

Foundation GEOMETRY

Transformations

There are four transformations. Each has associated phrases which you must state to get the marks when identifying transformations.

rotation – degrees, direction (clockwise or anti-clockwise) and centre of rotation.

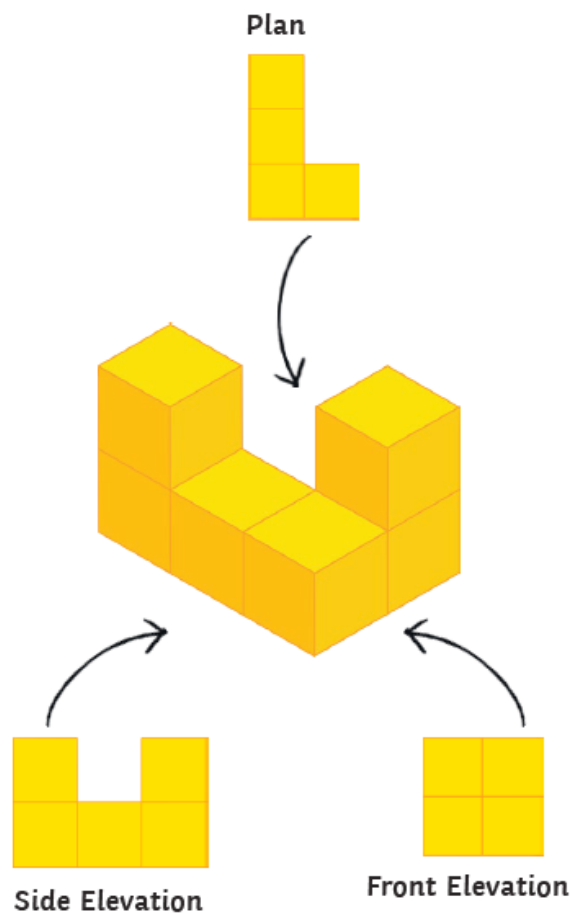
reflection – line of symmetry.

enlargement – centre of enlargement and scale factor. A negative scale factor will produce an image that is on the other side of the centre of enlargement and upside down!

translation – vector, e.g. $\begin{pmatrix} 3 \\ 5 \end{pmatrix}$ means 3 right and 5 up, $\begin{pmatrix} -2 \\ -4 \end{pmatrix}$ means 2 left and 4 down.

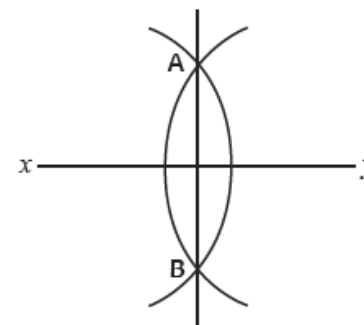
The question will usually ask you to describe a single transformation. In this case you must never write down more than one!

Plans and Elevations

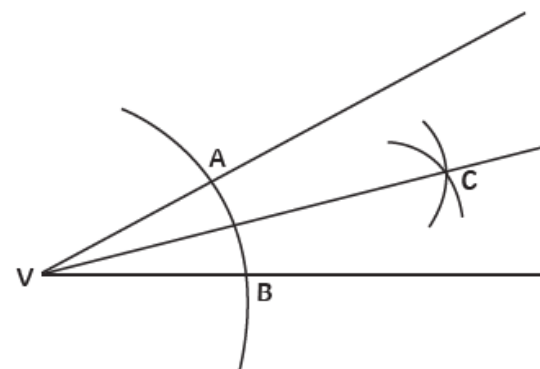


Loci and Constructions

Make sure you know how to construct SAS, ASA and SSS triangles in addition to perpendicular line bisectors:



and angle bisectors:



Never erase your construction lines!

Foundation GEOMETRY

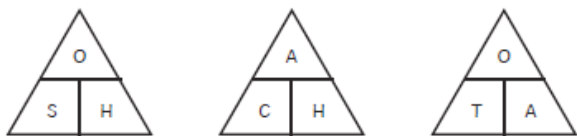
Pythagoras' Theorem

Only for right-angled triangles where no angles are given or need to be found.

$$a^2 + b^2 = c^2$$

Trigonometry

Only for right-angled triangles where angles are given or need to be found.



Volume

The space contained within a 3D shape, given by cm^3 or m^3 .

Volume of a cuboid = width \times height \times length

Volume of a prism = area of cross-section \times length

Surface Area

The total area of the faces on a 3D shape.

Angle Facts

Angles on a straight line add up to 180° .

Angles at a point add up to 360° .

Angles in a triangle add up to 180° .

Angles in a quadrilateral add up to 360° .

Exterior angles of a polygon add up to 360° .

Vertically opposite angles are equal.

Alternate angles in parallel lines are equal.

Corresponding angles are equal.

Supplementary angles add up to 180° .

Area

The space contained within a 2D shape, given by cm^2 or m^2 .

Area of a rectangle = width \times height

Area of a triangle = (width \times height) \div 2

Area of a parallelogram = width \times vertical height

Area of a trapezium = $\frac{1}{2}(a + b)h$

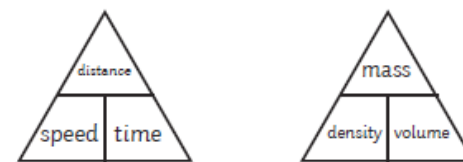
Area of a circle = πr^2

Perimeter

The distance around the outside of a shape. Don't forget to include units!

$$\text{Circumference} = \pi d$$

Speed and Density



Congruence and Similarity

Congruent triangles are exactly the same – SSS, ASA, SAS

Similar shapes have the same angles. One shape will be an enlargement of the other.

$$\text{Scale factor} = \frac{\text{new length}}{\text{old length}}$$

Higher GEOMETRY

Learn all the foundation key facts
and remember these top tips!

Arc Length and Sector Area

$$\text{Arc length} = \frac{\theta}{360} \times \pi d$$

$$\text{Sector area} = \frac{\theta}{360} \times \pi r^2$$

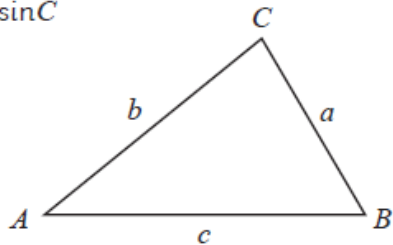
Trigonometry in Non-Right-Angled Triangles

$$\text{Sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{Cosine rule: } a^2 = b^2 + c^2 - 2bccosA$$

$$\text{Or } \cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

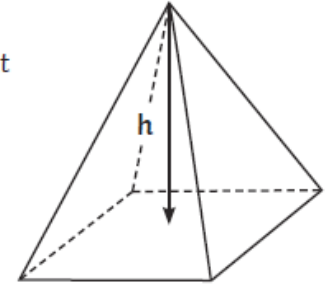
$$\text{Area} = \frac{1}{2} absinC$$



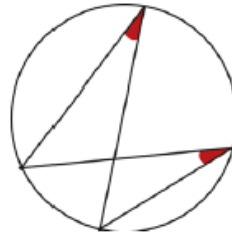
Volume

$$\text{Volume of a pyramid} = \frac{1}{3} \times \text{area of base} \times \text{perpendicular height}$$

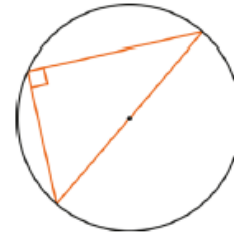
The other formulae will be given to you in the exam,
make sure you familiarise yourself with them!



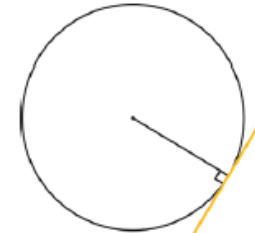
Circle Theorems



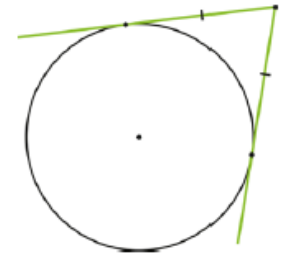
Angles in the same segment are equal.



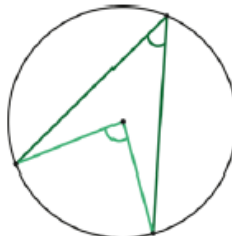
The angle in a semicircle is a right angle.



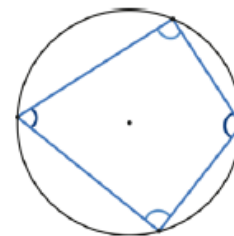
The tangent to a circle is perpendicular to the radius at the point of contact.



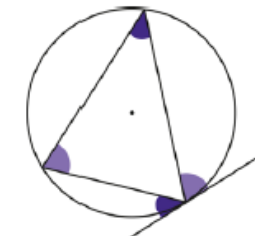
The two tangents to a circle from a point are equal.



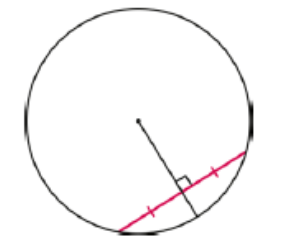
The angle at the centre is twice the angle at the circumference.



The opposite angles of a cyclic quadrilateral add up to 180°.



The angle between a tangent and a chord is equal to the angle in the alternate segment.



The perpendicular from the centre to a chord bisects the chord.