Whitehall Nursery and Infant School

Maths language and what it means for parents

Concrete, Pictorial, Abstract approach (CPA)

The concrete, pictorial, abstract approach is a way of teaching mathematical concepts and theories in various stages, in order to help children fully understand and master what they are learning.

The concrete stage involves using items, models and objects, giving children a chance to be 'hands-on'. For example, children may solve a problem adding groups of toys together using real toys, or they may manipulate buttons, Lego, etc when working out fractions of amounts. At school, there are a variety of concrete resources specially designed for maths, such as place value counters, dienes, Numicon and tens frames.

The pictorial stage uses visual representations of concrete objects to model problems, encouraging children to make connections between the physical object and the picture that represents the object. For example, children may use drawing of toys to solve a problem adding toys.

The abstract stage uses symbols, such as numbers or mathematical symbols (+, -, x, =) to model problems. Children will need to master the concrete and pictorial stages before moving onto the abstract stage.

Analogue and digital clocks

An analogue clock is a clock with the numbers 1 to 12 around the outside and two hands, one short hand that represents hours and one long hand that represents minutes.
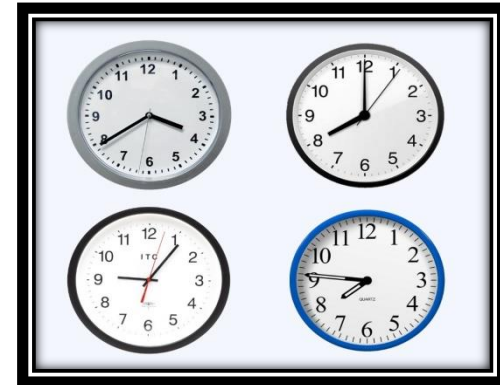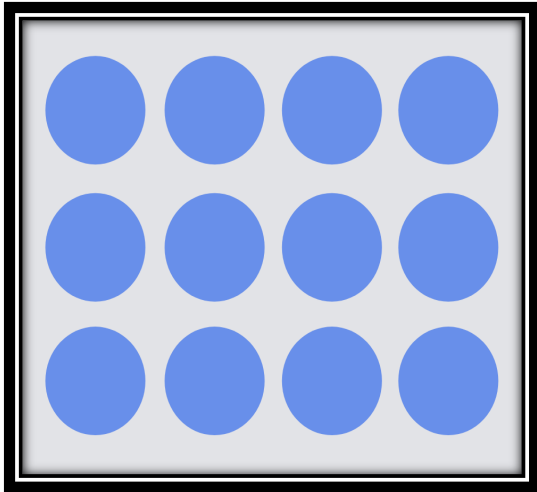

A digital clock uses 24-hour time and always has four digits. For example, 15:30 is half-past three in the afternoon on a digital clock.

Array

An array is a pictorial representation of a calculation, using rows of dots, to help children understand multiplication and times tables.

So this array shows 3 rows of 4 dots or 4 rows of 3 dots which equals 12 in total

Ascending order
To ascend means to go up, so numbers given in ascending order are going from smallest to largest.
For example, 1, 2, 3, 4, 5, 6 are numbers in ascending order.

Descending order
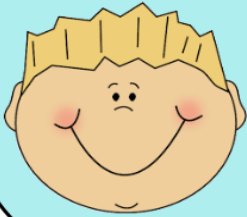Descending order means to go from the largest number to the smallest and is the opposite of ascending order.
For example, 9, 8, 7, 6, 5 are numbers in descending order.

Bar model

A bar model is a method that uses diagrams of rectangular bars to represent maths problems in a visual way, making them easier for children to see which operation to use to work out a calculation. Younger children may use cubes to physically represent this.

17

4 13

Miles is using this bar model to write a number fact family. Can you help fill out the answers?
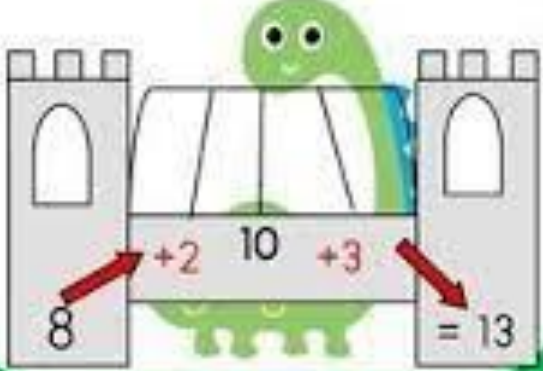
4+13=
17-4=
17-13=
13+4=

Bridging through 10

Bridging through 10 is a way of adding numbers greater than 10 in your head.

For example, to add 8 + 5, you add 2 (from the 5) to get 10, then add the remaining 3 to get 13.

Bridging through 10.
First make the number up to 10.
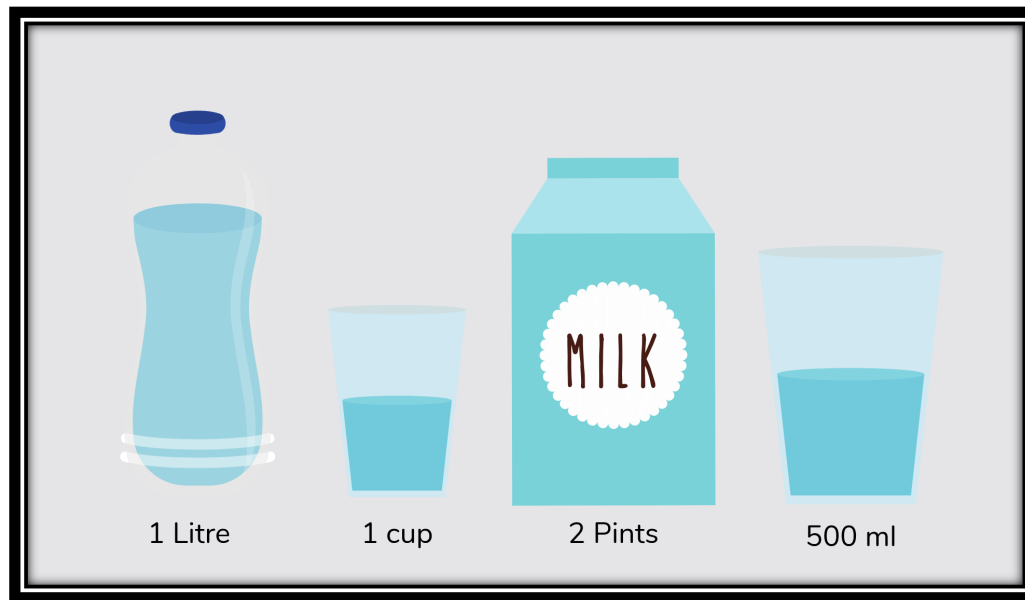Then count on what's left.
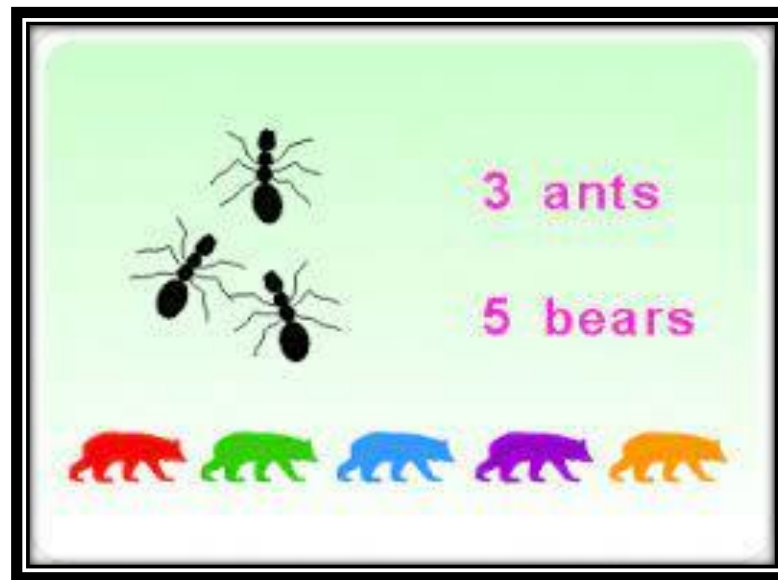
For Example: 8 + 5 =

8 + 2 = 10
10 + 3 = 13

2   3

+2   10   +3

8   = 13

Capacity

The capacity of a container is how much that container can hold, measured using units such as litres, millilitres, pints etc.

Cardinal numbers

A cardinal number tells you how many of something there are; they refer to a set of objects. For example, there are three marbles in my hand.

Carroll diagram

A Carroll diagram is a way of organising information and grouping according to what criteria it fits into.

	Shapes with curved lines	Shapes with straight lines
Pink Shapes		
Blue Shapes		

Column method

The column method is way to solve addition and subtraction calculations, that sometimes involve 'exchanging' amounts from one column to the next (which in the past has been called 'carrying' and 'borrowing'). The numbers are written on top of each other, with the correct digits in each column (e.g. tens and ones).

$$
\begin{array}{r}
{}^{6}\!\!\!\not{7}\ \ {}^{1}2 \\
-\ 5\ \ 6 \\
\hline
1\ \ 6 \\
\hline
\end{array}
$$

Commutative law

The commutative law states that addition and multiplication calculations can be carried out with the numbers in any order, whereas for subtraction and division, the numbers must be in a particular order.

For example, 3x4 = 12 or 4x3 = 12   8+4=12 or 4+8=12

Converting into same units

When you convert measurements into the same units, you understand that the same length, weight or capacity can be shown in different units of measurement.

For example, a bottle of water can be measured in litres or millilitres and there are 1000ml in 1L. 100cm is the same a 1 metre or there are 100 pennies in £1.

Data handling
Data handling is another term for statistics, meaning how we collect, display and interpret data or information, such as the most popular flavour of ice cream in a class, using tables, tally charts, pictograms, block diagrams, bar charts, line graphs and pie charts.
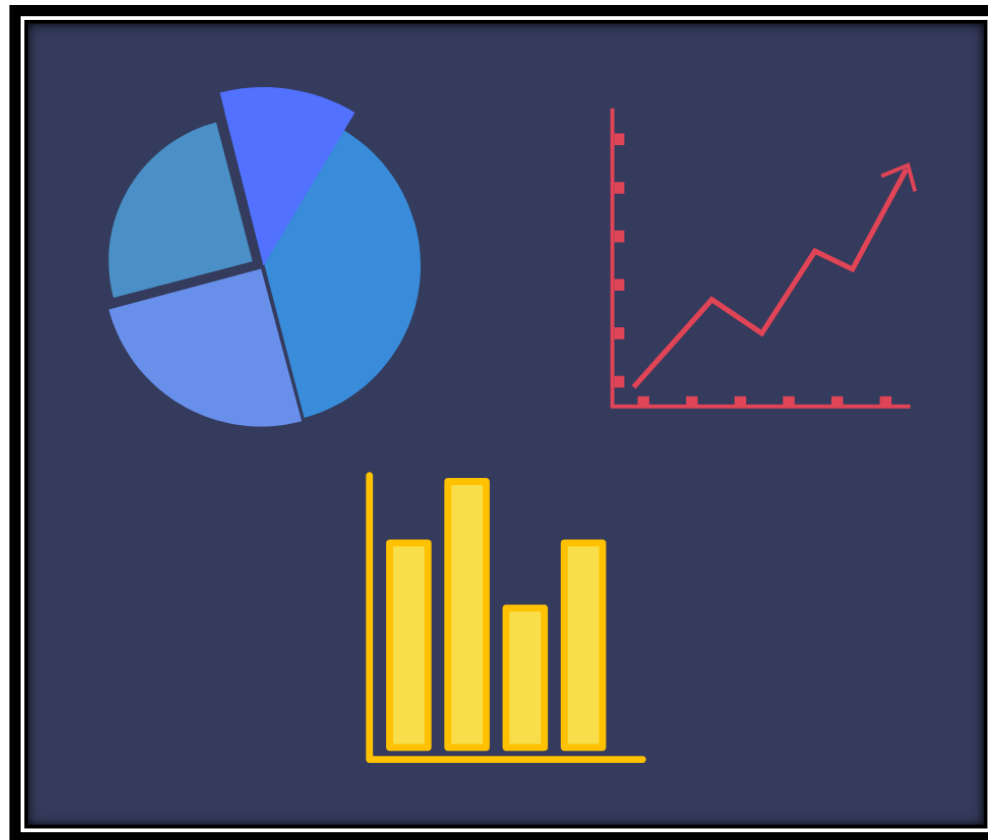
Descending order

Descending order means to go from the largest number to the smallest and is the opposite of ascending order.

For example, 90, 80, 70, 60, 50 are numbers in descending order.

Dienes

Dienes are coloured plastic or wooden blocks that are used to represent numbers. They are usually used to represent 1000, 100, 10 and 1. Dienes allow teachers and students to represent numbers visually. So here there are 3 tens sticks which total 30 and two ones cubes which total 2. The Dienes show 32 altogether. They can also be referred to as *base ten.*
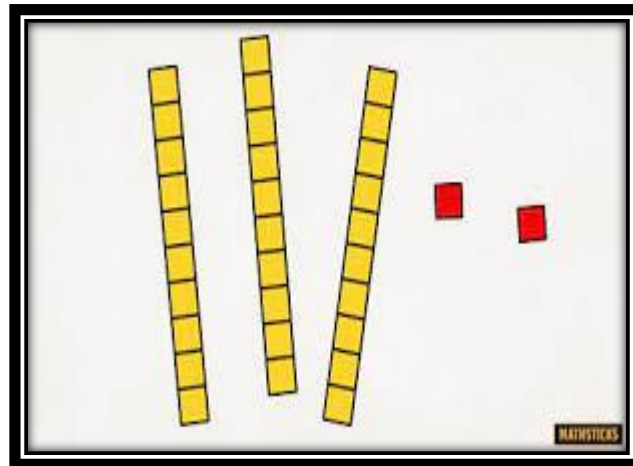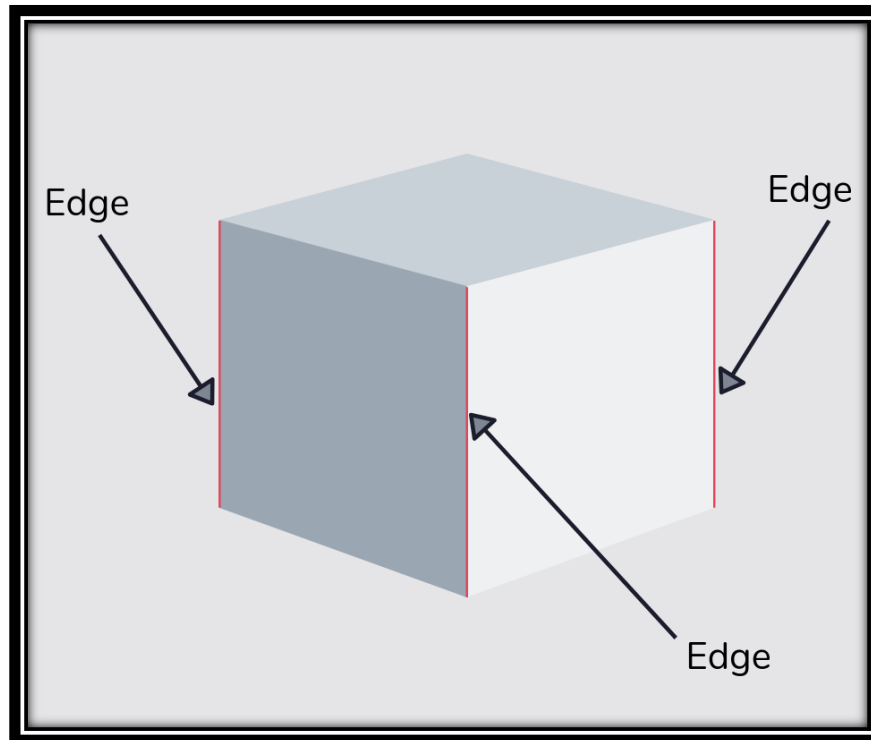
Digit
The place of a digit represents its value.
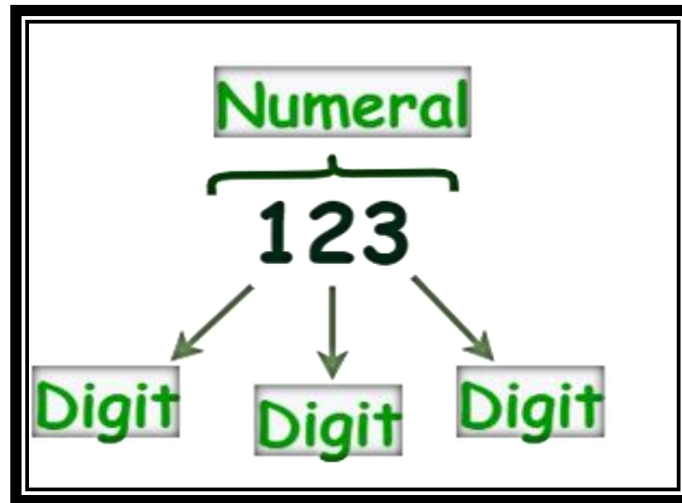
So the first digit in this numeral is worth 100, the second digit is worth twenty and the third digit is worth 3 ones.

Edge

An edge is the name for lines created when two faces in a 3D shape meet. **This is NOT a side. Sides are only on 2D shapes** If something is 3D it is a solid shape rather than being a flat shape (2D).

Estimate

To estimate is to make a clever guess to the answer of a question, by roughly calculating the value. For example, children might estimate how many cubes there are. Or they might estimate the length of the playground to be 100 metres.
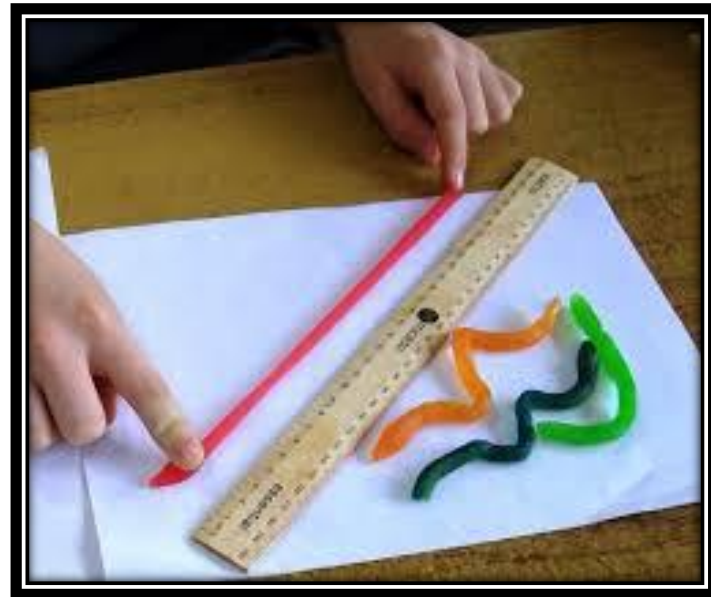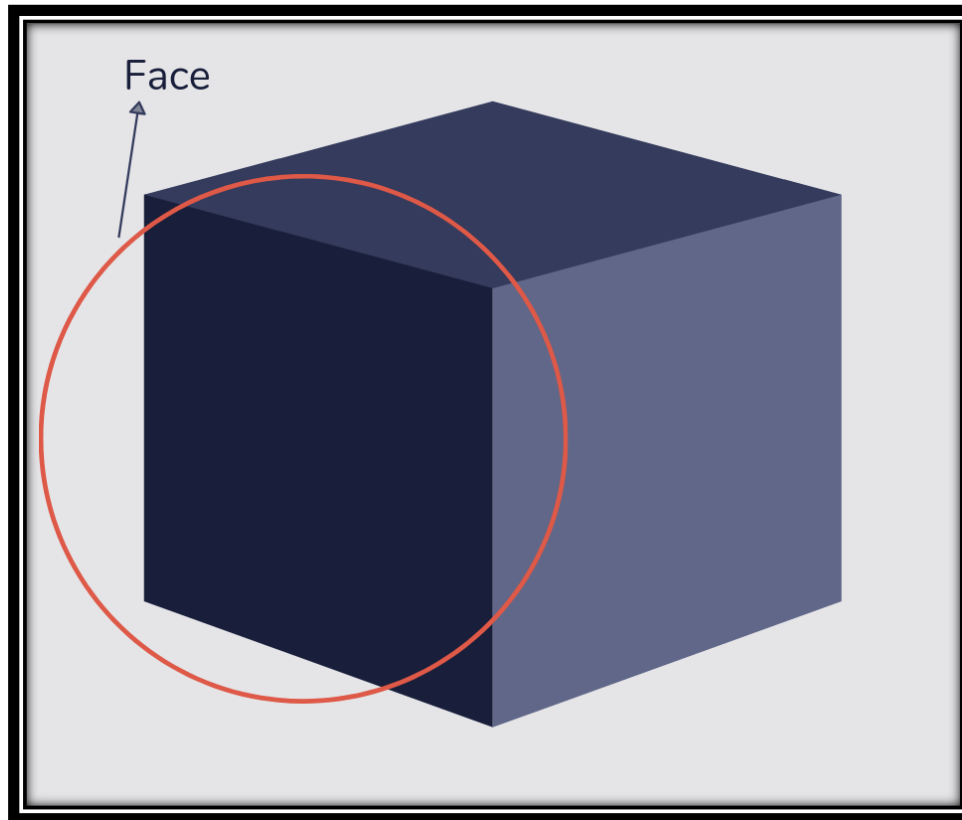
Equation

An equation is another name for a number sentence where both sides equal the other.
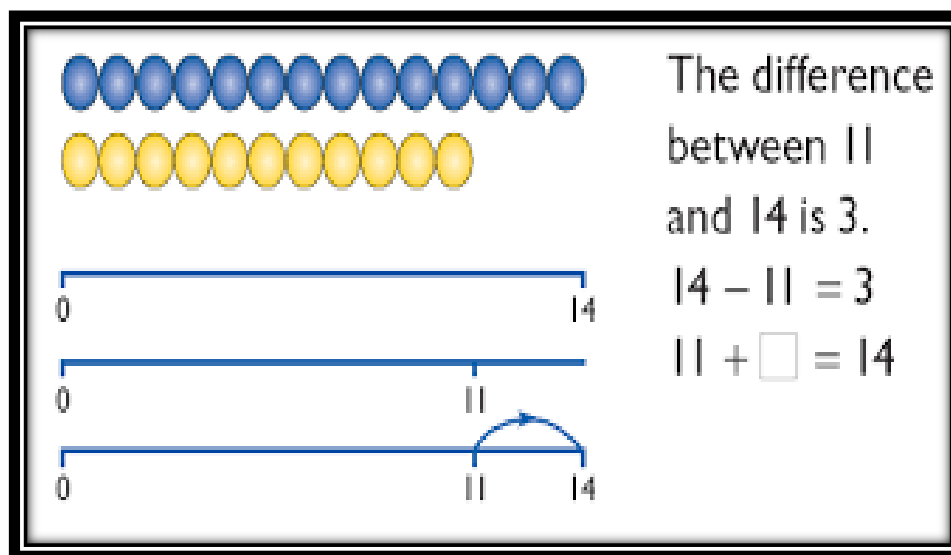
For example, $12 - 5 = 3 + 4$

Face

A face is the flat part of a 3D shape.   Faces
can be flat or curved.

Finding the difference between two numbers

Finding the difference between two numbers is the *same as subtracting* a smaller number from a larger number. This method is usually taught using a number line, counting the jumps from one number to another.

The difference between 11 and 14 is 3.

$14 - 11 = 3$

$11 + \square = 14$

Greater than

When a one number is bigger than another it is the greater number for example 10 is greater than 6.

Less than

When a number is smaller than another number, it is less than that number for example 6 is less than 10.

Greater than > and Less than < signs

This can also be represented with mathematical symbols. So the number sentence for 10 is greater than 6 would be written like this **10 > 6**
The number sentence for 6 is less than 10 would be written like this **6 < 10**

Integer
An integer is **simply a whole number**, either positive or negative. For example, 8, -23, 502 and -1000 are all integers.

Inverse operation
An inverse operation is another way of saying an opposite operation, which can often be used to check calculations are correct. For example, addition and subtraction are inverse operations, as are multiplication and division.
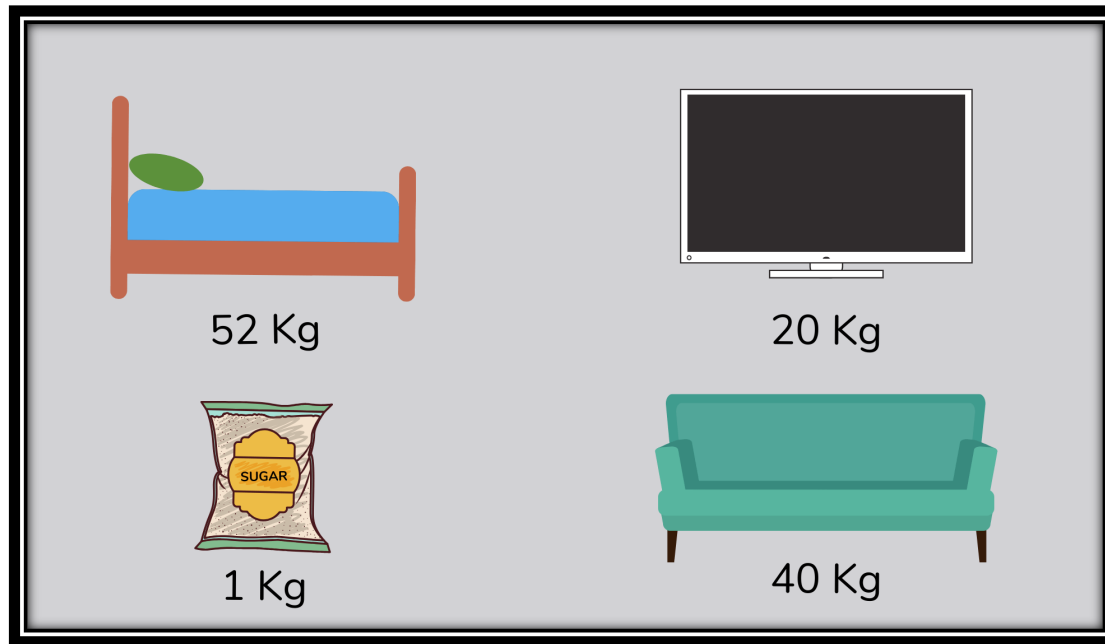
10+5=15 the inverse is 15-10=5   3x5=15 the inverse is 15 ÷ 3=5

Mass

The mass of an object is **how much it weighs** and is usually measured in grams and kilograms.

For example, the mass of a bag of sugar is 1 kilogram.

52 Kg

20 Kg

SUGAR

1 Kg

40 Kg

Metric units

Metric units are units of measurement that are common around the world and are based on the metric system. For example, grams, centimetres, litres and seconds are all examples of metric units.
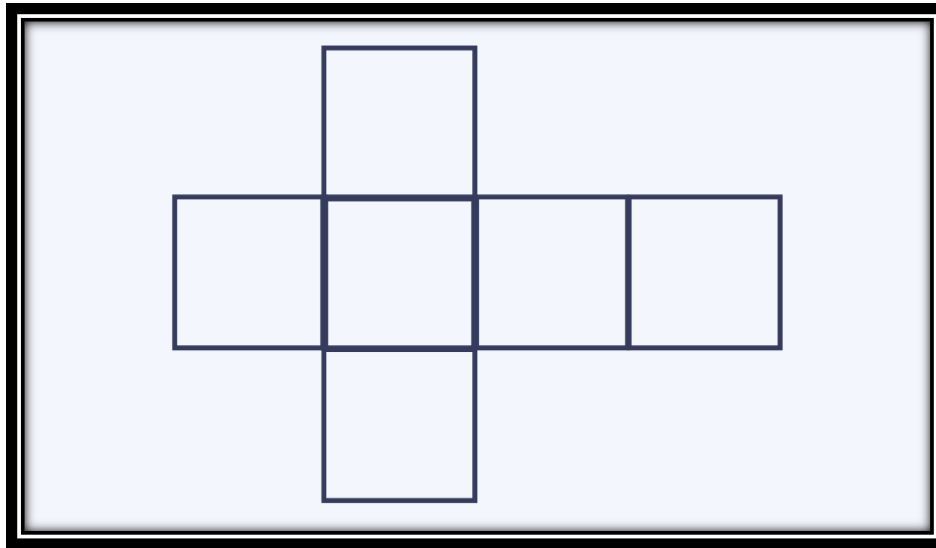
Kilometer m km mm Centimeter Meter cm Milimeter
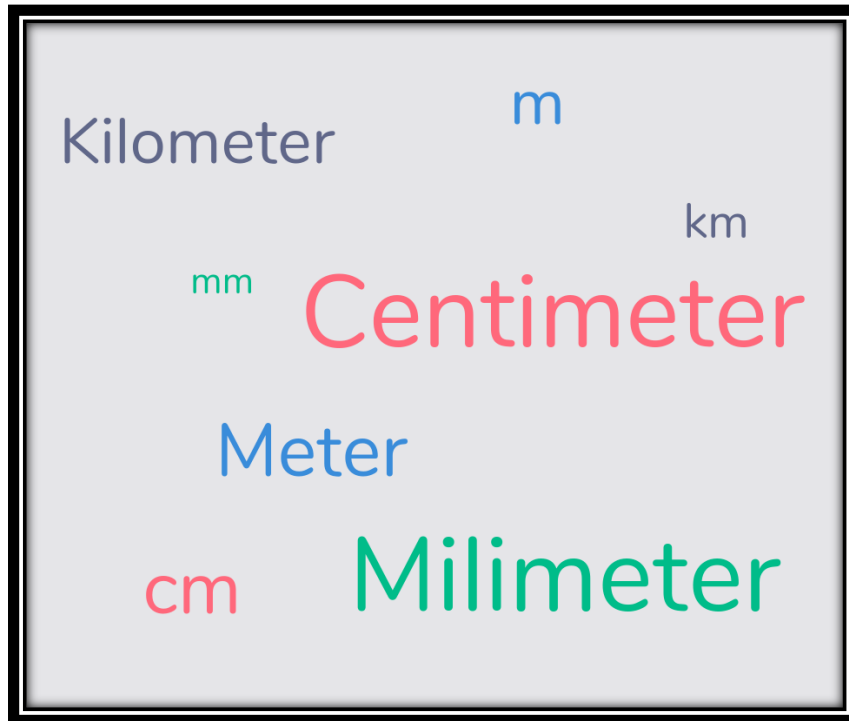
Mirror line

A mirror line is a line that can be drawn through the centre of a shape or picture to show that both sides are exactly the same.
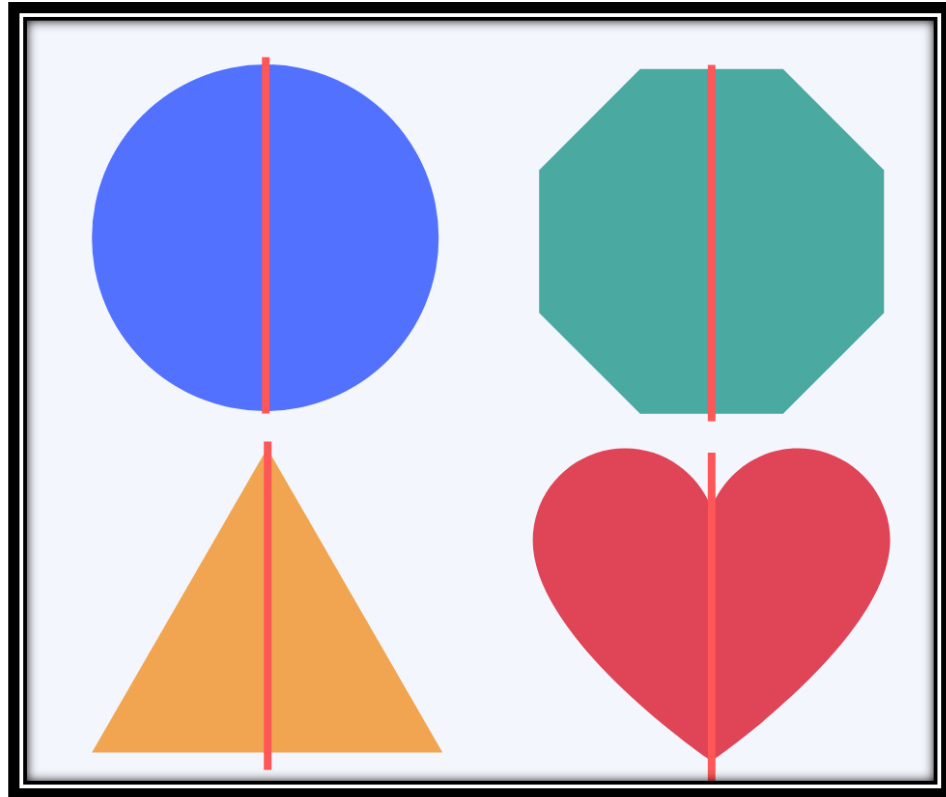
Net

A net is the flat outline of a 3D shape, before it is folded together. The example below is the net of a cube,

Number bonds

Number bonds are pairs of numbers that add together to make a given number. For example, 2 + 8 and 4 + 6 are number bonds to 10, whereas 43 + 57 and 81 + 19 are number bonds to 100.

Number facts

Number facts are simple addition, subtraction, multiplication and division calculations that children should be able to mentally recall easily. For example, 50 + 50 = 100 or 2 x 2 = 4 are number facts.

Number line

A number line is a horizontal line, with numbers going up the bottom of the line. The numbers will typically increase in size and the space between the numbers doesn't usually matter. Number lines are especially used in Key Stage 1 to teach number bonds and adding using jumping.
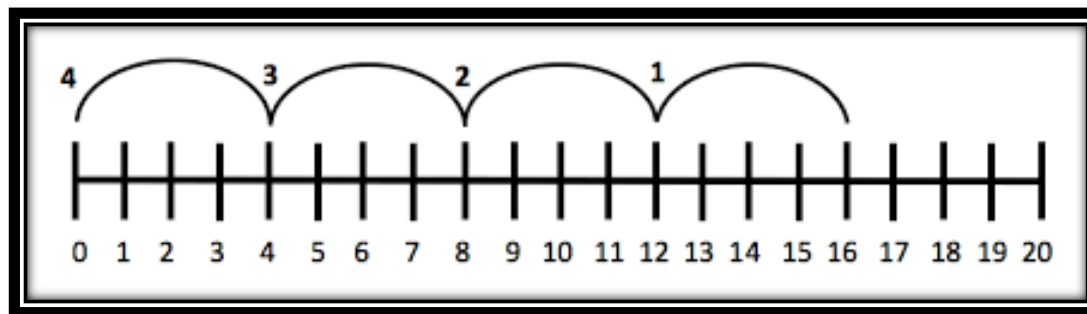
Number
Two cars, two houses, two people, two books *Two* is the number that is showing the quantity of something.

Numeral
A numeral is a symbol that represents that number.

Number sentence

A number sentence is how a calculation is written, using numbers and symbols. For example, 5 + 7 = 12 is an addition number sentence.

Number square

A number square is a maths aid used in primary schools, showing numbers in order from 0 up to, for example, 20 or 100. Number squares are useful for helping with counting and seeing patterns in number sequences.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Odd and even numbers
An even number is any number that can be divided into two equal groups and always end in 0, 2, 4, 6 and 8.
An odd number is any number that can't be divided into two equal groups and always end in 1, 3, 5, 7 and 9.

Ordinal numbers
An ordinal number tells us what position something is in a list, often taught using dates or the results of races. For example, Ben finished in 1st place, Chris in 2nd and Alex in 3rd. The contrast of this is a cardinal number.

Part-part-whole reasoning or the part-whole model is **the idea that numbers can be split into parts, which can be used in math learning.** Children using this model will see the relationship between the whole number and its component parts, helping learners to make the connections between addition and subtraction. Below you can see a few examples.
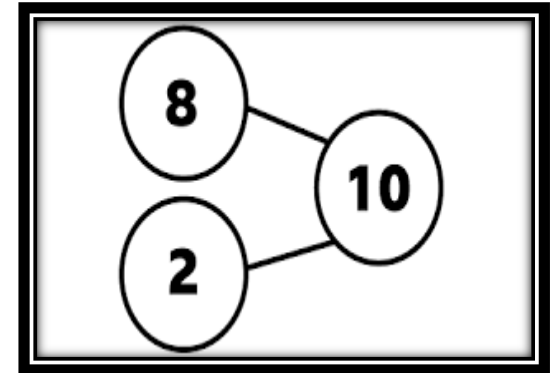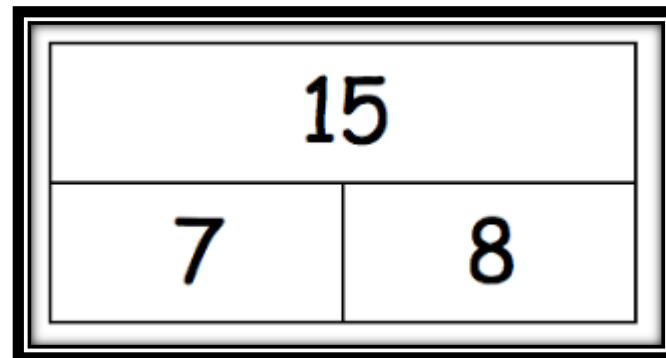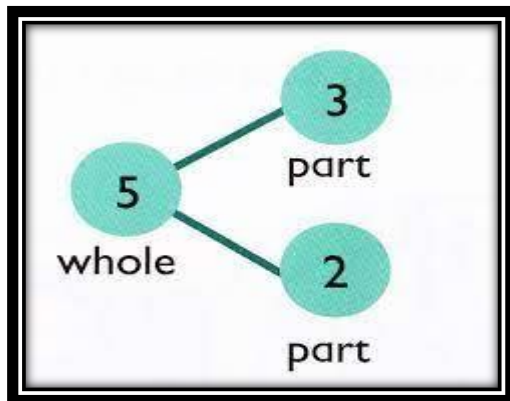
Partitioning

To partition a number means to separate a number into separate parts (ones, tens, hundreds, thousands etc.). Partitioning makes understanding place value easier for children to understand.

For example, 246 can be partitioned into 2 hundreds, 4 tens and 6 ones or 200 + 40 + 6.
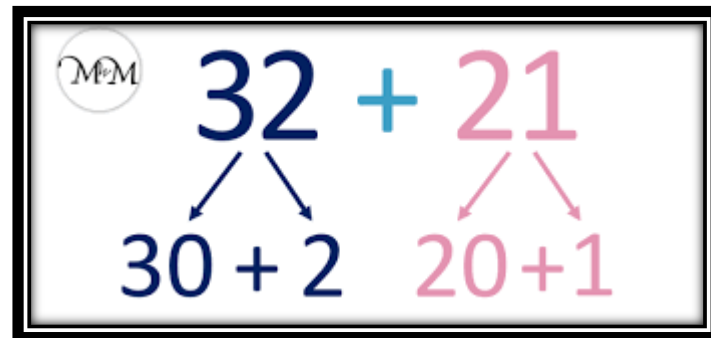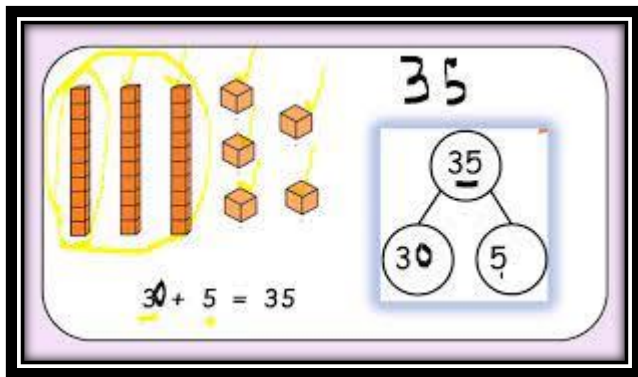
Place value

The place value of a number is how much each digit in the number represents.

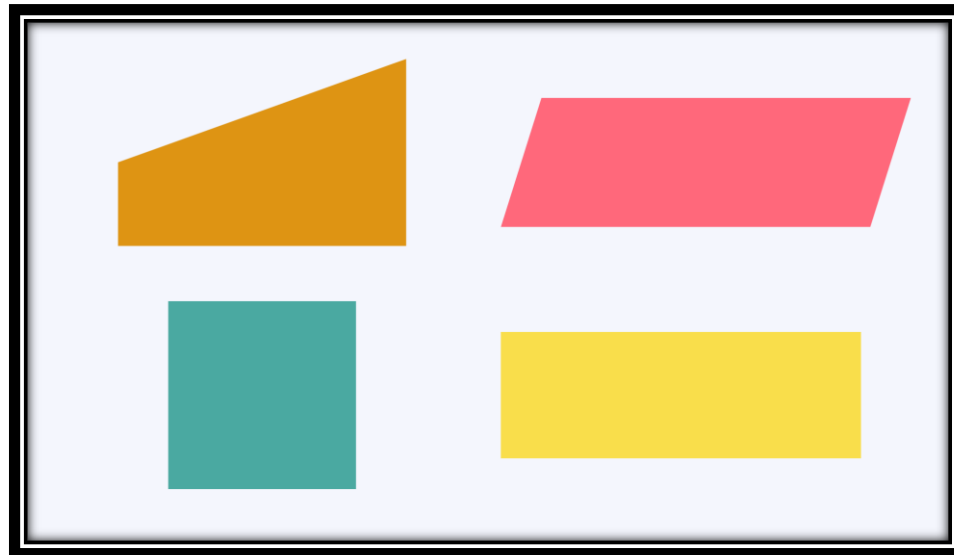For example, the place value of 113 is 1 hundred, 1 ten and 3 ones.
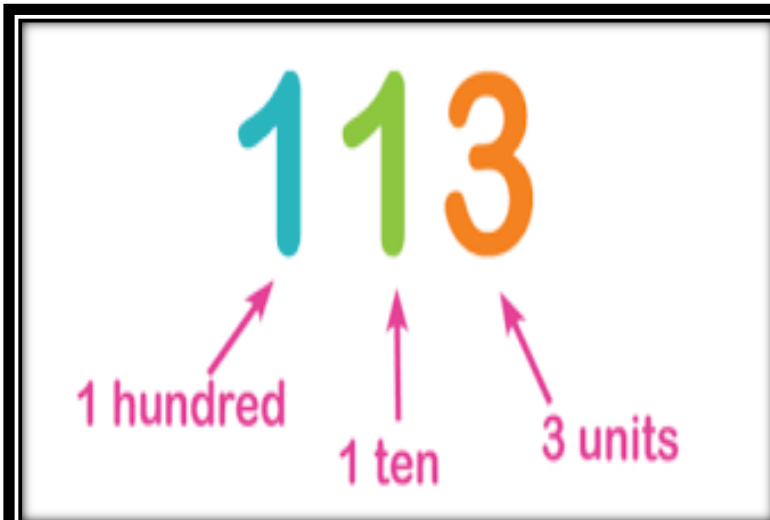
Prism

A prism is a 3D shape with two identical flat sides and ends. Cubes and cuboids are examples of prisms.
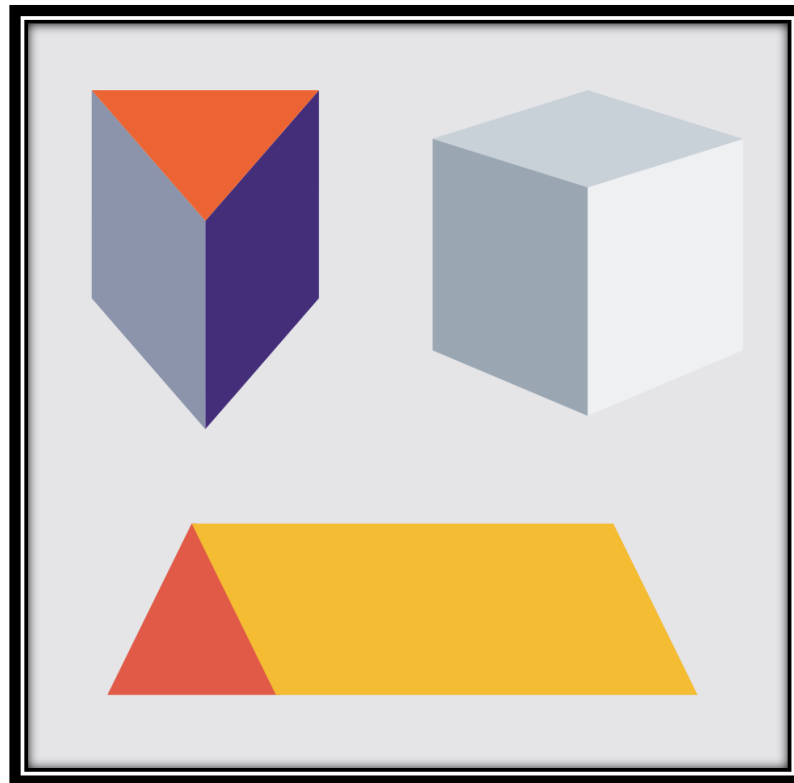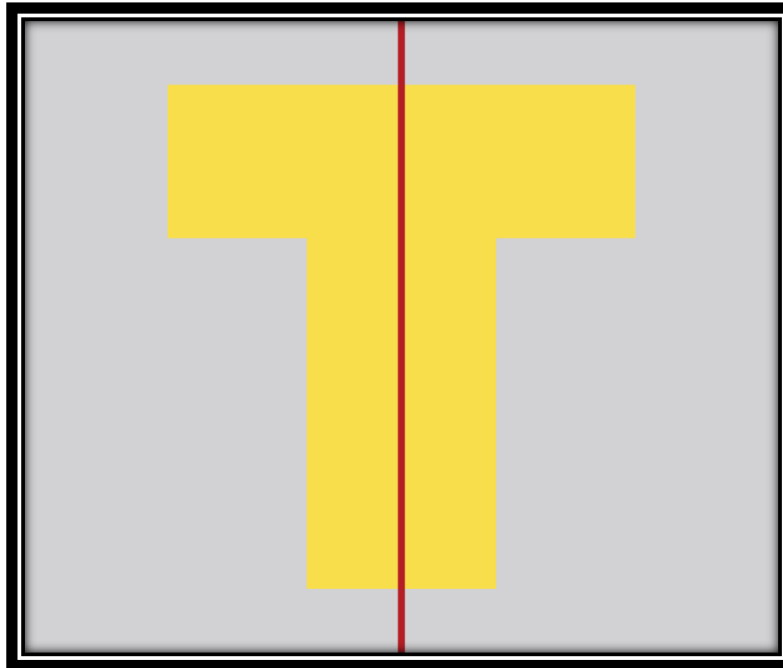
Quadrilateral

A quadrilateral is any 2D shape with four sides, including a square, rhombus, kite and trapezium.

Reflective symmetry

Reflective symmetry is a type of transformation, looking at when a shape or pattern is reflected in a mirror or line of symmetry. The reflected shape should be exactly the same size and distance from the mirror line as the original.

Rounding numbers
To round a number means to adjust it up or down to a number that makes calculating with it easier. Numbers are usually rounded up to the nearest 10, 100 or 1000, with decimals being rounded to the nearest whole number, tenth or hundredth. There is a rule that if a digit is 4 or less it rounds down and if it is 5 or more it rounds up.
For example, 426 rounds to 430 to the nearest 10, but 400 to the nearest 100.

Repeated addition
Repeated addition is a technique used to teach multiplication in Key Stage 1, where children add 'lots' of numbers together.
For example, 3 'lots' of 5 is 5 + 5 + 5 as well as 3 x 5.

Shared between
'Shared between' is a phrase used when introducing division, to show how a set of objects can be 'shared' into equal sized groups. For example 14 sweets shared between two people is 7 sweets each.

Standard and non-standard units
Standard units are the units of measurement we normally use to indicate the length, mass or capacity of an object. For example, centimetres, metres, grams, kilograms, millilitres and litres.
Non-standard units are used by when introducing measurement in KS1, for example the length of a pencil or hand spans.

Sum
A sum of two numbers is another name for the result of an addition calculation. For example, the sum of 15 and 23 is 38.

Statistics
In other words different ways to show data collected and the
reading of it.

Subitising

Is the ability to instantly recall the number of objects or images without needing to count them individually and it is an important skill for young children to practise and develop.
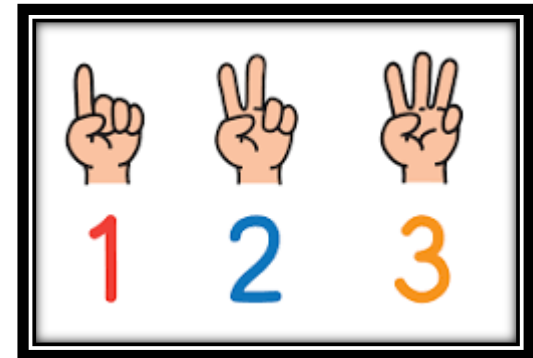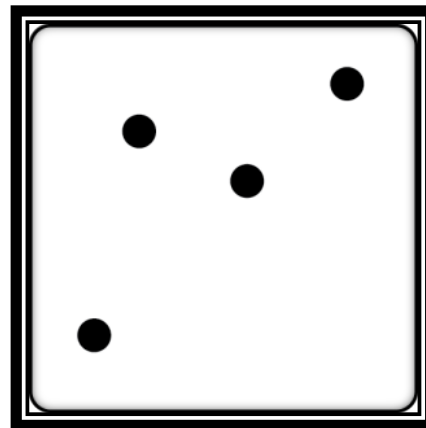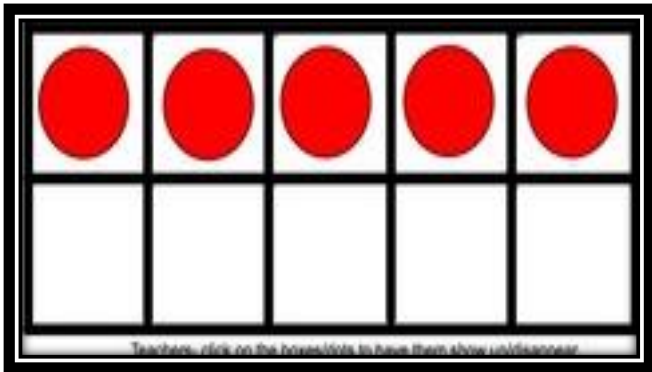
Symmetry

When a picture or shape is the same on both sides, we call it 'symmetrical', and this can be shown by drawing a line of symmetry through the centre and seeing if both sides are the same.
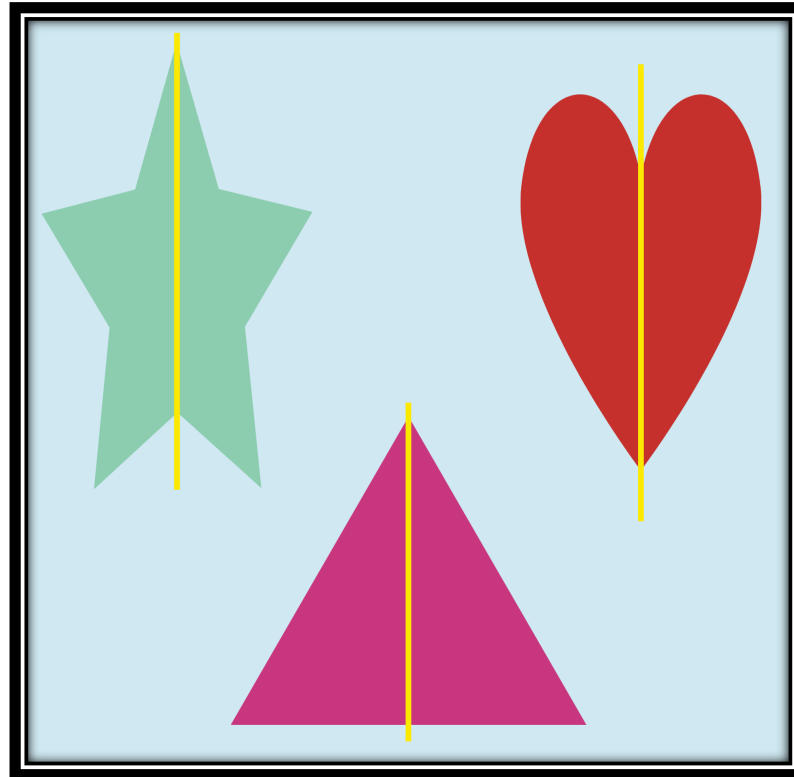
Tally chart

A tally chart uses marks instead of numbers to represent information. One vertical mark is used to represent each one unit, with five being shown as a fifth line crossed through the first four lines.

| Chocolate	Tally	Frequency
Milk	卌 卌 卌 I	16
Dark	卌 II	7
White	卌 卌 III	13

Two-step and multi-step problems

A two-step problem is a word problem which needs two calculations to solve it. A multi-step problem requires more than two calculations to solve it. For example: **I buy a magazine costing 83p and a pencil costing 45p. I pay with a voucher that gives me 20p off the things I am buying. How much do I spend?**

Tens frame

Is a concrete piece of apparatus that children can use to work out mathematical equations or problems. As the title suggests they are set out in a 10 pattern, because children are very familiar with this pattern. The diagram below shows that they often come in different colours to enable children to visualize really quickly the maths being represented.
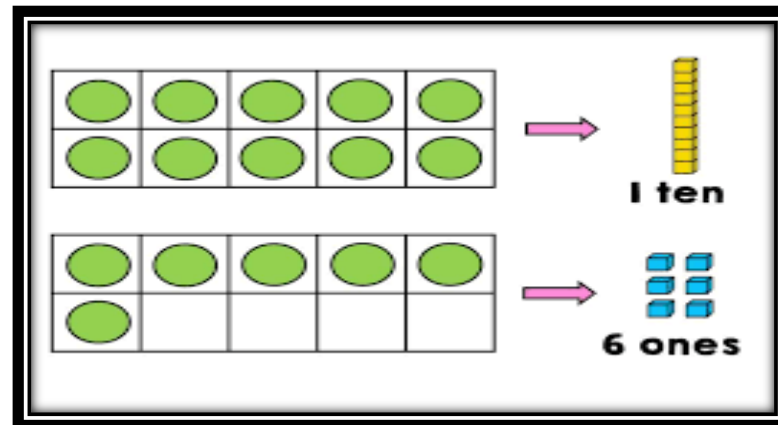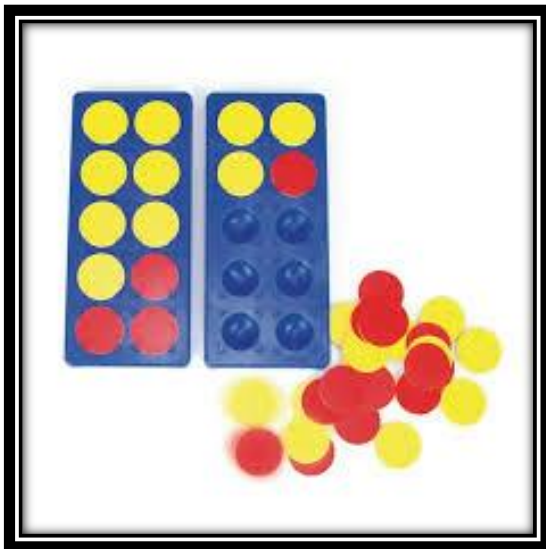
Venn diagram

A Venn diagram is a visual way of sorting different objects or numbers into overlapping circles with different rules, with anything in the overlapping part sharing both rules.