Maths Glossary of terms
Teaching and learning of maths

Mathematics Intent

At Teagues Bridge, our intention is **ambitious**. We aim to create strong mathematicians who have the necessary skills and understanding to tackle mathematical challenges in varying contexts, including the ability to reason and apply their knowledge to solving problems. This should mean that children are able to apply their knowledge to everyday life and can **aspire** to achieve anything that they want. We want our pupils to have strong mental manipulation and to use written strategies when appropriate.

Our philosophy for mathematics is replacing an idea that maths is lots of rules and numbers with a study of patterns and connected ideas. In early years they will build a foundation of number understanding and representation through mainly concrete and pictorial representations. The approach will be supported by in depth questioning, throughout the school to develop mastery.

Use of CPA is encouraged to ensure the curriculum is accessible for all children and that they all have the **opportunity** and are able to demonstrate their understanding in a variety of ways. This will enable them to have a good understanding of maths and not just the ability to follow a procedure. We want to **empower** them to want to ask questions and want to find the answers.

Aims: The national curriculum for mathematics aims to ensure that all pupils:
- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and nonroutine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

Our lessons are structured to enable all children to achieve and have an **opportunity** to make progress with their learning. Each lesson begins with a **CLIC maths** activity, where they have chance to develop their mental strategies, secure number facts and number manipulation. They then **develop** their mathematical fluency with the teacher modelling and explaining before they have a go themselves. Children then have a **reasoning/ problem solving** activity which is a variation of the previous work to demonstrate they have mastered the objective. Children who are ready can then **challenge** themselves with a task that requires applying the learning to a greater depth. We have our own programme of study which is supported with schemes like White Rose to support.

A

Acute : An acute angle is an angle that is less than a right angle. It is any angle between 0° and 90°.

Area: The area of a shape is how much surface it has. Area is measured in square units such as square centimetres (cm²), square metres (m²), and square kilometres (km²).

Array: Shapes or objects arranged in a rectangle are called an array. Egg boxes or muffin trays are good examples of arrays. Teachers use these to help children to 'see' multiplication. For example: If you have a tray of muffins that is four muffins along and three muffins deep, there will be twelve muffins in total.
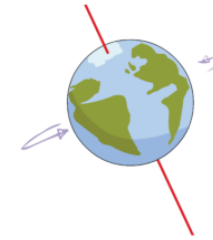

Axes : This is the plural of axis.
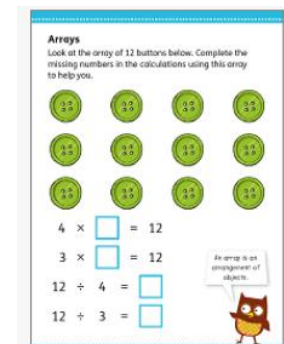
Axis

1. Many graphs have two axes: a horizontal axis and a vertical axis.
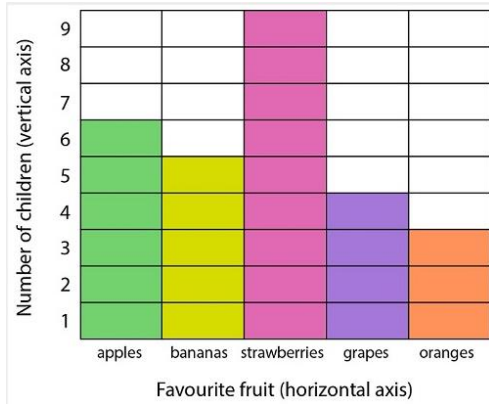
An axis is a straight line through the middle of a 3D shape.

The Earth turns on its axis.

B

Bar chart: A bar chart (or bar graph) is a graph that uses bars to show information. The bars are all the same thickness and can be horizontal or vertical. The bars usually show two different types of information.

Block graph: A block graph is a graph made up of blocks. The blocks are usually square but are sometimes rectangular.
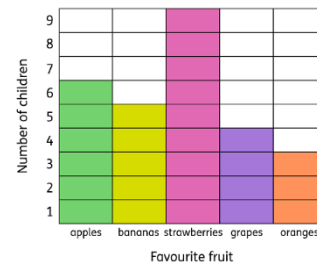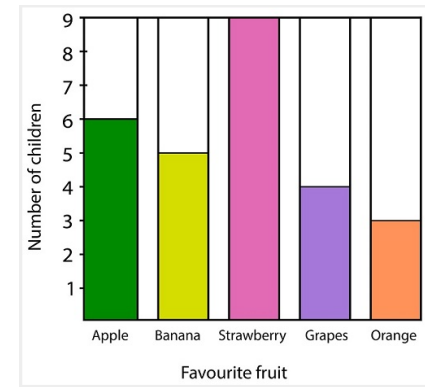
Bidmas: Mathematical operations can include orders (root and square numbers), division, multiplication, addition, and subtraction. 'BIDMAS' is a way of remembering the order these operations should be carried out within a calculation: first anything inside brackets, then any squares or roots (indices), then any division and multiplication, and finally any addition and subtraction, working from left to right.

C

Capacity: Capacity is how much something holds. It is usually measured in litres and millilitres.

Circumference: Circumference is the distance all the way around a circle. It is the perimeter of a circle.

Common factor: A common factor is a number that is a factor of two different numbers.

The common factors of 12 and 18 are 1, 2, 3, and 6 as these are the factors that are common to both numbers.

Commutative: The commutative law of arithmetic says that you can change the order of the numbers when adding or multiplying and the answer will not change. Knowing this property can help make calculations, especially mental calculations, easier.

Addition and multiplication are both commutative, but subtraction and division are not.
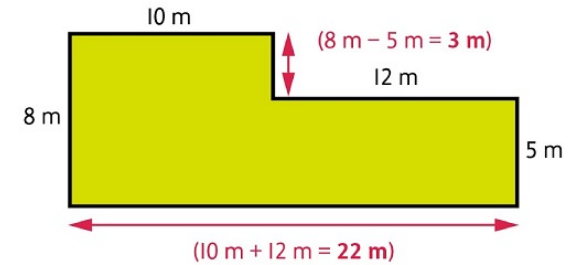
$6 + 3 + 4 = 6 + 4 + 3$

$2 \times 6 \times 5 = 2 \times 5 \times 6$

$7 - 3 \neq 3 - 7$

$12 \div 4 \neq 4 \div 12$

Composite: A composite number is any number with three or more factors. This means it cannot be 0, 1, or a prime number.

A composite shape is a 2D shape made from a number of other 2D shapes. The area of composite shapes is often found by breaking up the shape into its composite rectangles or triangles.

Complementary addition: Complementary addition is a method for subtraction that involves using a number line to jump from the smaller number to the bigger number and counting the number of jumps. This method is useful in KS1 for teaching children to 'find the difference' between two numbers.
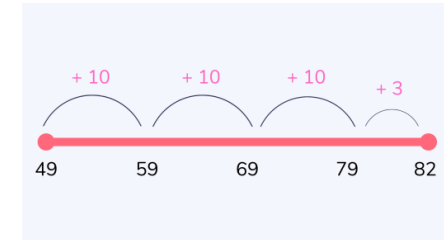
Cone: A cone has a flat base that is a circle. The top comes to a point and its sides are curved.

Continuous data: Continuous data is data that can be measured at any point on a scale. It is often shown using a line graph.

The time taken to run a race is continuous data, because it has an infinite number of possibilities within a range. The number of athletes is not continuous data, because it is a finite number that can be counted.

Coordinates: Coordinates are two numbers or letters that describe a position on maps, graphs and charts. The horizontal coordinate is always written first and the vertical coordinate is always written second.

Cuboid: A cuboid is a 3D shape shaped like a box, with six rectangular faces. A cuboid has six faces, eight vertices and 12 edges.

Cube numbers: A cube number is the result of when a number is multiplied by itself three times. When writing cube numbers, we write a small three above the number, e.g. $3 \times 3 \times 3$ or $3^3 = 27$

Cylinder: A cylinder is a 3D shape shaped like a roller. It has two flat faces and one curved surface. Cross-sections of a cylinder, parallel to the base, or its flat faces, are all identically sized circles.
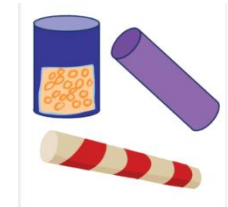
D

Data handling: Using simple lists, tables and graphs to present information.

Decimals: You use decimal numbers (or decimal notation) when you use hundreds, tens and ones. Decimals are based on ten, multiples of ten, and tenths. A decimal point separates whole numbers from decimal fractions.

124·75 is a decimal number made up of 1 hundred, 2 tens, 4 ones, 7 tenths, and 5 hundredths.

Denominator: The bottom number of a fraction is called the denominator. The denominator tells us how many equal parts the quantity or shape has been divided into. *In 1/2 the denominator is 2.*

Diameter : Any straight line from one side of a circle to the other is called a diameter. It must go through the centre.

Difference: The difference between two numbers is the value of how much one is greater than the other. It can found by subtracting the smallest number from the largest, or by counting on from the smallest to the largest.

The difference between 5 and 2 is 3. 5 − 2 = 3

Discrete data: Discrete data is data that can be counted. It is shown in distinct, separated groups, such as in bar charts. Data that cannot be counted is called continuous data.

Distributive property: The distributive property states that multiplying a number by a group of numbers added together is the same as doing each multiplication separately. For example, 5 x (2 x 6) = 5 x 2 + 5 x 6

Division is sharing, grouping, or separating a number into equal parts. Children use lots of different techniques to divide. Take a look at our Division section in the calculation policy for further guidance.

Short division and long division are both ways of dividing a smaller number into a larger number, one digit at a time, starting on the left. This means working from the largest to the smallest place value, rounding the final digits of the large number at each step. Short division involves 'carrying' numbers between place values, whereas long division involves writing down the answer to each step, so is more useful for larger numbers.

E

Equilateral: An equilateral triangle has all its sides the same length. Each of its three angles is also the same.
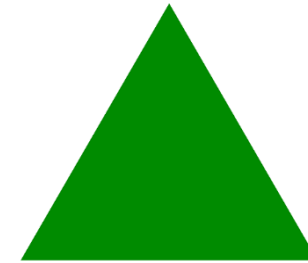
Equivalent: Two things are said to be equivalent to one another if they have the same value, or produce the same effect in use, but have different forms.

£1 is equivalent (in value) to 100 pence. 1/2 is equivalent to 0.5.

F

Factor: A factor is a whole number that another number can divide into without any remainders.

1, 2, 3, 4, 6, and 12 are all factors of 12.

Factor pairs: A factor pair is a pair of numbers that are multiplied together to get a particular number. For example:

9

3 and 2 are a factor pair of 6, because 3 × 2 = 6.

Financial education: An emphasis on numeracy skills, using money and working with percentages.

Formal Written Methods:

The standard procedures used for calculations that cannot easily be solved mentally. These include:

Column addition and column subtraction: The process of writing numbers one above the other and then calculating each column in turn, beginning with the units column and working upwards in place value.

Short multiplication and long multiplication: The process of multiplying two numbers by writing the numbers vertically, then multiplying the larger number by each digit of the smaller number, starting from the units column and then working upwards in place value. Short multiplication is suitable for multiplying a large number by a single-digit number, whereas long multiplication involves writing down the answers to each step, so is more useful for multiplying two large numbers.

Short division and long division: The process of dividing a smaller number into a larger number, one digit at a time, starting on the left. This means working from the largest to the smallest place value, effectively rounding the final digits of the large number at each step. Short division involves 'carrying' numbers between place values, whereas long division involves writing down the answer to each step, so is more useful for dividing by larger numbers.

Formula: A formula is a rule that tells you how to work something out based on certain values. A formula can be given in words or using letters and symbols.

The formula for finding the area of a rectangle is "area = length × width".

Fraction: A fraction is an equal part of a whole, like 1/2 or 2/3

If you had 1/2 of a cherry pie, the pie would be cut into two equal pieces, and you would get one piece.

If you had 2/3 of a cherry pie, the pie would be cut into three equal pieces, and you would get two pieces.

Numerator: The top number of a fraction is called the numerator. The numerator tells us how many equal parts there are.

In 1/2 the numerator is 1.

Unit fraction: A unit fraction is a fraction which has 1 as its numerator.

1/2 is a unit fraction, because the numerator is 1.

Non-unit fraction: A non-unit fraction is a fraction where the numerator is greater than 1.

2/3 is a non-unit fraction, because the numerator is 2.

Improper fraction: An improper fraction is a fraction with a numerator bigger than its denominator. This means the fraction is greater than 1.

3/2 is an improper fraction, because its numerator (3) is bigger than its denominator (2).

Mixed number: A mixed number is another way of showing an improper fraction, by mixing a whole number and a proper fraction.

For example: 7/3 (an improper fraction) can also be represented as 2 1/3 (a mixed number).

G

Grid method: Schools sometimes use the grid method as a way of visualising multiplication, as part of formal calculations. For example:

×	60	5
70	4200	350
4	240	20

You then multiply the numbers separately and add them together to find the total:

$70 \times 60 = 4200$

$70 \times 5 = 350$

$4 \times 60 = 240$

$4 \times 5 = 20$

$4200 + 350 + 240 + 20 = \mathbf{4810}$

Improper fraction: An improper fraction is a fraction with a numerator bigger than its denominator. This means the fraction is greater than 1.

3/2 is an improper fraction, because its numerator (3) is bigger than its denominator (2).

Inverse operations: We say that addition and subtraction are inverse operations. This means that we can use one operation to 'undo' the other. For example, you can undo adding 5 by taking away 5. Multiplication and division are also inverse operations. If you multiply a number by 10, you can undo this by dividing by 10.

Children are taught to use inverse operations to check their answers to a question.

For example:

If they think 15 + 35 = 50, they can check this by subtracting 35 from 50 to see if they get 15.

Irregular

Irregular polygons do not have all their sides the same length. They have different size angles.

Isosceles

An isosceles triangle has two sides that are the same length. Two angles are also equal.
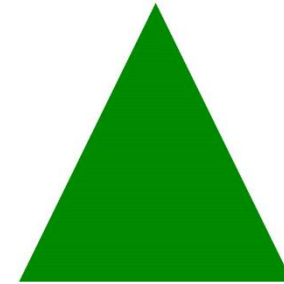
K

Kite A kite is a four-sided polygon. It has two pairs of adjacent sides that are the same length.

L

Line of symmetry: A line of symmetry divides a shape in half. One half is the reflection of the other half.

The line of symmetry is the same as a mirror line. Some shapes have no lines of symmetry while others have one or more.
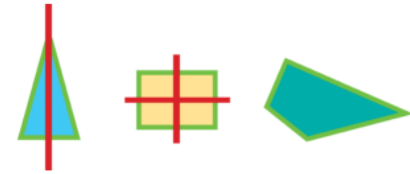
M

Mean: Mean is a kind of average. To find the mean, add up the quantities then divide by the number of quantities.

Here is how to find the mean average of 3, 3, 4, 6, and 9.

First, add the numbers together: 3 + 3 + 4 + 6 + 9 = 25

Because we added together 5 numbers, we now divide the total by 5 to find the mean: 25 ÷ 5 = 5

Therefore, the mean average of 3, 3, 4, 6, and 9 is 5.

Measurements:

Units of measure: An agreed quantity by which we measure things. So, metres, centimetres, litres, millilitres, grams, and kilograms are all units of measure.

Metric measurement systems: Systems for measuring things in which the units of measure go up in 10s or multiples of 10 (100, 1000, and so on).

Kilometres, metres, centimetres and millimetres are the metric system for measuring length and distance. There are:

10 millimetres in a centimetre.

100 centimetres in a metre.

1000 metres in a kilometre.

We now use metric systems for most of our measuring.

Imperial measurement systems: Systems for measuring that were developed in England in the 19th century. Examples are pounds and ounces for measuring mass, and inches, yards and miles for measuring length and distance. We do not use them much now, except miles for measuring distance and pints for volume.

Converting between units of measure: Changing a measurement from one unit (for example, metres) to another unit (for example, centimetres). So, the measurement 2 metres can be converted to 200 centimetres.

Length and distance are measured in kilometres, metres, centimetres and millimetres. There are:

10 millimetres in a centimetre.

100 centimetres in a metre.

1000 metres in a kilometre.

Mass is measured in grams and kilograms. There are:

1000 grams in a kilogram.

Volume is sometimes measured in litres and millilitres. There are:

1000 millilitres in a litre.

Converting between imperial and metric systems of measure: It can be useful to be able to convert between common Imperial systems of measurement and the comparable metric system (for example, between miles and kilometres). To do this, you need to know the relationships between them. For instance, there are roughly:

1.6 kilometres in a mile.

0.6 miles in a kilometre.

2 pints in a litre.

0.5 litres in a pint.

Mental maths: The ability to calculate mentally, i.e. in your head without writing anything down. Learning things such as number bonds, number patterns, doubles, and multiplication tables facts are important mental maths skills.

Missing number problems: A calculation where one of the numbers has been taken out. The missing number could be represented by a space, question mark, or shape.

4 + __ = 9. Children have to use related number facts to work out the answer. For instance, they may know that 9 – 4 = 5, and can therefore deduce that 4 + 5 = 9.

Mixed number: A mixed number is another way of showing an improper fraction, by mixing a whole number and a proper fraction.

7/3 can also be represented as 2 1/3 (a mixed number).

N

Non-unit fraction: A non-unit fraction is a fraction where the numerator is greater than 1.

2/3 is a non-unit fraction, because the numerator is 2.

Number We use numbers to count quantity or to measure. Numbers have a position on a number line. There are many different kinds of number.

Number bonds: Pairs which make up a total. The number bonds for 7, for example, are 3 + 4, 2 + 5, 1 + 6, and 0 + 7. Children will practise remembering these at schools.

Number line: A visual image used in almost all classrooms to help children grasp basic number relationships. Children will use a number line to count forwards and backwards, in, for example, 1s, 2s, and 10s, depending on the scale of the number line.

Numerator: The top number of a fraction is called the numerator. The numerator tells us how many equal parts there are.

1/2 the numerator is 1.

O
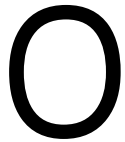
Obtuse: An obtuse angle measures between 90° and 180°.

An obtuse-angled triangle has one angle greater than a right angle.

Operation: In maths, the four types of operation are addition, subtraction, multiplication and division.

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.

Order of operations: Mathematical operations include addition, subtraction, multiplication, and division. The order of operations describes the order these should be carried out within a calculation: first anything inside brackets, then any squares or roots (orders), then any division and multiplication, and finally any addition and subtraction, working from left to right. See BIDMAS.

P

Parallel: Parallel lines are the same distance apart no matter how long they are. Parallel lines can never cross each other.

Parallelogram: A parallelogram is a four-sided shape that has its opposite sides parallel to each other.

Partitioning

Partitioning a number means to split the number into smaller chunks. It is often used to break down numbers when multiplying or dividing larger numbers to make the calculation easier.

58 × 2 can be broken down into 50 × 2 = 100 and 8 × 2 = 16, giving an answer of 116.

Pictogram: In a pictogram, pictures are used to stand for quantities. A picture can stand for one thing or a number of things. Pictograms can also be called pictographs or picture graphs.

Pie chart: In a pie chart, information is shown as a circle. The different-sized sectors or slices of the pie chart stand for the different quantities they represent. For example, the slices of a pie chart can represent the percentage of people who like different fruits.

Place value: The value of a digit depends on its place within a number. This is its place value and it is the basis of our entire number system.

In 378, there are 3 hundreds, 7 tens, and 8 units (Year R and year 1 refer to these as ones).

Polygon: A polygon is any 2D shape with straight sides. Many polygons have special names. For example, triangles, squares, and rectangles are types of polygon. Polygons can be regular or irregular.

Regular polygons: Shape with the same length sides and angles
Irregular polygons : A shape with unequal sides and angles that are not the same.

Polyhedron: A polyhedron is any 3D shape made from polygons. Some polyhedra have special names such as cube, pyramid, or tetrahedron. Polyhedra have faces, edges, and vertices (points).
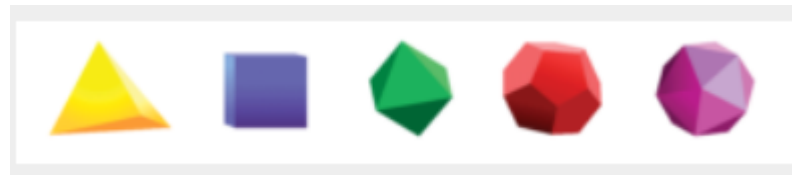
Pyramid: A pyramid is a solid shape that has a polygon for a base. Each of the sides are triangles meeting at a point. The shape of the base gives the pyramid its name (e.g. a pyramid with a square base is called a square-based pyramid).

Q

Quadrant

1. A quadrant is one quarter of a circle. The straight sides of the quadrant are both <u>radii</u> of the circle.

2. The axes of a graph divide the graph into four quadrants. In the first quadrant, both coordinates are positive. In the third quadrant, both <u>coordinates</u> are negative.
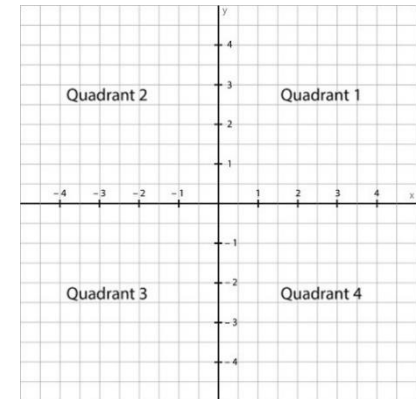
Quadrilateral

A quadrilateral is any <u>polygon</u> that has four sides. The four angles of a quadrilateral add up to 360°.

R

Radius

A radius is any straight line from the centre of a circle to the circumference.

Range

The difference between the highest and lowest numbers in any given group of numbers (for example, the age range of a group of children is the difference between the age of the oldest child and the age of the youngest child).

Ratio

A way of comparing the amounts of different things. For example, if a recipe asks for flour and sugar in a ratio of 2:1, it means that you need 2 lots of flour for every 1 lot of sugar that you put in.

Each thing in a ratio needs to be measured in the same kind of unit. So, if a recipe asks for flour and sugar in a ratio of 2:1 and you put in 2 cups of flour, you need to put in 1 cup of sugar. If you put in 2 kilograms of flour, you need to put in 1 kilogram of sugar. If you put in 2 bathtubs of flour, then you need to put in 1 bathtub of sugar!

You may also see ratios on map scales. In this case, it tells you the relationship between the distance on the map and the distance in real life. For example, 1:10,000 would mean that 1cm on the map represents an actual distance of 10,000cm (or 100m).

Rectangle

A rectangle is a 2D shape that has four straight sides and four right angles. The opposite sides of a rectangle are equal. A square is a special type of rectangle because all 4 sides are the same length. The word rectangle is usually used to mean the oblong rectangle. A rectangle has 4 angles of 90 degrees.

Rectilinear

A polygon is rectilinear if it can be divided into rectangles or squares, with all the sides of the polygon meeting at right angles.

Reflex

A reflex angle is an angle that is between 180° and 360°.

Regular

A regular polygon is any polygon with all its sides and angles the same size. A square is a regular quadrilateral.

Rhombus: A rhombus has four equal sides. The opposite sides are parallel. It is the correct name for a diamond shape.

Right angle: A right angle is a quarter of a complete turn. It measures 90°.

A right-angled triangle is a triangle with one 90° angle.

S

Scale: A scale is a set of points on a line used for measuring. You can see a scale on maps, thermometers, measuring jugs, or rulers.

Scale factor: A scale factor is the value of the multiplier used to make an enlargement.

Scalene: A scalene triangle has no sides the same length. All its angles are a different size.

Sequence: A set of things (usually numbers) that are in an order. Each number in the sequence is called a term. To find missing terms in a sequence, first you need to find the rule behind the sequence. For example, in the sequence '2, 4, 6, 8' the rule is to add two to the previous number. The next number in the sequence would be '10'.

Here are some examples of sequences:

3, 6, 9, 12, 15…

The rule is to add 3 with each step.

1, 4, 9, 16, 25…

The rule is to go up in steps increasing by 2 each time (+3, +5, +7, +9, and so on).

2, 6, 18, 54, 162…

The rule is to go up by 3 times the previous number.

Shape, space, and measure:
This term is used in curriculum documents and refers to work done with shapes, spatial awareness, (for example, volume, and area) and measurements (for example, centimetres, metres, and litres).

Sphere:
A sphere is a perfectly round shape like a ball.

Standard unit:
Standard units of measurements are units that are agreed by everyone. Metric units and imperial units are both sets of standard units.

Some standard units of length: centimetre, metre, kilometre, inch, foot, mile.

Some standard units of mass: gram, kilogram, ounce, pound.

Some standard units of capacity: millilitre, litre, pint, gallon.

Square
: A 2D shape which has 4 equal sides and 4 angles of 90 degrees. A square can also be classified as a rectangle.

Symmetrical:
Something is symmetrical if one half is exactly the same as the other half but the opposite way round.

T

Table: When information is written in a list in rows and columns, it is often called a table. Multiplication facts written in order are called the multiplication tables.

Tally chart: A tally chart shows how often something happens and a frequency table is used to record this. Tally marks are often used to show the frequency in a frequency table or chart.

Three-dimensional (3D): Three-dimensional shapes are solid shapes. They have length, width, and height. 3D is short for three-dimensional.

Translate: If you translate a shape, you slide it to a different position. You do not turn or rotate the shape. This is often done using coordinates on a graph.

Trapezium: A trapezium is a four-sided shape that has one pair of sides that are parallel. The other two sides are not parallel.

Two-dimensional (2D): Two-dimensional shapes are flat shapes. They have length and width but no thickness. 2D is short for two-dimensional.
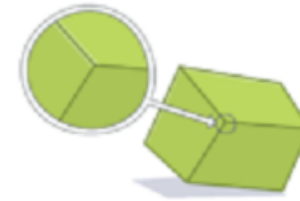
V

Variable: A variable is an unknown number in an equation that can take different values, usually shown by a symbol or letter.

In the equation 3x + y = 12, the letters x and y are both variables.

Vertices: A vertex is a point at which two or more lines meet in an object or a shape.

X

X axis : The horizontal axis on a graph – horizontal axis

y

Y axis – The vertical axis on a graph – vertical axis