





# **Geometry Progression of skills**



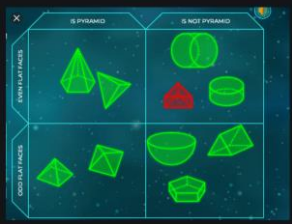
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GEOMETRY: PROPERTIES OF SHAPES

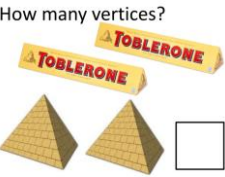
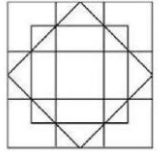



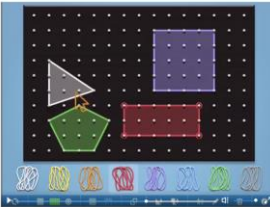
	National curriculum objective	Vocabulary	Lesson ideas
Year 1	<b>Identifying shapes and their properties</b> <ul style="list-style-type: none"> <li><i>Recognise and name common 2D/3D shapes</i></li> </ul>	2D 3D Rectangle Square Circles Triangles Cuboids Cubes Pyramids Spheres	 <p>How many different shapes can you spot on the superheroes?</p>  <p>Exploring the properties of 2D and 3D shapes</p> <p>Applicable for all year groups- use chatterpix for children to verbally explain the properties of shapes- MrP ICT</p>

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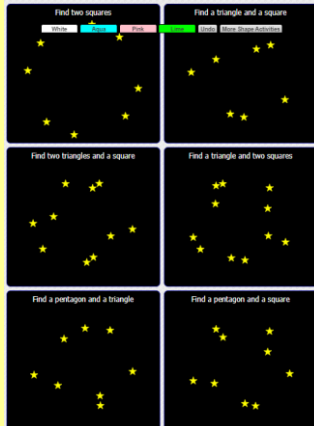
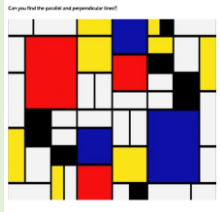




Year 2	<p><b>Identifying shapes and their properties</b></p> <ul style="list-style-type: none"> <li>• <i>identify and describe the properties of 2D shapes including the number of sides and line symmetry in a vertical line</i></li> <li>• <i>identify and describe the properties of 3D including the number of edges, vertices and faces</i></li> <li>• <i>identify 2D shapes on the surface of 3D shapes</i></li> </ul>	<p><b>Revise previous year groups vocabulary.</b></p> <p>Pentagon Hexagon Octagon Prism Cylinder Cone Edges Vertex/vertices Faces Symmetry Symmetrical</p>	<div style="display: flex; justify-content: space-between;"> <div style="width: 60%;">  </div> <div style="width: 35%; background-color: #fff9c4;"></div> </div> <div style="background-color: #263238; color: white; padding: 10px;"> <p><b>Lego Symmetry</b></p>  <p>Challenge:</p> <ul style="list-style-type: none"> <li>• Create a Lego masterpiece with line symmetry.</li> <li>• Basic level: build a Lego creation with at least one line of symmetry. When you're done, show the lines of symmetry.</li> <li>• Advanced: decide on how many lines of symmetry the creation will have. One? Two? More? Build a structure to those specifications.</li> </ul> </div>
	<p><b>Comparing and classifying</b></p> <ul style="list-style-type: none"> <li>• <i>Compare and sort common 2D/3D shapes and everyday objects</i></li> </ul>		<div style="background-color: #004d40; color: white; padding: 10px;">  <p><a href="https://mathsframe.co.uk/en/resources/resource/114/sorting-3d-shapes-on-a-carroll-diagram">https://mathsframe.co.uk/en/resources/resource/114/sorting-3d-shapes-on-a-carroll-diagram</a></p> <p>There are several questions that you could select from or the children. Another way of using ICT during Maths lessons.</p> </div>

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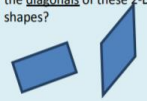
Year 3	<p><b>Identifying shapes and their properties</b></p> <ul style="list-style-type: none"> <li>• <i>Revision of shapes from Year 1 and 2</i></li> </ul>	<p><b>Revise previous year groups vocabulary</b></p> <p>Polygon</p>	<p><b>Visualising</b> I am thinking of a 3-dimensional shape which has faces that are triangles and squares. What could my shape be?</p> <p>How many vertices?</p>  <p><b>Links to measure</b></p> <p>2D Shape Challenge</p> <p>How many squares are there?</p>  <p><b>What's the same, what's different?</b> What is the same and different about these three 2-D shapes?</p> 
	<p><b>Drawing and constructing</b></p> <ul style="list-style-type: none"> <li>• <i>draw 2D shapes and make 3D shapes using modelling materials</i></li> <li>• <i>recognise 3D shapes in different orientations and describe them</i></li> </ul>	<p><b>Orientation</b></p>	<p><b>Other possibilities</b> One face of a 3-D shape looks like this.</p>  <p>What could it be? Are there any other possibilities?</p> <p>How many cubes are there?</p>  <p>Using the free Geoboard app the children can draw shapes and explain their properties through voice recording.</p> 

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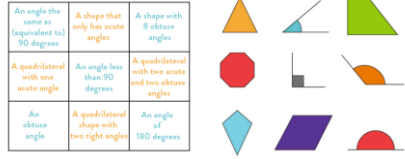
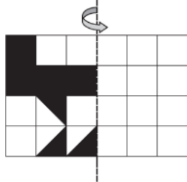


			 <p><a href="https://www.transum.org/software/Online_Exercise/ShapesInTheStars/">https://www.transum.org/software/Online_Exercise/ShapesInTheStars/</a></p>
	<p><b>Angles</b></p> <ul style="list-style-type: none"> <li>• <i>recognise angles as a property of a shape or a description of a turn</i></li> <li>• <i>identify right angles/recognise two right angles make a half turn/three make a three quarter turn/four complete a turn</i></li> <li>• <i>identify whether angles are greater than or less than a right angle</i></li> <li>• <i>identify horizontal and vertical lines and pairs of perpendicular and parallel lines.</i></li> </ul>	<p><b>Angles</b></p> <p>Right angle Half turn Three quarters of a turn Horizontal lines Vertical lines Pairs of perpendicular lines Pairs of parallel lines</p>	<p><b>Convince me</b></p> <p>Which capital letters have perpendicular and / or parallel lines? Convince me.</p>  <div> <p>The arrow on a spinner started in this position.</p>  <p>After making a turn it ended in this position.</p>  <p>Jack says,  The arrow has moved a quarter turn anti-clockwise.</p> <p>Alex says,  The arrow has moved a three-quarter turn clockwise.</p> <p>Who do you agree with?</p> </div>

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			 <p>Perpendicular and parallel line video. Simple and easy to understand.  <a href="https://www.bbc.co.uk/bitesize/topics/zb6tyrd/articles/zp327hv">https://www.bbc.co.uk/bitesize/topics/zb6tyrd/articles/zp327hv</a></p>
Year 4	<b>Identifying shapes and their properties</b> <ul style="list-style-type: none"> <li>identify lines of symmetry in 2D shapes presented in <b>different orientations</b></li> </ul>	<b>Revise previous year groups vocabulary.</b> Trapezium Kite Equilateral triangle Isosceles triangle Scalene triangle Parallelogram Rhombus	<div> <div> <p><b>What's the same, what's different?</b>            What is the same and what is different about the <b>diagonals</b> of these 2-D shapes?</p>  </div> <div> <p><b>Visualising</b>            Imagine a square cut along the diagonal to make two triangles. Describe the triangles. Join the triangles on different sides to make new shapes. Describe them. (you could sketch them)            Are any of the shapes symmetrical? Convince me.</p> </div> </div> <p> <a href="https://www.youtube.com/watch?time_continue=12&amp;v=JQUTVgT9RXY&amp;feature=emb_logo">https://www.youtube.com/watch?time_continue=12&amp;v=JQUTVgT9RXY&amp;feature=emb_logo</a> - Types of triangle song            Parallelogram song- explains can be a square or a rectangle  <a href="https://www.youtube.com/watch?v=Rpkjb4Tx844">https://www.youtube.com/watch?v=Rpkjb4Tx844</a> </p>

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			<div><div>Parallelogram Song</div><div></div><div>Draw a quick 3 x 3 grid on your whiteboard. Answer each question by drawing the correct shape in the grid square.</div><div><table><tr><td>An angle the same as (equivalent to) 90 degrees</td><td>A shape that only has acute angles</td><td>A shape with 8 obtuse angles</td></tr><tr><td>A quadrilateral with one acute angle</td><td>An angle less than 90 degrees</td><td>A quadrilateral with two acute and two obtuse angles</td></tr><tr><td>An obtuse angle</td><td>A quadrilateral shape with two right angles</td><td>An angle of 180 degrees</td></tr></table></div></div>	An angle the same as (equivalent to) 90 degrees	A shape that only has acute angles	A shape with 8 obtuse angles	A quadrilateral with one acute angle	An angle less than 90 degrees	A quadrilateral with two acute and two obtuse angles	An obtuse angle	A quadrilateral shape with two right angles	An angle of 180 degrees
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<div><div>Drawing and constructing</div><div><ul style="list-style-type: none"><li><i>complete a simple symmetric figure with respect to a specific line of symmetry</i></li></ul></div></div>		<div><div></div><div><div>Other possibilities</div><div>Can you draw a non-right angled triangle with a line of symmetry?</div><div>Are there other possibilities.</div></div></div> <div><div>Lego Symmetry</div><div></div><div><div>Challenge:</div><div>1. Create a Lego masterpiece with line symmetry<ul style="list-style-type: none"><li>Basic level: build a Lego creation with at least one line of symmetry. When you're done, show the lines of symmetry.</li><li>Advanced: decide on how many lines of symmetry the creation will have. One? Two? More? Build a structure to those specifications.</li></ul></div></div></div>										
<div><div>Comparing and classifying</div><div><ul style="list-style-type: none"><li><i>compare and classify geometric shapes including quadrilaterals and</i></li></ul></div></div>	<div><div>Quadrilateral</div></div>	<div><div><div>Always, sometimes, never</div><div>Is it always, sometimes or never true that the two diagonals of a rectangle meet at right angles.</div></div><div></div></div>										

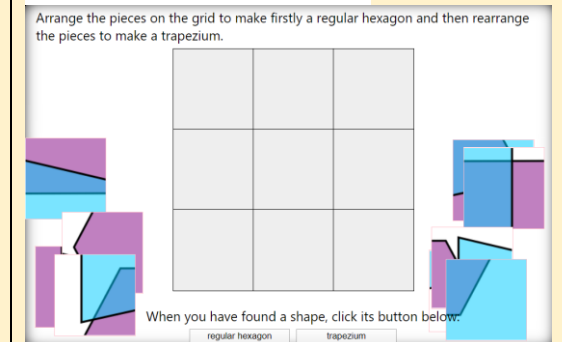
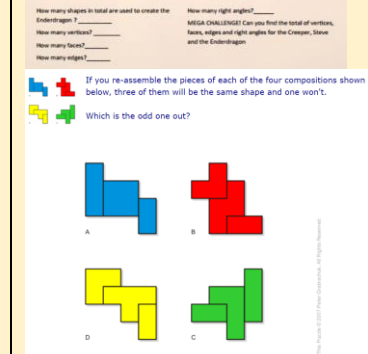
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	<i>triangles based on their properties and sizes</i>		<p>Quadrilateral song  <a href="https://www.youtube.com/watch?v=WmKY_uIku9Q">https://www.youtube.com/watch?v=WmKY_uIku9Q</a></p>
	<p><b>Angles</b></p> <ul style="list-style-type: none"> <li><i>identify acute and obtuse angles and compare and order angles up to two right angles by size</i></li> </ul>	<p>Right-angled triangle            Acute            Obtuse</p>	<p><b>Convince me</b></p> <p>Ayub says that he can draw a right angled triangle which has another angle which is obtuse. Is he right? Explain why.</p> 
Year 5	<p><b>Identifying shapes and their properties</b></p> <ul style="list-style-type: none"> <li><i>identify 3D shapes including cubes and other cuboids from 2D representations</i></li> </ul>	<b>Revise previous year groups vocabulary.</b>	<p><b>What's the same, what's different?</b> What is the same and what is different about the net of a cube and the net of a cuboid?</p> <p><b>Visualising</b>            I look at a large cube which is made up of smaller cubes.</p>  <p>If the larger cube is made up of between 50 and 200 smaller cubes what might it look like?</p>





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[https://www.transum.org/Maths/Activity/Polygon\\_Pieces/](https://www.transum.org/Maths/Activity/Polygon_Pieces/)

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	<p><b>Drawing and constructing</b></p> <ul style="list-style-type: none"> <li>• <i>draw given angles and measure them in degrees</i></li> </ul>	<p>Degrees</p>	<p><b>Other possibilities</b> Here is one angle of an isosceles triangle. You will need to measure the angle accurately. What could the other angles of the triangle be? Are there any other possibilities?</p> 
	<p><b>Comparing and classifying</b></p> <ul style="list-style-type: none"> <li>• <i>use the properties of rectangles to deduce related facts and find missing lengths and angles</i></li> <li>• <i>distinguish between regular and irregular polygons based on reasoning about equal side and angles</i></li> </ul>	<p>Regular Irregular</p>	<p><b>Always, sometimes, never</b> Is it always, sometimes or never true that the number of lines of reflective symmetry in a regular polygon is equal to the number of its sides <math>n</math>.</p> 

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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 =  $360^\circ$ /straight line =  $180^\circ$  and other multiples of  $90^\circ$*

### Reflex

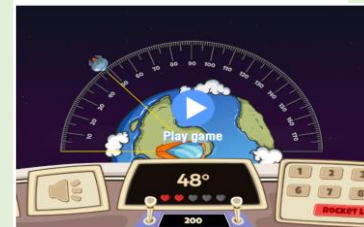
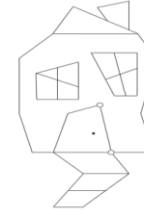
Angles at a point  
 $360^\circ$

### 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 plan 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  $45^\circ$  angle from the roof. Label all of the angles.



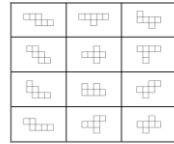
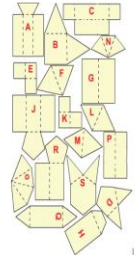


<https://mathsframe.co.uk/en/resources/resource/470/Angle-Alien-Attack>

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Year 6	<b>Identifying shapes and their properties</b> <ul style="list-style-type: none"> <li>• <i>recognise, describe and build simple 3D shapes (inc. making nets)</i></li> <li>• <i>illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius</i></li> </ul>	<b>Revise previous year groups vocabulary.</b> Nets Dimensions Opposite angles Radius Diameter Circumference	<div> <b>What's the same, what's different?</b> What is the same and what is different about the nets of a triangular prism and a square based pyramid? </div> <div> <b>Visualising</b>  Jess has 24 cubes which she builds to make a cuboid. Write the dimensions of cuboids that she could make. List all the possibilities. </div>
	<b>Drawing and constructing</b> <ul style="list-style-type: none"> <li>• <i>recognise, describe and build simple 3D shapes (inc. making nets)</i></li> <li>• <i>draw 2D shapes using given dimensions and angles</i></li> </ul>		<div> <b>Other possibilities</b>  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<sup>3</sup>. </div> <div> <p>Draw a ring around the letter of the correct net for each cube.</p> <div> 1.  </div> <div> 3.  </div> </div> <div> <p>2. Now make your own net puzzle.</p>  </div>

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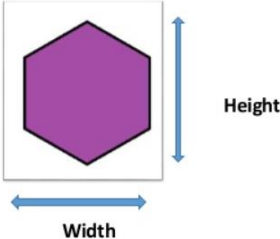
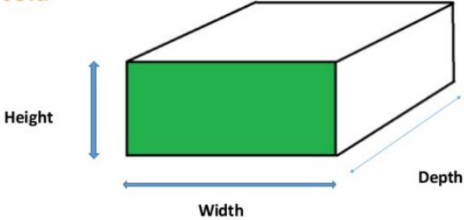
			<div data-bbox="1608 212 2152 507"> <div> <p><b>Goal 100</b></p> <p>Most of these can be used to make a cube. To find out, copy them onto a grid and try to make a cube. You can use any of the pieces. You can also use the pieces to make a cube. You can also use the pieces to make a cube. You can also use the pieces to make a cube.</p>  <p><b>Challenge</b> Can you find any other shapes that can be used to make a cube?</p> <p>You can also use the pieces to make a cube. You can also use the pieces to make a cube. You can also use the pieces to make a cube.</p> </div> <div> <p>Here are the nets of 9 solid shapes. Each one of these has been cut into 2 pieces. Use the net of the cube.</p>  </div> </div>
	<p><b>Comparing and classifying</b></p> <ul style="list-style-type: none"> <li><i>compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals and regular polygons</i></li> </ul>		<div data-bbox="1608 507 2152 853"> <p>On a 3 x 3 grid you can make polygons with 3, 4, 6, and 7 sides.</p>  <p>Have a go!</p> <p>How many different polygons can you make on 4 x 4, 5 x 5, 6 x 6 grids?</p> <p>Use this task for the children to generate shapes and then they could classify them.</p> </div>
	<p><b>Angles</b></p> <ul style="list-style-type: none"> <li><i>recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.</i></li> </ul>	<p>Revolution</p>	<div data-bbox="1608 853 2152 1353"> <p><b>Convince me</b></p>  <p>One angle at the point where the diagonals of a rectangle meet is 36 degrees. What could the other angles be? Convince me</p> </div>

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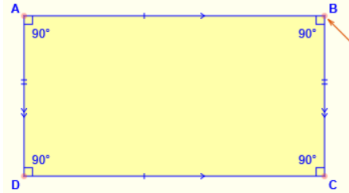
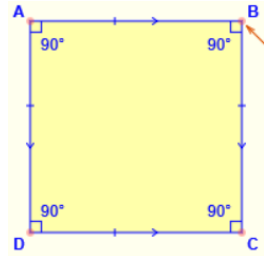
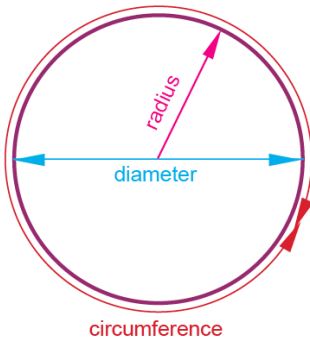
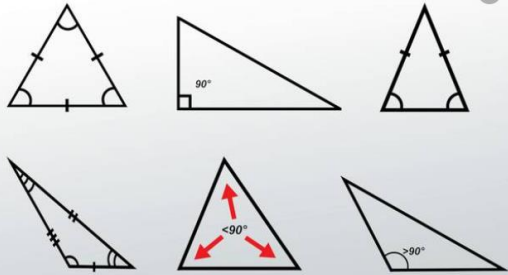
### **Glossary**

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.

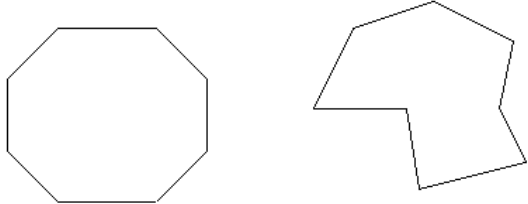
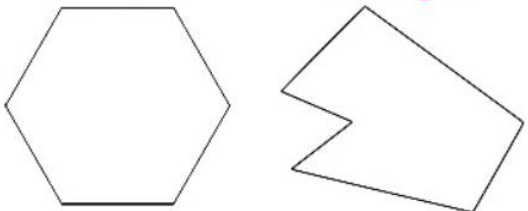
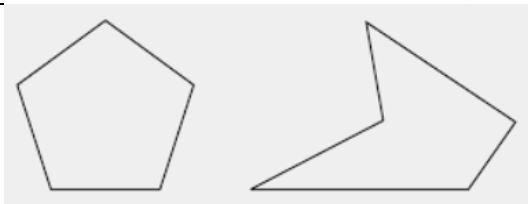

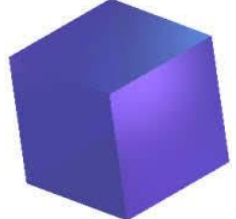
**Example:** A Year 1 child may describe a square as '*a 2D shape with 4 equal sides*'.  
However, as the children progress you would expect them to be able to articulate the properties of shapes in a much more sophisticated way.  
A Year 6 child may describe a square as '*a 2D shape with 4 equal sides 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.*'

	<u><b>Term</b></u>	<u><b>Definition</b></u>	<u><b>Example</b></u>
	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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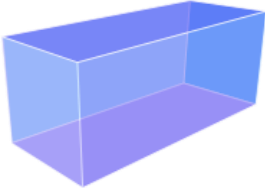

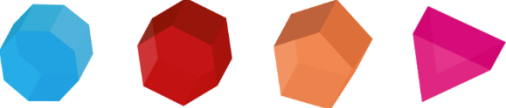


	Rectangle	Polygon/quadrilateral with 4 sides and 4 vertices. 4 right angles at $90^\circ$ . Opposite sides (2 sets) parallel lines.	
	Square	Polygon/quadrilateral with 4 sides and 4 vertices. 4 right angles at $90^\circ$ . All 4 sides are equal and opposite sides are parallel.	
	Circle	A round, 2D shape. All points on the edge of the circle are at the same distance from the center and the angles in a circle total $360^\circ$ .	
	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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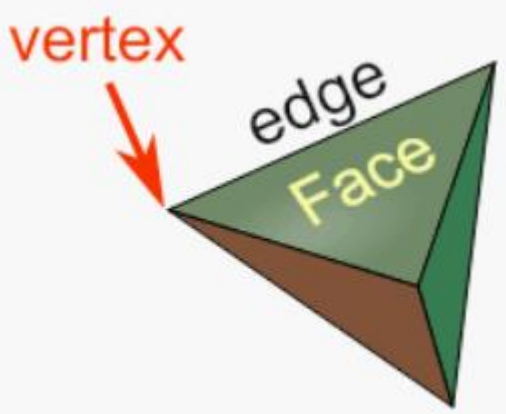
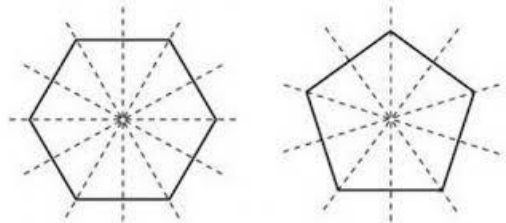

	Octagon	A 2D polygon with 8 straight sides and 8 interior angles.	
	Hexagon	A 2D polygon with 6 straight sides and 6 interior angles.	
	Pentagon	A 2D polygon with 5 straight sides and 5 interior angles.	
	Sphere	A 3D shape with 1 curved face and no edges or vertices. Every point on the surface is the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



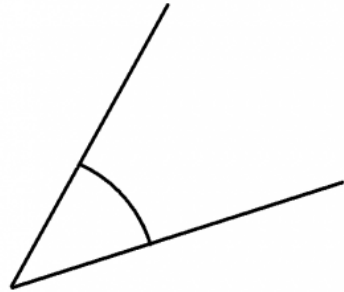
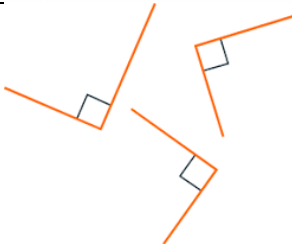
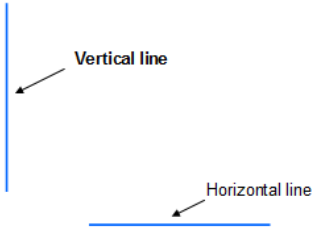

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	Cuboid	A 3D shape with flat sides. It has 6 rectangular faces, 8 vertices and 12 edges.	
	Pyramid	A 3D shape with flat sides. It has a base made from a polygon. Each edge is joined by triangles which then meet at a top which is a vertex.	
	Prism	A 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.	


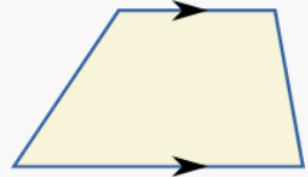
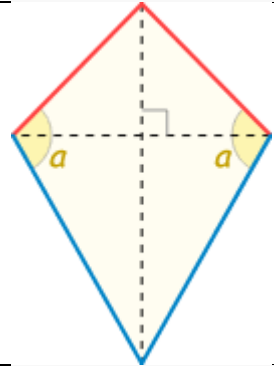
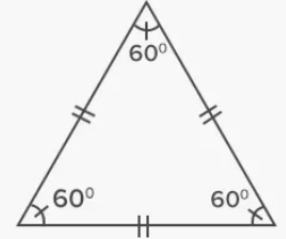
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	Edges	The side of a polygon or a line segment where two faces of a 3D shape meet.	
	Vertex/vertices	A point where two lines meet on either 2D or 3D shapes.	
	Faces	An individual flat surface of a solid object/3D shape.	
	Symmetry /Symmetrical	A shape 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.	
	Polygon	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.	

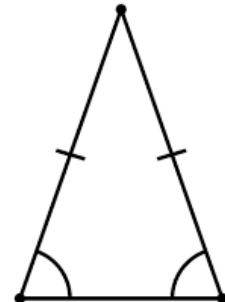
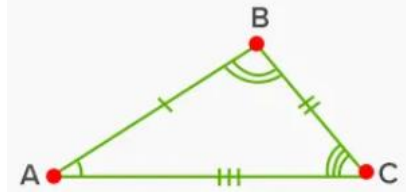
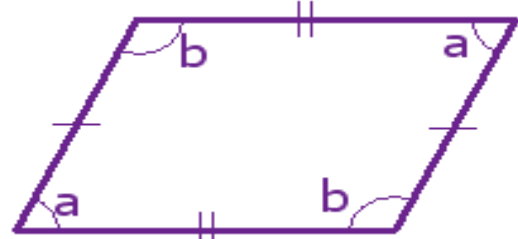
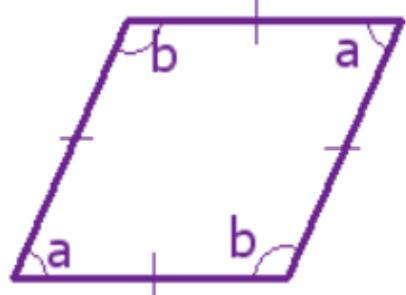
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	Angle	The space between two intersecting lines.	
	Right angle	An angle that is measuring 90° exactly.	
	Horizontal	A line that runs left and right. On a coordinate grid it would have the same y coordinate at any point.	
	Vertical	A line that runs 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.	

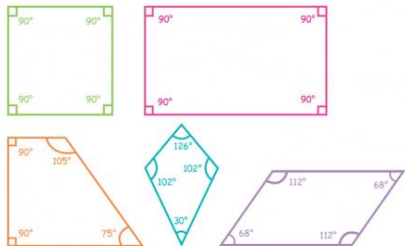
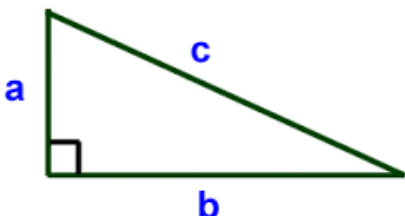
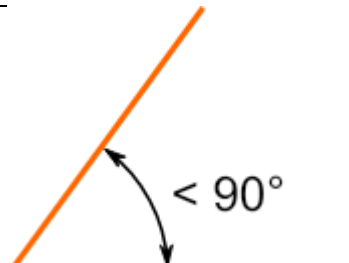
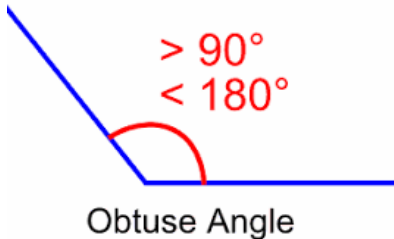
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	Parallel	Lines that are an equal distance apart and will never meet.	
	Trapezium	A 2D quadrilateral that has one pair of parallel sides.	
	Kite	A Kite is a 2D quadrilateral shape with two pairs of equal-length adjacent (next to each other) sides.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

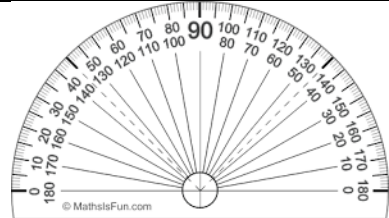


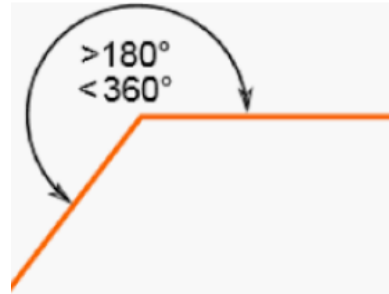
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	Isosceles triangle	A polygon with 3 sides but 2 of which are equal. 2 interior angles are equal and always add up to $180^\circ$ .	
	Scalene triangle	A polygon with 3 sides but none of which are equal. None of the angles are equal to one another but always add up to $180^\circ$ .	
	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.	

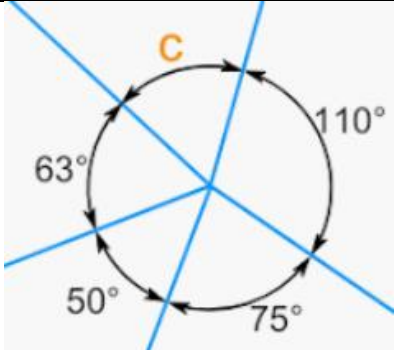
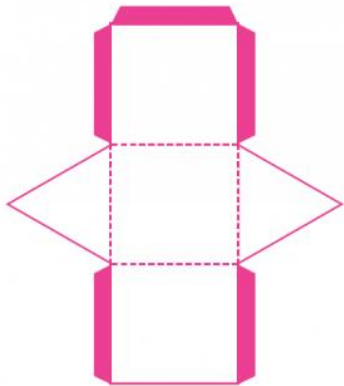
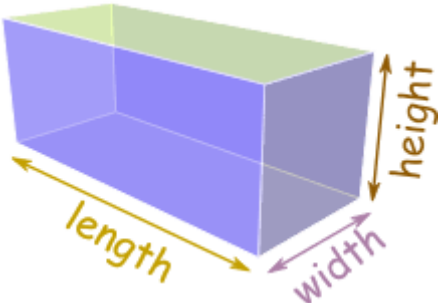
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	Quadrilateral	A 4-sided 2D shape	
	Right-angled triangle	A polygon with 3 sides where one of the angles are equal to $90^\circ$ . All 3 angles always add up to $180^\circ$ .	
	Acute	An angle which is less than the size of a right angle $90^\circ$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

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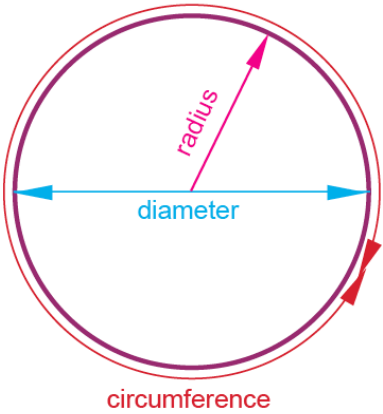
	Degrees	The unit of measure used to measure the size of an angle. E.g. $360^\circ$ $180^\circ$ $90^\circ$	
	Regular	A shape that has sides that are equal and interior angles that are equal.	
	Irregular	A shape that has sides of any length and angles of any size.	
	Reflex	An angle which is greater than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

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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 $360^\circ$ .	 A diagram showing a circle with a center point. Four lines intersect at the center, dividing the circle into eight sectors. Four of these sectors are labeled with their angles: $63^\circ$ , $50^\circ$ , $75^\circ$ , and $110^\circ$ . The center point is labeled with a small orange 'C'.
	Nets	A pattern that you can cut and fold to make a model of a solid 3D shape.	 A net of a rectangular prism, drawn in pink. It consists of six rectangles arranged in a cross-like pattern. The top and bottom rectangles are connected to a central vertical column of three rectangles. The two side rectangles are attached to the middle rectangle of this column.
	Dimensions	A measurable size of something. Most often refers to length, width and height.	 A 3D diagram of a rectangular prism. The front face is light blue, the top face is light green, and the right side face is a darker blue. Three dimensions are labeled with arrows: 'length' (yellow arrow along the bottom front edge), 'width' (purple arrow along the bottom right edge), and 'height' (brown arrow along the right vertical edge).



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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°	