

Properties of Shapes

Knowledge Organiser

Key Vocabulary

angle
 right angle
 acute
 obtuse
 reflex
 protractor
 horizontal
 vertical
 parallel
 perpendicular
 polygon
 regular
 irregular
 two-dimensional
 three-dimensional
 flat face
 curved surface
 edge
 curved edge
 vertex
 vertices
 apex
 radius
 diameter
 circumference

Year 6

Angle Types



Acute Angles

Any angle that measures less than 90° is called an **acute** angle.



Obtuse Angles

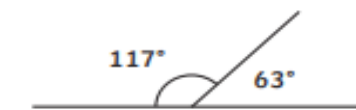
Any angle that measures greater than 90° and less than 180° is called an **obtuse** angle.



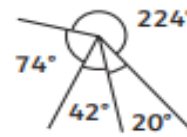
Reflex Angles

Any angle that measures greater than 180° is called a **reflex** angle.

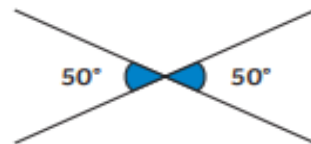
Calculating Angles



Angles on a straight line always total 180° .



Angles around a point always total 360° .



Opposite angles that share a vertex are equal.



$\frac{1}{4}$ turn
 90°



$\frac{1}{2}$ turn
 180°



$\frac{3}{4}$ turn
 270°

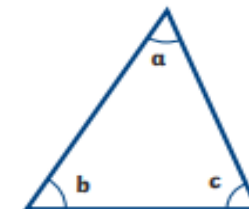


1 turn
 360°



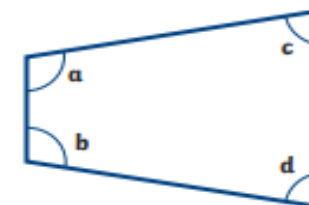
Multiples of 90° can be used as descriptions of a turn.

Angles in a Triangle



$$a + b + c = 180^\circ$$

Angles in a Quadrilateral



$$a + b + c + d = 360^\circ$$

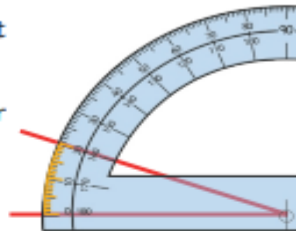
Properties of Shapes

Using a Protractor

Place the cross or circle at the point of the angle you are measuring.

Read from the zero on the outer scale of your protractor.

Count the degree lines carefully.

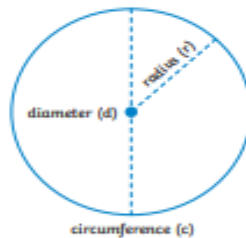


Parts of Circles

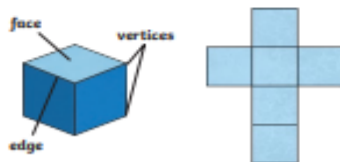
A circle is a 2D shape. The perimeter of a circle is called the **circumference** (c). The distance across the circle, passing through the centre, is called the **diameter** (d).

The distance from the centre of the circle to the circumference is called the **radius** (r).

$$r \times 2 = d \quad \frac{d}{2} = r$$



Nets of 3D Shapes



A shape net shows which 2D shapes can be folded and joined to make a 3D shape. When you are drawing a net, or solving a problem involving a shape net, think carefully about where the edges of the faces meet.

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Angles in Regular Polygons

As the number of sides of a polygon increases by one, the total of the interior angles increases by 180° . When n = number of sides, this formula can be used to find the size of each angle in a **regular polygon**:

$$\text{Sum of Interior Angles} = (n - 2) \times 180^\circ$$

$$\text{Each Angle} = \frac{(n - 2) \times 180^\circ}{n}$$



Pentagon

$$n = 5$$

$$(5 - 2) \times 180^\circ = 540^\circ$$

$$540^\circ \div 5 = 108^\circ$$



Hexagon

$$n = 6$$










$$(6 - 2) \times 180^\circ = 720^\circ$$

$$720^\circ \div 6 = 120^\circ$$

Properties of 3D Shapes

3D shapes have three dimensions – **length, width** and **depth**.

A **polyhedron** is a 3D shape with flat faces. Spheres, cylinders and cones are not polyhedrons as they have curved surfaces.

Cube  6 square faces 12 edges 8 vertices	Tetrahedron  4 triangular faces 6 edges 4 vertices	Sphere  1 curved surface 0 edges 0 vertices
Cuboid  6 faces 12 edges 8 vertices	Octahedron  8 faces 12 edges 6 vertices	Triangular prism  5 faces 9 edges 6 vertices
Square-based pyramid  5 faces 8 edges 5 vertices	Cone  1 circular face 1 curved surface 1 curved edge 1 apex	Cylinder  2 circular faces 1 curved surface 2 curved edges 0 vertices