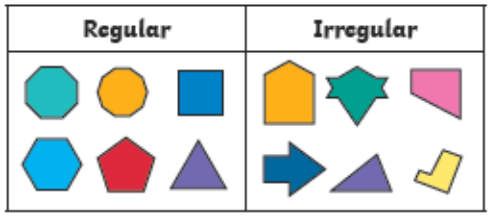
Properties of Shape: Year 5

Key Vocabulary	Definition
angle	The number of degrees rotated around a point
right angle	An angle which measures 90 degrees
protractor	Used to measure angles in degrees
horizontal	Describes a line parallel to the earth's surface.
vertical	A line which is at right angles to a horizontal line.
parallel	Lines which are always an equal distance apart
perpendicular	A line at right angles to another line
polygon	A two-dimensional shape having three or more straight sides
regular	Shapes which have all equal sides and all equal angles
irregular	Shapes which do not have all equal sides and all equal angles
two-dimensional (2d)	Having two dimensions of length and width (cannot be picked up)
three-dimensional (3d)	Having three dimensions of length, width and height (can be picked up)
flat face	A flat surface of a three-dimensional (3d) object
curved surface	A curved surface of a three-dimensional (3d) object
edge	Where two faces of a three-dimensional object meet.
vertex / vertices	The point at which two or more arms of an angle meet or the adjacent sides of a polygon meet
apex	the highest point, the point at the top of a shape

Regular and Irregular Polygons



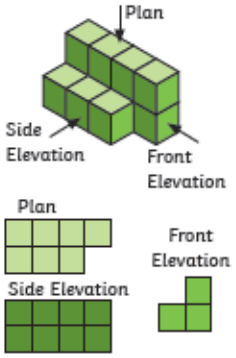
A polygon is any two-dimensional shape formed with straight lines.

In a regular polygon, all the sides and angles are equal.

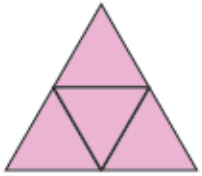
In an irregular polygon, the sides and angles are not equal.

Representations

Cube models can be drawn as 2D representations using different elevations.



A shape net is a 2D drawing of an unfolded 3D shape. When you are drawing or reasoning about shape nets, think carefully about where the edges of the faces meet.



Shape net of a tetrahedron.

Properties of 3D Shapes

Name	Surfaces		Edges		Vertices	Picture
	Flat	Curved	Flat	Curved		
sphere	0	1	0	0	0	
cube	6	0	12	0	8	
cuboid	6	0	12	0	8	
cone	1	1	0	1	0	
cylinder	2	1	0	2	0	
square-based pyramid	5	0	8	0	5	
tetrahedron	4	0	6	0	4	
triangular prism	5	0	9	0	6	
pentagonal prism	7	0	15	0	10	
hexagonal prism	8	0	18	0	12	
octagonal prism	10	0	24	0	16	
octahedron	8	0	12	0	6	

A cone has an apex. This is because a vertex is the point where two straight edges meet and a cone has no straight edges.

Real Life

- **Building:** Making sure shelves / doors are at right angles.
- **Sports players:** Knowing what angle to kick / hit a ball at to pass / score.
- **Deliveries:** Nets of boxes for deliveries / pizza boxes
- **Measuring planets:** How far away from one another are planets / stars?

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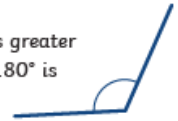
Identifying Angles

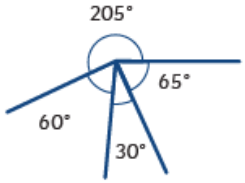
Acute Angles
Any angle that measures less than 90° is called an **acute** angle.

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



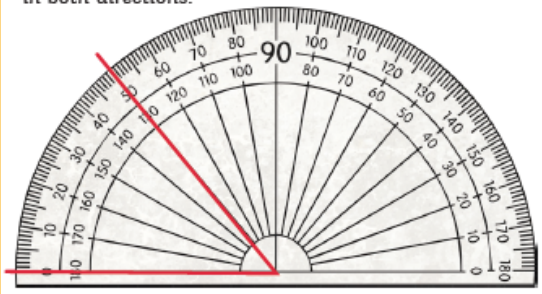
Reflex Angles
Any angle that measures greater than 180° is called a **reflex** angle.

Angles on a straight line always total 180°.

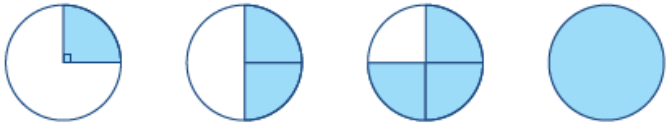


Angles around a point always total 360°.

Measuring and Drawing Angles
To measure angles, we use a protractor. Look carefully at how the numbers on the scale count from 0° to 180° in both directions.

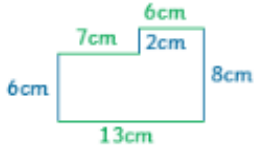


Multiples of 90° can be used as descriptions of a turn.



$\frac{1}{4}$ turn = 90° $\frac{1}{2}$ turn = 180° $\frac{3}{4}$ turn = 270° 1 turn = 360°

Using Properties of Rectangles



6cm + 2cm = 8cm

7cm + 6cm = 13cm

Zooming out...

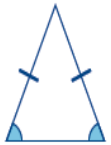
- **Ancient Egyptians.** In 1500BC in Egypt, measurements were taken of the Sun's shadow against graduations marked on stone tables (a sun dial)
- **'Geometry'** comes from the Greek word *geometria*, meaning 'earth measurement'
- **Ancient Egyptians** are thought to be the first group to begin studying geometry. We can see evidence of this type of thinking with their design and construction of the Great Pyramids

Prior Knowledge

Triangles

Triangles have 3 sides and 3 vertices. The total of the angles in a triangle is 180°.

An equilateral triangle is a regular polygon. It has sides of equal length and each angle is 60°.



An isosceles triangle has two sides of equal length and two angles of equal size.

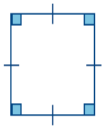
A right-angled triangle always has one 90°angle.

It can be isosceles or scalene.

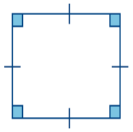
A scalene triangle has no equal sides or angles.

Quadrilaterals

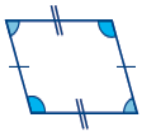
A quadrilateral is a polygon with four sides.



A square has four sides of equal length and four right angles (90°). A square is also a rectangle, a rhombus and a parallelogram.

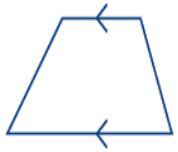


A rectangle has two pairs of parallel, equal sides and four right angles. A rectangle is also a parallelogram.

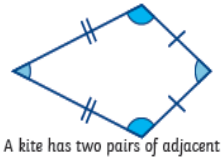


A parallelogram has two pairs of parallel, equal sides and opposite equal angles.

A rhombus has four sides of equal length and opposite equal angles. A rhombus is also a parallelogram.



A trapezium only has one pair of opposite parallel sides.



A kite has two pairs of adjacent equal sides and one pair of opposite equal angles.