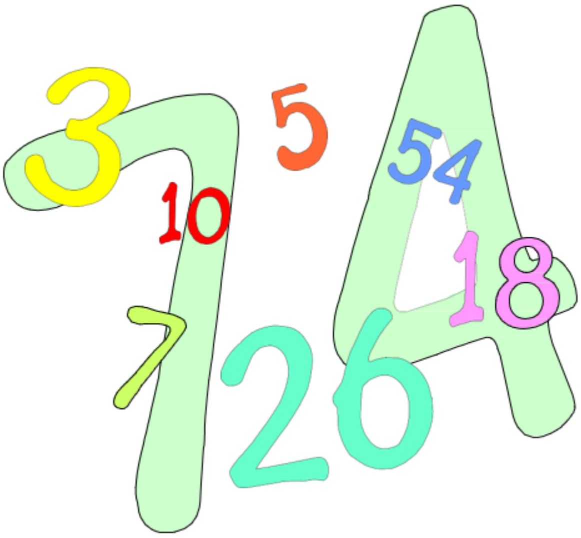
Kinross High School



Maths and Numeracy Methodology Booklet

A Guide for Teachers and Parents/Carers

Introduction

Numeracy is a skill for life, learning and work. Having well-developed numeracy skills allows young people to be more confident in social settings and enhances enjoyment in a large number of leisure activities.

What is the purpose of the booklet?
This booklet has been produced to give guidance to staff & parents/carers on how certain common Numeracy topics are taught within the Mathematics department for problem solving, following the Curriculum for Excellence guidelines used in all schools in Scotland.

Curriculum for Excellence Numeracy Strands

- Number, Money and Measure
- Estimation and Rounding
- Number and number processes
- Fractions, Decimals and Percentages
- Money
- Time
- Measurement
- Data and Analysis
- Ideas of chance and uncertainty

How can it be used?
Before teaching a topic containing numeracy you can refer to the booklet to see what methods are being taught.
A timeline of when topics are taught in S1/S2 is included at the end of this booklet.

Why do some topics include more than one method?
In some cases (e.g. percentages), the method used will be dependent on the level of difficulty of the question, and whether or not a calculator is permitted.

For mental calculations, pupils should be encouraged to develop a variety of strategies so that they can select the most appropriate method in any given situation.

For calculator questions do try to estimate the answer mentally first.

Table of Contents

Addition

Mental Strategies

There are a number of useful mental strategies for addition. Some examples are given below.

Example Calculate 64 + 27

Method 1 Add tens, then units, then add together

60 + 20 = 80   4 + 7= 11   80 + 11 = 91

Method 2 Split up number to be added (last number 27) into tens and units and add separately.

64 + 20 = 84   84 + 7 = 91

Method 3 Round up to nearest 10, then subtract.

64 + 30 = 94 but 30 is 3 too much so subtract 3;

94 – 3 = 91

Written Method

When adding numbers, ensure that the numbers are lined up according to place value. Start at right hand side, write down units, carry tens.

Example Add 3032 and 589

3032	3032	3032	3032
+ 589	+ 589	+ 589	+ 589
1	21	621	3621
1	1 1	1 1	1 1

2 + 9 = 11   3 +8 +1 = 12   0 +5 +1 =6   3 + 0 = 3

Subtraction

We use decomposition as a written method for subtraction (see below). Alternative methods may be used for mental calculations

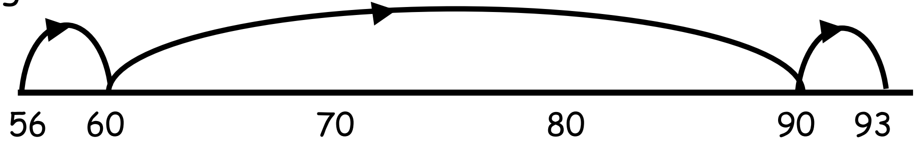
Mental Strategies

Example 1 Calculate 93 - 56

Method 1 Count on

Count on from 56 until you reach 93. This can be done in several ways.

E.g.

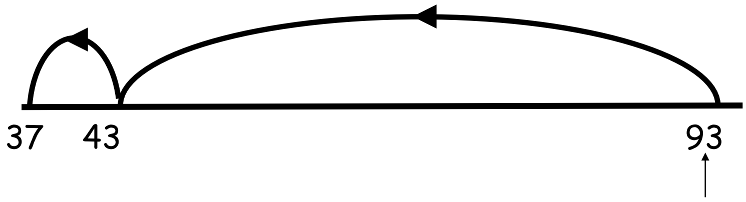


Method 2 Break up the number being subtracted

E.g. subtract 50, then subtract 6.

93 - 50 = 43

43 - 6 = 37



Written Method

Example 1 4590 – 386

$$\begin{array}{r} 45\overset{8}{\cancel{9}}{}^{1}0 \\ -\ 386 \\ \hline 4204 \\ \hline \end{array}$$

We do not "borrow and pay back".

Example 2 Subtract 692 from 14597

$$\begin{array}{r} 1\overset{3}{\cancel{4}}{}^{1}597 \\ -\ 692 \\ \hline 13905 \\ \hline \end{array}$$

Important steps for example 1

1. Say "zero subtract 6, we can't do this"
2. Look to next column exchange one ten for ten units, ie 9 tens becomes 8 & 10 units
3. Then say "ten take away six equals four"
4. Normal subtraction rules can be used to then complete the question.

Multiplication 1

It is essential that you know all of the multiplication tables from 1 to 10. These are shown in the tables square below.

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

Mental Strategies

Example **Find 39 x 6**

Method 1

30 x 6
=180

9 x 6
=54

180 + 54
=234

Method 2

40 x 6 =240

40 is 1 too many so take away 1 x 6

240-6
= 234

Multiplication 2

When using written methods for multiplication, we use the Grid Method to answer questions. Break numbers up into "easy" numbers that add to give that number, then multiply. Once you have multiplied, add up all your answers!

Example 1 a) Multiply 39 by 6:

What numbers add to 39? 30 and 9

X	30	9
6	180	54

Then sum these answers:

39 × 6 = 180 + 54

= 234

b) Multiply 156 by 62

What numbers add to 156? 100, 50 and 6.

What numbers add to 62? 60 and 2

X	100	50	6
60	6000	3000	360
2	200	100	12

156 × 62 = 6000 + 3000 + 360

+ 200 + 100 + 12

= 9672

We can also use this method when multiplying decimals

Example 2: Find 2.36 x 38.4

X	2	0.3	0.06
30	60	9	1.8
8	16	2.4	0.48
0.4	0.8	0.12	0.024

2.36 × 38.4 = 60 + 9 + 1.8 + 16
+2.4 + 0.48 + 0.8
+ 0.12 + 0.024

= 90.624

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?

$$\begin{array}{r} 2\ 4 \\ 8\ \overline{)\ 1\ {}^{1}9\ {}^{3}2} \end{array}$$

There are 24 pupils in each class

Example 2 Divide 4.74 by 3

$$\begin{array}{r} 1\ .\ 5\ 8 \\ 3\ \overline{)\ 4\ .\ {}^{1}7\ {}^{2}4} \end{array}$$

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?

$$\begin{array}{r} 0\ .\ 2\ 7\ 5 \\ 8\ \overline{)\ 2\ .\ {}^{2}2\ {}^{6}0\ {}^{4}0} \end{array}$$

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.

Long Division – This is not a feature in modern day courses although we do show our more able pupils. In general, we would expect Pupils to estimate the answer and then use a calculator to get the exact answer.

Order of Calculations (BODMAS/ BIDMAS)

Consider this: what is the correct answer to **2 + 4 x 5** ?

Is it	(2 + 4) x 5	OR	2 + (4 x 5)
	= 6 x 5		= 2 + 20
	= 30		= 22

The correct answer is 22.

Calculations which have more than one operation need to be done in a particular order. The order can be remembered using either of the mnemonics **BODMAS** or **BIDMAS**.

The mnemonic tells us which operation should be done first.

BODMAS (BIDMAS) represents:

(B)rackets

(O/I)rder or (I)ndices

(D)ivision

(M)ultiply

(A)dd

(S)ubtract

Therefore in the example above multiplication should be done before addition.

Note: 'order' means a number raised ro a power such as 2^2 or $(-3)^4$.

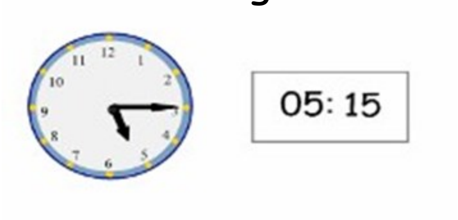
Scientific calculators are programmed with these rules, however some basic calculators may not so take care.

Example 1	15 – 12 ÷ 6	BODMAS tells us to divide first
	= 15 – 2	
	= 13	
Example 2	(9 + 5) x 6	BODMAS tells us to work out the brackets first
	= 14 x 6	
	= 84	
Example 3	18 + 6 ÷ (5-2)	Brackets first
	= 18 + 6 ÷ 3	Then divide
	= 18 + 2	Now add
	= 20	
Example 4	18 - 6 + 2	Add & subtract have equal priority
	= 12 + 2	So subtract
	= 14	Now add

Time 1

Time may be expressed in 12 or 24 hour notation.

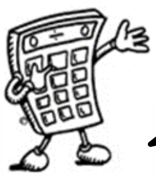
12– Hour clock Time can be displayed on a clock face, or digital clock



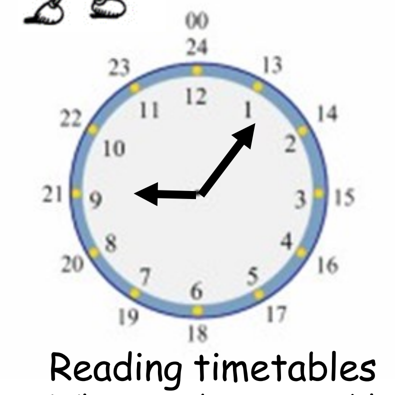
These clocks both show fifteen minutes past five, or quarter past five.

When writing in 12 hour clock we need to add a.m or p.m. after the time.
a.m. is used for times between midnight and 12 noon (morning).
p.m. is used for times between 12 noon and midnight (afternoon/ evening).

24– Hour clock



In 24 hour clock, the hours are written as number between 00 and 24. Midnight is expressed as 00 00. After 12 noon, the hours are numbered 13, 14,15 … etc



Examples

9.55 am → 09 55 hours

3.35 pm → 15 35 hours

12.20 am → 00 20 hours

02 16 hours → 2.16 am

20 45 hours → 8.45 pm

Reading timetables

When reading timetables you often have to convert to and from 24 hours clock.

To convert from 24 hour time to 12 hour time:

If the hour is 13 or more, subtract 12 from the hours and call it P.M. Otherwise it is A.M.

If the hour is 12, leave it unchanged, but call it P.M.

If the hour is 0, make it 12 and call it A.M.

Otherwise, leave the hour unchanged and call it A.M.

To convert from 12-hour time to 24-hour time:

If the P.M. hour is from 1 through 11, add 12.

If the P.M. hour is 12, leave it as is.

If the A.M. hour is 12, make it 0.

Otherwise, leave the hour unchanged. Then drop the A.M. or P.M., of course.

Time 2

Time Facts
It is essential to know the number of months, weeks and days in a year, and the number of days in each month.

Time Calculations

Example 1 How long is it from 0755 to 0948?

Method—Working (use a time line)

0755 -> 0800 -> 0900 -> 0948

(5mins) (1hr) (48mins)

Then add total time to give 1 hr 53mins

WE DON'T TEACH TIME AS SUBTRACTION

Example 2 Change 27 minutes into decimals hours

27 mins = 27 ÷ 60 = 0.45 Hours

Fractions 1

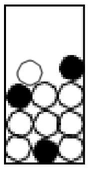
Addition, subtraction, multiplication and division of fractions are studied in mathematics. However, the examples below may be helpful in all subjects

Understanding Fractions

Example

A jar contains black and white sweets.

What fractions of the sweets are black?



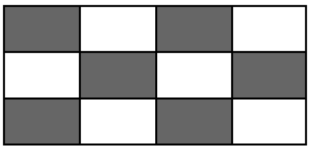
There are 3 black sweets out of total of 7, so $\frac{3}{8}$ of the sweets are black.

NOTE: Please encourage pupils to write fractions as above and not at $^{3}/_{8}$. It is important that pupils recognise the different parts of the fraction.

Equivalent Fractions

Example

What fraction of the flag is shaded?



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

It could also be said that $\frac{1}{2}$ of the flag is shaded and that $\frac{6}{12}$ and $\frac{1}{2}$ are **equivalent fractions.**

Fractions 2

Simplifying Fractions

The top of a fraction is called the **numerator;** the bottom is called the **denominator**.
To simplify a fraction, divide the **numerator** and **denominator** of the fraction by the same number.

Example 1

(a)

$$\frac{20}{25} \underset{\div 5}{\overset{\div 5}{=}} \frac{4}{5}$$

(b)

$$\frac{16}{24} \underset{\div 8}{\overset{\div 8}{=}} \frac{2}{3}$$

This can be done repeatedly until the numerator and denominator are the smallest possible number—the fraction is then said to be in it **simplest form**.

Example 2 Simplify $\frac{72}{84}$

$$\frac{72}{84} = \frac{36}{42} = \frac{18}{21} = \frac{6}{7}$$ (Simplest form)

Calculating Fractions of a Quantity

To find the fraction of a quantity, divide by the denominator.
To find $\frac{1}{2}$ divide by 2, to find $\frac{1}{4}$ divide by 4, to find $\frac{1}{8}$ divide by 8 etc.
If the fraction has a numerator not equal to 1 we then need to multiply our answer by the numerator.

Example 1 Find $\frac{1}{5}$ of £150

$\frac{1}{5}$ of £150 = £150 ÷ 5 = £30

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

To find $\frac{3}{4}$ of a quantity, start by finding $\frac{1}{4}$ then multiply by 3 (the numerator)

Percentages 1

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

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

36% is therefore equivalent to $\frac{9}{25}$ and 0.36

To change a fraction to a decimal (fraction) divide the numerator by the denominator.

Common Percentages

Some percentages are used very frequently. It is useful to know these as fractions and decimals.

Percentage	Fraction	Decimal (Fraction)
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

Percentages 2

There are many ways to calculate percentages of a quantity. Some of the common ways are shown below.

Non—Calculator Methods

Method 1: Using Equivalent Fractions

In this method, we replace our percentage with an equivalent common fraction we can easily find, then multiply to give the required value.

Example 1 Find 9% of 200g

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

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

Example 2 Find 70% of £35

$$10\% \text{ of } £35 = \frac{1}{10} \text{ of } £35 = £35 \div 10 = £3.50$$

So 70% of £35 = 7 x £3.50 = £24.50

Method 2: Using a Combination of Equivalent Fractions

The previous examples can be used in combinations as to calculate any percentage.

We can "break apart" our percentages into multiples of 10% and 1%

Example 3 Find 23% of £15000

23% can be broken up into 20% and 3%.

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.

Percentages 3

Calculator Methods

To find a percentage of a quantity using a calculator, change the percentage to a decimal by dividing by 100 and then multiply.

To find a percentage of a total, first make a fraction, then convert to a decimal by dividing the top by the bottom. This can then be expressed as a percentage by multiplying by 100.

Example 1 There are 30 pupils in Class 3A3. 18 are girls.

What percentage of Class 3A3 are girls?

$$\frac{18}{30} = 18 \div 30 = 0.6 = 60\%$$

So 60% of 3A3 are girls.

Example 2 James scored 36 out of 44 in his biology test.

What is his percentage mark?

$$\text{Score} = \frac{36}{44} = 36 \div 44 = 0.81818\ldots$$

$$= 81.818\ldots\% = 82\% \text{ (rounded)}$$

Percentages 4

Percentages Changes

There are many situations where we could be asked to change an amount by a percentage or to calculate the percentage change.

Example 1: Percentage Increase/Decrease

Increase £300 by 24%

Using the methods previously spoke about 24% can be broken up into 20% and 4%.

10% of £300 = £30 so 20% = £30 x 2 = £60

1% of £300 = £3 so 4% = £3 x 4 = £12

24% of £300 = £60 + £12 = £72.

Therefore to increase £300 by 24%, we now **add** £72 to the original amount.

£300 + £72 = £372.

Decreasing by a percentage is the same process but subtracts rather than adds.

Example 2: Percentage Change

You could be asked to calculate a change as a percentage. We use the following method:

$$\% \text{ Change} = \frac{\text{New Value}}{\text{Original Value}} \times 100$$

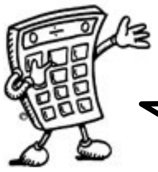
Reminder: We always start with 100% of something, so if your percentage is over 100%, subtract 100 from the percentage to find out by how much something has increased.

Example: A flat cost £80,000 last year and now costs £108,000. By what percentage has the value increased.

$$\% \text{ Chane} = \frac{108,000}{80,000} \times 100 = 135\%$$

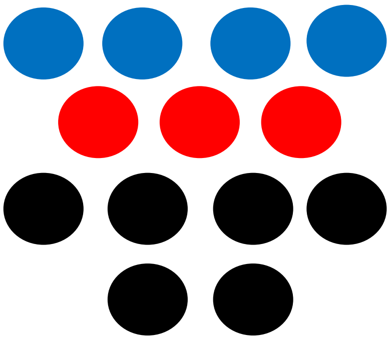
Therefore % increase = 135% - 100%
= 35%

Ratio 1



When quantities are to be mixed together, the ratio, or proportion of each quantity is often given. The ratio can be used to calculate the amount of each quantity, or to share a total into parts.

Writing Ratios



In a bag of beads, there are 4 blue, 3 red, and 6 black beads.

The ratio of blue : red : black is 4 : 3 : 6

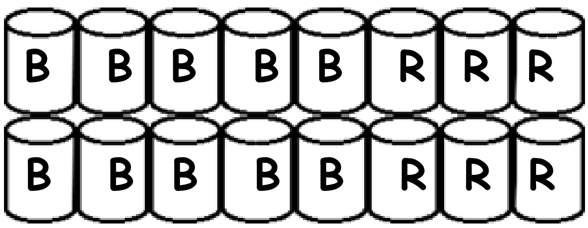
Simplifying Ratios

Ratios can be simplified in much the same way as fractions.

Example 1

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, as it is possible to split up the tins into 2 groups, each containing 5 tins of blue and 3 tins of red.



Blue : Red = 10 : 6

= 5 : 3

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

Ratio 2

Example 2

Simplify each ratio:

a) 4 : 6

= 2 : 3

Divide each figure by 2

b) 24 : 36

= 2 : 3

Divide each figure by 12

c) 6 : 3 : 12

= 2 : 1 : 4

Divide each figure by 3

Example 3

Concrete is made by mixing 20kg of sand with 4kg cement. Write the ratio of

Sand : Cement in its simplest form.

Sand : Cement = 20 : 4

= 5 : 1

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?

x5

Fruit	Nuts
3	2
15	**10**

x5

We try to figure out what have we multiplied 3 by to get to 15?

5, hence why we multiply each side by 5.

This means that the chocolate bar contains 10g of nuts.

Information Handling: Tables

It is sometimes useful to display information in graphs, charts or tables

Example The table below shows the average maximum temperatures (in degrees Celsius) in Barcelona and Edinburgh.

	J	F	M	A	M	J	J	A	S	O	N	D
Barcelona	13	14	15	17	20	**24**	27	27	25	21	16	14
Edinburgh	6	6	8	11	14	17	18	18	16	13	8	6

The average temperature in June in Barcelona is 24°C.

Frequency Tables are used to present information. Often data is grouped in intervals

Example 2 Homework marks for Class 4B.

27 30 23 24 22 35 24 33 38 43 18 29 28 28 27

33 36 30 43 50 30 25 26 37 35 20 22 24 31 48

Mark	Tally	Frequency
16—20	||	2
21—25	~~||||~~ ||	7
26—30	~~||||~~ ||||	9
31—35	~~||||~~	5
36—40	|||	3
41—45	||	2
46—50	||	2

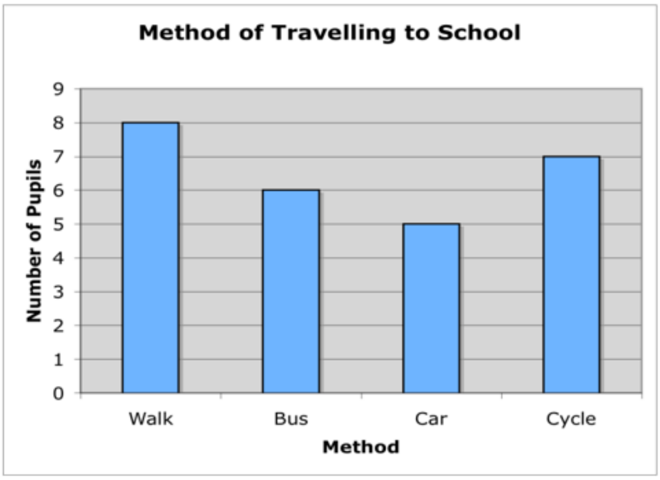
Each mark is recorded in the table by a tally mark. Tally marks are grouped in 5's to make it easier to read and count.

Information Handling: Bar Graphs/ Historgrams

Bar graphs and Histograms are often used to display data. **<u>They must not be confused as being the same.</u>**
<u>Bar Graphs</u> are used to present discrete* or non numerical data*, whereas **<u>histograms</u>** are used to present continuous data*.
(See key words for explanation of these terms)
All graphs should have a title, and each axis must be labelled.

Example 1 Example of a Bar Graph

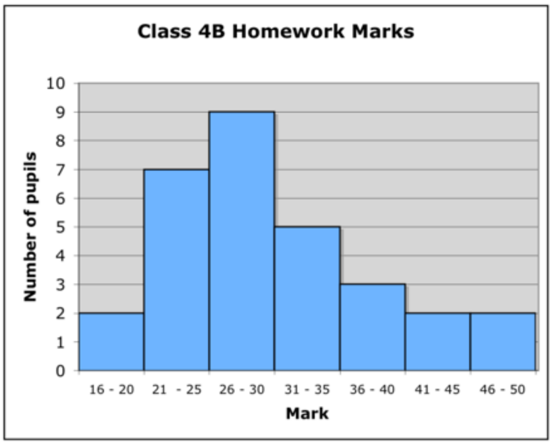
How do pupils travel to school?



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

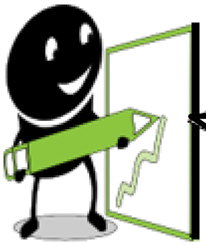
Example 2 Example of a histogram

The graph below shows the homework marks for Class 4B.



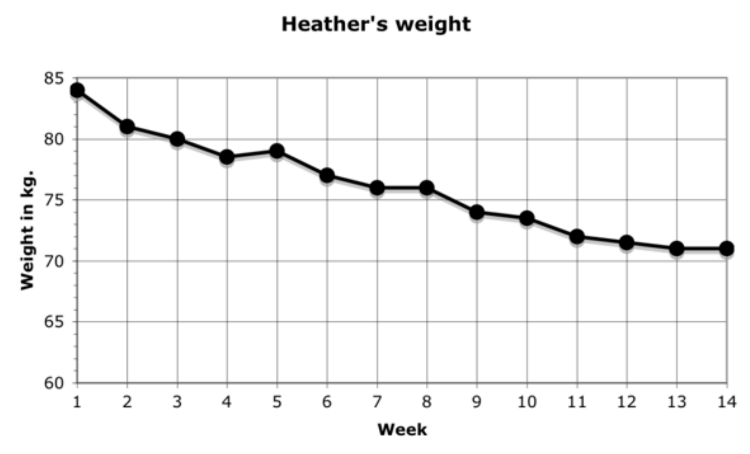
Important—there should be no space between each bar.

Information Handling : Line Graphs



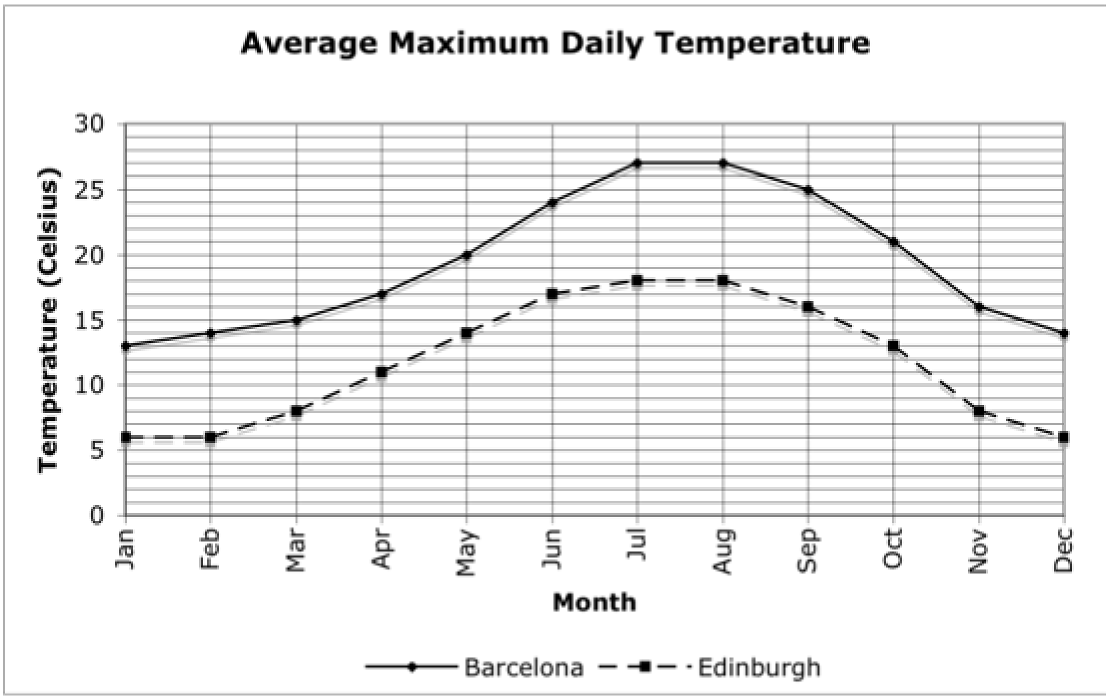
Line graphs consist of a series of points which are plotted, then joined by a line. The trend of a graph is a general description of it, usually looking from left to right.

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



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

Example 2 Graph of average temperatures in Edinburgh and Barcelona.

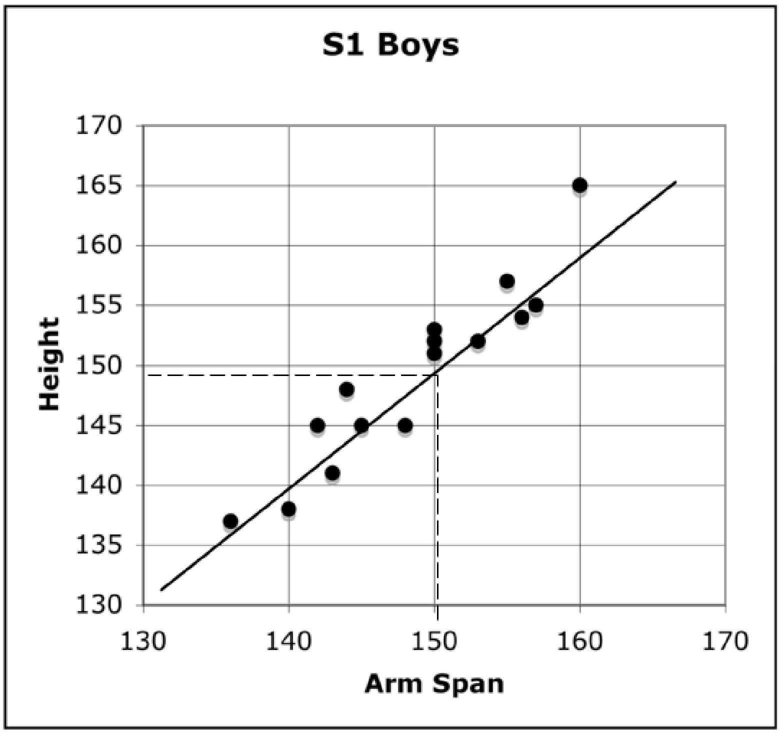


Information Handling : Scatter Graphs

A scatter diagram is used to display the relationship between two variables. A pattern may appear on the graph. This is called **correlation**.

Example The table below shows the height and arm apn of a group of first year boys. This is then plotted as a series of points on the graph below.

Arm Span (cm)	150	157	155	142	153	143	140	145	144	150	148	160	150	156	136
Height (cm)	153	155	157	145	152	141	138	145	148	151	145	165	152	154	137

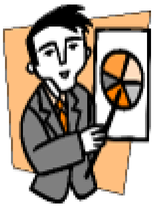


The graph shows a general trend, that as the arm span increases, so does height. This graph shows a positive correlation. (The points generally go upwards looking from left to right).

The straight line drawn is called the line of best fit. This line can be used to provide estimates. For example, a boy of arm span 150 cm would be expected to have a height of around 149cm.

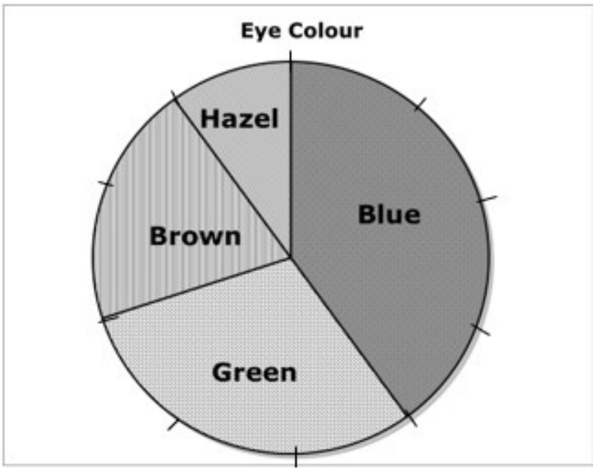
Note that in some subjects, it is a requirement that the axes start from 0.

Information Handling : 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?

The pie chart is divided up into ten parts, so the pupils with brown eyes represent $\frac{2}{10}$ of the total.

$\frac{2}{10}$ Of 30 = 6, so 6 pupils had brown eyes.

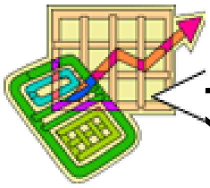
If no divisions are marked, we can work out the fraction by measuring the angle of each sector.

The angle in the brown sector is 72°, so the number of pupils with brown eyes

= $\frac{72}{360}$ x 30 = 6 pupils.

If you find all of the values, you can check your answers! They should totals to 30!

Information Handling : Averages



To provide information about a set of data, the average value may be given. There are 3 ways of finding the average value—the mean, the median and the mode. It could also be useful to see how spread out the information is, for this we use the range.

Mean

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

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.

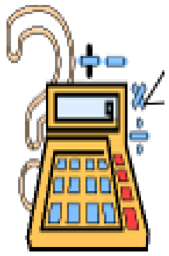
Ordered values: 4 , 5 , 5, 6, 6, 6, $\boxed{7}$,7, 8 , 8 , 9 , 9 , 10

Median = 7

6 is the most frequent mark, so Mode = 6

Range = 10—4 = 6

Scientific Notation or Standard Form



In engineering and scientific calculations you often deal with very small or very large numbers, for example 0.000 000345 or 870,000,000. To avoid writing these very long numbers a system has been develped , known as **scientific notation (standard form)** which enables us to write numbers much more concisely.

The rules when writing a number in standard form is that first you write down a number between 1 and 10, then you write x 10 (to the power of a number). In the Sciences the power of the number tends to be a multiple of 3, in Maths the power can be any number.

Example

Write 81 900 000 000 000 in standard form:

81 900 000 000 000 = 8.19×10^{13}

It's 10^{13} because the digits have moved 13 places to the right to get to the number 8.19

Example

Write 0.000 001 2 in standard form:

0.000 001 2 = 1.2×10^{-6}

It's 10^{-6} because the digits have moved 6 places to the left to get to the number 1.2

On a calculator, you usually enter a number in standard form as follows:

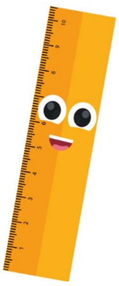
Type in the first number (the one between 1 and 10). Press EXP or $x10^{x}$. Type in the power to which 10 is risen.

Interesting facts

Mass of Earth = **5974200000000000000000000 kg** = **5.9742×10^{24} kg**

Mass of an electron = **0.00000000000000000000000000000092**kg = **9.2×10^{-31} kg**

Measurement



Within the study of Mathematics, learners work with and learn how to convert between metric units in different contexts.

The common units used in Maths are:

Length

Millimetres (mm), Centimetres (cm), Metres (m) and Kilometres (km)

Area

Square Centimetres (cm^2), Square Metres (m^2), etc.

Volume

Cubic Centimetres (cm^3), Cubic Metres (m^3), etc.

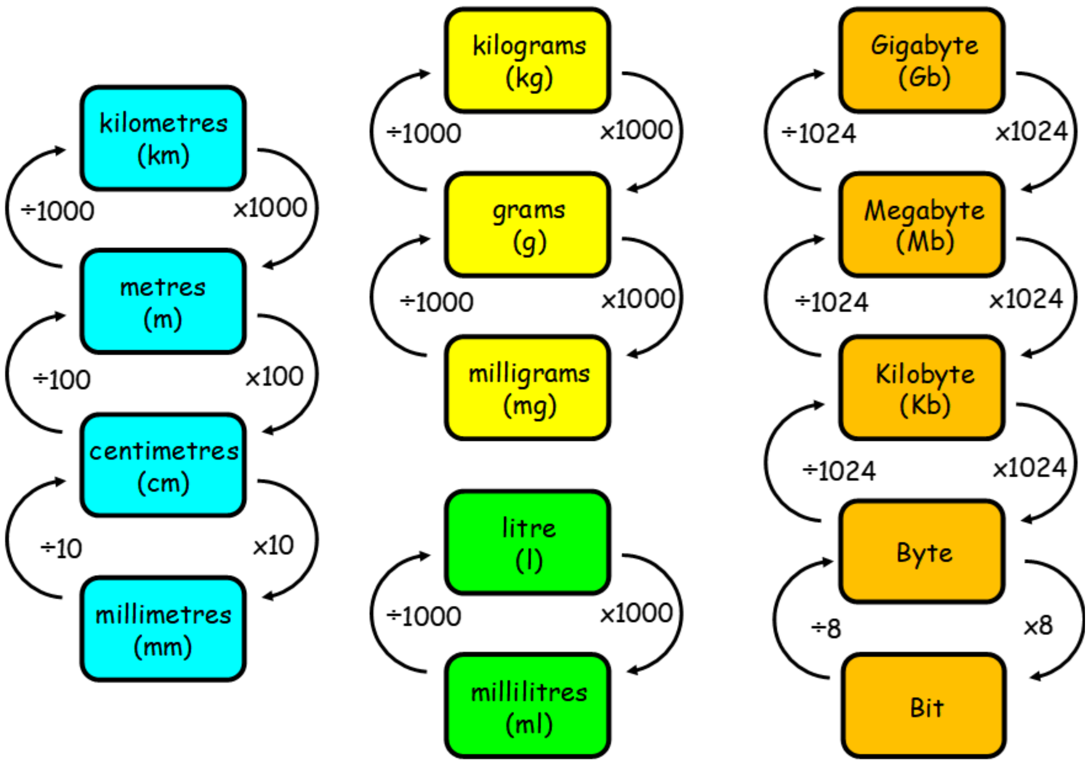
Important! Do **NOT** try to convert between units of area or volume, convert your length units first then calculate area or volume!

Liquid Volume

Millilitres (ml), Litres (l)

Weight

Grams (g), Kilograms (kg)

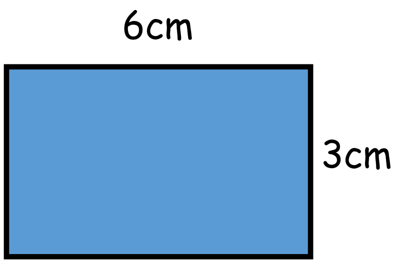


Perimeter, Area and Volume

Perimeter

The perimeter of a shape is the distance the whole way around a shape.

Example

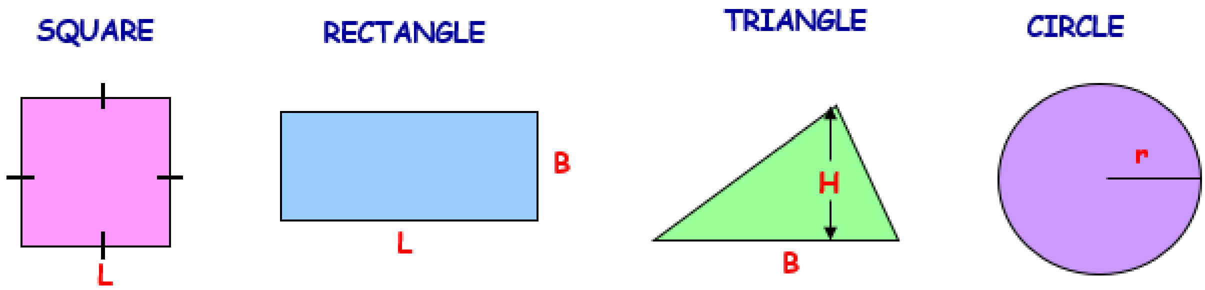


Perimeter = 6 + 3 + 6 + 3

= 18 cm

Area

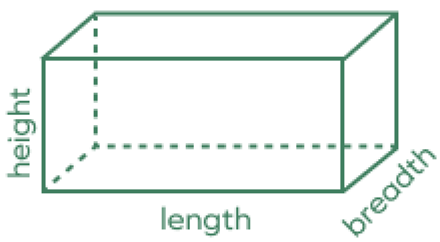
The area of a 2D shape is "how much space it takes up". Individual shapes have individual formulae to calculate their areas. For each shape we substitute into the formula and can calculate the area from there. Units are always in square units.



$A = L^2$ $A = LB$ $A = \frac{1}{2} BH$ $A = \pi r^2$

Volume

The volume of a 3D shape is "how much space it takes up". Individual shapes have individual formulae to calculate their volume. For each shape we substitute into the formula and can calculate the volume from there. Units are always in cubed units.



Volume of Cuboid =

= Length x Breadth x Height

= LBH

Mathematical Literacy (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 snd 12 noon).
Approximate	An estimated answer, often obtained by rounding to nearest 10, 100 or decimal place.
Calculate	Find the answer to a problem. It doesn't mean that you must use a calculator!
Continuous Data	Has an infinite number of possible values within a selected range. They could get placed on a number line with no gaps (e.g. temperature, height, length)
Data	A collection of information (may include facts, numbers or measurements
Discrete	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 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	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—See Page 25
Median	Another type of average—the middle number of an ordered set of data—See page 25
Minus (-)	To subtract.
Mode	Another type of average—the most frequent number or category (See page 25)
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 4, 8, 12, 16…
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 of a fraction
Non Numerical Data	Data which is non numerical eg favourite football team, favourite sweet etc. Can be put into a category
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/ BIDMAS— See page).
Place Value	The value of a digit dependent on it's 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 1 and itself). Note 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.
Range	How spread out your data is, calculated by Highest Value - Lowest Value.
Remainder	The amount left over when dividing a number.
Share	To divide into equal groups
Substitute	To replace one thing with another. Commonly used when using a formula.
Sum	The total of a group of numbers (found by adding).
Total	The sum of a group of numbers (found by adding).