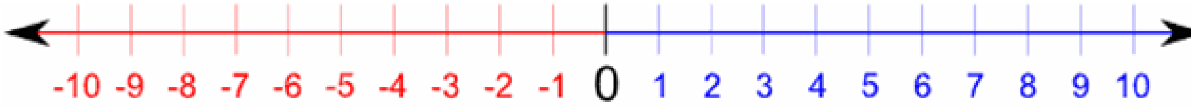
Each glass contains 0.275 litres

If you have a remainder at the end of a calculation, add a zero onto the end of the decimal and continue with the calculation.

Integers



An integer is what is more commonly known as a whole number. It may be positive, negative, or the number zero, but it must be whole.



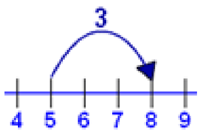
Negative Numbers (-) Positive Numbers (+)

Remember - No Sign in front of a number means it is positive

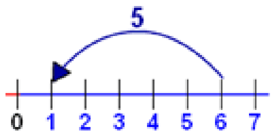
Adding and Subtracting positive numbers

A number line may be used

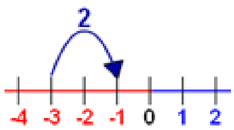
Examples 5+3 = 8



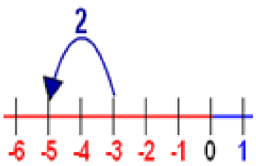
6-5 = 1



-3+2 = -1



-3-2=-5



If you *add* a *positive number* you move to the *right* on a number line.
If you *subtract* a *positive number* you move to the *left* on a number line.
Always start from the position of the first number.

Adding or subtracting *negative* numbers.

Adding a negative number is the same as subtracting:

Example 7 + (–3) is the same as 7 – 3 = 4

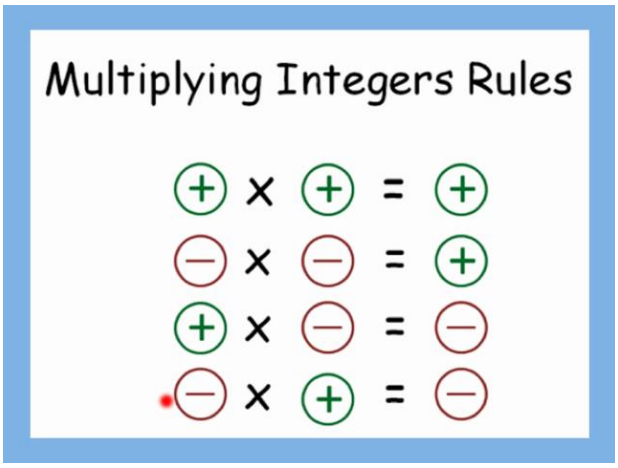
General rule a+(-b) = a - b

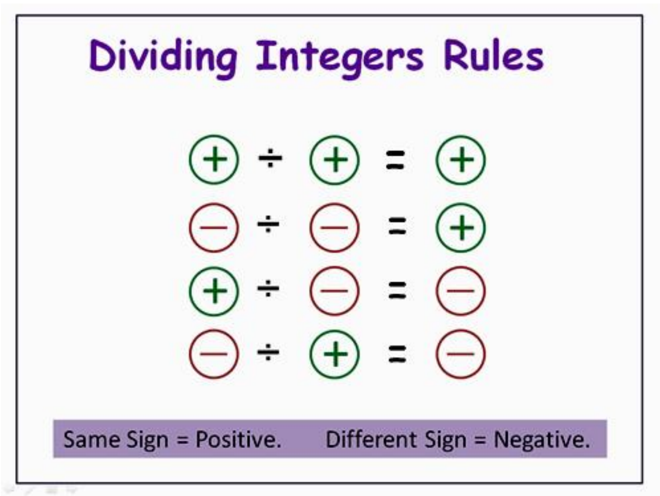
Subtracting a negative number is the same as adding:

Example (–5) – (–2) is the same as (–5) + 2 = –3

General rule a-(-b) = a + b

Multiplying and Dividing Integers





Examples

(-3) x 2 = -6

(-5) x (-4) = 20

2 x (-132) = -264

Examples

-15 ÷ (-3) = 5

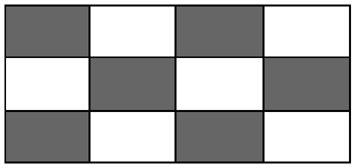
-12 ÷ 2 = -6

40 ÷ (-8) = -5

Fractions, Decimals and Percentages

Equivalent Fractions

Example
What fraction of the flag is shaded?

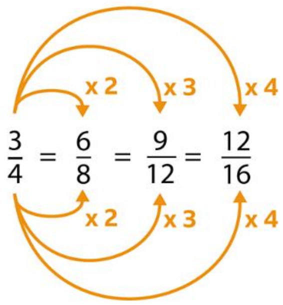


6 out of 12 squares are shaded. So $\frac{6}{12}$ of the flag is shaded.

It could also be said that $\frac{1}{2}$ the flag is shaded.

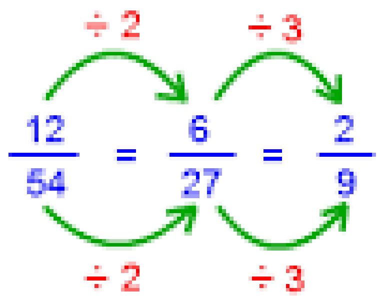
$\frac{6}{12}$ and $\frac{1}{2}$ are **equivalent fractions**.

We find equivalent fraction by multiplying or dividing both parts of a fraction by the same number.



Simplifying Fractions

Here we divide numerator and denominator by a common factor to get an <u>equivalent</u> but easier-to-understand fraction.



Finding a fraction of an amount

To find a fraction of an amount,

we find **one** fifth or **one** third first, then multiply for how many we need.

Example 1 Find $\frac{1}{5}$ of £150

$\frac{1}{5}$ of £150 = £150 ÷ 5 = £

Example 2 Find $\frac{3}{4}$ of 48

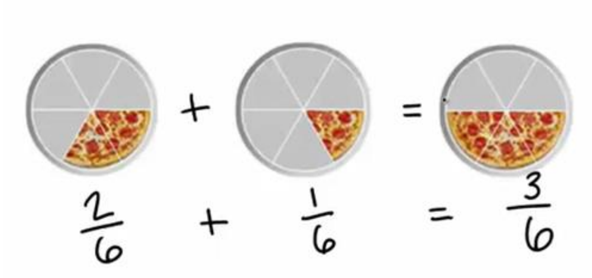
$\frac{1}{4}$ of 48 = 48 ÷ 4 = 12

so $\frac{3}{4}$ of 48 = 3 x 12 = 36

Adding and Subtracting Fractions

This is easy when the denominators are the same

The denominator (number of parts) stays the same and we add/subtract the numerators.



When the denominators are different, we need to find equivalent fractions with the same denominators.

$$\frac{2}{5} + \frac{1}{3}$$

$$= \frac{6}{15} + \frac{5}{15}$$

$$= \frac{11}{15}$$

x3

$$\frac{2}{5} = \frac{6}{15}$$

x3

x5

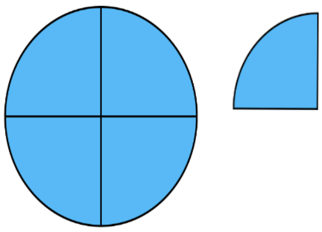
$$\frac{1}{3} = \frac{5}{15}$$

15 is the lowest common multiple of 5 and 3

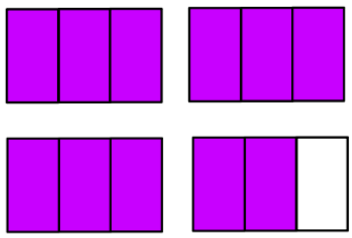
Improper Fractions and Mixed Numbers

An 'improper fraction' is one where the numeractor is larger than the denominator. Eg $\frac{5}{4}$ and $\frac{11}{3}$

These can be written as a mixture of whole number and leftover fraction.



$$\frac{5}{4} = 1\frac{1}{4}$$



$$\frac{11}{3} = 3\frac{2}{3}$$

Multiplying and Dividing Fractions

To multiply fractions multiply the numerators together and the denominators together separately. To divide turn the second fraction upside down (flip) and then multiply.

Example 1

$$\frac{4}{5} \times \frac{2}{3} = \frac{8}{15}$$

Example 2

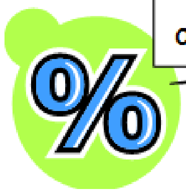
$$\frac{2}{7} \div \frac{1}{3}$$

$$= \frac{2}{7} \times \frac{3}{1}$$

remember to flip second fraction

$$= \frac{6}{7}$$

Percentages



Percent means out of 100.
A percentage can be converted to an equivalent fraction or decimal.

36% means $\frac{36}{100}$

"36 out of 100" or "36 divided by 100"

Commonly used Percentages

Percentage	Fraction	Decimal
1%	$\frac{1}{100}$	0.01
10%	$\frac{1}{10}$	0.1
20%	$\frac{1}{5}$	0.2
25%	$\frac{1}{4}$	0.25
$33^{1}/_{3}\%$	$\frac{1}{3}$	0.333...
50%	$\frac{1}{2}$	0.5
$66^{2}/_{3}\%$	$\frac{2}{3}$	0.666...
75%	$\frac{3}{4}$	0.75

Calculating a percentage without a calculator

We can use our common percentages to help us – since we know their equivalent fractions and we know how to calculate a fraction of a number.

Percentages that are more complicated can be broken down.

Example Find 9% of 200g

1% of 200g = $\frac{1}{100}$ of 200g = 200g ÷ 100 = 2g

so 9% of 200g = 9 x 2g = 18g

Example Find 23% of £15000

10% of £15000 = £1500 so 20% = £1500 x 2 = £3000
1% of £15000 = £150 so 3% = £150 x 3 = £450

23% of £15000 = £3000 + £450 = £3450

Calculating a percentage with a calculator

Remember 9% means 9÷100

so 9% of 200g

= 9 ÷ 100 x 200

= 18g

23% of £15000

= 23÷100 x 15000

=£3450

Expressing one number as a percentage of another

This is when you have two values and want to show how big one value is compared to another.

For instance if you got 18 out of 25 in a test

$$\frac{18}{25} = 18 \div 25 = 0.72$$

To find this as a percentage, simply multiply by 100: $0.72 = 72\%$

Example

In class 1X1, 14 pupils had brown hair, 6 pupils had blonde hair, 3 had black hair and 2 had red hair. What percentage of the pupils were blonde?

Total number of pupils = 14 + 6 + 3 + 2 = 25

6 out of 25 were blonde, so.

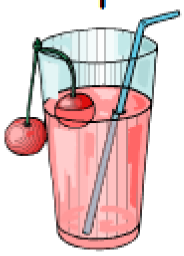
$$\frac{6}{25} = 6 \div 25 = 0.24 = 24\%$$

24% were blonde.

Ratio

Writing Ratios

Example 1



To make a fruit drink, 4 parts water is mixed with 1 part of cordial.
The ratio of water to cordial is 4:1
(said "4 to 1")
The ratio of cordial to water is 1:4.

Order is important when writing ratios.

Example 2

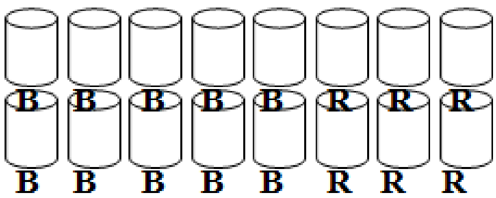
In a bag of balloons, there are 5 red, 7 blue and 8 green balloons.

The ratio of red : blue : green is 5 : 7 : 8

Simplifying Ratios

Purple paint can be made by mixing 10 tins of blue paint with 6 tins of red. The ratio of blue to red can be written as 10 : 6

It can also be written as 5 : 3



Blue : Red
10 : 6
5 : 3

To simplify a ratio, divide each figure in the ratio by a common factor.

Simplifying Ratios

Sometimes the values in the ratio are decimal numbers. To make them simpler we may want larger values. This can be done by first multiplying by 10 / 100 / 1000 etc. to get to whole numbers, then dividing down to smaller whole numbers if possible.

Example

An average African elephant is 3.6m, whereas an average Asian elephant is 2.8m.

The ratio of heights of African to Asian elephants is:

3.6 : 2.8

36 : 28

9 : 7

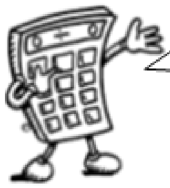
Using ratios

The ratio of fruit to nuts in a chocolate bar is 3 : 2. If a bar contains 15g of fruit, what weight of nuts will it contain?

	Fruit	Nuts	
	3	2	
x5			x5
	15	**10**	

So the chocolate bar will contain 10g of nuts.

Proportion



Two quantities are said to be in direct proportion if when one doubles the other doubles.
We can use proportion to solve problems.

It is often useful to make a table when solving problems involving proportion.

Example 1
A car factory produces 1500 cars in 30 days. How many cars would they produce in 90 days?

	Days	Cars	
×3	30	1500	×3
	90	**4500**	

The factory would produce 4500 cars in 90 days.

Money

Calculating 'best buy'

The same brand of coffee is sold in two different sized jars as shown.
Which jar represents better value for money?

Find the cost per gram for both jars.

100g costs 185p so 185 ÷ 100 = 1·86p per gram.

250g costs 315p so 315 ÷ 250 = 1·26p per gram.

1·26p per gram is less than 1·86p per gram, so the large jar is better value for money.

Currency Exchange

The rate of exchange for each currency will normally be given by an amount per £ and it changes daily. Great Britain uses the pound (GBP) as its currency. Many European countries use the Euro.

Foreign Money = Number of Pounds X Exchange Rate
Number of Pounds = Foreign Money ÷ Exchange Rate
In May 2010 the exchange rate was: £1 ⟶ €1·15

Example 1 Robert goes on holiday to Paris and takes £600 spending money with him. Using the exchange rate above how many Euros would he get?

Euros = 600 X 1·15 = €690

Example 2 Jim returns from a school trip to Germany with €85. Use the exchange rate above to find out how many pounds he will get back.

Pounds = 85 ÷ 1·15 = £73·9130... = £73·91

Time

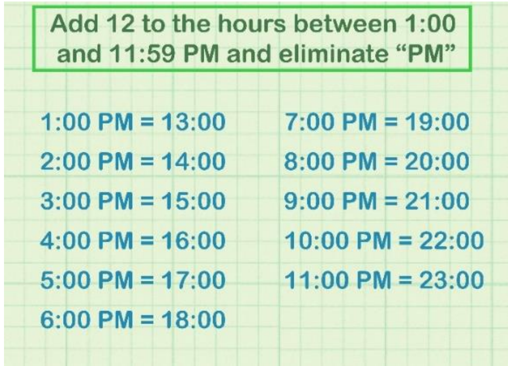
12 and 24 hour time

12 hour time uses 'am' and 'pm'

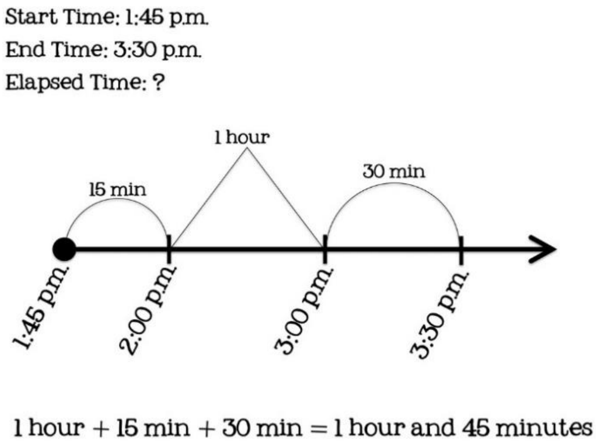
and seperates the two halves of our day.

24 hour time doesn't need 'am' and 'pm' as it continues through our whole day.

Converting 'pm' times to 24 hour



Time Intervals



We can calculate the time taken for an event / journey using jumps.

The time passed between 1:46pm and 3:30pm is 1 hour and 45 minutes.

Note: laying out as a subtraction will not work (since there are not 100 minutes in an hour)

Units of Time

Conversion	Rule	Example
Days into Hour	1 day = 24 hours	7 days = 7 × 24 = 168 hours
Days and hours into hours	First, convert days into hours by multiplying number of days with 24 and then add hours into it.	7 days 9 hours = 7 days + 9 hours = (7 × 24) + 9 hours = 168 hours + 9 hours = 177 hours
Hours into Minutes	1 hour = 60 minutes	5 hours = 5 × 60 = 300 minutes
Hours and minutes into minutes	First, convert hours into minutes by multiplying number of hours with 60 and then add minutes into it.	7 hours 45 minutes = 7 hours + 45 minutes = (7 × 60) + 45 minutes = 420 + 45 = 465 minutes
Minutes into seconds	1 minute = 60 seconds	25 minutes = 60 × 25 = 1500 seconds

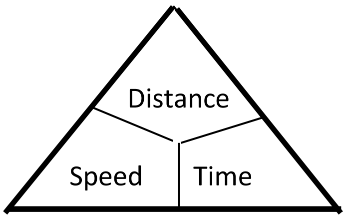
Distance, Speed and Time.

Distance = Speed x Time

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

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

To help remember equations of this form a magic triangle can be used e.g



Example Calculate the speed of a train which travelled 450 km in 5 hours

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

= 450 ÷ 5

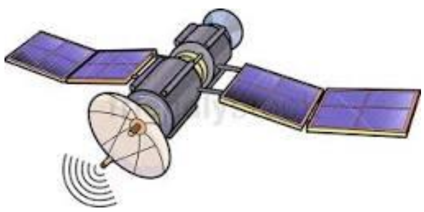
= 9 km/h

In Physics, you must use the correct scientific symbols.

Speed – v

Time – t

Distance – d



Example

Calculate the time taken for a Radio wave travelling at 3×10^8 m/s to travel 36,000km.

$$t = \frac{d}{v}$$

$$= \frac{36{,}000{,}000}{3 \times 10^8}$$

= 0.12 seconds

Note: the distance needed to be in '**metres**' to match up with a speed in '**metres per second**'.

This gives an answer in '**seconds**'

Measurement

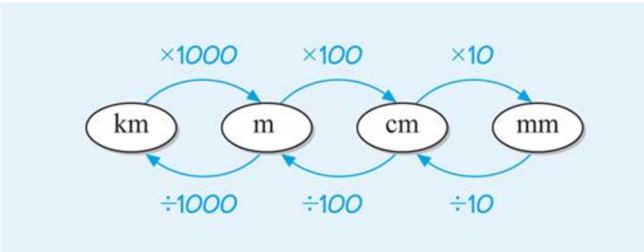
Units of length, Volume and Weight

Length	Volume (Capacity)	Weight
10mm = 1cm	1000ml = 1 litre	1000mg = 1g
100cm = 1m	100cl = 1 litre	1000g = 1kg
1000m = 1km	10dl = 1 litre	1000kg = 1 tonne
	$1000cm^3$ = 1 litre	

Converting Units

- If changing from small units to large units (for example, g to kg), we divide.
- If changing from large units to small units (for example, km to m), we multiply.

The diagram below will hopefully help you convert metric lengths.

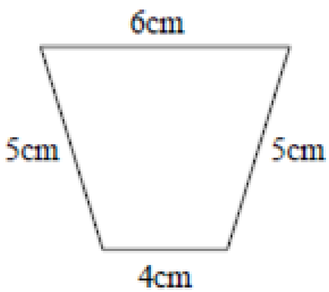


Perimeter

The total distance around the outside edge of a shape is called the perimeter. The units in the perimeter calculation should be the same.

Example 1 Calculate the perimeter of the shape below.

P = 6 + 5 + 4 + 5 = 20cm



Area

Area is defined as the surface covered by a 2D shape. Again like perimeter before we perform any calculations you have to check that all the units are consistent with perimeter.

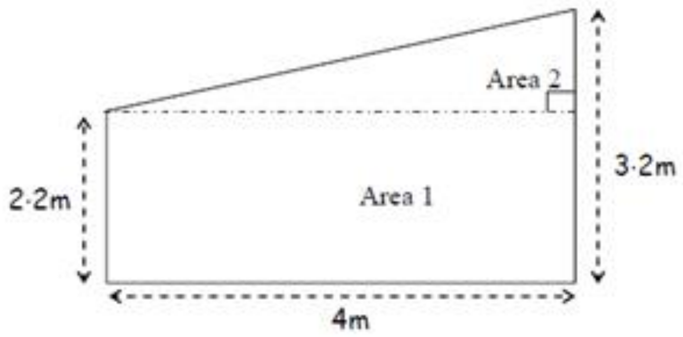
The area of a rectangle is given by $A = l \times b$ (length times breadth).

The area of a triangle is given by $A = \frac{1}{2} \times b \times h$ (half times the base times the height).

Note that base and height of a triangle must be perpendicular (at right angles to each other).

Note: More complicated shapes can be split up into separate shapes.

Example Calculate the area of the shape below.



Area 1 = l × b
A = 4 × 2·2
A = 8·8

Area 2 = $\frac{1}{2}$ × b × h
A = $\frac{1}{2}$ × 4 × 1
A = 2

h = 3·2 - 2·2
h = 1

Total area = 8·8 + 2
= 10·8m^2

Volume

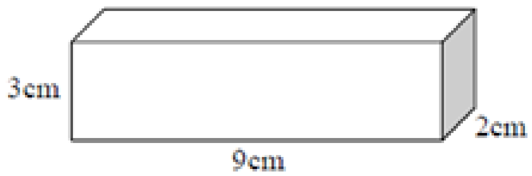
The volume of a shape is simply the "amount of space" it takes up and is three dimensional.

A small cube measuring 1cm by 1cm by 1cm has a volume of 1 cubic centimetre or $1cm^3$. This space is equivalent to 1ml of liquid.

The volume of a cuboid is calculate by multiplying the length by the breadth by the height, the formula is V = l x b x h.

All the units in the calculation should be the same through out.

Example 1 *Calculate the volume of the cuboid.*



$V = l \times b \times h$

$V = 9 \times 2 \times 3$

$V = 54cm^3$

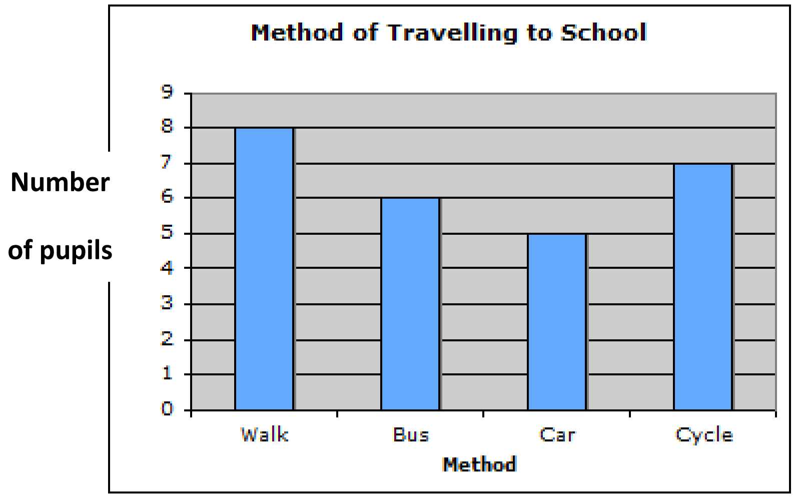
<u>The volume of the cuboid is $54cm^3$</u>

Data Analysis

Bar Graphs

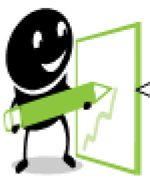
Example 1 Example of a Bar Graph

How do pupils travel to school?



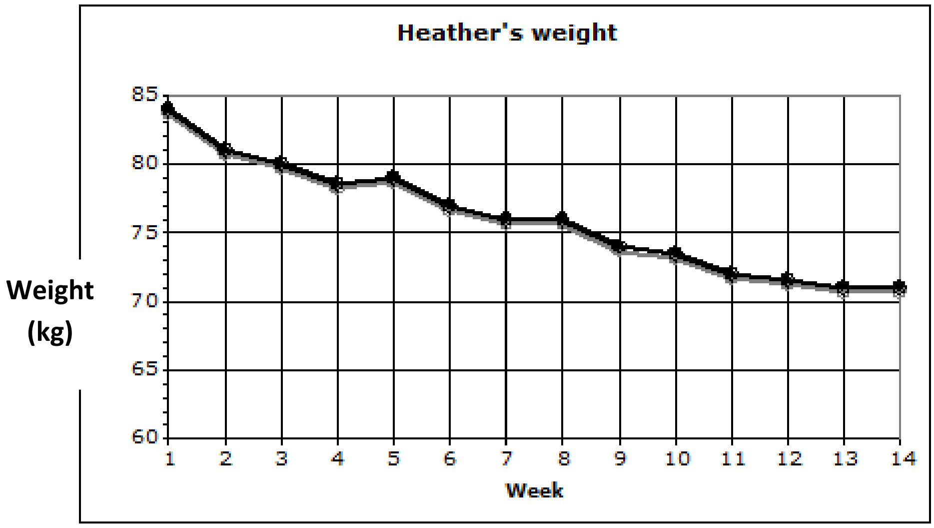
An even space should be between each bar and each bar should be of an equal width. (also leave a space between vertical axis and the first bar.)

Line Graphs



Line graphs consist of a series of points which are plotted, then joined by a line. All graphs should have a title, and each axis must be labelled. The trend of a graph is a general description of it.

Example 1 The graph below shows Heather's weight over 14 weeks as she follows an exercise programme.



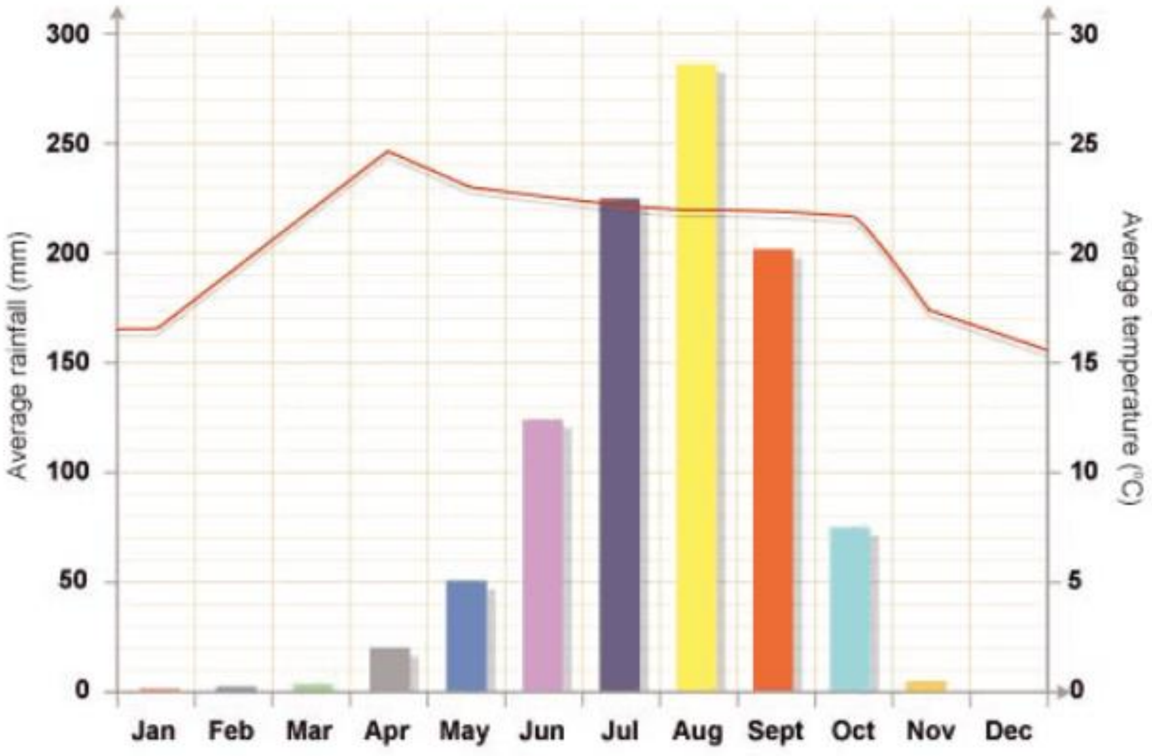
The trend of the graph is that her weight is decreasing.

Combined Graphs

We use different types of graphs for different data and relationships.

For example, in Geography you will look at Climate Graphs, which use lines to show temperature and bars for rainfall.

We can draw these on the same graph. This means we will have two sets of numbers (temperature and rainfall) up the sides so we need to be careful to read the correct scale.



For instance, this graph shows that in June, the average rainfall was 125mm and the average temperature was around 12.5°C.

Scatter Graphs

A scatter graph can be used to show the relationship between two sets of data.

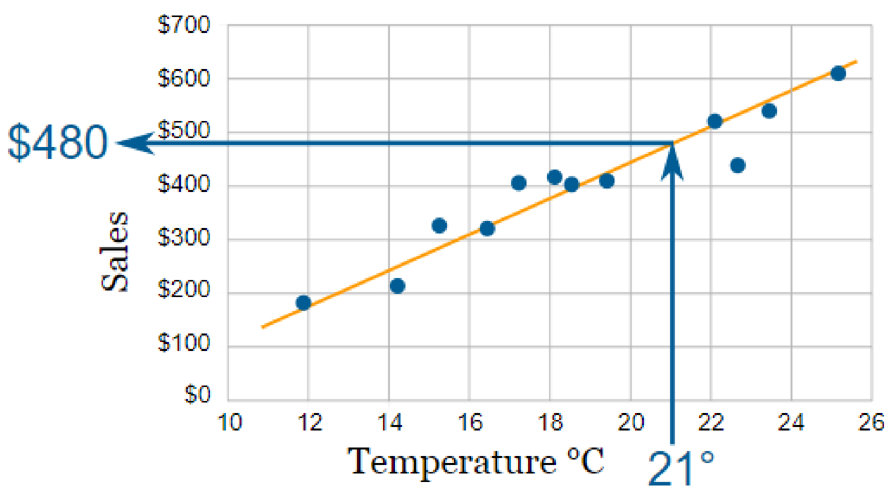
Ice Cream Sales vs Temperature	
Temperature °C	**Ice Cream Sales**
14.2°	$215
16.4°	$325
11.9°	$185
15.2°	$332
18.5°	$406
22.1°	$522
19.4°	$412
25.1°	$614
23.4°	$544
18.1°	$421
22.6°	$445
17.2°	$408

For example, this table shows the amount of money made on Ice Cream Sales at different temperatures.

This data can be plotted to show that as the temperature increases, the money made on Sales increases.

A 'line of best fit' which best fits the point can be drawn.

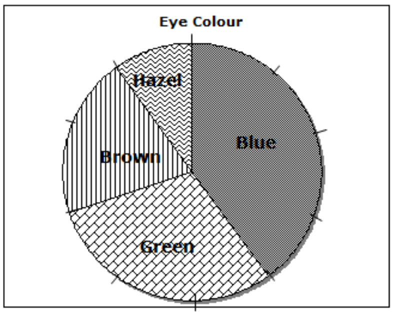
This line allows us to predict sales at certain temperature which haven't been recorded yet.



Pie Charts

A pie chart can be used to display information. Each sector (slice) of the chart represents a different category. The size of each category can be worked out as a fraction of the total using the number of divisions or by measuring angles.

Example 30 pupils were asked the colour of their eyes. The results are shown in the pie chart below.

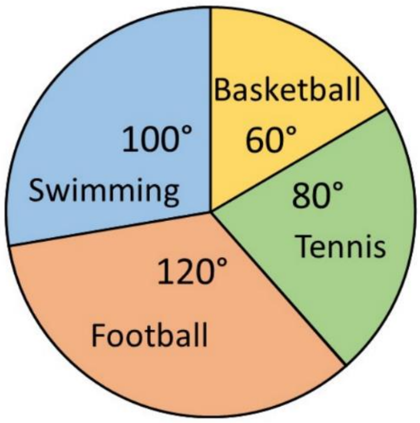


How many pupils had brown eyes?

Example 2

90 people were asked their favourite sport and the pie chart shows their responses.

How many people chose each sport?



Swimming: $\frac{100}{360}$ x 90 = 25 pupils

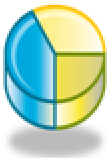
Basketball: $\frac{60}{360}$ x 90 = 15 pupils

Tennis: $\frac{80}{360}$ x 90 = 20 pupils

Football: $\frac{120}{360}$ x 90 = 30 pupils

We can check our answers by checking the number of pupils adds up to 90.

Drawing Pie Charts



On a pie chart, the size of the angle for each sector is calculated as a fraction of 360°.

Example: In a survey about school, a group of pupils were asked what was their favourite subject. Their answers are given in the table below. Draw a pie chart to illustrate the information.

Subject	Number of people
Mathematics	28
Home Economics	24
Music	10
Physics	12
PE	6

Total number of people = 80

Mathematics $= \frac{28}{80} \rightarrow \frac{28}{80} \times 360° = 126°$

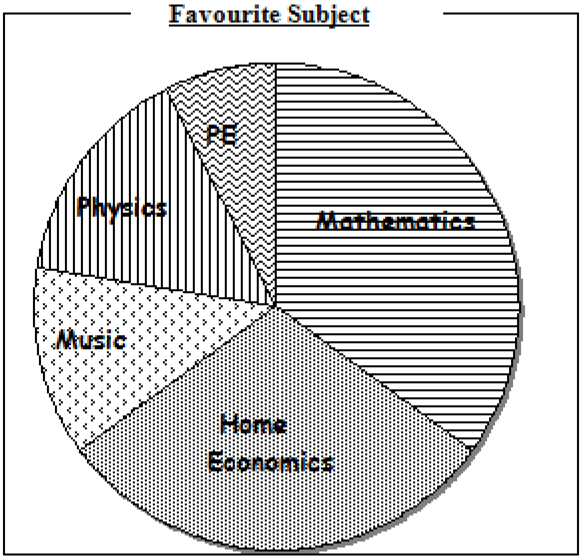
Home Economics $= \frac{24}{80} \rightarrow \frac{24}{80} \times 360° = 108°$

Music $= \frac{10}{80} \rightarrow \frac{10}{80} \times 360° = 45°$

Physics $= \frac{12}{80} \rightarrow \frac{12}{80} \times 360° = 54°$

PE $= \frac{6}{80} \rightarrow \frac{6}{80} \times 360° = 27°$

Check that the total = 360°

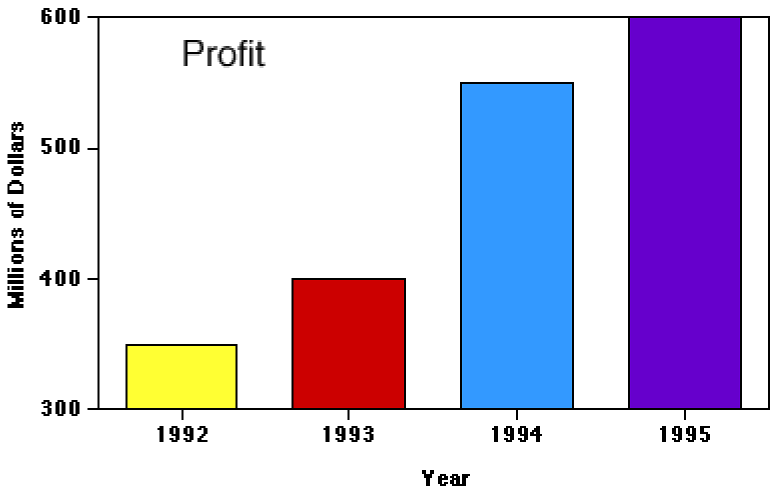


Misleading Data

Sometimes graphs can be misleading. A common reason for this is inconsistent scales, or scales which don't start at zero.

In the graph below, the size of the bars suggests that the value for 1992 is about half of that in 1993.

However, in 1992 the value was $3500 and only went up to around $4000 in 1993.



To stop our graphs being misleading, we need to make sure our scales start at zero and go up in equal amounts each division.

Averages

The **mean**, **median** and **mode** are all types of average. It depends on the data and circumstances which average is most suitable.

The **range** is not an average. It is a measure of how spread out the numbers are.

Mean
The mean is found by adding all the data together and dividing by the number of values.

Median
The median is the middle value when all the data is written in numerical order (if there are two middle values, the median is half-way between these values).

Mode
The mode is the value that occurs most often.

Range
The range of a set of data is a measure of spread.
Range = Highest value – Lowest value

Example *Class 1A scored the following marks for their homework assignment.* Find the mean, median, mode and range of the results.

6, 9, 7, 5, 6, 6, 10, 9, 8, 4, 8, 5, 7

$$\text{Mean} = \frac{6+9+7+5+6+6+10+9+8+4+8+5+7}{13}$$

$$= \frac{90}{13} = 6.923\ldots$$

Mean = 6.9 to 1 decimal place

Ordered values: 4, 5, 5, 6, 6, 6, [7], 7, 8, 8, 9, 9, 10
Median = 7

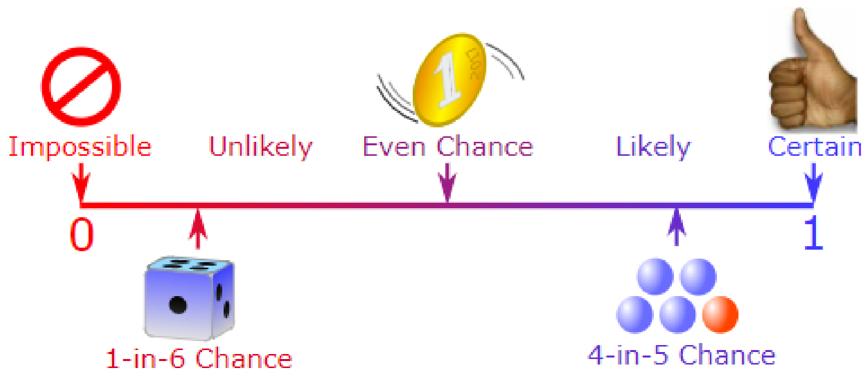
6 is the most frequent mark, so Mode = 6

Range = 10 - 4 = 6

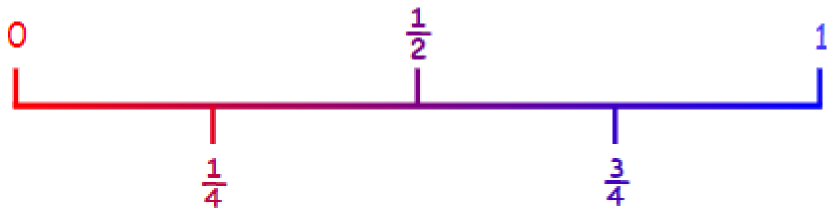
Hey diddle diddle
The median's in the middle;
You add and divide for the mean.
The mode is the one that appears the most
And the range is the difference between.

Probability

Probability is the **chance** that something will happen. It can be shown on a line:



We can use fractions to show probability



A probability of 0 means impossible.

A probability of 1 means certain.

To find the probability of an event we use the rule:

$$P(\text{event}) = \frac{\text{Number of favourable outcomes}}{\text{Number of possible outcomes}}$$

Example 1 What is the probability of picking a black counter from a bag containing 5 red, 3 blue and 2 black counters?

Number of favourable outcomes = 2 (number of black counters)
Number of possible outcomes = 5 + 3 + 2 = 10 (total number of counters)

P(black) = $\frac{2}{10} = \frac{1}{5}$ Always leave your fraction in its simplest form.

Example 2 If a die (singular of dice) is thrown 300 times, approximately how many fives are likely to be obtained?

$P(5) = \frac{1}{6}$

We multiply 300 by $\frac{1}{6}$ since 5 is expected $\frac{1}{6}$ of the time.

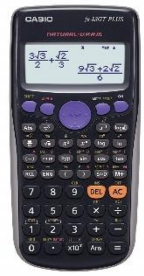
$\frac{1}{6} \times 300 = 50 \text{ fives}$

<u>Approximately 50 fives will be obtained.</u>

Using Your Scientific Calculator

- The 'fraction button'

Remember that when values are written as a fraction, the way to calculate a decimal answer is to divide. $\frac{6}{5}$ means 6÷5 which is equal to 1.2



You don't need to use the — button.

- Scientific Notation

Your calculator can be set to give you numbers in Scientific Notation.

To do this on most Casio calculators, go to 'SHIFT' & 'SETUP' then choose '7:Sci'. You can then choose the number of significant figures you would like.

To change back, go to 'SHIFT' & 'SETUP', choose '8:Norm' then '2'.

- The SD button

This button will change the form of your answer. Eg $\frac{2}{3}$ to $0.\dot{6}$ to 0.6666666

Remember - $0.\dot{6}$ is not rounded and is not acceptable as a final answer in some subjects.

Numeracy Dictionary - Key words

Add; Addition (+)	To combine 2 or more numbers to get one number (called the sum or the total) Example: 12+76 = 88
a.m.	(ante meridiem) Any time in the morning (between midnight and 12 noon).
Approximate	An estimated answer, often obtained by through rounding.
Calculate	Find the answer to a problem. It doesn't mean that you must use a calculator!
Conclusion	A statistical statement made on data. 'Drawing' a conclusion is coming up with this statement. Eg the higher the temperature, the more ice-cream was sold.
Consecutive	Following each other in order. Eg – Wednesday, Thursday and Friday are consecutive days. 17, 18, 19, 20 are consecutive numbers.
Continuous Data	Data with an infinite number of possible values within a selected range e.g. temperature, height,length
Data	A collection of information (may include facts, numbers or measurements).
Discrete	Data which can only have a finite or limited number of possible values. Shoe sizes are an example of discrete data because sizes 6 and 7 mean something, but size 6.3 for example does not.
Denominator	The bottom number in a fraction (the number of parts into which the whole is split).

Difference (-)	The amount between two numbers (subtraction). Example: The difference between 50 and 36 is 14 50 – 36 = 14
Division (÷)	Sharing a number into equal parts. 24 ÷ 6 = 4
Double	Multiply by 2.
Equals (=)	Makes or has the same amount as.
Equivalent fractions	Fractions which have the same value. Example $\frac{6}{12}$ and $\frac{1}{2}$ are equivalent fractions
Estimate	To make an approximate or rough answer, often by rounding.
Evaluate	To work out the answer.
Even number	A number that is divisible by 2. Even numbers end with 0, 2, 4, 6 or 8.
Factor	A number which divides exactly into another number, leaving no remainder. Example: The factors of 15 are 1, 3, 5, 15.
Frequency	How often something happens. In a set of data, the number of times a number or category occurs.
Greater than (>)	Is bigger or more than. Example: 10 is greater than 6. 10 > 6
Least	The lowest number in a group (minimum).

Less than (<)	Is smaller or lower than. Example: 15 is less than 21. 15 < 21.
Maximum	The largest or highest number in a group.
Mean	The arithmetic average of a set of numbers
Median	Another type of average - the middle number of an ordered set of data
Minimum	The smallest or lowest number in a group.
Minus (-)	To subtract.
Mode	Another type of average – the most frequent number or category
Most	The largest or highest number in a group (maximum).
Multiple	A number which can be divided by a particular number, leaving no remainder. Example Some of the multiples of 4 are 8, 16, 48, 72
Multiply (x)	To combine an amount a particular number of times. Example 6 x 4 = 24
Negative Number	A number less than zero. Shown by a minus sign. Example -5 is a negative number.
Numerator	The top number in a fraction.
Non Numerical data	Data which is non numbers e.g. favourite football team, favourite sweet etc.
Odd Number	A number which is not divisible by 2. Odd numbers end in 1 ,3 ,5 ,7 or 9.
Operations	The four basic operations are addition, subtraction, multiplication and division.

Order of operations	The order in which operations should be done: BODMAS.
Place value	The value of a digit dependent on its place in the number. Example: in the number 1573.4, the 5 has a place value of 100.
p.m.	(post meridiem) Any time in the afternoon or evening (between 12 noon and midnight).
Prime Number	A number that has exactly 2 factors (can only be divided by itself and 1). Eg 2, 3, 5, 7, 11, … Note that 1 is not a prime number as it only has 1 factor.
Product	The answer when two numbers are multiplied together. Example: The product of 5 and 4 is 20.
Remainder	The amount left over when dividing a number.
Share	To divide into equal groups.
Sum	The total of a group of numbers (found by adding).
Total	The sum of a group of numbers (found by adding).

Extra Practice with Numeracy

Mathletics

All pupils in S1 to S3 have logins to Mathletics. This website gives unlimited practice with the full S1-S3 Mathematics Course.

Username..

Password ....

RBS Moneysense

This is an impartial financial education program that uses real-life experiences to help you develop good money habits. https://rbs.mymoneysense.com/home

BBC Bitesize

For S1 - 3, you will be looking mainly at the Level 2, 3 and 4 Mathematics sections. http://www.bbc.co.uk/education

Maths Workout

This will be used in school but can be used at home too.

Username: boclair ***Password: graph26***

National5maths

As well as help for pupils sitting their National 5 Maths, this website has a section to support your Maths and Numeracy in earlier stages: http://www.national5maths.co.uk

Numeracy Ninjas

All S1 classes use Numeracy Ninjas in Maths. More questions available at www.numeracyninjas.org

Extra practice and videos found at www.mrbartonmaths.com and www.corbettmaths.com