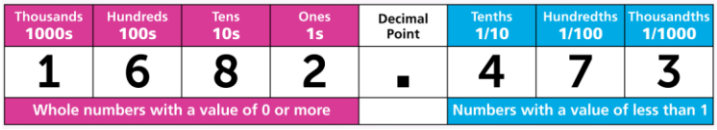
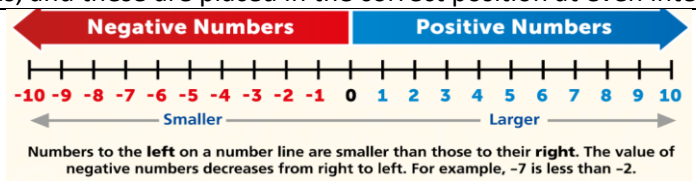
Maths HT1
Knowledge Organiser
Year 7

"Knowledge is Power"

Francis Bacon 1597

Year 7 Knowledge Organiser: Maths HT1

A. Key Terminology			Examples
1	**Number**	An arithmetical value, expressed by a word, symbol, or figure, representing a particular quantity	'Two' can be written as '2' or shown as 2 of something.
2	**Integer**	Whole numbers including zero. These can be positive or negative numbers. They cannot have a decimal or fraction.	-2, -1, 0, 1, 2, 3, …
3	**Positive number**	Any number above zero.	1, 2, 3, 4……
4	**Negative number**	Any number below zero. Always written with a negative sign in front of it.	-1, -2, -3, -4…….
5	**Decimal**	A number with a decimal point in it. Can be positive or negative.	0.2, -0.57, 1.23 etc.
6	**Operation**	In mathematics, an operation is a function which takes some input (or inputs) and produces an output. The most common operations are addition, subtraction, multiplication, and division.	$+ , - , \times , \div$
7	**Inverse operation**	The operation that reverses the effect of another operation.	
8	**Addition**	Finding the total value of two or more numbers. To add. Other terms: plus, sum, total. Addition is the inverse operation of subtraction.	Symbol: $+$ 3 + 2 = 5
9	**Sum**	The sum is the result of adding two or more numbers.	The sum of 3 and 2 is 5
10	**Subtraction**	Subtraction is when you **find the difference** between two numbers. To subtract. Other terms: minus, take-away. Subtraction is the inverse operation of addition.	Symbol: $-$ $7 - 5 = 2$
11	**Find the difference**	The result of subtracting one number from another. Finding the distance between two numbers on a number line.	The difference between 17 and 23. $\mathbf{23 - 17 = 6.}$ The difference between them is 6.
12	**Multiplication**	Multiplication is the operation of scaling one number by another. Multiplication is the inverse operation of division.	Symbol: $\times$ $3 \times 11 = 33$
13	**Product**	Product is the result of multiplying two or more numbers.	The product of 4 and 5 is 20. $4 \times 5 = 20$
14	**Division**	Division can be sharing – the number to be divided is shared equally into the stated number of parts. Division is the inverse operation of multiplication.	Symbol: $\div$ $8 \div 4 = 2$
15	**is Equal to**	To be equal to, is to have the same value or amount.	Symbol: $=$ $2 \times 3 = 4 + 2$
16	**is Not equal to**	To be not equal to, is to not have the same value or amount. Also known as an **inequality**.	Symbol: $\neq$ $2 \times 5 \neq 11$
17	**Less than**	A value or amount that is less than another value or amount.	Symbol: $<$ $21 < 30$ *21 is less than 30*
18	**Greater than**	A value or amount that is greater than another value or amount.	Symbol: $>$ $30 > 21$ *30 is greater than 21*
19	**Factor**	Factors are numbers that divide exactly into another number.	The factors of 8 are: 1, 2, 4, 8.
20	**Multiple**	The result of multiplying a number with a whole number, multiples are really just extended times tables.	The multiples of 2 are: 2, 4, 6, 8…..and so on

B. Place Value and Ordering Integers and Decimals			Examples
1	**Place Value**	The value of a digit in a number depends upon its position, or place. The position, or place, of each digit represents a power of ten.	In 1234 the digits represent 1 thousand, 2 hundreds, 3 tens, and 4 ones.
			
2	**Zero place holder**	A zero that is used as a place holder to represent the absence of a particular power of ten.	The number 702 has no tens.
3	**to Order numbers**	Ordering numbers is a method of arranging them in order, often in ascending or descending order.	
4	**Ascending**	To order a set of numbers of values from smallest to largest.	These numbers are in ascending order: 1, 2, 3, 4, 5
5	**Descending**	To order a set of numbers of values from largest to smallest.	These numbers are in descending order: 5, 4, 3, 2, 1
6	**Order integers**	To order whole numbers: order by the number of digits and look at what each digit in each number represents.	These numbers are in ascending order: 1, 31, 101, 2536
7	**Order decimals**	To order decimals: order by whole number part, then put the decimal parts in order by comparing the digits in each decimal place working from left to right.	These numbers are in ascending order: 0.2, 1.3, 2.05, 10.1
8	**Number line**	A number line is a line with numbers which can be positive or negative, integers, decimals, or fractions, and these are placed in the correct position at even intervals along the number line.	
			
9	**Less than**	A value or amount that is less than another value or amount. Symbol: $<$	$21 < 30$ *21 is less than 30*
10	**Less than or equal to**	A value or amount that is less than or equal to another value or amount. Symbol: $\leq$	The value x is $\leq$ to £12, so x could be £12 or it could be £20
11	**Greater than**	A value or amount that is greater than another value or amount. Symbol: $>$	$30 > 21$ *30 is greater than 21*
12	**Greater than or equal to**	A value or amount that is greater than or equal to another value or amount. Symbol: $\geq$	The value x is $\geq$ to £12
13	**Rounding Numbers**	Rounding means making a number simpler but keeping its value close to what it was. The result is less accurate, but easier to use. 43 rounded to the nearest ten is 40, because 43 is closer to 40 than to 50. But 46 goes up to 50. • Decide which is the last digit to **keep** • Leave it the same if the next digit is less than 5 (this is called rounding down) • Increase it by 1 if the next digit is 5 or more (this is called rounding up)	
14	**Round to decimal places**	A number can be rounded to any number of decimal points, often to 1 or 2 decimal places (d.p.). The number 1.253 rounded to 1 d.p. is 1.3, and to 2 d.p. is 1.25.	
15	**Significant figures**	If something is 'significant' it is large or important. The most significant figure means 'largest' or 'most important'. The first significant figure (s.f.) in a number is the first digit that is not 0. In the number 321, the first s.f. is the 3 which represents 300. We can round to any number of s.f., often to 1 s.f. The number 757 rounded to 1 significant figure would be 800.	

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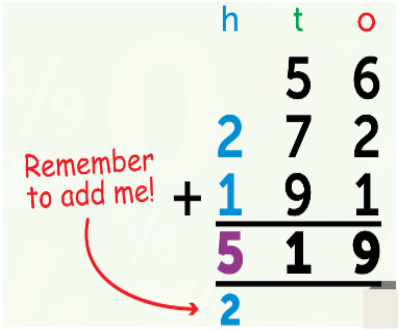
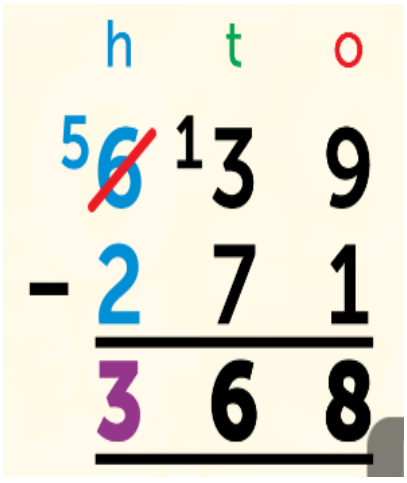
C. Solving Problems with Addition and Subtraction			Examples
1	**Addition**	Finding the total value of two or more numbers. To add. Other terms: plus, sum, total. Addition is the inverse operation of subtraction.	Symbol: + 3 + 2 = 5
2	**Subtraction**	Subtraction is when you **find the difference** between two numbers. To subtract. Other terms: minus, take-away. Subtraction is the inverse operation of addition.	Symbol: − $7 - 5 = 2$
3	**Commutative**	Addition is commutative – the order of addition does **NOT** change the result. Subtraction is **NOT** commutative. The order of subtraction does change the result.	2 + 3 = 3 + 2
4	**Associative**	Addition is associative. When you add you can do so regardless of how the numbers are grouped. Subtraction is not associative.	1 + (2 + 3) = (1 + 2) + 3
5	**Column Addition**	It is not always possible to complete addition calculations mentally (i.e., in your head), you can use column addition. Use the following steps: • List the numbers being added together underneath one another, so that digits with the same place value are aligned vertically. • Always work from right to left, • Add the numbers in the ones column first, write the answer underneath the numbers that are being added together, • If the answer has 2 digits than the second digit is written underneath the numbers being added, and the first digit is carried over to be added to the next place value column.	To solve the addition: $56 + 272 + 191$ 
6	**Column Subtraction**	It is not always possible to complete subtraction calculations mentally (i.e., in your head), you can use column subtraction. Use the following steps: • List the number being subtracted under the other number, • Ensure the digits with the same place value are aligned vertically, • Always work from right to left, • Subtract the numbers in the ones column first and write the answer underneath the ones column. • Continue to work from right to left until you have completed all subtraction calculations and you have your answer, • If the top number is smaller than the bottom number, take one from the column to the left and exchange it to enable you to complete the subtraction. • In this example, in the tens column, because the 3 is smaller than the 7, you take 1 from the hundreds column and exchange it for ten tens so the tens column becomes 13.	To solve the subtraction: $639 - 271$ 

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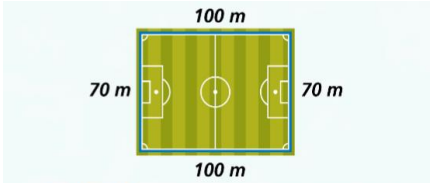
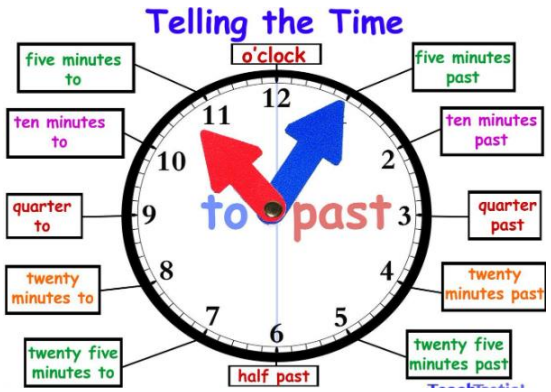
C. Solving Problems with Addition and Subtraction			Examples
7	**Perimeter**	Perimeter is the total distance around a two-dimensional (or flat) shape. To calculate the perimeter of a shape, add together the lengths of all the sides.	 The perimeter of the football field is 340 m: 100 + 100 + 70 + 70 = 340 m
8	**Measurement**	The metric units of length are millimetre (mm), centimetre (cm), metre (m) and kilometre (km) • 10 mm = 1 cm • 100 cm = 1 m • 1,000 m = 1 km	We can convert between different units of measurement: 123 cm is the same as 1.23 m 123 cm is the same as 1230 mm
9	**Measurement**	The metric units of mass are grams (g) and kilograms (kg) • 1,000 g = 1 kg	3,000 g is the same as 3 kg
10	**Measurement**	The metric units of capacity are millilitres (ml) and litres (l) • 1,000 ml = 1 l	1.25 l is the same as 1, 250 ml
11	**Money**	The currency used in the UK is pounds is a range of coins and notes that are used. One hundred pence (100 p) equate to one pound (£1). The format for writing pounds and pence is: £4.02 which is four pounds and two pence.	
12	**Time**	Units of time are seconds (secs), minutes (mins), hours (hrs), days, weeks, years. • 60 seconds = 1 minute • 60 minutes = 1 hour • 24 hours = 1 day • 1 week = 7 days • 365 days = 1 year	
13	**Time**	**Analogue** 	**Digital** 
14	**Time**	Time can be represented in 12-hour format (e.g., 3am or 3pm), or 24-hour format (e.g., 03:00 or 15:00	
15	**Days**	Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday	
16	**Months**	January (31 days), February (28 days unless a leap year then 29 days), March (31 days), April (30 days), May (31 days), June (30 days), July (31 days), August (31 days), September (30 days), October (31 days), November (30 days), December (31 days).	

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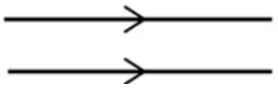
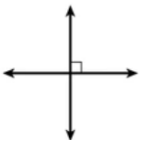
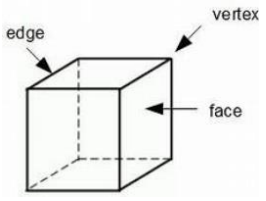
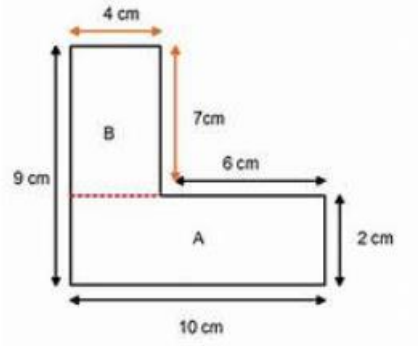
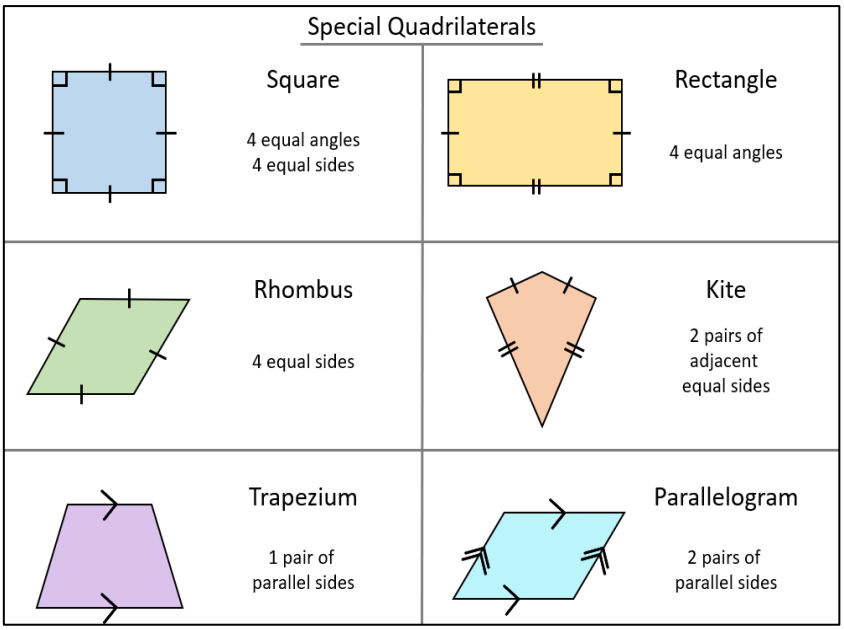
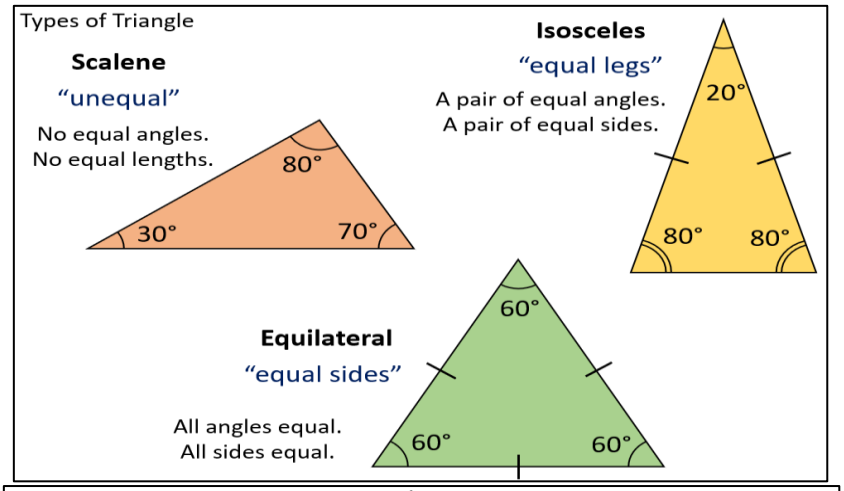
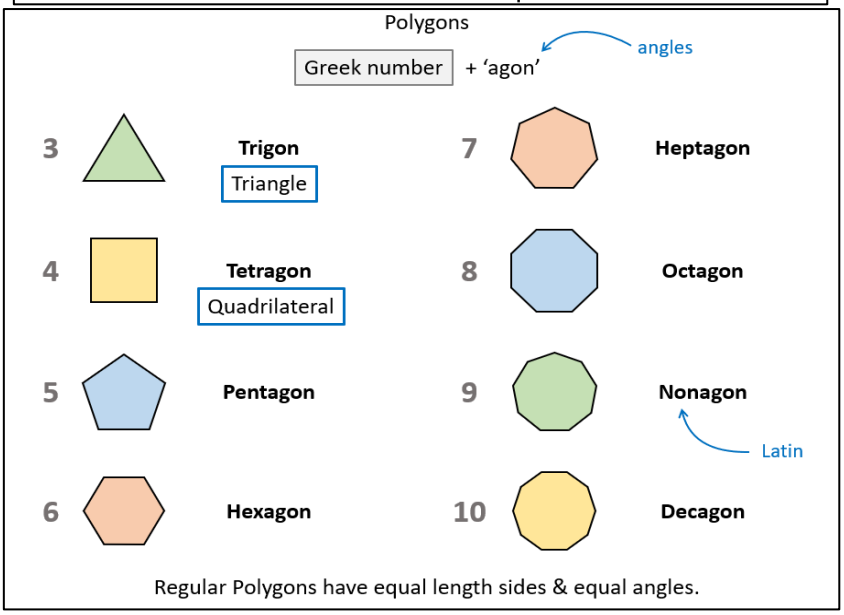
D. Shape			Examples
1	**Parallel Lines**	Parallel lines are two lines that never meet however far they are extended. They are always an equal distance apart from one another.	
2	**Perpendicular Lines**	Perpendicular lines are defined as two lines that meet or intersect (cross) each other at a right angle ($90°$).	
3	**2D shape**	2D stands for 2-dimensional. 2-dimensional shapes are flat and only have two dimensions: length and width. They include squares, rectangles, circles, triangles……..	
4	**Quadrilateral**	A quadrilateral is a 4-sided 2D shape. They have 4 sides and 4 angles. The interior angles always add up to $360°$.	Types include square, rectangle, parallelogram, rhombus
5	**Triangle**	A triangle is a 3-sided 2D shape. They have 3 sides and 3 angles. The interior angles always add up to $180°$	Types include isosceles, equilateral, scalene, right angle
6	**Polygon**	A polygon is a 2D shape that has 3 sides or more, are made of straight lines, and are closed (no open sides)	
7	**Regular polygon**	A polygon is regular is all its sides and interior angles are equal.	
8	**Irregular polygon**	An irregular polygon can have sides of any length and interior angles of any size.	
9	**Polygon**	Common polygons include triangle, quadrilateral, pentagon, hexagon, heptagon, octagon	
10	**3D Shape**	3D shapes have three dimensions - length, width, and depth.	Types include cube, cuboid, triangular prism, cylinder, pyramid
11	**Face**	Any of the individual flat surfaces of a solid object.	
12	**Vertex**	A point where two or more line segments meet. A corner.	
13	**Edge**	Edges are the line segments that join one vertex to another and are also where the shape's faces meet.	
14	**Compound Shape**	A composite or compound shape is any shape that is made up of two or more geometric shapes.	

2-D SHAPES AND POLYGONS

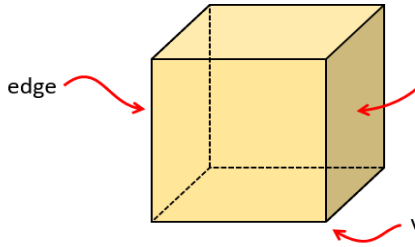






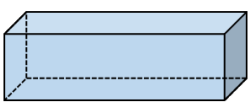
3-D SHAPES

A **cube**



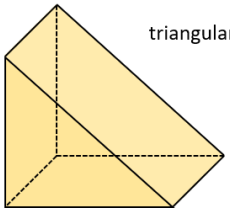
'*to turn*'
Latin: '*highest point*'

6 faces	a 'side' of the shape, can be flat or curved
12 edges	where 2 faces meet
8 vertices	where 2 or more straight lines meet



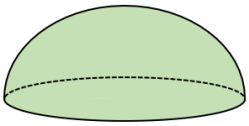
cuboid

6	faces
12	edges
8	vertices



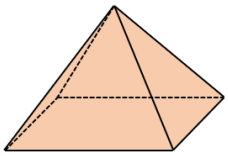
triangular prism

5	faces
9	edges
6	vertices



hemisphere

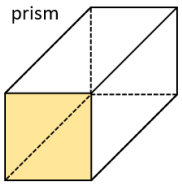
2	faces
1	edge
0	vertices



square-based pyramid

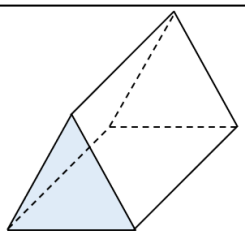
5	faces
8	edges
5	vertices

square-based prism



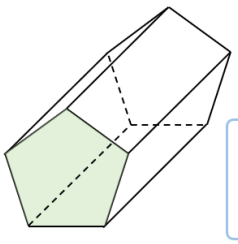
cuboid

6	faces
12	edges
8	vertices



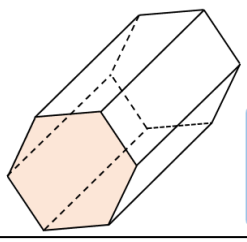
triangular prism

5	faces
9	edges
6	vertices



pentagonal prism

7	faces
15	edges
10	vertices



hexagonal prism

8	faces
18	edges
12	vertices

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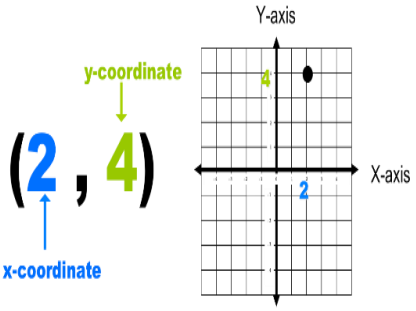
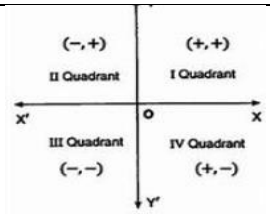
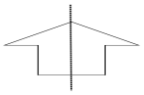
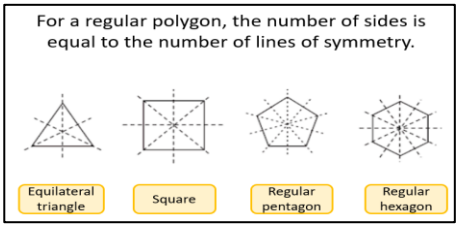
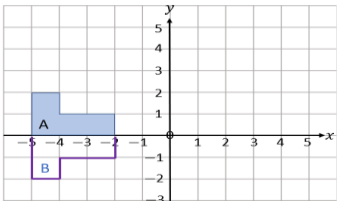
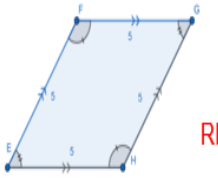
E. Co-ordinates and Symmetry			Examples
1	**Axis**	• A graph is made up of an x-axis and a y-axis. The horizontal axis is called the x-axis, this is the axis going across from left to right. • The vertical axis is called the y-axis, this is the axis which goes up and down.	
2	**Coordinates**	• A point on a grid has two numbers to identify its position. These numbers are known as coordinates. • Coordinates are always written as the x-coordinate value (across) first, and the y-coordinate value (up or down) second.	
3	**Origin**	The coordinate (0,0), where the x-axis and y-axis intersect or cross.	
4	**Coordinate plane (grid)**	Divided into 4 quarters by the x-axis (horizontal) and the y-axis (vertical): Quadrant 1: x and y are positive. Quadrant 2: x negative and y positive. Quadrant 3: x and y are negative. Quadrant 4: x positive and y negative.	
5	**Line Symmetry**	A line of symmetry, or line of reflection, divides an object into two parts that are the same size and shape	
6.	**Line symmetry & Polygons**		
7	**Reflection**	A reflection produces a mirror image of a shape along a line of reflection. An image can be reflected across a line of reflection. The line of reflection could be the x-axis or y-axis, or a given line on a grid. In the given example, shape A (the object) has been reflected across the x-axis to create the reflected image, shape B.	
8	**Rotational Symmetry**	• A shape has rotational symmetry when it can be rotated (less than 360°) and look exactly the same as it did at its starting point. • The order of rotational symmetry is the number of times it fits into itself through a rotation of 360°. • If a shape only fits into itself once, it has no rotational symmetry. We also state that it has rotational symmetry of order 1.	
9	**Rotational Symmetry & Polygons**	In regular polygons, the order of rotational symmetry is equal to the number of sides	The order of rotational symmetry of a regular octagon is 8