

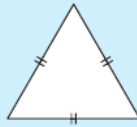
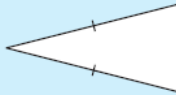
## MATHS Unit 3

### 2D Geometry: classifying and constructing 2D shapes

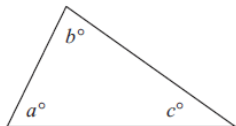
#### PROPERTIES OF TRIANGLES

A triangle is a three-sided polygon

- **scalene** where the 3 sides all have different lengths
- **isosceles** where 2 sides have the same length
- **equilateral** where all 3 sides have the same length.

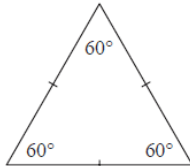


In any triangle the sum of the angles is  $180^\circ$ .

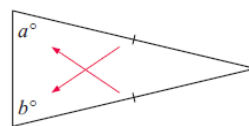


$$a + b + c = 180$$

All angles of an equilateral triangle measure  $60^\circ$ .



The angles opposite the equal sides of an isosceles triangle are equal.



$$a = b$$

#### PROPERTIES OF POLYGONS

Keywords	Definition/Tips	Example
1. Square	<ul style="list-style-type: none"> <li>• Four equal sides</li> <li>• Four right angles</li> <li>• Opposite sides parallel</li> <li>• Diagonals bisect each other at right angles</li> <li>• Four lines of symmetry</li> <li>• Rotational symmetry of order four</li> </ul>	
2. Rectangle	<ul style="list-style-type: none"> <li>• Two pairs of equal sides</li> <li>• Four right angles</li> <li>• Opposite sides parallel</li> <li>• Diagonals bisect each other, not at right angles</li> <li>• Two lines of symmetry</li> <li>• Rotational symmetry of order two</li> </ul>	
3. Rhombus	<ul style="list-style-type: none"> <li>• Four equal sides</li> <li>• Diagonally opposite angles are equal</li> <li>• Opposite sides parallel</li> <li>• Diagonals bisect each other at right angles</li> <li>• Two lines of symmetry</li> <li>• Rotational symmetry of order two</li> </ul>	
4. Parallelogram	<ul style="list-style-type: none"> <li>• Two pairs of equal sides</li> <li>• Diagonally opposite angles are equal</li> <li>• Opposite sides parallel</li> <li>• Diagonals bisect each other, not at right angles</li> <li>• No lines of symmetry</li> <li>• Rotational symmetry of order two</li> </ul>	
5. Kite	<ul style="list-style-type: none"> <li>• Two pairs of adjacent sides of equal length</li> <li>• One pair of diagonally opposite angles are equal (where different length sides meet)</li> <li>• Diagonals intersect at right angles, but do not bisect</li> <li>• One line of symmetry</li> <li>• No rotational symmetry</li> </ul>	
6. Trapezium	<ul style="list-style-type: none"> <li>• One pair of parallel sides</li> <li>• No lines of symmetry</li> <li>• No rotational symmetry</li> </ul> <p>Special Case: Isosceles Trapeziums have one line of symmetry.</p>	

## THE NUMBER PLANE

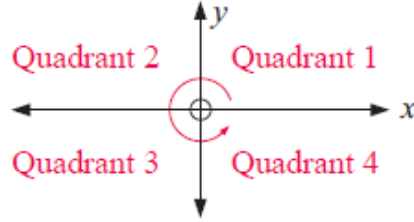
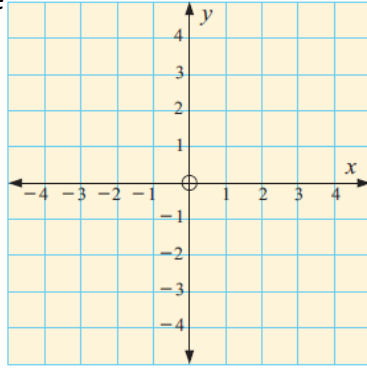
In the centre of the number plane is the origin O.

The x-axis is positive to the right of O and negative to the left of O.

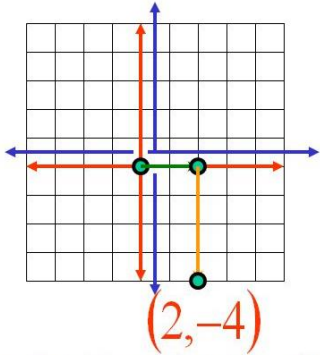
The y-axis is positive above O and negative below O.

The number plane is called the **Cartesian** plane, which takes its name from the mathematician **René Descartes**.

The Cartesian plane is divided into four quadrants, numbered in an anti-clockwise direction.



## Plotting Points in a Coordinate Plane



Up and down  
 $(x, y)$   
 Left and right

To plot the point  $(2, -4)$ , start at the origin and go 2 units to the right, then go 4 units down. This is the point  $(2, -4)$

## CONGRUENCE AND SIMILARITY

Keywords	Definition/Tips	Example
Congruent Shapes	<p>Shapes are congruent if they are <b>identical - same shape and same size</b>.</p> <p>Shapes can be rotated or reflected but still be congruent.</p> <p>4 ways of proving that two triangles are congruent:</p> <ol style="list-style-type: none"> <li>1. <b>SSS</b> (Side, Side, Side)</li> <li>2. <b>RHS</b> (Right angle, Hypotenuse, Side)</li> <li>3. <b>SAS</b> (Side, Angle, Side)</li> <li>4. <b>ASA</b> (Angle, Side, Angle) or <b>AAS</b></li> </ol> <p><u>ASS does not prove congruency.</u></p>	<p><math>BC = DF</math>  <math>\angle ABC = \angle EDF</math>  <math>\angle ACB = \angle EFD</math>  <math>\therefore</math> The two triangles are congruent by AAS.</p>
Congruent Triangles	<p>Shapes are similar if they are the <b>same shape but different sizes</b>.</p> <p>The proportion of the matching sides must be the same, meaning the ratios of corresponding sides are all equal.</p>	
Similar Shapes		