Summary sheet: Trigonometry

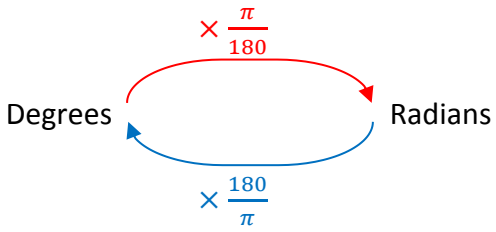
E1 Work with radian measure, including use for arc length and area of sector.
E2 Understand and use the standard small angle approximations of sine, cosine and tangent
E3 Know and use exact values of sin, cos and tan for listed angles and their multiples

Radians

Radians can be used (instead of degrees) to measure angles, and they can sometimes make calculations easier.

Remember: $180° = \pi$ rads
$360° = 2\pi$ rads

Converting between degrees and radians:



There are some common angles that you should know and remember (these should be expressed as fractions of π instead of as decimals). Remembering that $180° = \pi$ rads should help you to remember:

$30° = \frac{\pi}{6}$ radians	$45° = \frac{\pi}{4}$ radians	$60° = \frac{\pi}{3}$ radians	$90° = \frac{\pi}{2}$ radians

Arc length

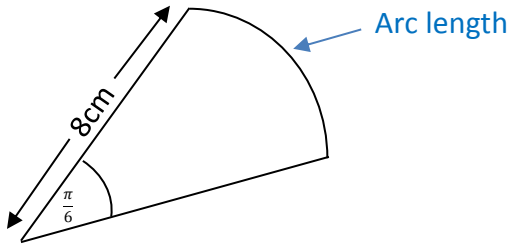
Arc length = $r\theta$

Area of a sector

Area of a sector = $\frac{1}{2}r^2\theta$

(where r is the radius of the circle and θ is the angle at the centre (in radians))

e.g. find the arc length and area for the following sector:



Arc length = $8 \times \frac{\pi}{6} = \frac{4\pi}{3}$ (4.2)

Area = $\frac{1}{2} \times 8^2 \times \frac{\pi}{6} = \frac{16\pi}{3}$ (16.8)

Summary sheet: Trigonometry

Standard small angle approximations of sine, cosine and tangent

$\sin\theta \approx \theta$	$\cos\theta \approx 1 - \frac{\theta^2}{2}$	$\tan\theta \approx \theta$

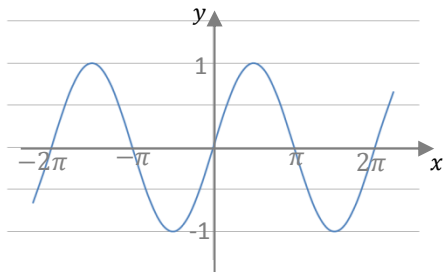
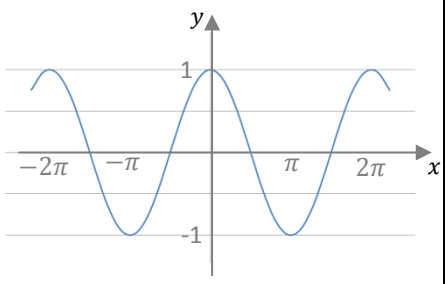
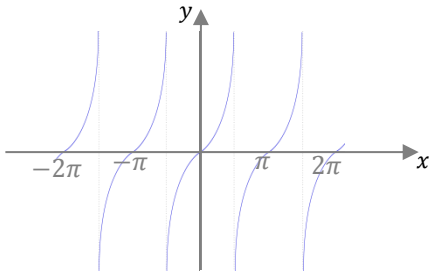
For small angles where θ is the angle in radians.

Some common angles

You should know the exact values of sin, cos and tan for the following angles (and their multiples):

$\boldsymbol{\theta} =$	**0**	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π
$\sin\theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1
$\tan\theta$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	Undefined	0

The graphs of $\sin x$, $\cos x$ and $\tan x$

$y = \sin x$	$y = \cos x$	$y = \tan x$
		
• Period = 2π • Rotational symmetry about the origin • Lies between -1 and 1 • Line of symmetry at $x = \frac{\pi}{2}$ and $x = -\frac{\pi}{2}$	• Period = 2π • Line of symmetry at y-axis • Lies between -1 and 1 • $y = \cos x$ is the same as $y = \sin x$ shifted left by $\frac{\pi}{2}$	• Period = π • Rotational symmetry about the origin • Lies between $-\infty$ and ∞ • Asymptotes at $x = \pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \pm\frac{5\pi}{2}$ etc

