Firpark Secondary School

Numeracy Across The Curriculum

A Guide for Parents/Carers and Staff explaining how topics involving numbers are taught within Firpark Secondary School.

Introduction

Curriculum for Excellence has given the opportunity for all educators to work together. All teachers now have a responsibility for promoting the development of Numeracy. With an increased emphasis upon Numeracy for all young people, teachers will need to revisit and consolidate Numeracy skills throughout schooling. To this end I feel that it is important that "we" (all staff at Firpark Secondary) deliver a consistent approach to "our" pupils. Pupils always have difficulties with transferable skills and if we can deliver consistent approaches of Numeracy across the school we will be helping our pupils become successful learners.

This information booklet has been produced to inform parents/carers and teachers how the Numeracy Outcomes from Curriculum for Excellence are taught within the Maths Department at Firpark Secondary School.

It is hoped that use of the information in the booklet will help our parents/carers. You will hopefully be given an insight into the way number topics are being taught to your children in the school, making it easier for you to help them with their homework, and as a result improve their progress.

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Note: Each topic starts by displaying the numeracy outcomes up to the Third Level. Some pupils will go on to achieve Fourth Level or above by the time they leave Firpark Secondary.

Number and Number Processes

First Level	Second Level	Third Level
I have investigated how whole numbers are constructed, can understand the importance of zero within the system and can use my knowledge to explain the link between a digit, its place and its value. ***MNU 1-02a*** *I can use addition, subtraction, multiplication and division when solving problems, making best use of the mental strategies and written skills I have developed.* ***MNU 1-03a***	*I have extended the range of whole numbers I can work with and having explored how decimal fractions are constructed, can explain the link between a digit, its place and its value.* ***MNU 2-02a*** *Having determined which calculations are needed, I can solve problems involving whole numbers using a range of methods, sharing my approaches and solutions with others.* ***MNU 2-03a***	*I can use a variety of methods to solve number problems in familiar contexts, clearly communicating my processes and solutions.* ***MNU 3-03a***

Every pupil should know their tables, particularly as they move up the school. Their six, seven, eight and nine times tables are particularly important and should be practised at home.

Place Value

Place value is very important throughout all of mathematics. It is important that the column headings for numbers are remembered.

Millions	Hundreds of Thousands	Tens of Thousands	Thousands	Hundreds	Tens	Ones	Decimal Point	tenths	hundredths
M	HTh	TTh	Th	H	T	U		t	h
				3	5	6	.	7	8

From the table above the:

3 stands for 3 hundreds: 300
5 stands for 5 tens: 50
6 stands for 6 Ones: 6
7 stands for 7 tenths: 0.7 or $\frac{7}{10}$
8 stands for 8 hundredths: 0.08 or $\frac{8}{100}$.

Reading and writing large numbers is a common difficulty that can easily be practised.

3,678,023 reads as

"Three million, six hundred and seventy eight thousand and twenty three."

Addition

Pupils are encouraged to always set out their working neatly writing one number in each box, lining up their columns and using a ruler to draw straight lines. When adding, we usually carry numbers underneath the line.

Example 1 Calculate 1243 + 668.

```
  1243
+  668
  1911
   1 1
```

It is important when working with decimals that pupils always line up the decimal point. A large number of pupils have difficulty with this which inevitably leads to the wrong answer.

Example 2 Calculate 12.5 + 6.12.

```
  12.5          12.50
+ 6.12        +  6.12
   73.7 ✗        18.62 ✓
```

Note: When adding or subtracting decimals, figures with the same place value must be in line with each other. Zeros can be added in to help pupils line up and consequently answer questions correctly.

Subtraction

The method for subtraction that we teach is called decomposition. We do not use the method of borrowing from below and paying back.

Example 3 What is the difference between 167 and 128?

```
   5 1
   1 6 7
 - 1 2 8
     3 9
```

We also expect pupils to be able to carry out subtraction mentally using:

- Counting on: to solve 41 – 27, count on from 27 until you get to 41.
- Breaking up the number being subtracted: to solve 41-27, subtract 20 then subtract 7.

We do not:

"Pay back!"

Multiplication

We must encourage all pupils to learn their tables so that they are able to recite them confidently.

Example 4 A packet of crisps weighs 26.7 grams. What is the weight of 8 packets?

$$\begin{array}{r} 26.7 \\ \times \quad 8 \\ \hline 213.6 \\ \hline {\scriptstyle 5\ 5} \end{array}$$

8 packets of crisps weigh 213.6 grams.

Example 5 David changed £600 to dollars before going on holiday to America. If the exchange rate is £1 = $1.35, how many dollars would David receive?

To multiply by 600, we split this into multiplying by 100 then multiply by 6.

100 x 1.35 = 135

135 x 6 = 810

$$\begin{array}{r} 135 \\ \times \quad 6 \\ \hline 810 \\ \hline {\scriptstyle 2\ 3} \end{array}$$

David would receive $810.

Note: It is good for pupils to be reminded that multiplication is commutative, i.e. 5 x 6 is the same as 6 x 5.

Division

Pupils will not be able to divide if they are not confident with their times tables. Again, we must positively encourage pupils to learn tables.

Example 6 Calculate 132 ÷ 4.

$$\begin{array}{r} 3\ 3 \\ \hline 4\,\big)\,1\ 3^{1}2 \end{array}$$

For dividing by multiples of 10, 100 etc., as with multiplication, we break the calculation into two steps. For example, if dividing by 50, first we would divide by 10 then we would divide by 5.

Pupils sometimes have difficulty reading a question and interpreting what to do. The table below can help pupils to understand the vocabulary that can be used and what operation to carry out.

Addition	Subtraction
+	-
add	subtract
the sum of	subtract
the total of	take away
altogether	difference between
total	decrease by
more	less

Multiplication	Divide
x	÷
multiply	divide
times	share
product	how many each
lots of	group equally
groups of	goes into

Estimating and Rounding

First Level	Second Level	Third Level
I can share ideas with others to develop ways of estimating the answer to a calculation or problem, work out the actual answer, then check my solution by comparing it with the estimate. ***MNU 1-01a***	*I can use my knowledge of rounding to routinely estimate the answer to a problem then, after calculating, decide if my answer is reasonable, sharing my solution with others.* ***MNU 2-01a***	*I can round a number using an appropriate degree of accuracy, having taken into account the context of the problem.* ***MNU 3-01a***

Historically, all pupils find this topic difficult to deal with. However, at Firpark Secondary we are placing greater emphasis on reinforcing this.

Estimating

For every calculation that we perform, we should really carry out a rough check in order to satisfy ourselves that the result is reasonably accurate.

Example 1 How much money would I need to buy 19 fudges at 18p each?

As an approximation we could easily find the cost of 20 fudges at 20p each, i.e. 20 x 20 = 400p = £4.

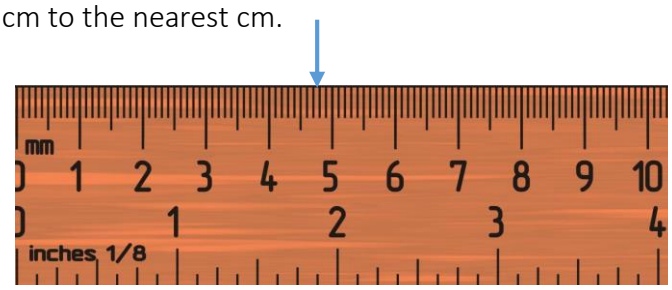
This answer is obviously too high (the actual answer is £3.42), but it does give us a rough idea of how much money we will need.

Pupils can practise estimating answers as well as getting the feel of large and small weights, heights and distances and using money in a practical way.

Rounding

When using very large or very small numbers, it is useful to round numbers to a given approximation.

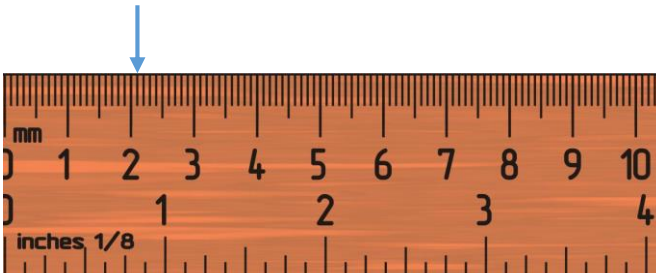
Example 2 Round 4.8 cm to the nearest cm.



4.8 cm is between 4 cm and 5 cm.
It is nearer to 5 cm so we say that

4.8 cm = 5 cm (to the nearest cm).

Example 3 Round 2.1 cm to the nearest cm.



2.1 cm is between 2 cm and 3 cm.
It is nearer to 2 cm so we say that
2.1 cm = 2 cm (to the nearest cm).

When the number is half way between, we always round up to the higher number.

Example 4 Round 8.5 cm to the nearest cm.

8.5cm is between 8 cm and 9cm.
8.5 cm rounds to 9 cm (to the nearest cm).

The rules of rounding apply to all units of measurement including weight, length and volume.

The rules for rounding are:

- If the digit after the one you are rounding is a 0, 1, 2, 3 or 4, the last digit stays the same.
- Otherwise, if the digit is 5, 6, 7, 8 or 9, you have to add on 1 (i.e. round up) the last digit.

The above rule works in all cases

Example 5

1)	27 (rounded to the nearest ten)	→	30
2)	5364 (rounded to the nearest hundred)	→	5400
3)	843 (rounded to the nearest ten)	→	840
4)	1953 (rounded to the nearest thousand)	→	2000
5)	23.35 (rounded to the nearest 1 d.p.)	→	23.4

<u>Money</u>

When we are working with money calculations, often we can have an answer with more than two decimal places. It is important that we round our answer to the nearest 1p (i.e. round to 2 d.p). For example, £2.953 = £2.95 to the nearest penny.

<u>Significant Figures (sig figs)</u>

Sometimes a number has far too many figures in it for practical use. This can be overcome by reducing the number to a certain number of significant figure, e.g. John won £3,496,129 in the lottery. It would be much more practical to say John has won £3.5 million.

A digit in a number is significant if it gives some sense of quantity and accuracy. Zeros can be complicated – when do we count them and when do we not? When zeros are used to determine the position of the decimal point or place value then they are **NOT** significant.

Example 6

1) 38 rounded to 1 sig fig → 40 (Zero is here as a place holder)
2) 45732 rounded to 2 sig figs → 46000 (Zeros here as place holders)
3) 0.00694 rounded to 1 sig fig → 0.007 (Zeros here for decimal point position and place value)
4) 0.050608 rounded to 3 sig figs → 0.0506 (Zeros here for decimal point position and place value. The 0 between the 5 and the 6 is significant.)

Fractions, Decimal Fractions and Percentages

First Level	Second Level	Third Level
Having explored fractions by taking part in practical activities, I can show my understanding of: *• how a single item can be shared equally* *• the notation and vocabulary associated with fractions* *• where simple fractions lie on the number line.* ***MNU 1-07a*** *Through exploring how groups of items can be shared equally, I can find a fraction of an amount by applying my knowledge of division.* ***MNU 1-07b***	*I have investigated the everyday contexts in which simple fractions, percentages or decimal fractions are used and can carry out the necessary calculations to solve related problems.* ***MNU 2-07a*** *I can show the equivalent forms of simple fractions, decimal fractions and percentages and can choose my preferred form when solving a problem, explaining my choice of method.* ***MNU 2-07b***	*I can solve problems by carrying out calculations with a wide range of fractions, decimal fractions and percentages, using my answers to make comparisons and informed choices for real-life situations.* ***MNU 3-07a***

<u>Fractions</u>

At First Level, pupils should be able to find a unitary fraction of a quantity by dividing by the denominator (bottom number) of a fraction. At Second Level and above, pupils are encouraged to find the fraction of a quantity by dividing by the denominator and then multiplying that answer by the numerator (top number).

Example 1 Find $\frac{1}{3}$ of 12.

12 ÷ 3 = 4.

Example 2 Find $\frac{3}{7}$ of 28.
28 ÷ 7 = 4,
3 x 4 = 12.

At Second Level and above, pupils should recognise equivalent fractions and should give their answers in the simplest form.

Example 3 Multiply the top and bottom numbers of the fraction by a simple number to create a new equivalent fraction.

a) $\frac{2}{3}$
$= \frac{2\times2}{3\times2}$
$= \frac{4}{6}$.

b) $\frac{9}{10}$
$= \frac{9\times3}{10\times3}$
$= \frac{27}{30}$.

Example 4 Simplify $\frac{15}{20}$.

First we look for the largest number that both the top and bottom numbers can be divided by. In this case, 15 and 20 can be divided by 5. (This is called the Highest Common Factor).

$$\frac{15 \div 5}{20 \div 5} = \frac{3}{4}.$$

It is important when working with equivalent fractions that we do exactly the same to the top as the bottom.

Decimal Fractions

Decimal fractions (previously known as decimals) are closely linked with percentages and fractions. Pupils should be able to recognise decimal numbers and should be comfortable carrying out calculations involving decimal fractions.

At the Third Level and above, pupils should be able to change between decimals, fractions and percentages easily.

It is important to say numbers correctly e.g 1.4 is "one point four" not "one dot four".

Percentages

Pupils should know that percentage (%) means out of 100. Every percentage can be written as a fraction or a decimal.

Pupils should learn the following:

$100\ \% = \frac{100}{100} = 1$ $\qquad$ $50\ \% = \frac{50}{100} = \frac{1}{2}$

$25\ \% = \frac{25}{100} = \frac{1}{4}$ $\qquad$ $20\ \% = \frac{20}{100} = \frac{1}{5}$

To calculate percentages using a calculator we always get pupils to change the percentage into a decimal first by dividing by 100 and then multiply.

We do not:

Use the % button on the calculator because different models work in different ways.

Example 5 Find 14% of 360.

$14 \div 100 = 0.14$

0.14 x 360 = 50.4

Example 6 Find 68.5% of £500.

68.5 ÷ 100 = 0.685
0.685 x 500 = 342.5
So, 68.5% of £500 = £342.50.

To change a fraction into a percentage, we change the fraction into a decimal first then we multiply by 100.

Example 7 Jemima scored 24 out of 30 in her Maths test. Calculate her percentage.

24 ÷ 30 = 0.8
0.8 x 100 = 80%
Jemima scored 80% in her Maths test.

Money

First Level	Second Level	Third Level
I can use money to pay for items and can work out how much change I should receive. ***MNU 1-09a*** *I have investigated how different combinations of coins and notes can be used to pay for goods or be given in change.* ***MNU 1-09b***	*I can manage money, compare costs from different retailers, and determine what I can afford to buy.* ***MNU 2-09a*** *I understand the costs, benefits and risks of using bank cards to purchase goods or obtain cash and realise that budgeting is important.* ***MNU 2-09b*** *I can use the terms profit and loss in buying and selling activities and can make simple calculations for this.* ***MNU 2-09c***	*When considering how to spend my money, I can source, compare and contrast different contracts and services, discuss their advantages and disadvantages, and explain which offer best value to me.* ***MNU 3-09a*** *I can budget effectively, making use of technology and other methods, to manage money and plan for future expenses.* ***MNU 3-09b***

Pupils should be able to recognise all of the common coins and notes in the UK. Pupils should be encouraged to practise simple money calculations at home by working out the total of a simple shopping bill.

Pupils who are working on the Second Level and above should be able to tell the difference between a debit card and a credit card and how they are used.

Money Calculations

Money links well with the decimal fractions portion of numeracy since we use a decimal point to separate pounds from pence. We always use the correct units, either £ or p, in our answer.

It is very important when carrying out money calculations that the values are lined up correctly.

Example 1 How much money do I have left if I have £42.64 in my purse and I spend £30?

£42.64	£42.64
- £30	- £30.00
£42.34 ✗	£12.64 ✓

Pupils should be able to carry out money calculations involving the four basic operations. By the Second Level, pupils should be able to carry out calculations involving profit and loss as well as calculate bills involving discounts, surcharges and VAT. This work ties in with the percentages work previously mentioned.

It is important that pupils recognise that discount means they pay less (and link this to a subtraction) and that a surcharge means that they have to pay more (and link this to an addition question).

Example 2 Bethany buys a new top from her favourite clothes shop. It costs £34.99 but she receives a £10 discount. How much did she buy the top for?

£34.99
- £10.00
£24.99

Bethany pays £24.99 for her new top.

Money on a calculator

It is important to emphasise that calculators display answers as decimals not as money. Pupils should always remember to change money into a decimal value before beginning any calculations. It is important that pupils work entirely in pounds or in pence (depending on the context on the question).

Often pupils can become confused about calculator answers. When a calculator shows 10.5 it is important that pupils recognise this as £10.50 not £10.05.

Example 3 What is the total of my shopping bill if I buy a salad for £3.49 and a can of cola for 65p?

£3.49
+ £0.65 Changing the 65p into pounds.
£4.14

The total shopping bill is £4.14.

Note: Even though a calculator has been used to carry out the calculation, we still expect to see all the working written down.

Budgeting

Pupils are encouraged to work out the best way to buy things. They are encouraged to consider how much they are getting for their money and are reminded that sometimes the best deals are found online.

Example 4 Heinz baked beans can be bought as 4 individual cans at £1.39 each or in a pack of 4 for £4.49. Which is the better buy and how much money would you save?

Calculate the cost of the four tins:

	£1.39
x	4
	£5.56

Work out how much money is saved:

	£5.56
-	£4.49
	£1.07

It is a better buy to buy the pack of 4 beans as you would save £1.07.

Time

First Level	Second Level	Third Level
I can tell the time using 12 hour clocks, realising there is a link with 24 hour notation, explain how it impacts on my daily routine and ensure that I am organised and ready for events throughout my day. ***MNU 1-10a*** *I can use a calendar to plan and be organised for key events for myself and my class throughout the year.* ***MNU 1-10b*** *I have begun to develop a sense of how long tasks take by measuring the time taken to complete a range of activities using a variety of timers.* ***MNU 1-10c***	*I can use and interpret electronic and paper-based timetables and schedules to plan events and activities, and make time calculations as part of my planning.* ***MNU 2-10a*** *I can carry out practical tasks and investigations involving timed events and can explain which unit of time would be most appropriate to use.* ***MNU 2-10b*** *Using simple time periods, I can give a good estimate of how long a journey should take, based on my knowledge of the link between time, speed and distance.* ***MNU 2-10c***	*Using simple time periods, I can work out how long a journey will take, the speed travelled at or distance covered, using my knowledge of the link between time, speed and distance.* ***MNU 3-10a***

<u>Units of Time</u>

The units of time we commonly use in maths are:

- 1 century = 100 years
- 1 decade = 10 years
- 1 year = 12months = 52 weeks = 365 days (366 in a leap year)
- 1 week = 7 days
- 1 day = 24 hours
- 1 hour = 60 minutes
- 1 minute = 60 seconds.

30 days have September, April, June and November.
All the rest have thirty-one except February alone
which has 28 days clear and 29 in each leap year.

<u>12 Hour Clock</u>

Points to note about 12 Hour time:

- Pupils should remember to use am for morning and pm for afternoon/evening.
- Midday = noon = 12 pm
- Midnight = 12 am
- The digits should have a point between the hours and minute e.g. 9.20 am (or 9:20 am) is twenty past nine in the morning.

24 Hour Clock

Points to note about 24 Hour time:

- There has to be four numbers for 24 hour time, no point and no am or pm.
- There are 2 blocks of 2 numbers, first block for hours, second block for minutes.
- Hours 12 or larger indicate pm.
- Midday = 1200
- Midnight = 0000
- 0920 is twenty past nine in the morning.
- 2120 is twenty past nine in the evening.

Example 1 Change from 12 hour clock into 24 hour clock.

a) 6.30 am = 0630
b) 10.15 pm = 2215
c) Five to nine in the morning = 0855
d) Five past seven in the evening = 1905

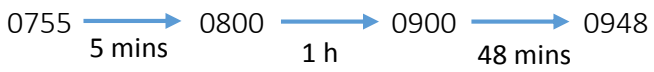
Example 2 Change from 24 hour clock to 12 hour clock.

a) 0715 = 7.15 am
b) 2035 = 8.35 pm
c) 0010 = 12.10 am

Time Intervals

A number line can help when calculating time intervals. The easiest way of finding how long something lasts is by "counting on".

Example 3 How long is it from 0755 to 0948?



Total time = 1 hour 53 minutes.

We do not:

Teach time as a subtraction calculation.

Changing Units

To change decimals/fractions of an hour to minutes, you multiply by 60. Pupils often make mistakes with this. For example, they think 2.5 hours is 2 hours 5 minutes or 1.25 hours is 1 hour and 25 minutes. To change minutes to a decimal of an hour, you divide by 60.

Second Level pupils should know that:

$\frac{1}{2}$ hour = 0.5 hours = 30 minutes
$\frac{1}{4}$ hour = 0.25 hours = 15 minutes
$\frac{3}{4}$ hour = 0.75 hours = 45 minutes.

Example 4 Change 0.8 hours into minutes.

0.8 hour = 0.8 x 60 = 48 minutes.

Example 5 Change 27 minutes into hours.

27 min = 27 ÷ 60 = 0.45 hours.

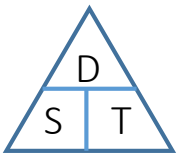
Time is a lifeskill which everyone uses every day of their life. Pupils should be encouraged to use time calculation wherever possible (e.g. planning journeys or looking at timetables).

Speed Distance Time

Third Level pupils will use the three formulae to calculate Speed, Distance and Time.

$$D = S \times T \qquad S = \frac{D}{T} \qquad T = \frac{D}{S}$$

These formulae can be easily remembered by putting the letters D, S and T in alphabetical order into a triangle as follows.



To help you work out the formula, place your finger over the letter you want to find out and the position of the remaining letters leaves you the formula you require.

Example 6 Alison jogs at an average speed of 6 km/h for 3 hours.
What distance does she jog?

S = 6 km/h
T = 3 h
D = ?

D = S x T
= 6 x 3
= 18 km.

Example 7 A hot air balloon travelled 25 kilometres at an average speed of 10 km/h. For how long was the balloon in the air?

D = 25 km
S = 10 km/h
T = ?

$$T = \frac{D}{S}$$
$$= \frac{25}{10}$$
= 2.5 h = 2 hours 30 minutes.

Example 8 George can walk to the office in 30 minutes. The distance from his house to work is 2.5 miles. Work out George's average speed in miles per hour.

T = 30 mins = 0.5 h
D = 2.5 miles
S = ?

$$S = \frac{D}{T}$$
$$= \frac{2.5}{0.5}$$
= 5 mph.

Note: When doing Speed, Distance and Time questions it is important that the units correspond. For example, if the speed is in km/h and the time is in minutes, you will get the wrong answer unless you change the unit of time into hours.

Measurement

First Level	Second Level	Third Level
I can estimate how long or heavy an object is, or what amount it holds, using everyday things as a guide, then measure or weigh it using appropriate instruments and units. ***MNU 1-11a*** *I can estimate the area of a shape by counting squares or other methods.* ***MNU 1-11b***	*I can use my knowledge of the sizes of familiar objects or places to assist me when making an estimate of measure.* ***MNU 2-11a*** *I can use the common units of measure, convert between related units of the metric system and carry out calculations when solving problems.* ***MNU 2-11b*** *I can explain how different methods can be used to find the perimeter and area of a simple 2D shape or volume of a simple 3D object.* ***MNU 2-11c***	*I can solve practical problems by applying my knowledge of measure, choosing the appropriate units and degree of accuracy for the task and using a formula to calculate area or volume when required.* ***MNU 3-11a***

<u>Units of length</u>

In Firpark we use metric units, however pupils are aware of imperial

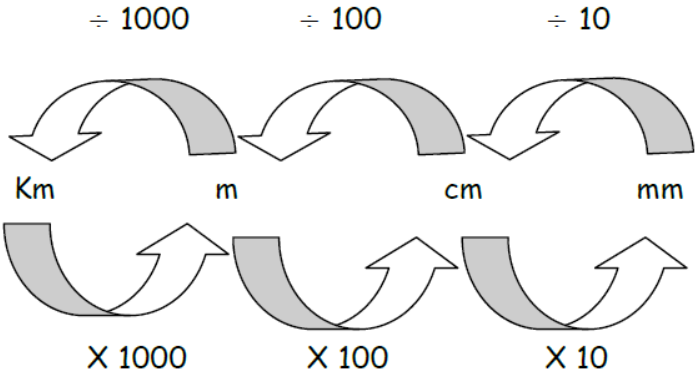
units. Pupils are expected to be able to convert between metric units.

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

Converting units

- If changing from small units to large units (e.g., g to kg), you divide.
- If changing from large units to small units (e.g., km to m), you multiply.

The diagram below will hopefully help you to convert metric lengths.

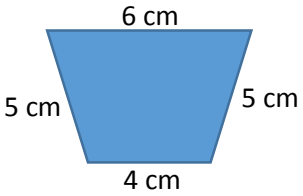


Perimeter

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

Example 1 Calculate the perimeter of the shape below.

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



Area

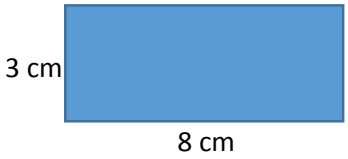
The area is defined as the space inside a 2D shape. Again, like perimeter, before you perform any calculations you have to check that the units are the same. The area of a rectangle is given by:

$$A = l \times b$$

(length times breadth).

We always need three lines of working when calculating area.

Example 2 Calculate the area of the rectangle.



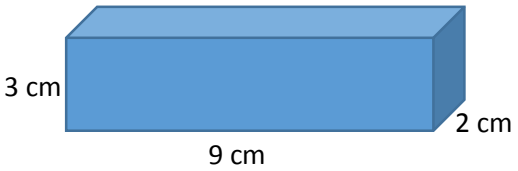
A = l x b
= 8 x 3
= 24 cm^2.

More complicated shapes can be split up into separate shapes to calculate the area.

Volume

The volume of a 3D shape is simply the "amount of space" it takes up. A small cube measure 1 cm by 1 cm by 1cm has a volume of 1 cubic centimetre or 1 cm^3. This space is equivalent to 1 ml. The formula for calculating the volume of a cubioid is: $V = l \times b \times h$.
Again, you should check the units are consistent through out.
Once again, we always need 3 lines of working for calculating the volume of a cuboid.

Example 3 Calculate the volume of this cuboid.



V = l x b x h
= 9 x 2 x 3
= 54 cm^3.

When using Area or Volume formula pupils are expected to:

- Write down the formula
- Substitute appropriate values
- Calculate answers with appropriate units.

Data Analysis

First Level	Second Level	Third Level
I have explored a variety of ways in which data is presented and can ask and answer questions about the information it contains. ***MNU 1-20a*** *I have used a range of ways to collect information and can sort it in a logical, organised and imaginative way using my own and others' criteria.* ***MNU 1-20b***	*Having discussed the variety of ways and range of media used to present data, I can interpret and draw conclusions from the information displayed, recognising that the presentation may be misleading.* ***MNU 2-20a*** *I have carried out investigations and surveys, devising and using a variety of methods to gather information and have worked with others to collate, organise and communicate the results in an appropriate way.* ***MNU 2-20b***	*I can work collaboratively, making appropriate use of technology, to source information presented in a range of ways, interpret what it conveys and discuss whether I believe the information to be robust, vague or misleading.* ***MNU 3-20a***

When pupils are asked to carry out surveys, they should always use tally marks.
Pupils working at First Level and above should collect tally marks in groups of five.

Example 1

Favourite Colour	Frequency	Total
Red	𝍸	5
Blue	𝍸 𝍸 ||	12
Green	𝍸 |	6
Pink	||||	4

When pupils are asked to draw graphs of any sort, we have certain expectations. We expect pupils to:

- Use a sharp pencil and a ruler at all times (never a pen!).
- Give the graph a title.
- Label both axes.
- If it is a bar graph, to label the bars and make sure the bars are evenly spaced.
- If it is a pictograph or a Stem and Leaf diagram, to draw a key.
- Label all sections neatly when drawing a pie chart.

When interpreting graphs, pupils should be careful when reading scales and keys as pupils often make careless mistakes.

There are three different types of average: mean, median and mode.

Mean: This is sometimes known as the "average" and is calculated as:

$$\text{Mean} = \frac{\textbf{total of all values added together}}{\textbf{the number of values used}} .$$

Median: This is the middle number when the data is put in order from smallest to largest.

Mode: This is the number that appears the most often.

The range is also used with data to help us decide how spread out the data is. The range is calculated as:

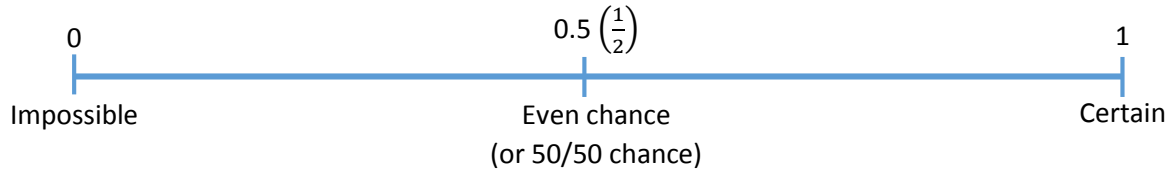
$$\text{Range} = \text{Highest number} - \text{Lowest number} .$$

When the range is small that means that your data is close together or consistent. If the range is large then your data is well spread out and has very high or low values.

Ideas of Chance

First Level	Second Level	Third Level
I can use appropriate vocabulary to describe the likelihood of events occurring, using the knowledge and experiences of myself and others to guide me. ***MNU 1-22a***	*I can conduct simple experiments involving chance and communicate my predictions and findings using the vocabulary of probability.* ***MNU 2-22a***	*I can find the probability of a simple event happening and explain why the consequences of the event, as well as its probability, should be considered when making choices.* ***MNU 3-22a***

Probability is a measure of how likely an event is to happen. It is measured between 0 and 1 and can be shown as a fraction or a decimal.



To find the probability of an event, we use:

$$\text{Probability(event)} = \frac{\text{number of favourable outcomes}}{\text{Total number of possible outcomes}}$$

Example 1 Describe in words the likelihood of the following events happening.

a) If today is Sunday, tomorrow is Monday. Certain.
b) The next person to walk past me will be male. Even chance.
c) An elephant will be the next Prime Minister. Impossible.

Example 2 What is the probability of picking a black counter from a bag containing five red, three blue and two black counters?

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

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

Order of Operations (BODMAS)

BODMAS is the mnemonic which we teach in Maths to enable pupils to know exactly the right sequence for carrying out mathematical operations. Scientific calculators use this rule to know which answer to calculate when given a string of numbers to add, subtract, multiply, divide etc.

The order in which we carry out calculations is:

Brackets
Order
Divide
Multiply
Add
Subtract

Example 1 What is the answer to 2 + 3 x 5?
Is it 25 or is it 17?

Using BODMAS, we multiply before we add, so…

	2 + 3 x 5
Multiply first:	2 + 15
Then add:	17

Example 2 Calculate $4 + 70 \div 10 \times (1 + 2)^2 - 1$ according to BODMAS rules

	$4 + 70 \div 10 \times (1 + 2)^2 - 1$
Brackets:	$4 + 70 \div 10 \times 3^2 - 1$
Order:	$4 + 70 \div 10 \times 9 - 1$
Divide:	$4 + 7 \times 9 – 1$
Multiply:	$4 + 63 – 1$
Add:	$67 – 1$
Subtract:	66