Geometry Progression of skills

Fairisle Junior School

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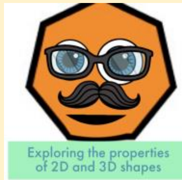
GEOMETRY: PROPERTIES OF SHAPES

	National curriculum objective	Vocabulary	Lesson ideas
Year 1	**Identifying shapes and their properties** • *Recognise and name common 2D/3D shapes*	2D 3D Rectangle Square Circles Triangles Cuboids Cubes Pyramids Spheres	 How many different shapes can you spot on the superheroes?  Applicable for all year groups- use chatterpix for children to verbally explain the properties of shapes- MrP ICT

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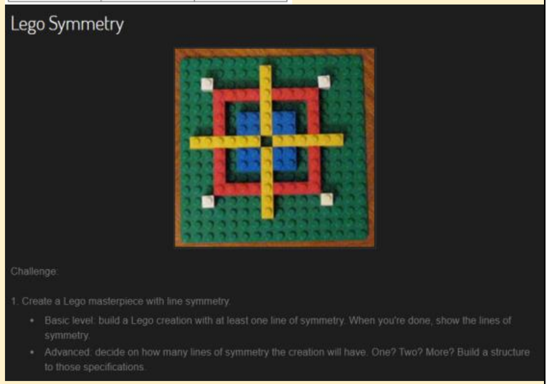
<table>
<tr>
<td rowspan="2">Year 2</td>
<td>Identifying shapes and their properties
identify and describe the properties of 2D shapes including the number of sides and line symmetry in a vertical line
identify and describe the properties of 3D including the number of edges, vertices and faces
identify 2D shapes on the surface of 3D shapes</td>
<td>Revise previous year groups vocabulary.
Pentagon
Hexagon
Octagon
Prism
Cylinder
Cone
Edges
Vertex/vertices
Faces
Symmetry
Symmetrical</td>
<td>


</td>
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<tr>
<td>Comparing and classifying
Compare and sort common 2D/3D shapes and everyday objects</td>
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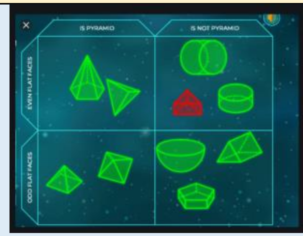
<td>

https://mathsframe.co.uk/en/resources/resource/114/sorting-3d-shapes-on-a-carroll-diagram

There are several questions that you could select from or the children. Another way of using ICT during Maths lessons.</td>
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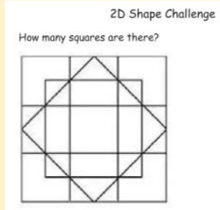
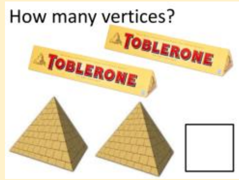
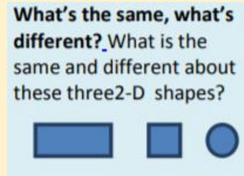
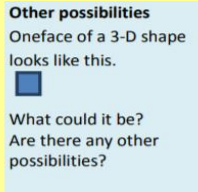
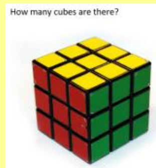
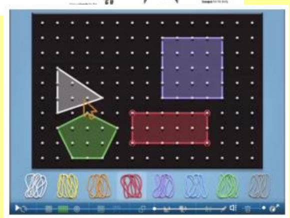
Year 3	**Identifying shapes and their properties** • *Revision of shapes from Year 1 and 2*	**Revise previous year groups vocabulary** Polygon	**Visualising** I am thinking of a 3-dimensional shape which has faces that are triangles and squares. What could my shape be? Links to measure   
	Drawing and constructing • *draw 2D shapes and make 3D shapes using modelling materials* • *recognise 3D shapes in different orientations and describe them*	Orientation	    Using the free Geoboard app the children can draw shapes and explain their properties through voice recording.

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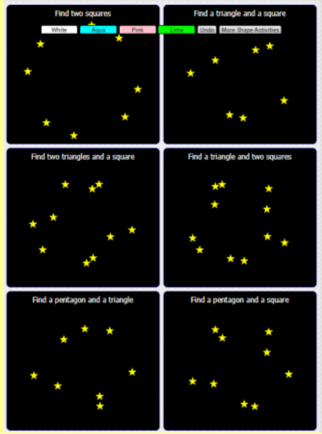
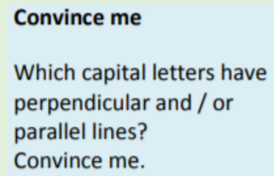
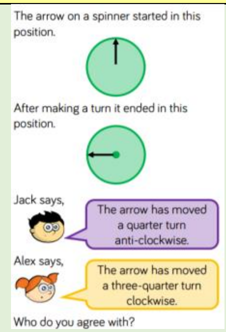
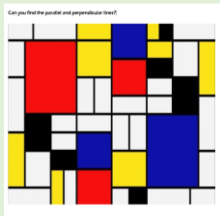
			 https://www.transum.org/software/Online_Exercise/ShapesInTheStars/
	Angles • *recognise angles as a property of a shape or a description of a turn* • *identify right angles/recognise two right angles make a half turn/three make a three quarter turn/four complete a turn* • *identify whether angles are greater than or less than a right angle* • *identify horizontal and vertical lines and pairs of perpendicular and parallel lines.*	Angles Right angle Half turn Three quarters of a turn Horizontal lines Vertical lines Pairs of perpendicular lines Pairs of parallel lines	  

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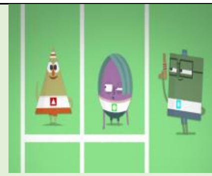
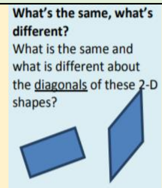
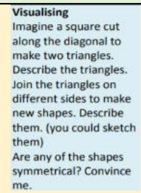
			Perpendicular and parallel line video.Simple and easy to understand. https://www.bbc.co.uk/bitesize/topics/zb6tyrd/articles/zp327hv
Year 4	**Identifying shapes and their properties** • *identify lines of symmetry in 2D shapes presented in different orientations*	**Revise previous year groups vocabulary.** Trapezium Kite Equilateral triangle Isosceles triangle Scalene triangle Parallelogram Rhombus	 https://www.youtube.com/watch?time_continue=12&v=JQUTVgT9RXY&feature=emb_logo - Types of triangle song Parallelogram song- explains can be a square or a rectangle https://www.youtube.com/watch?v=Rpkjb4Tx844

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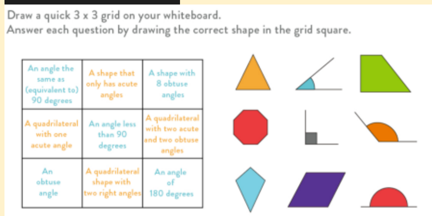
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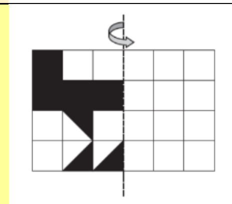
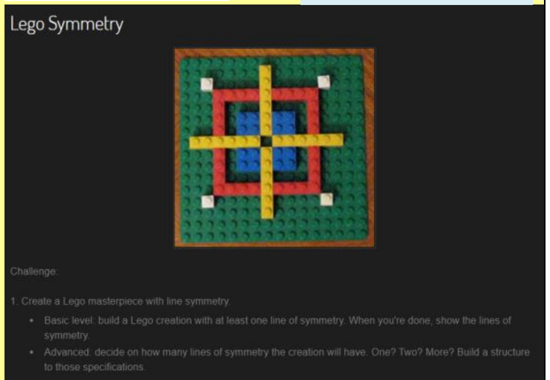
<tr><td></td><td>Drawing and constructing
complete a simple symmetric figure with respect to a specific line of symmetry</td><td></td><td>
Other possibilities Can you draw a non-right angled triangle with a line of symmetry?
Are there other possibilities.

</td></tr>
<tr><td></td><td>Comparing and classifying
compare and classify geometric shapes including quadrilaterals and</td><td>Quadrilateral</td><td>Always, sometimes, never
Is it always, sometimes or never true that the two diagonals of a rectangle meet at right angles.

</td></tr>
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	triangles based on their properties and sizes		Quadrilateral song https://www.youtube.com/watch?v=WMkY_uIku9Q
	Angles • *identify acute and obtuse angles and compare and order angles up to two right angles by size*	Right-angled triangle Acute Obtuse	**Convince me** Ayub says that he can draw a right angled triangle which has another angle which is obtuse. Is he right? Explain why. 
Year 5	**Identifying shapes and their properties** • *identify 3D shapes including cubes and other cuboids from 2D representations*	**Revise previous year groups vocabulary.**	**What's the same, what's different?** What is the same and what is different about the net of a cube and the net of a cuboid? **Visualising** I look at a large cube which is made up of smaller cubes.  If the larger cube is made up of between 50 and 200 smaller cubes what might it look like?

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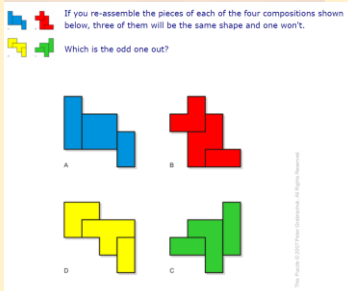

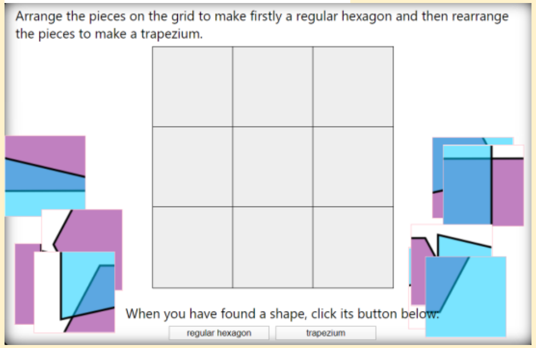

https://www.transum.org/Maths/Activity/Polygon_Pieces/
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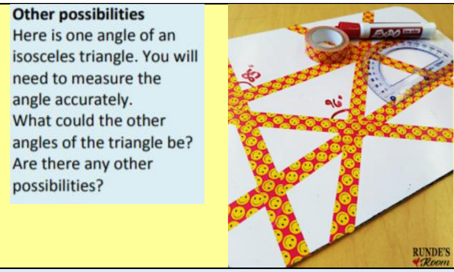
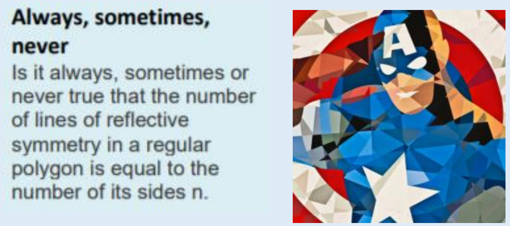
	Drawing and constructing ● *draw given angles and measure them in degrees*	Degrees	
	Comparing and classifying ● *use the properties of rectangles to deduce related facts and find missing lengths and angles* ● *distinguish between regular and irregular polygons based on reasoning about equal side and angles*	Regular Irregular	

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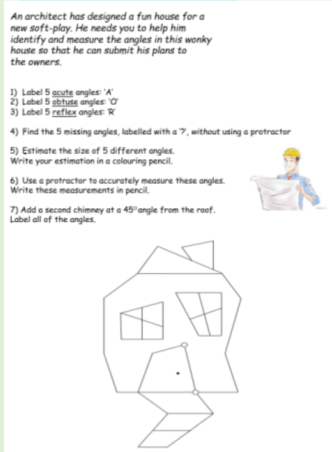
	Angles • *know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles* • *identify: angles at a point and one whole turn = 360°/straight line = 180° and other multiples of 90°*	Reflex Angles at a point *360°*	**Convince me** What is the angle between the hands of a clock at four o clock? At what other times is the angle between the hands the same? Convince me  *An architect has designed a fun house for a new soft-play. He needs you to help him identify and measure the angles in this wonky house so that he can submit his plans to the owners.* 1) Label 5 acute angles: 'A' 2) Label 5 obtuse angles: 'O' 3) Label 5 reflex angles: 'R' 4) Find the 5 missing angles, labelled with a '?', without using a protractor 5) Estimate the size of 5 different angles. Write your estimation in a colouring pencil. 6) Use a protractor to accurately measure these angles. Write these measurements in pencil. 7) Add a second chimney at a 45° angle from the roof. Label all of the angles.  https://mathsframe.co.uk/en/resources/resource/470/Angle-Alien-Attack

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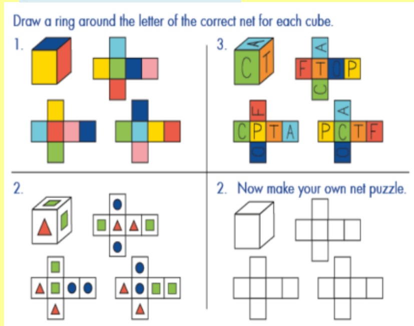
Year 6	**Identifying shapes and their properties** • *recognise, describe and build simple 3D shapes (inc. making nets)* • *illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius*	**Revise previous year groups vocabulary.** Nets Dimensions Opposite angles Radius Diameter Circumference	**What's the same, what's different?** What is the same and what is different about the nets of a triangular prism and a square based pyramid? **Visualising** Jess has 24 cubes which she builds to make a cuboid. Write the dimensions of cuboids that she could make. List all the possibilities.
	Drawing and constructing • *recognise, describe and build simple 3D shapes (inc. making nets)* • *draw 2D shapes using given dimensions and angles*		**Other possibilities** If one angle of an isosceles triangle is 36 degrees. What could the triangle look like – draw it. Are there other possibilities . Draw a net for a cuboid that has a volume of 24 cm^3. 

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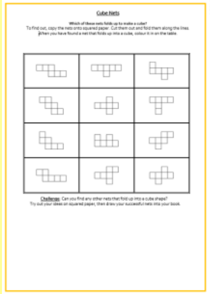
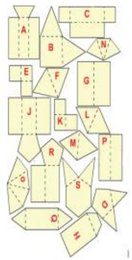
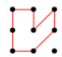
			 
	Comparing and classifying • *compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals and regular polygons*		On a 3 x 3 grid you can make polygons with 3, 4, 6,and 7 sides.  Have a go! How many different polygons can you make on 4 x 4, 5 x 5, 6 x 6 grids? Use this task for the children to generate shapes and then they could classify them.
	Angles • *recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.*	Revolution	**Convince me**  One angle at the point where the diagonals of a rectangle meet is 36 degrees. What could the other angles be? Convince me

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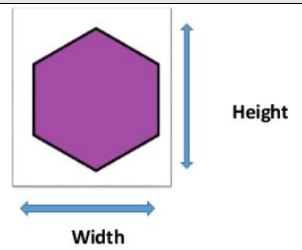
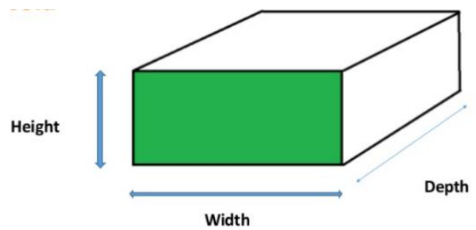
Glossary

These terms have been described to the level of our most able Year 6 child.
When describing the properties of these shapes to children you will have to use your teacher's judgement to decide how to describe these shapes in an appropriate way.

Example: A Year 1 child may describe a square as *'a 2D shape with 4 equal sides'*.
However, as the children progress you would expect them to be able to articulate the properties of shapes in a much more sophisticated way.
A Year 6 child may describe a square as *'a 2D shape with 4 equal sides and 4 vertices; this means the shape is a quadrilateral. It has four equal angles too which makes it a regular shape. The four angles are all equal at 90° and total 360°; this is the same total for all quadrilaterals. The shape has 2 sets of parallel lines but no perpendicular lines.'*

	Term	**Definition**	**Example**
	Two- dimensional (2D)	A shape that only has two dimensions; length and width (height)	
	Three-dimensional (3D)	A shape that has three dimensions; length, width(height) and depth.	

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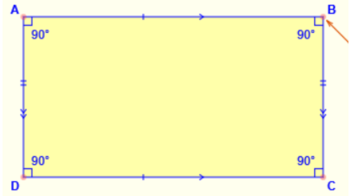
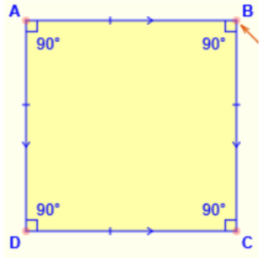
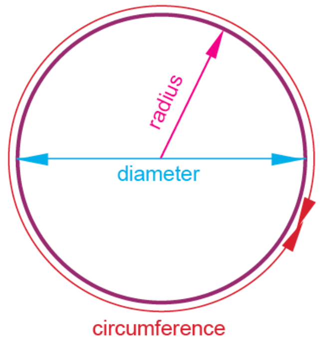
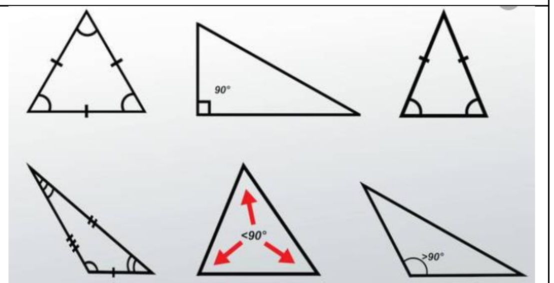
	Rectangle	Polygon/quadrilateral with 4 sides and 4 vertices. 4 right angles at 90°. Opposite sides (2 sets) parallel lines.	
	Square	Polygon/quadrilateral with 4 sides and 4 vertices. 4 right angles at 90°. All 4 sides are equal and opposite sides are parallel.	
	Circle	A round, 2D shape. All points on the edge of the circle are at the same distance from the center and the angles in a circle total 360°.	
	Triangle	Triangles are polygons with the least possible number of sides (three). The three internal angles of a triangle always add to 180 degrees.	

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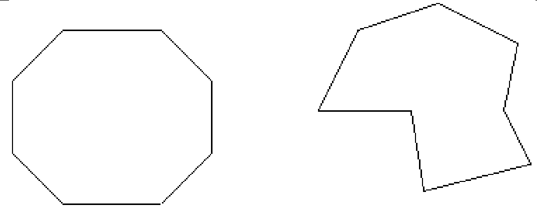
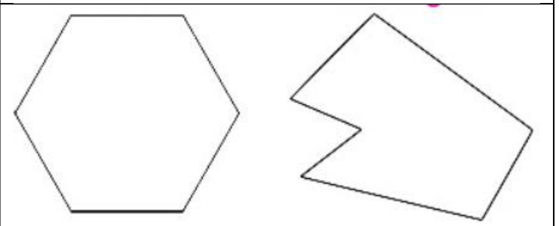
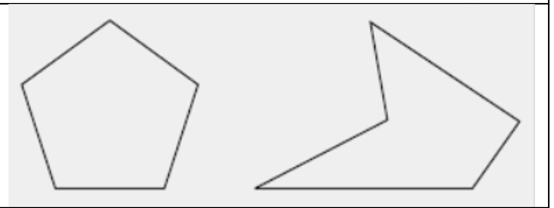
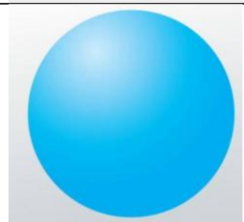
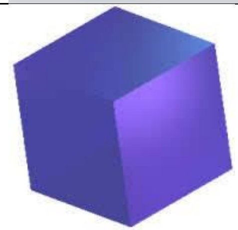
	Octagon	A 2D polygon with 8 straight sides and 8 interior angles.	
	Hexagon	A 2D polygon with 6 straight sides and 6 interior angles.	
	Pentagon	A 2D polygon with 5 straight sides and 5 interior angles.	
	Sphere	A 3D shape with 1 curved face and no edges or vertices. Every point on the surface is the same distance from the centre.	
	Cube	A 3D shape with flat sides. It has 6 square faces, 8 vertices and 12 edges.	

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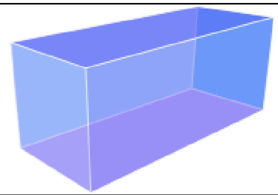
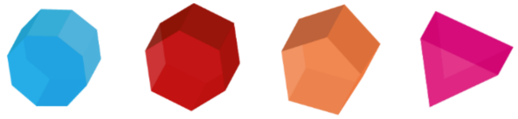
	Cuboid	A 3D shape with flat sides. It has 6 rectangular faces, 8 vertices and 12 edges.	
	Pyramid	A 3D shape with flat sides. It has a base made from a polygon. Each edge is joined by triangles which then meet at a top which is a vertex.	
	Prism	A 3D shape with flat sides. It has two ends that are the same shape and size. Each edge is joined by rectangles. (It has the same cross-section all along the shape from end to end; that means if you cut through it you would see the same 2D shape as on either end.)	
	Cylinder	A 3D shape with two circular flat faces opposite to one another. The body of the shape is curved.	
	Cone	A 3D shape with a single circular flat face as its base. The body of the shape has curved sides that lead up to a vertex.	

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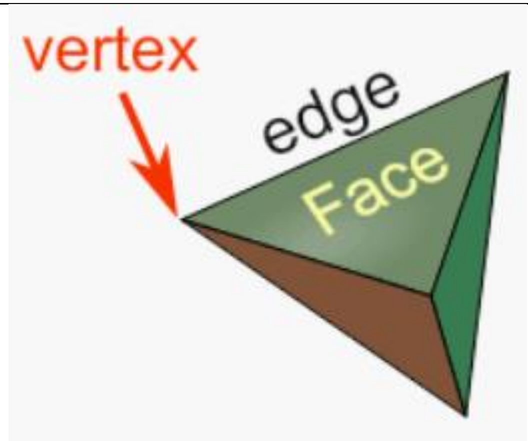
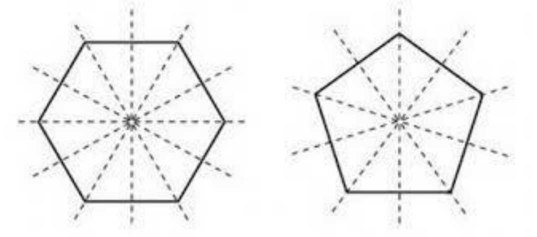
<table>
<tr><td></td><td>Edges</td><td>The side of a polygon or a line segment where two faces of a 3D shape meet.</td><td rowspan="3">
</td></tr>
<tr><td></td><td>Vertex/vertices</td><td>A point where two lines meet on either 2D or 3D shapes.</td></tr>
<tr><td></td><td>Faces</td><td>An individual flat surface of a solid object/3D shape.</td></tr>
<tr><td></td><td>Symmetry /Symmetrical</td><td>A shape or object is symmetrical when one half is a mirror image of the other half. It may be divided by one or more lines of symmetry.</td><td></td></tr>
<tr><td></td><td>Polygon</td><td>A 2D shape with straight sides that is fully closed (all the sides are joined up). The sides must be straight. Polygons may have any number of sides but due to the sides being joined up the minimum amount of sides is 3.</td><td></td></tr>
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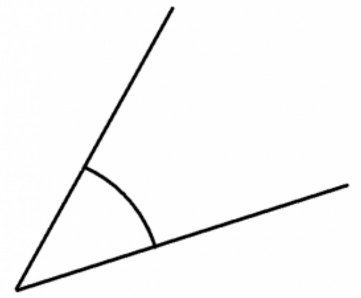
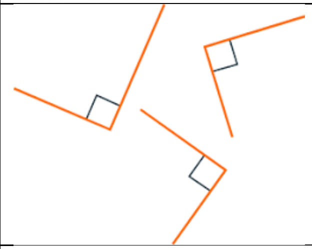
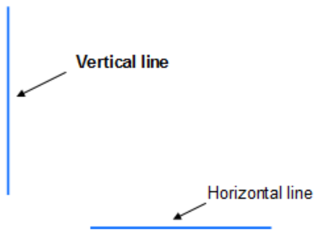
	Angle	The space between two intersecting lines.	
	Right angle	An angle that is measuring 90° exactly.	
	Horizontal	A line that runs left and right. On a coordinate grid it would have the same y coordinate at any point.	
	Vertical	A line that runs up and down. On a coordinate grid it would have the same x coordinate at any point.	
	Perpendicular	Perpendicular lines cross each other at right angles.	

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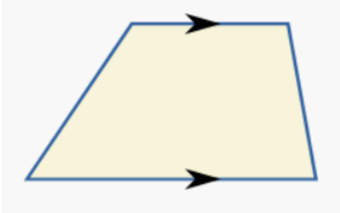
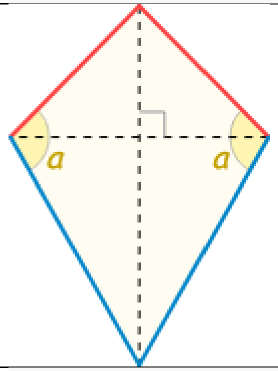
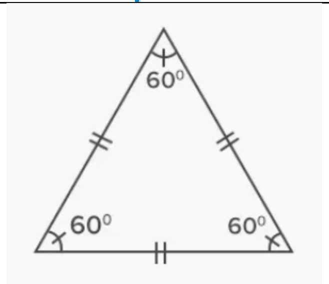
	Parallel	Lines that are an equal distance apart and will never meet.	
	Trapezium	A 2D quadrilateral that has one pair of parallel sides.	
	Kite	A Kite is a 2D quadrilateral shape with two pairs of equal-length adjacent (next to each other) sides.	
	Equilateral triangle	A polygon with 3 equal sides. The three interior angles are equal (60°) and always add up to 180°.	

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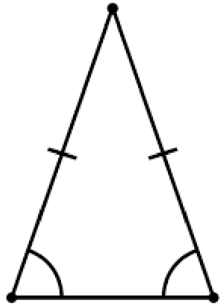
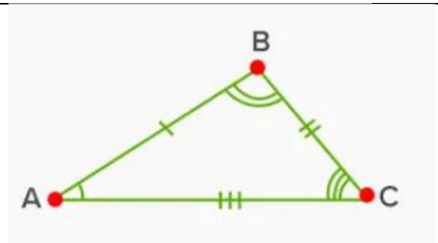
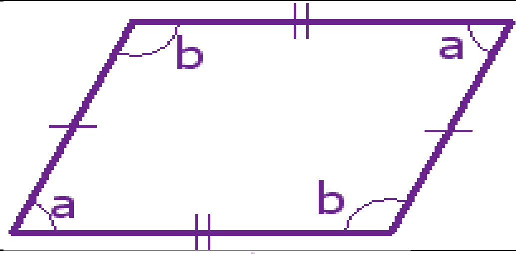
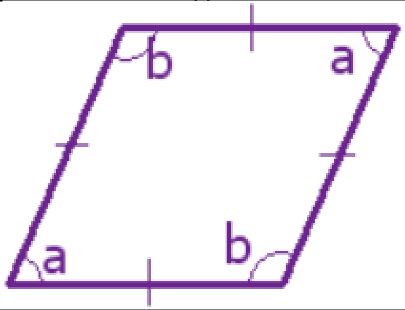
	Isosceles triangle	A polygon with 3 sides but 2 of which are equal. 2 interior angles are equal and always add up to 180°.	
	Scalene triangle	A polygon with 3 sides but none of which are equal. None of the angles are equal to one another but always add up to 180°.	
	Parallelogram	A 2D quadrilateral that has 2 sets of opposite sides that are parallel and 2 sets of opposite angles that are equal.	
	Rhombus	A 2D quadrilateral that has 4 equal sides and 2 sets of opposite angles that are equal.	

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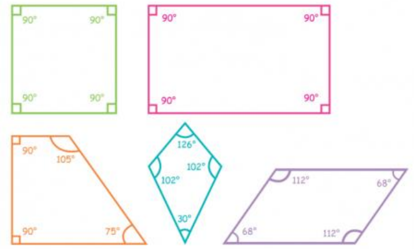
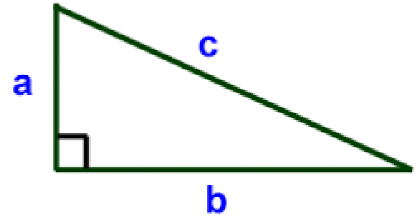
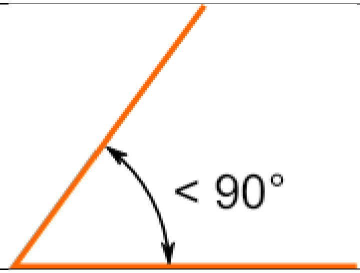
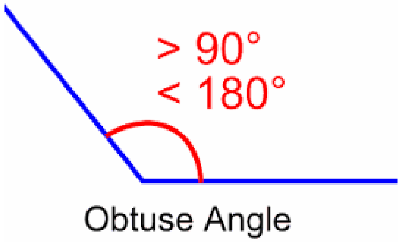
	Quadrilateral	A 4-sided 2D shape	
	Right-angled triangle	A polygon with 3 sides where one of the angles are equal to 90°. All 3 angles always add up to 180°.	
	Acute	An angle which is less than the size of a right angle 90°.	
	Obtuse	An angle which is greater than a 90° (or a straight line) but less than the size of a half turn 180°.	

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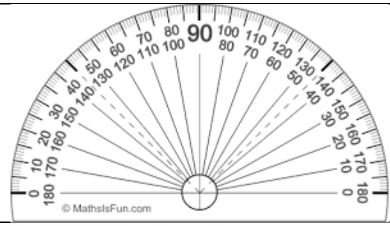
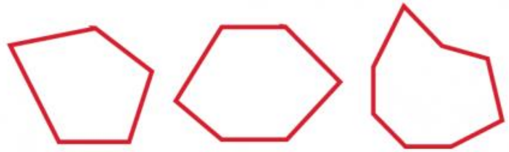
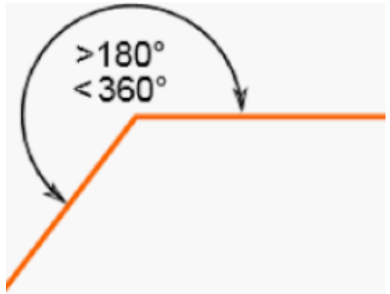
	Degrees	The unit of measure used to measure the size of an angle. E.g. 360° 180° 90°	
	Regular	A shape that has sides that are equal and interior angles that are equal.	
	Irregular	A shape that has sides of any length and angles of any size.	
	Reflex	An angle which is greater than a 180° (or a straight line) but less than the size of a full revolution 360°.	

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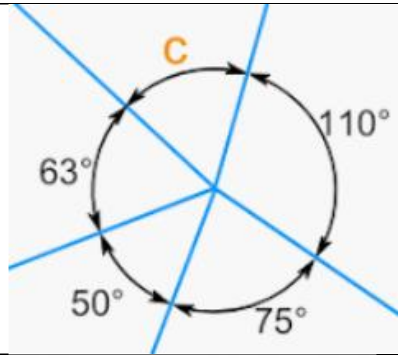
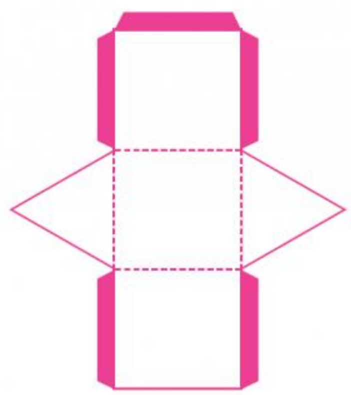
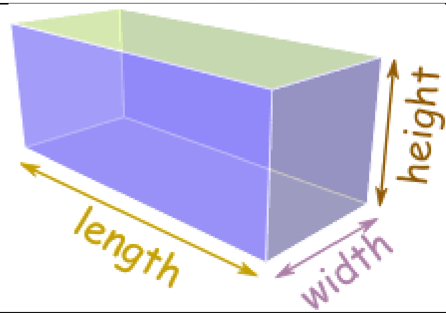
	Angles at a point	Have a common endpoint which is the centre of a circle. The sum of the angles around a point would always be 360°.	
	Nets	A pattern that you can cut and fold to make a model of a solid 3D shape.	
	Dimensions	A measurable size of something. Most often refers to length, width and height.	

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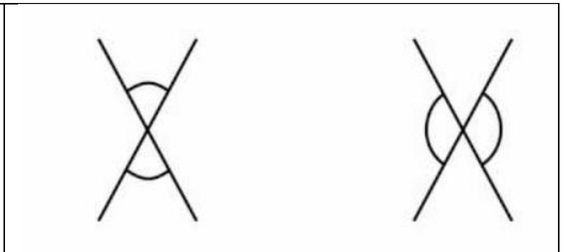
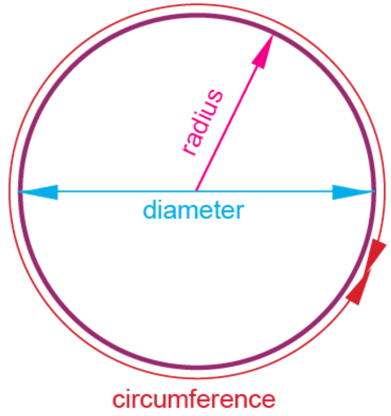
	Opposite angles	Where two lines intersect, the opposite angles are equal to one another.	
	Radius	The distance from one side of a circle to the centre point. Radius x 2 = Diameter of a circle	
	Diameter	The distance from one side of the circle to the opposite side. Diameter is equal to twice its radius.	
	Circumference	The measured distance around the edge of a circle.	
	Revolution	A full turn within a circle = 360°