YEAR 7

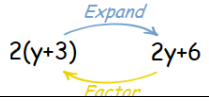
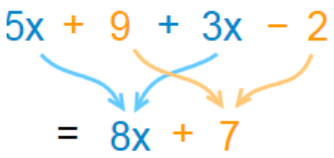
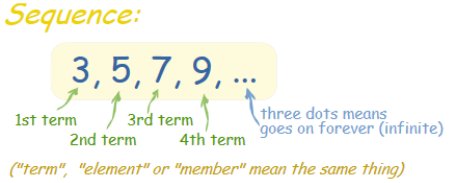
Knowledge Organisers

Maths 7.1 Topic 1

	Term	Definition
1	Probability	Probability is the likelihood of something happening in the future. It is expressed as a number between 0 (impossible) and 1 (certain).
2	Theoretical Probability	What is the probability of it happening in theory. E.g. The theoretical probability of rolling a 3 on a dice is $\frac{1}{6}$
3	Event	One (or more) outcomes of an experiment. Example events: • Getting a Tail when tossing a coin • Rolling a "7" with two dice
4	Outcome	A possible result of an experiment. Example: rolling a 1, 2, 3, 4, 5 or 6 are all outcomes. Note: an **Event** can include one or more possible outcomes: Example: choosing a "King" from a deck of cards is an event, it includes 4 outcomes (any of the 4 Kings)
5	Mutually Exclusive	Mutually exclusive outcomes cannot happen at the same time. Flipping a coin has mutually exclusive outcomes, it can't be both heads and tails.
6	Sample Space	All the possible outcomes of an experiment. Example: choosing a card from a deck There are 52 cards in a deck (not including Jokers) So the Sample Space is all 52 possible cards: {Ace of Hearts, 2 of Hearts, etc... }
7	Experimental probability	What was the probability of it in real life when you actually did the experiment. This will differ from the theoretical probability initially but will get closer and closer with an increasing number of trials you do.
8	Integer	A whole number. A positive number, a negative number or zero but not a fraction or a decimal.
9	Product	The result of multiplying two or more numbers
10	Multiple	The result of multiplying a number by an integer (not by a fraction).
11	Factor	Factors are whole numbers we can multiply together to get another number
12	Prime factor	A factor of a number that is also prime. Any number can be written as the product of its prime factors. This is called its **prime factor decomposition**
13	Index notation	Express the product of numbers using powers where possible
14	Lowest Common Multiple (LCM)	The smallest positive number that is a multiple of two or more numbers
15	Highest Common Multiple (HCF)	The highest number that divides exactly into two or more numbers.
16	Square (number)	To multiply a number by itself
17	Cube (number)	The result of using a whole number in a multiplication three times.
18	Square root	The inverse operation of squaring.

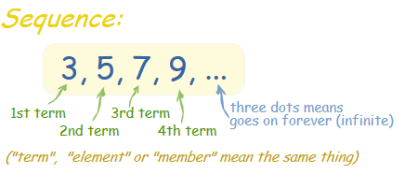
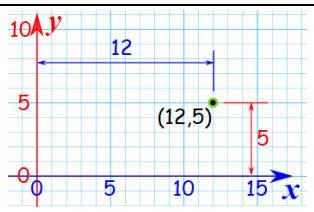
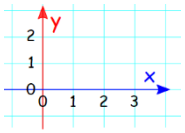
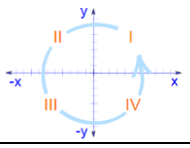
19	Cube root	The inverse operation of cubing. The cu be root of a number is a special value that, when used in a multiplication three times, gives that number.
20	Operation	A mathematical process.
21	Operator	The sign that represents this mathematical process.
22	Numerator	Number of equal parts we want. The top number of a fraction.
23	Denominator	Total number of equal parts. The bottom number of fraction.
24	Proper fraction	A fraction where the numerator is less than the denominator. The value is less than 1.
25	Improper fraction	A fraction where the numerator is greater than the denominator. The value is more than 1.
26	Mixed number	The mixed number is made of a whole number and a fraction
27	Simplest form	A fraction is in simplest form when the numerator and denominator cannot be any smaller (while still being whole numbers).
28	Percent	% means out of 100
29	Decimal places	The places to the right of the decimal point.
30	First significant figure	First non zero digit in a number
31	Second significant figure	Digit directly after the non zero number
32	Approximate	To guess or estimate

Maths 7.2 Topic 1

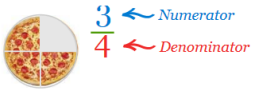
	Term	Definition
1	**Algebra**	Algebra uses letters (like x or y) or other symbols in place of values, and then plays with them using special rules.
2	Expressions	An algebraic expression involves letter that represent numbers. They do not have an equals sign. For example, a or 6b or $x^2 + y^2 + z^2$ are all expressions.
3	Substitution	Putting values where the letters are. E.g. 3x + 5 Substitute x = 4 into the expression. 3(4) + 5 = 17
4	Variable	A quantity that could take on a range of values (undefined value – expression).
5	Unknown	A quantity whose value is not known (defined value – equation)
6	Expression	a mathematical sentence containing numbers, operators & variables
7	Equation	An equation says that two things are equal and can be solved.
8	Coefficent	The constant quantity placed before and multiplying the variable in an expression.
9	Identity	An equation that is true no matter what values are chosen. Example: **a/2 = a × 0.5** is true, no matter what value is chosen for "a". **Notation** When written algebraically a formula should not include any units.
10	Formula	A rule or fact written with mathematical symbols.
11	Inequality	An inequality says that two values are not equal. **a ≠ b** says that a is not equal to b There are other special symbols that show in *what way* things are not equal. **a < b** says that a is less than b **a > b** says that a is greater than b (those two are known as strict inequality) **a ≤ b** means that a is less than or equal to b **a ≥ b** means that a is greater than or equal to b.
12	Expand	Expand is when we multiply to remove the ( ) 
13	Like Term	Terms whose variables (such as x or y) with any exponents (such as the 2 in x^2) are the same. Examples: 7x and 2x are **like terms** because they are both "x". $3x^2$ and $-2x^2$ are **like terms** because they are both "x^2". 
14	Term	A single number or variable.
15	Sequence	A list of numbers or objects in a special order. Example: 3, 5, 7, 9, ... is a sequence starting at 3 and increasing by 2 each time. 

16	Term-to-term rule	When you have a sequence and can work out the following numbers. E.g. find the next three terms of this sequence, 10, 20, 30, …, …, …
17	Position-to-term rule	This is an explicit rule you can find which allows you to find the 100^{th} term quite easily. E.g. 5n + 7. 100^{th} term = 5(100)+7 = 507
18	Ascending	Increasing in size.
19	Descending	Decreasing in size.
20	Pattern	Things arranged following a rule or rules. Example: these tiles are arranged in a pattern Another Example: there is a pattern in these numbers: 2, 7, 12, 17, 22, ... they follow a rule "start at 2 and add 5 each time"

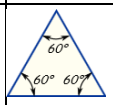
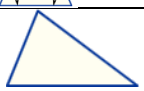
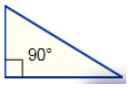
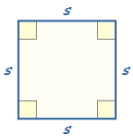
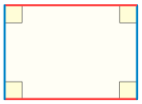
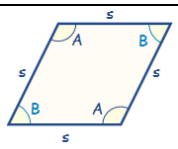
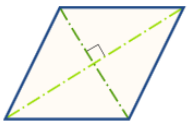
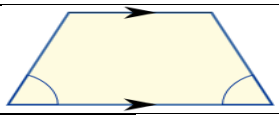
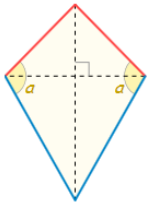
Maths 7.3 Topic 3

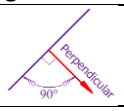
	Term	Definition
1	Triangle numbers	1, 3, 6, 10, 15, 21, 28…. They form a triangle.
2	Square numbers	1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225. These form a square.
3	Cube numbers	1, 8, 27, 64, 135, 216… These numbers form a cube.
4	Arithmetic progression	A sequence that goes up or down by the same amount each time.
5	Fibonacci sequence	A sequence that is made by adding the previous two terms to give you the next term. 1, 1, 2, 3, 5, 8, 13, 21 …
6	Geometric sequence	A sequence made by multiplying by the same value each time. Example: 2, 4, 8, 16, 32, 64, 128, 256, ... (each number is 2 times the number before it)
7	Term-to-term rule	When you have a sequence and can work out the following numbers. E.g. find the next three terms of this sequence, 10, 20, 30, …, …, …
8	Position-to-term rule	This is an explicit rule you can find which allows you to find the 100^{th} term quite easily. E.g. 5n + 7. 100^{th} term = 5(100)+7 = 507
9	Sequence	A list of numbers or objects in a special order. Example: 3, 5, 7, 9, ... is a sequence starting at 3 and increasing by 2 each time. 
10	Coordinates	A set of values that show an exact position. On graphs it is usually a **pair of numbers**: the first number shows the distance along, and the second number shows the distance up or down. Example: the point (12,5) is 12 units along, and 5 units up. 
11	Axes	Axes often means the "x" and "y" lines that cross at right angles to make a graph. 
12	x coordinate	The horizontal value in a pair of coordinates: how far **along** the point is.
13	x axis	The line on a graph that runs horizontally (left-right) through zero.
14	y coordinate	The vertical value in a pair of coordinates. How far **up or down** the point is.
15	y axis	The line on a graph that runs vertically (up-down) through zero.
16	Quadrant	Any of the 4 areas made when we divide up a plane by an **x** and **y** axis, as shown. They are usually numbered I, II, III and IV 
17	Midpoint	The middle of. The point halfway along.

Maths 7. 4 Topic 3

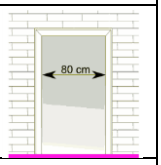
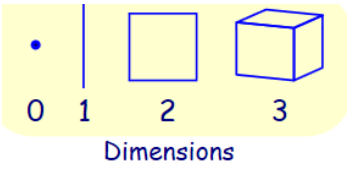
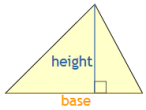
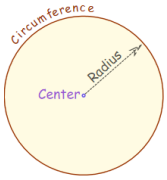
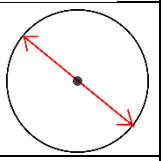
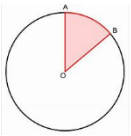
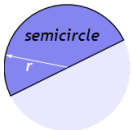
	Term	Definition
1	Ratio	A ratio shows the relative sizes of two or more values. Example: if there is 1 boy and 3 girls you could write the ratio as: 1:3 (for every one boy there are 3 girls)
2	Proportion	Proportion says that two ratios (or fractions) are equal. Example: 1/3 = 2/6
3	Equivalent ratio	Ratios that are equal Example 1:10 = 10:100
4	Fraction	How many parts of a whole: • the top number (the numerator) says how many parts we have. • the bottom number (the denominator) says how many equal parts the whole is divided into 
5	Simplify	To simplify (or reduce) a fraction or ratio means to make it as simple as possible. We can try dividing the numbers by 2, 3, 5, 7 ,... etc, until we can't go any further. Example: 2/10 can be simplified to 1/5 by dividing both top and bottom by 2 (and that is as far as we can go)
6	Whole	All of something. Complete.
7	Sharing	Splitting into equal parts or groups.

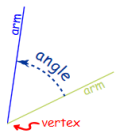
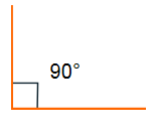
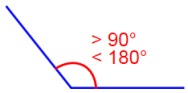
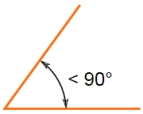
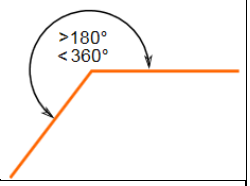
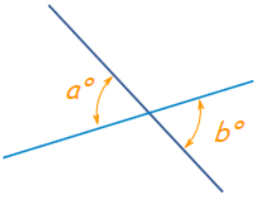
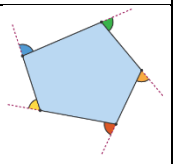
Maths 7.5 Topic 4

	Term	Definition
1	Triangle	A 3-sided flat shape with straight sides. It is a polygon.
2	Equilateral triangle	 A triangle with all three sides of equal length. All the angles are 60°
3	Isosceles triangle	A triangle with two equal sides. The angles opposite the equal sides are also equal.
4	Scalene triangle	 A triangle with all sides of different lengths. All angles are different, too. So no sides are equal and no angles are equal.
5	Right angled triangle	 A triangle that has a right angle (90°)
6	Quadrilateral	A flat shape with four straight sides.
7	Square	A square has equal sides (marked "s") and every angle is a right angle (90°) - Also opposite sides are parallel. - A square also fits the definition of a rectangle (all angles are 90°), and a rhombus (all sides are equal length). 
8	Rectangle	A rectangle is a four-sided shape where every angle is a right angle (90°). - Also opposite sides are parallel and of equal length. 
9	Rhombus	A rhombus is a four-sided shape where all sides have equal length (marked "s"). - Also opposite sides are parallel and opposite angles are equal. - Another interesting thing is that the diagonals (dashed lines) meet in the middle at a right angle. In other words they "bisect" (cut in half) each other at right angles.  
10	Parallelogram	A parallelogram has opposite sides parallel and equal in length. Also opposite angles are equal (angles "A" are the same, and angles "B" are the same).
11	Trapezium	A trapezium is a quadrilateral with one pair of parallel sides. 
12	Kite	It has two pairs of sides: Each pair is made of two equal-length sides that join up. The angles where the two pairs meet are equal. - the diagonals, shown as dashed lines above, meet at a right angle. - one of the diagonals bisects (cuts equally in half) the other. 

13	Symmetry	When two or more parts are identical after a flip, slide or turn. The simplest type of Symmetry is "Reflection" (or "Mirror")
14	Parallel	Always the same distance apart and never touching.
15	Perpendicular	At right angles (90°) to. 
16	Vertex	A point where two or more line segments meet. A corner.
17	Polygon	A plane shape (two-dimensional) with straight sides. Examples: triangles, rectangles and pentagons. (Note: a circle is not a polygon because it has a curved side)
18	Regular polygon	A polygon is **regular** when all angles are equal and all sides are equal (otherwise it is "irregular").
19	Rotational symmetry	A shape has Rotational Symmetry when it still looks the same after some rotation.

Maths 7.6 Topic 4

	Term	Definition
1	Area	The size of a surface. The amount of space inside the boundary of a flat (2-dimensional) object such as a triangle or circle, or surface of a solid (3-dimensional) object.
2	Perimeter	The distance around a two-dimensional shape.
3	Length	Distance. How far from end to end. Or from one point to another.
4	Width	The distance from side to side. Example: the width of this door is 80 cm. 
5	Dimension	A measurement of length in one direction. Examples: width, depth and height are dimensions. A line has one dimension (1D), a square has two dimensions (2D), and a cube has three dimensions (3D). 
6	Compound shape	A compound shape is shape made up of two or more basic shapes.
7	Formula	A rule or fact written with mathematical symbols. It usually has: • an equals sign (=) • two or more variables (x, y, etc) Example: Area of a rectangle = length x width
8	Height	The distance from top to bottom. Or at right angles from any base to the furthest corner. 
9	Radius	The distance from the centre to the circumference of a circle It is half of the circle's diameter. 
10	Diameter	The length from one side of a circle to the other, passing through the centre. 
11	Circumference	The “perimeter” of a circle is called the circumference.
12	Sector	A "pie-slice" part of a circle - the area between two radiuses and the connecting arc of a circle. 
13	Semi-circle	Half a circle (made by a diameter and the connecting arc) Its area is half of a circle's area: $\frac{\pi r^2}{2}$ - Its perimeter is half of a circle's perimeter plus the diameter: $\pi r + 2r$ 

14	Pi	The ratio of a circle's circumference to its diameter In other words: all the way around a circle divided by all the way across it. The symbol is **π.** It is an irrational number that goes on forever, here are the first 40 digits 3.1415926535897932384626433832795028841 97…
15	Irrational	A number that cannot be written as a fraction. π (the famous number "pi") is an irrational number, as it can **not** be made by dividing two integers
16	Angle	The **amount of turn** between two lines around their common point (the vertex). 
17	Degrees	A measure for angles. There are 360 degrees in a full rotation. The symbol for degrees is °
18	Right angle	An angle which is equal to 90°, one quarter of a full revolution. 
19	Obtuse angle	An obtuse angle is more than 90° but less than 180° In other words, it is between a right angle and a straight angle. 
20	Acute angle	An angle less than 90° (90° is called a Right Angle) 
21	Reflex angle	An angle that is more than 180° but less than 360° (In other words, more than a straight angle, but less than a full rotation.) 
22	Protractor	An instrument used in measuring or drawing angles.
23	Vertically Opposite	The angles opposite each other when two lines cross. They are always equal. - In this example a° and b° are vertical angles. 
24	Interior angle	An angle inside a shape, between two joined sides.
25	Exterior angle	The exterior angle at a vertex (corner) of a shape is made by extending a side. 
26	Construction	To draw a shape, line or angle accurately using a compass and straightedge (ruler). Sometimes you are also allowed to use a protractor and triangle.