HIGH SCHOOL MATHEMATICS

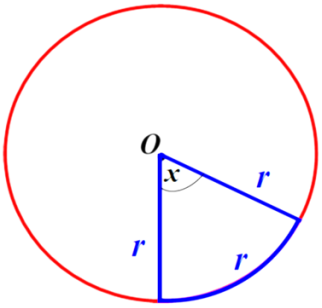
RADIANS

Matteman

Radian measure:

Radians are units for measuring angles.

1 radian is the size of the angle formed at the centre of a circle by two radii which join the ends of an arc equal in length to the radius.



$$1\ rad. = \frac{180}{\pi}$$

$$x = 1\ rad.\ or\ 1^c$$

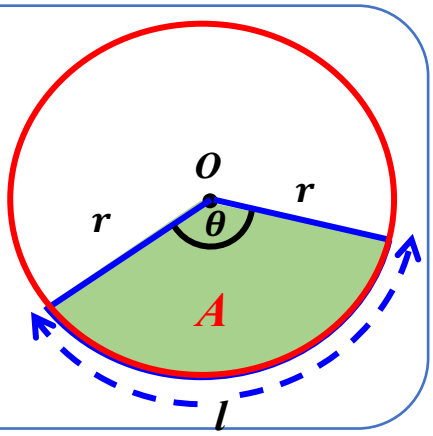
Important measures: $\pi\ rad. = 180°$, $\frac{\pi}{2}\ rad. = 90°$, $\frac{\pi}{3}\ rad. = 60°$, $\frac{\pi}{4}\ rad. = 45°$, $\frac{\pi}{6}\ rad. = 30°$

Arc length & Area of a sector:

For a sector of angle θ radians of a circle of radius r,

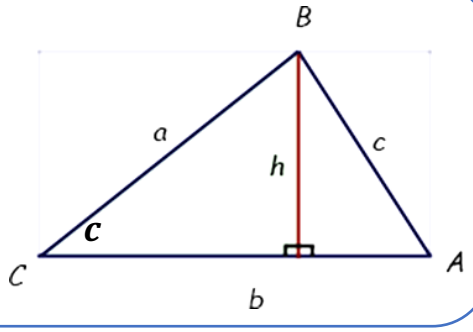
the arc length, l, is $l = r\theta$

the sector area, A, is $A = \frac{1}{2}r^2\theta$



Area of a triangle:

$A = \frac{1}{2}bh$ ***or*** $A = \frac{1}{2}ab\sin C$



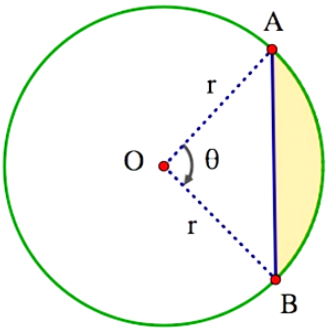
Area of a segment:

For a sector of angle θ radians of a circle of radius r,

the area of a segment, A, is

Area of the sector – Area of the triangle

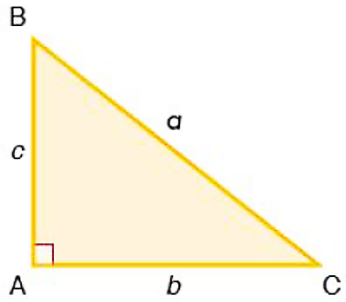
$$A = \frac{1}{2}r^2\theta - \frac{1}{2}r^2\sin\theta$$



Pythagoras theorem:

This theorem is only applicable for right-angled triangles.

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



Sine rule:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

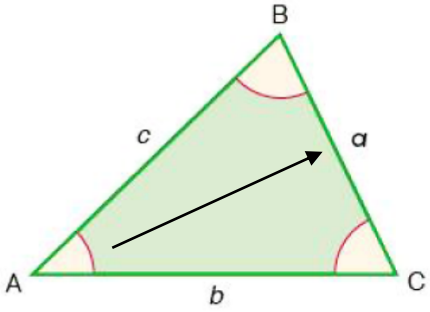
alternatively;

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

Angle & opposite side

Ambiguous case of sine rule

$$\sin(\theta) = \sin(\pi - \theta)$$



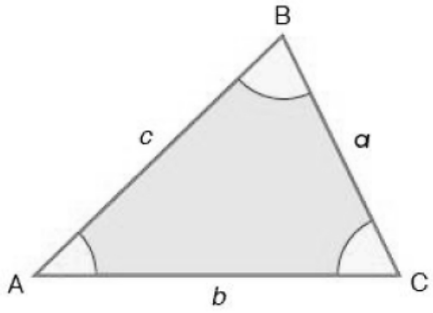
Cosine rule:

$$a^2 = b^2 + c^2 - 2bc\cos A$$

alternatively;

$$b^2 = a^2 + c^2 - 2ac\cos B$$

$$c^2 = a^2 + b^2 - 2ab\cos C$$



Re-arranging the cosine rule:

You may find the following re-arrangement useful where the angle is unknown.

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

Which one should I use? (Sine or cosine rule):

An angle *and the length of its* ***opposite side*** *are given* ➡ **use sine rule**

Lengths of three sides are given **(SSS)**

Lengths of two sides and the angle in between are given **(SAS)**

➡ **use cosine rule**