

Y10 - Working with Circles (F) - KO

What do I need to be able to do?

- Recognise and label parts of a circle
- Calculate the length of an arc
- Calculate the area of a sector
- Understand and use volume of a cone, cylinder and sphere.
- Understand and use surface area of a cone, cylinder and sphere.

Keywords & definitions:

Circumference: the length around the outside of the circle – the perimeter

Area: the size of the 2D surface

Diameter: the distance from one side of a circle to another through the centre

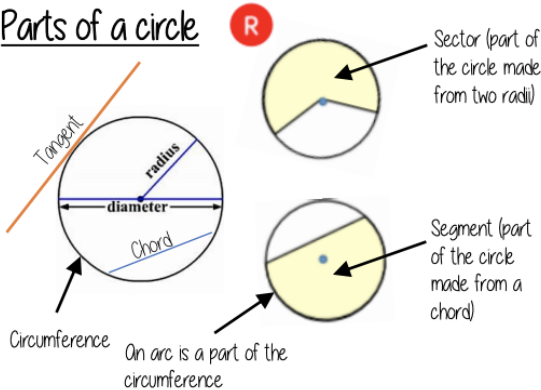
Radius: the distance from the centre to the circumference of the circle

Tangent: a straight line that touches the circumference of a circle

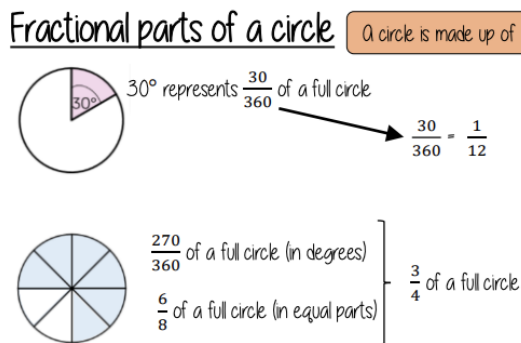
Chord: a line segment connecting two points on the curve

Surface area: the total area of the surface of a 3D shape.

Parts of a circle



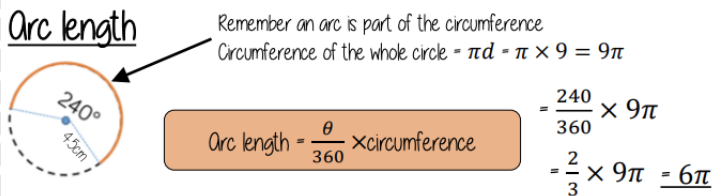
Fractional parts of a circle



Formula to remember:
Area of a circle = πr^2
Circumference of a circle = πd or $2\pi r$

The fraction of the circle is as $\frac{\theta}{360}$
 θ represents the degrees in the sector

Arc length

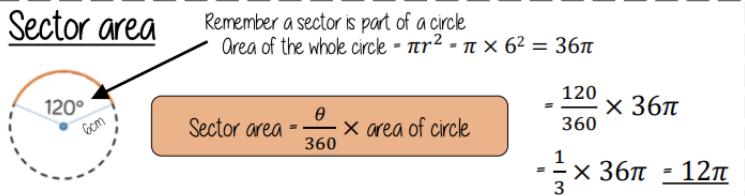


Perimeter

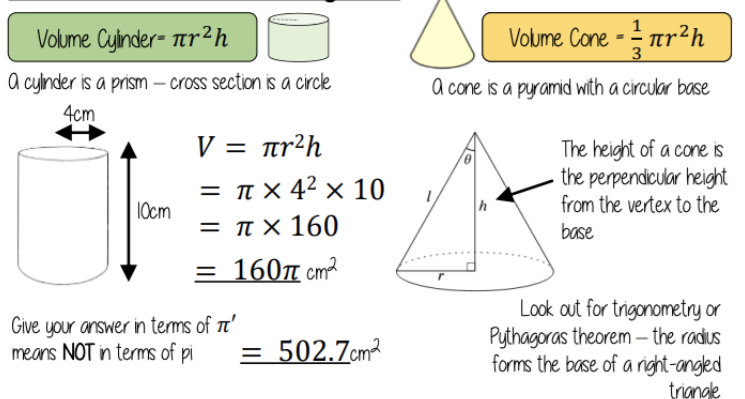
Perimeter is the length around the outside of the shape.
This includes the arc length and the radii that enclose the shape

Perimeter = $\frac{\theta}{360} \times \text{circumference} + 2r = 6\pi + 9$

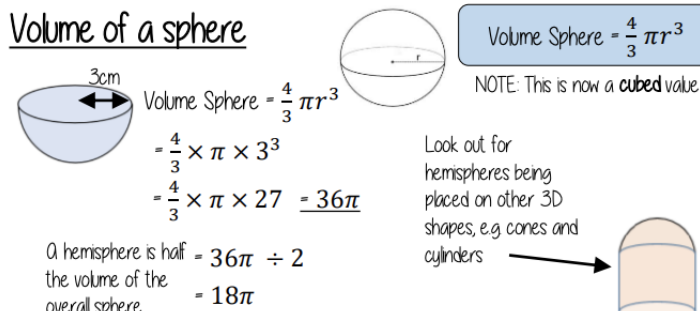
Sector area



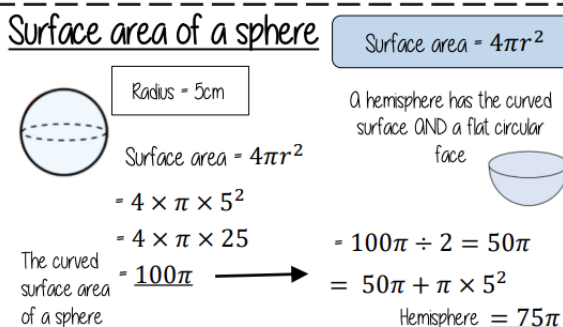
Volume of a cone and a cylinder



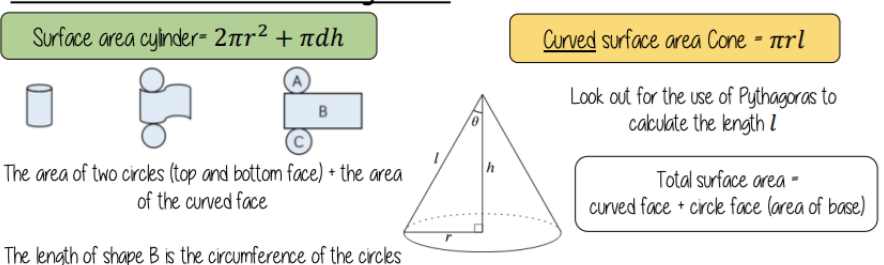
Volume of a sphere



Surface area of a sphere



Surface area of cones and cylinders



Retrieval Quiz

Answers

Y10 - Constructions (F) - KO

What do I need to be able to do? Draw and measure angles

- Construct scale drawings
- Find locus of distance from points, lines, two lines
- Construct perpendiculars from points, lines, angles

Keywords & definitions:

Protractor: piece of equipment used to measure and draw angles

Locus: set of points with a common property

Equidistant: the same distance

Perpendicular: lines that meet at 90°

Arc: part of a curve

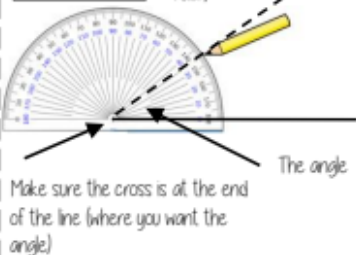
Bisector: a line that divides something into two equal parts

Draw and measure angles

R

Draw a 35° angle

Make a mark at 35° with a pencil
And join to the angle point (use a ruler)



Make sure the cross is at the end of the line (where you want the angle)

Scale drawings

R

A picture of a car is drawn with a scale of 1:30

For every 1cm on my image is 30cm in real life

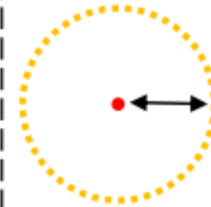
The car image is 10cm

Image : Real life
1cm : 30cm
10cm : 300cm

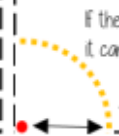


Locus of a distance from a point

All points are equidistant (the same distance) from the fixed point in the middle



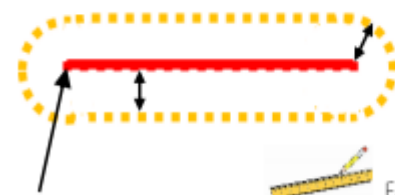
If the point is in the corner it can only make a quarter circle



Equipment needed
The radius is the distance from the fixed point

Locus of a distance from a straight line

All points are equidistant (the same distance) from line



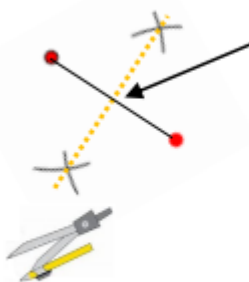
The ends of the line are fixed points



Equipment needed
The line is straight so a ruler is used for the straight lines parallel to your original line

Locus equidistant from two points

Also a perpendicular bisector
Because if the points are joined, this new line intersects it at a 90°



Keep the compass the same size and draw two arcs from each point
Join the intersections with a ruler
All points on this line are equidistant from both points



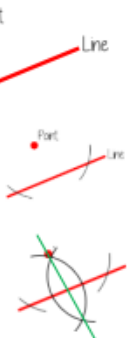
Construct a perpendicular from a point

Use a compass and draw an arc that cuts the line. Use the point to place the compass

Keep the compass the same distance and now use your new points to make new intersecting arcs

Connecting the arcs makes the bisector

If P is a point on the line the steps are the same



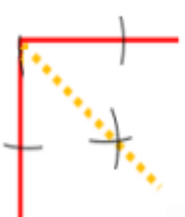
Locus of a distance from two lines

Also an angle bisector
This cuts the angle in half

From the angle vertex draw two arcs that cut the lines forming the angle

Keep the compass the same size and use the new arcs as centres to draw intersecting arcs in the middle

Join the vertex to the intersection



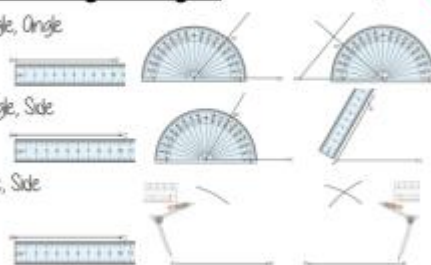
Constructing Triangles

Link to steps → R

Side, Angle, Angle

Side, Angle, Side

Side, Side, Side



Retrieval Quiz

Answers

Y10 - Congruence, similarity & enlargement - KO

What do I need to be able to do?

- Enlarge by a positive scale factor
- Enlarge by a fractional scale factor
- Identify similar shapes
- Work out missing sides and angles in similar shapes
- Use parallel lines to find missing angles
- Understand similarity and congruence

Keywords & definitions:

Enlarge: to make a shape bigger (or smaller) by a given multiplier (scale factor)

Scale Factor: the multiplier of enlargement

Centre of enlargement: the point the shape is enlarged from

Similar: when one shape can become another with a reflection, rotation, enlargement or translation.

Congruent: the same size and shape

Corresponding: items that appear in the same place in two similar situations

Parallel: straight lines that never meet (equal gradients)

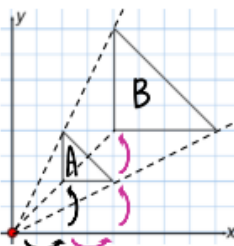
Positive scale factors

Enlargement from a point

Enlarge shape A by SF 2 from (0,0)

The shape is enlarged by 2

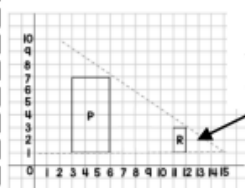
The distance from the point enlarges by 2



Fractional scale factors

Fractions less than 1 make a shape **SMALLER**

R is an enlargement of P by a scale factor $\frac{1}{3}$ from centre of enlargement (15,1)



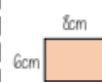
SF $\frac{1}{3}$ - R is three times smaller than P

Identify similar shapes



Angles in similar shapes do not change
e.g. if a triangle gets bigger the angles can not go above 180°

Similar shapes



Compare sides

6 : 9

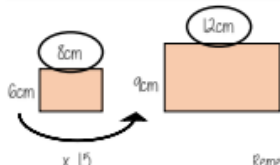
2 : 3

8 : 12

2 : 3

Both sets of sides are in the same ratio

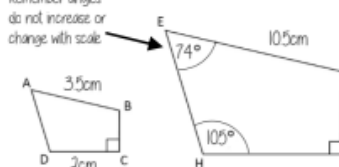
Information in similar shapes



Compare the equivalent side on both shapes

Scale Factor is the multiplicative relationship between the two lengths

Remember angles do not increase or change with scale



Shape ABCD and EFGH are similar

Notation helps us find the corresponding sides

AB and EF are corresponding

Angles in parallel lines

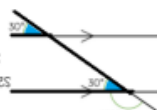
Alternate angles



Because alternate angles are equal the highlighted angles are the same size

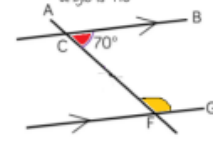
Corresponding angles

Because corresponding angles are equal the highlighted angles are the same size



Co-interior angles

Because co-interior angles have a sum of 180° the highlighted angle is 110°



As angles on a line add up to 180° co-interior angles can also be calculated from applying alternate/ corresponding rules first

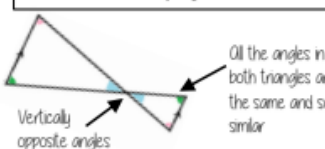
Similar triangles

Shares a vertex

Because corresponding angles are equal the highlighted angles are the same size

Parallel lines - all angles will be the same in both triangle

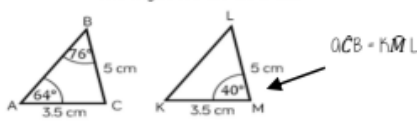
As all angles are the same this is similar - it only one pair of sides are needed to show equality



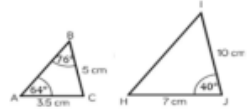
All the angles in both triangles are the same and so similar

Congruence and Similarity

Congruent shapes are identical - all corresponding sides and angles are the same size



Because all the angles are the same and AC=KM BC=LM triangles ABC and KLM are **congruent**



Because all angles are the same, but all sides are enlarged by 2 ABC and HJL are **similar**

Conditions for congruent triangles

Triangles are congruent if they satisfy any of the following conditions

Side-side-side

All three sides on the triangle are the same size

Angle-side-angle

Two angles and the side connecting them are equal in two triangles

Side-angle-side

Two sides and the angle in-between them are equal in two triangles (it will also mean the third side is the same size on both shapes)

Right angle-hypotenuse-side

The triangles both have a right angle, the hypotenuse and one side are the same

Retrieval Quiz

Answers