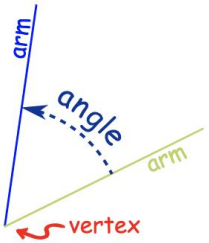
Geometry glossary

Position and Direction and Properties of Shapes

Angles



angle (KS1): An angle is a measure of rotation and is often shown as the amount of rotation required to turn one line segment onto another where the two line segments meet at a point (vertex)

turn (KS1): A rotation about a point: a quarter turn is a rotation of 90°. A half turn is a rotation of 180°, a whole turn is a rotation of 360°

clockwise (KS1): In the direction in which the hands of an analogue clock travel

anticlockwise (KS1): In the opposite direction from the normal direction of travel of the hands of an analogue clock

rotation (KS1): In 2-D, a transformation of the whole plane which turns about a fixed point, the centre of rotation. A is specified by a centre and an (anticlockwise) angle

direction (KS1): The orientation of a line in space. e.g. north, south, east, west; up, down, right, left are directions

right (KS2): Used as an adjective, right-angled or erect. Example: In a right cylinder the centre of one circular base lies directly over the centre of the other

quarter turn (KS1): A rotation through 90°, usually anticlockwise unless stated otherwise

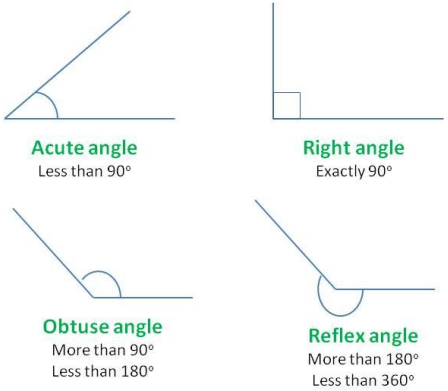
Angles

degree (KS2): The most common unit of measurement for angle. One whole turn is equal to 360 degrees, written 360°

acute angle (KS2): An angle between 0° and 90°

right angle (KS2): One quarter of a complete turn. An angle of 90 degrees.

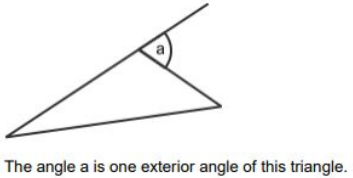
- An acute angle is less than one right angle.
- An obtuse angle is greater than one right angle but less than two.
- A reflex angle is greater than two right angles.



obtuse angle (KS2): An angle greater than 90° but less than 180°

reflex angle (KS2): An angle that is greater than 180° but less than 360°

exterior angle (UKS2/KS3): Of a polygon, the angle formed outside between one side and the adjacent side produced. This is the angle that has to be turned at the vertex if you are travelling around a shape e.g. as in LOGO



The angle a is one exterior angle of this triangle.

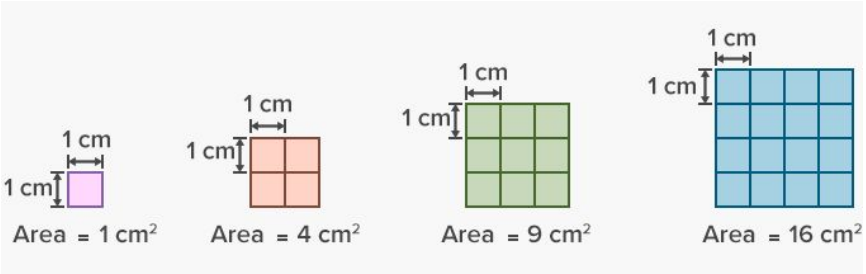
angle at a point (KS2): The complete angle all the way around a point is 360°

angle at a point on a line (KS2): The sum of the angles at a point on a line is 180°

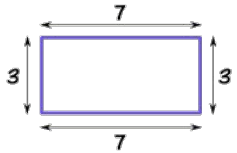
protractor (KS2): An instrument for measuring angles

Area and Perimeter

area (KS2): A measure of the size of any plane surface. Area is usually measured in square units e.g. square centimetres (cm^2), square metres (m^2)



perimeter (KS2): The length of the boundary of a closed figure

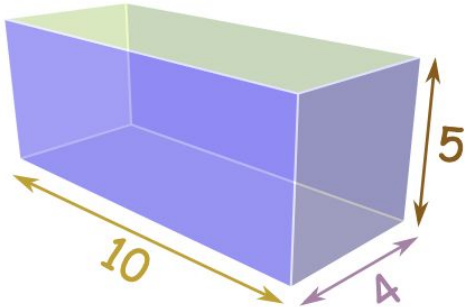


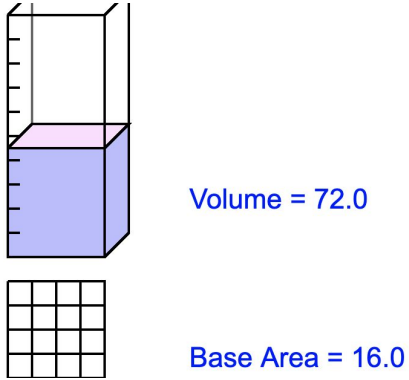
square centimetre and square metre (KS2): Square centimetre = A unit of area, a square measuring 1 cm by 1 cm.
Square metre = A unit of area, a square measuring 1 m by 1 m.
$100mm^2 = 1cm^2$
$10{,}000\ cm^2 = 1\ m^2$

Note: 2cm squared is not the same as 2 square cm.
$2cm^2$ is 2 square cm and not 2 cm squared

Volume

volume (KS1): A measure of three-dimensional space. Usually measured in cubic units; for example, cubic centimetres (cm^3) and cubic metres (m^3)

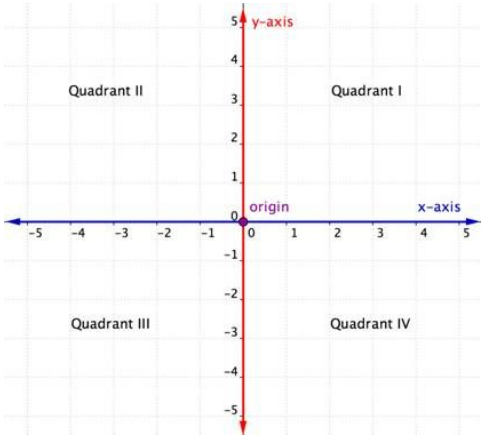




cubic centimetre (KS2): A unit of volume. The three-dimensional space equivalent to a cube with edge length 1cm

cubic metre (KS2): A unit of volume. A three-dimensional space equivalent to a cube of edge length 1m

Co-ordinates



Position (KS1): Location as specified by a set of coordinates in a plane or in full 3-dimensional space.

Coordinate (KS2): In geometry, a coordinate system is a system which uses one or more numbers, or coordinates, to uniquely determine the position of a point in space.
See Cartesian coordinates.

Axis (KS2): A fixed, reference line along which or from which distances or angles are taken

Quadrant (KS2): One of the four regions into which a plane is divided by the x and y axes in the Cartesian coordinate system.
Origin (KS2): A fixed point from which measurements are taken. See also Cartesian coordinate system.

Cartesian coordinate system (KS2): A system used to define the position of a point in two- or three-dimensional space.
Two axes at right angles to each other are used to define the position of a point in a plane. The usual conventions are to label the horizontal axis as the x-axis and the vertical axis as the y-axis with the origin at the intersection of the axes. The ordered pair of numbers (x, y) that defines the position of a point is the coordinate pair. The origin is the point (0,0); positive values of x are to the right of the origin and negative values to the left, positive values of y are above the origin and negative values below the origin. Each of the numbers is a coordinate.

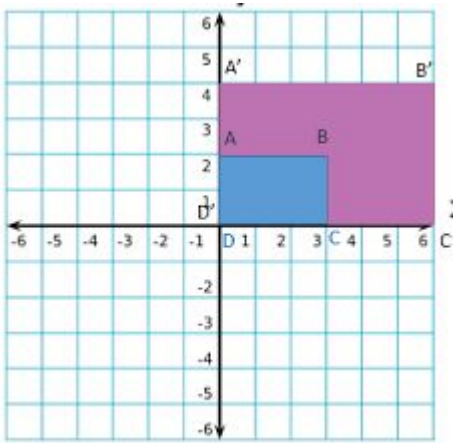
Co-ordinates

Orientation (KS2): How a line segment or other geometric shape is positioned with respect to a coordinate system.

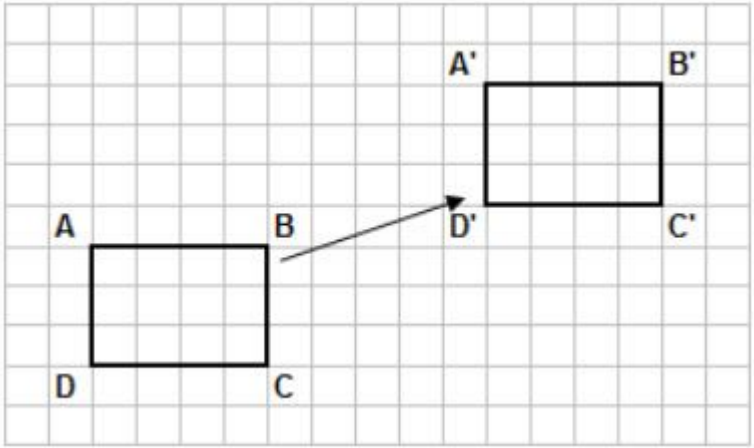
Transformation (UKS2/KS3): A change that is, or is equivalent to, a change in the position or direction of the coordinate axes

Scale factor (KS2): For two similar geometric figures, the ratio of corresponding edge lengths.

Translation (KS2): A transformation in which every point of a body moves the same distance in the same direction. A transformation specified by a distance and direction (vector).

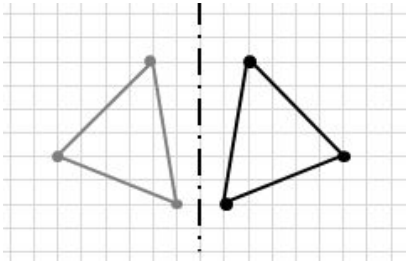


Scale factor



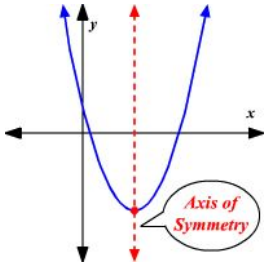
translation

Symmetry

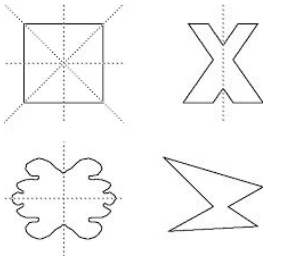


Reflection symmetry (KS2): A 2-D shape has reflection symmetry about a line if an identical-looking object in the same position is produced by reflection in that line. The line is often referred to as the 'mirror line' and it bisects the shape.

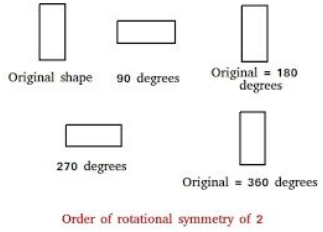
Axis of symmetry (KS1): A line about which a geometrical figure, or shape, is symmetrical or about which a geometrical shape or figure is reflected in order to produce a symmetrical shape or picture.



Symmetry (KS1): A plane figure has symmetry if it is invariant under a reflection or rotation i.e. if the effect of the reflection or rotation is to produce an identical-looking figure in the same position. See also reflection symmetry, rotation symmetry. Adjective: symmetrical. Reflective symmetry exists when for every point on one side of the line there is another point (its image) on the other side of the line which is the same perpendicular distance from the line as the initial point.
Example: a regular hexagon has six lines of symmetry; an equilateral triangle has three lines of symmetry.

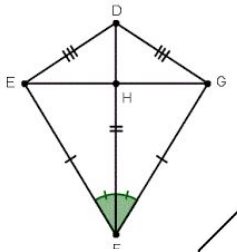


Reflection (KS2): In 2-D, a transformation of the whole plane involving a mirror line or axis of symmetry in the plane, such that the line segment joining a point to its image is perpendicular to the axis and has its midpoint on the axis. A 2-D reflection is specified by its mirror line.

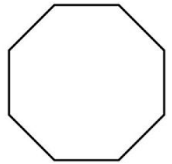


***R*otation symmetry (KS2):** A 2-D shape has rotational symmetry about a point if an identical-looking shape in the same position is produced by a rotation through some angle greater than 0° and less than 360° about that point.

2D shapes KS1

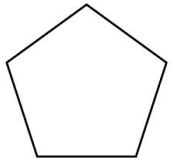


Kite (KS1): A quadrilateral with two pairs of equal, adjacent sides whose diagonals consequently intersect at right angles.

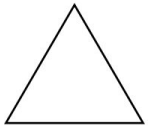


Octagon (KS1): A polygon with eight sides. Adjective: octagonal, having the form of an octagon.

Square (KS1): A quadrilateral with four equal sides and four right angles.

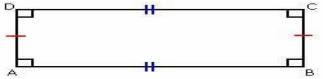


Pentagon (KS1): A polygon with five sides and five interior angles. Adjective: pentagonal, having the form of a pentagon.

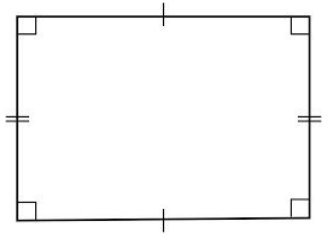


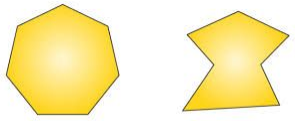
Triangle (KS1): A polygon with three sides. Adjective: triangular, having the form of a triangle.

Oblong (KS1): Sometimes used to describe a non-square rectangle – i.e. a rectangle where one dimension is greater than the other.

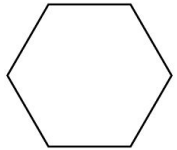


Rectangle (KS1): A parallelogram with an interior angle of 90°. Opposite sides are equal.
If adjacent sides are also equal the rectangle is a square. If adjacent sides are not equal, the rectangle is sometimes referred to as an oblong.
A square is a (special type) of rectangle but a rectangle is not a square. The use of the word 'oblong' (favoured by some) resolves this issue.
An oblong is a rectangle which is not square.



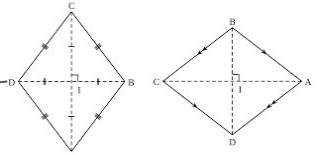


2D shapes KS2

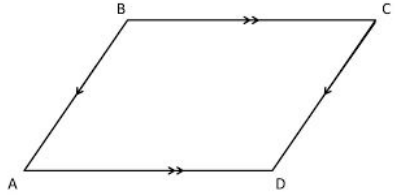


Heptagon (KS2): A polygon with seven sides and seven edges.

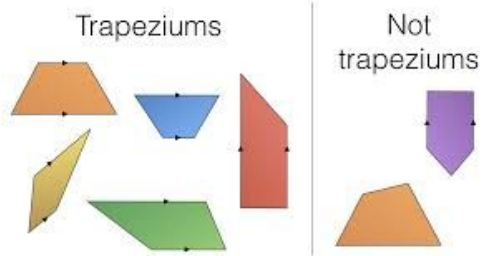
Hexagon (KS2): A polygon with six sides and six edges. Adjective: hexagonal, having the form of a hexagon.



Rhombus (KS2): A parallelogram with all sides equal.



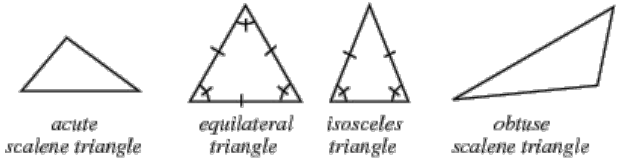
Parallelogram (KS2): A quadrilateral whose opposite sides are parallel and consequently equal in length.



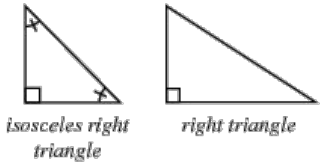
Trapezium (KS2): A quadrilateral with exactly one pair of sides parallel.

Scalene triangle (KS2): A triangle with no two sides equal and consequently no two angles equal.

Isosceles triangle (KS2): A triangle in which two sides have the same length and consequently two angles are equal. This definition includes an equilateral triangle as a special case – i.e. an equilateral triangle is isosceles and an isosceles right angle



Equilateral triangle (KS2): A triangle with all three sides of equal length. All the angles are the same (60°)



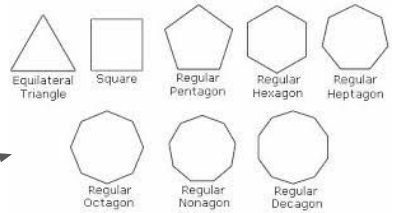
Right angle triangle (KS2): A triangle that has a right angle (90°)

2D shape vocabulary

Polygon (KS1): A closed plane figure bounded by straight lines.
The name derives from many angles. If all interior angles are less than 180° the polygon is convex. If any interior angle is greater than 180°, the polygon is concave. If the sides are all of equal length and the angles are all of equal size, then the polygon is regular; otherwise it is irregular. Adjective: polygonal.

Quadrilateral (KS1): A polygon with four sides.

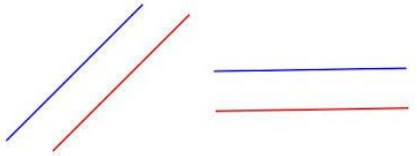
Vertex (KS1): The point at which two or more lines intersect. Plural: vertices.



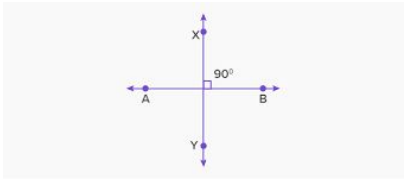
2-D (KS1): Short for 2-dimensional. A figure is two-dimensional if it lies in a plane. A plane is specified by ordered pairs of numbers called coordinates, typically (x,y)

Regular (KS2): Describing a polygon, having all sides equal and all internal angles equal.

Parallel (KS2): In Euclidean geometry, always equidistant.
Parallel lines, curves and planes never meet however far they are produced or extended.



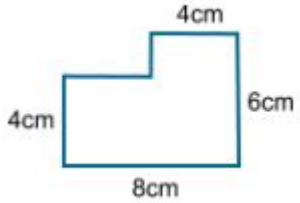
Perpendicular (KS2): A line or plane that is at right angles to another line or plane.



Equilateral (KS2): Of equal length - e.g. an equilateral triangle is a triangle with all 3 sides of equal length.

2D shape vocabulary continued …

Property (KS1): Any attribute. Example: One property of a square is that all its sides are equal.



Composite shape (KS1): A shape formed by combining two or more shapes.

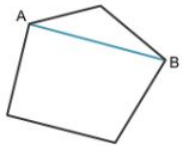
Corner (KS1): In elementary geometry, a point where two or more lines or line segments meet. More correctly called vertex, vertices (plural).
Examples: a rectangle has four corners or vertices; and a cube has eight corners or vertices.

Line (KS1): A set of adjacent points that has length but no width. A straight line is completely determined by two of its points, say A and B. The part of the line between any two of its points is a line segment.

Vertical (KS1): At right angles to the horizontal plane. The up-down direction on a graph or map.

Rectilinear (KS2): Bounded by straight lines. A closed rectilinear shape is also a polygon. A rectilinear shape can be divided into rectangles and triangles for the purpose of calculating its area.

Centre (KS2): The middle point for example of a line or a circle



The line AB is one diagonal of this polygon.

Diagonal (of a polygon) (KS2): A line segment joining any two non-adjacent vertices of a polygon.

Horizontal (KS2): Parallel to the horizon.

Intersect (UKS2/KS3): To have a common point or points. Examples: Two intersecting lines intersect at a point; two intersecting planes intersect in a line.

Concave (UKS2/KS3): Curving inwards.

Convex (UKS2/KS3): Curved outwards.

Congruent (figures) (UKS2/KS3): Two or more geometric figures are said to be congruent when they are the same in every way except their position in space.

Circles

Circle (KS1): The set of all points in a plane which are at a fixed distance (the radius) from a fixed point (the centre) also in the plane. Alternatively, the path traced by a single point travelling in a plane at a fixed distance (the radius) from a fixed point (the centre) in the same plane. One half of a circle cut off by a diameter is a semi-circle. The area enclosed by a circle of radius r is πr^2 .

Circular (KS1): 1. In the form of a circle. 2. Related to the circle, as in circular function

Radius (KS2): In relation to a circle, the distance from the centre to any point on the circle. Similarly, in relation to a sphere, the distance from the centre to any point on the sphere.

Circumference (KS2): The distance around a circle (its perimeter). If the radius of a circle is r units, and the diameter d units, then the circumference is 2 πr, or π d units.

Diameter (KS2): Any of the chords of a circle or sphere that pass through the centre.

Pi (UKS2/ KS3): Symbol: π. The ratio of the circumference of a circle to the length of its diameter is a constant called π.
π is an irrational number and so cannot be written as a finite decimal or as a fraction. One common approximation for π is 22/7 3.14159265 is a more accurate approximation, to 8 decimal places.

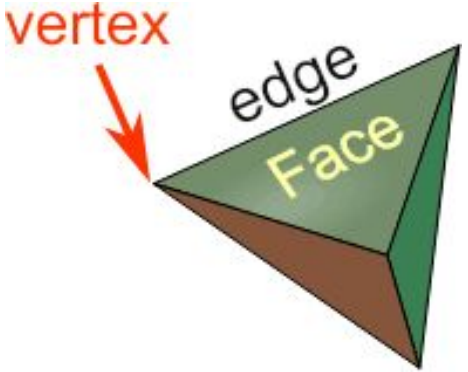
3D shape vocabulary KS1

3-D (KS1): Short for 3-dimensional. A solid is three-dimensional and occupies space (in more than one plane). A plane is specified by ordered pairs of numbers called coordinates, typically (x,y). Points in 3-dimensional space are specified by an ordered triple of numbers, typically (x, y, z).

Vertex (KS1): The point at which two or more lines intersect. Plural: vertices.

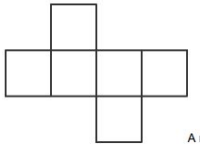
Surface (KS1): A set of points defining a space in two or three dimensions.

Face (KS1): One of the flat surfaces of a solid shape. Example: a cube has six faces; each face being a square.



3D shape vocabulary

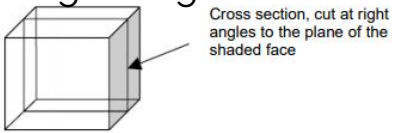
Net (KS2): A plane figure composed of polygons which by folding and joining can form a polyhedron.



A net of a cube

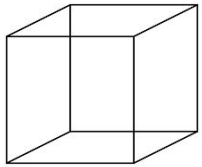
Polyhedron (KS2): Plural: polyhedra. A closed solid figure bounded by surfaces (faces) that are polygonal. Its faces meet in line segments called its edges. Its edges meet at points called vertices. *For a polyhedron to be convex, it must lie completely to one side of a plane containing any face. If it is not convex it is concave. A regular polyhedron has identical regular polygons forming its faces and equal angles formed by its surfaces and edges. The Platonic Solids are the five possible convex regular polyhedra: tetrahedron with four equilateral-triangular faces; cube with six square faces; octahedron with eight equilateral-triangular faces; dodecahedron with twelve regular- pentagonal faces; and icosahedron with twenty equilateral-triangular faces.*

Cross section (KS2): In geometry, a section in which the plane that cuts a figure is at right angles to an axis of the figure. Example: In a cube, a square revealed when a plane cuts at right angles to a face.

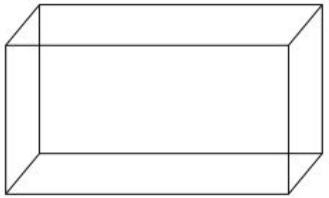


Curved surface (KS2): The curved boundary of a 3-D solid, for example; the curved surface of a cylinder between the two circular ends, or the curved surface of a cone between its circular base and its vertex, or the surface of a sphere.

3D shapes KS1

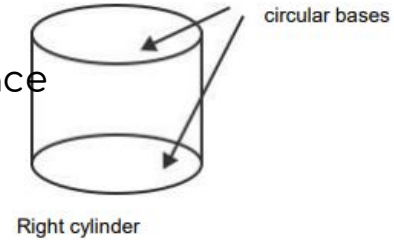


Cube (KS1): In geometry, a three-dimensional figure with six identical, square faces. Adjoining edges and faces are at right angles.

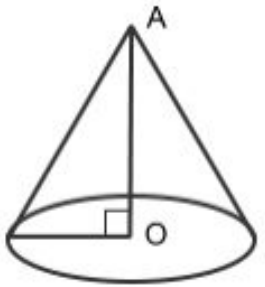


Cuboid (KS1): A three-dimensional figure with six rectangular faces

Cylinder (KS1): A three-dimensional object whose uniform cross-section is a circle.
A right cylinder can be defined as having circular bases with a curved surface joining them, this surface formed by line segments joining corresponding points on the circles. The centre of one base lies over the centre of the second.

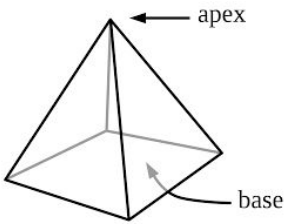


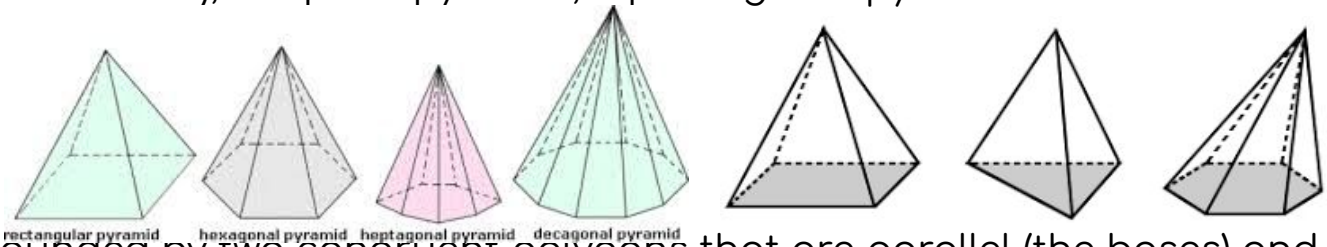
Cone (KS1): A cone is a 3-dimensional shape consisting of a circular base, a vertex in a different plane, and line segments joining all the points on the circle to the vertex.
If the vertex A lies directly above the centre O of the base, then the axis of the cone AO is perpendicular to the base and the shape is a right circular cone.



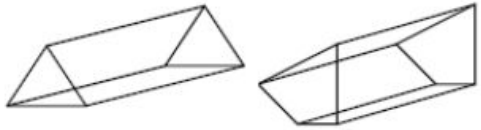
3D shapes

Pyramid (KS1): A solid with a polygon as the base and one other vertex, the apex, in another plane.
Each vertex of the base is joined to the apex by an edge. Other faces are triangles that meet at the apex.
Pyramids are named according to the base: a triangular pyramid (which is also called a tetrahedron, having four faces), a square pyramid, a pentagonal pyramid etc.

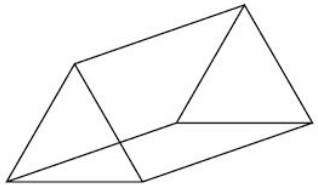


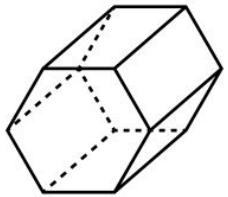


Prism (KS1): A solid bounded by two congruent polygons that are parallel (the bases) and parallelograms (lateral faces) formed by joining the corresponding vertices of the polygons.
Prisms are named according to the base e.g. triangular prism, quadrangular prism, pentagonal prism etc. A **prism** is a polyhedron, which means all faces are flat! No curved sides. For example, a **cylinder** is not a **prism**, because it has curved sides.

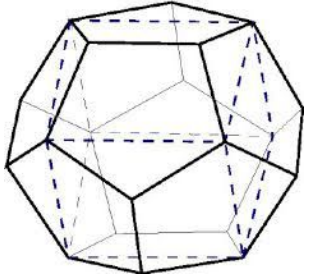


If the lateral faces are rectangular and perpendicular to the bases, the prism is a right prism.

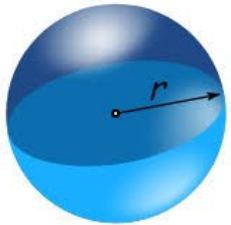




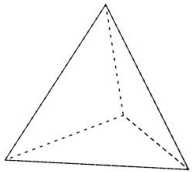
3D shapes



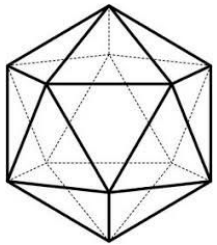
Dodecahedron (KS2): A polyhedron with twelve faces. The faces of a regular dodecahedron are regular pentagons. A dodecahedron has 20 vertices and 30 edges.



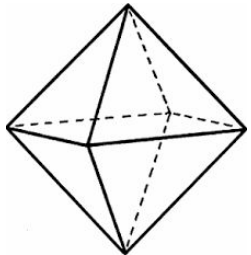
Sphere (KS2): A closed surface, in three-dimensional space, consisting of all the points that are a given distance from a fixed point, the centre. A hemisphere is a half-sphere. Adjective: spherical



Tetrahedron (KS2): A solid with four triangular faces. A regular tetrahedron has faces that are equilateral triangles. Plural: tetrahedra



Icosahedron (KS2): A polyhedron with 20 faces. In a regular Icosahedron all faces are equilateral triangles.



Octahedron (KS2): A polyhedron with eight faces. A regular octahedron has faces that are equilateral triangles.

Miscellaneous

Dissection (KS2): To cut into parts.

Pattern (KS1): A systematic arrangement of numbers, shapes or other elements according to a rule.

Point (KS2): An element, in geometry, that has position but no magnitude.

Set square (KS2): A drawing instrument for constructing parallel lines, perpendicular lines and certain angles. A set square may have angles 90° , 60° , 30°; or 90° , 45° , 45° .

Compare (KS1): In mathematics when two entities (objects, shapes, curves, equations etc.) are compared one is looking for points of similarity and points of difference as far as mathematical properties are concerned.