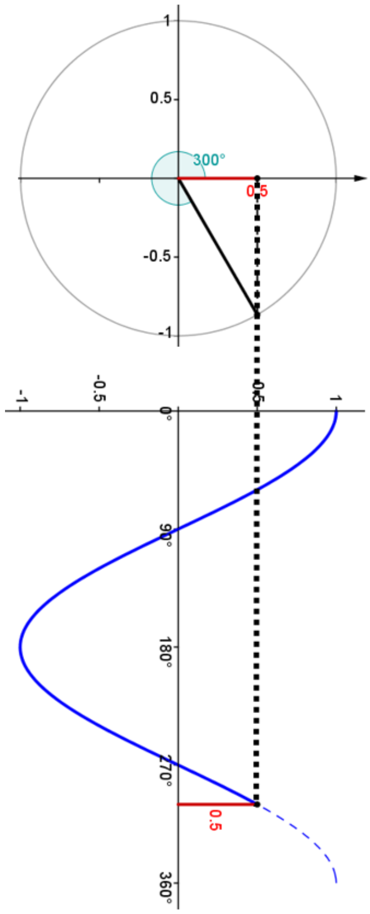
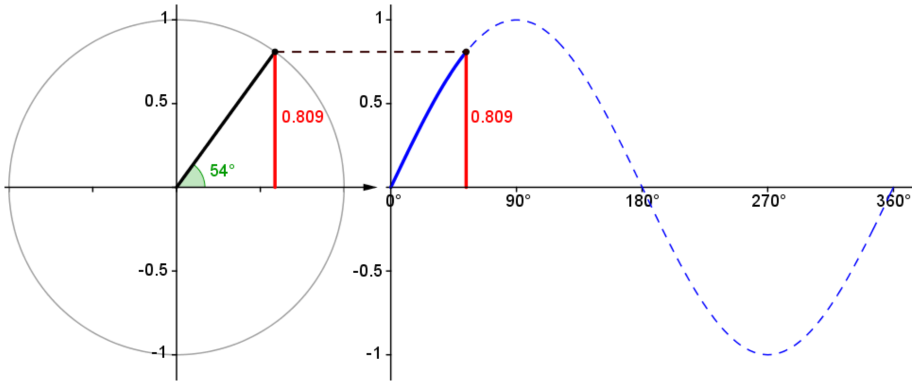
Unit Circle

If we consider a unit circle (a circle of radius 1), then

sine of an angle is given by the **opposite side**, or the **y coordinate** on the unit circle $sin\theta = \frac{opposite}{hypotenuse} = \frac{opposite}{1}$

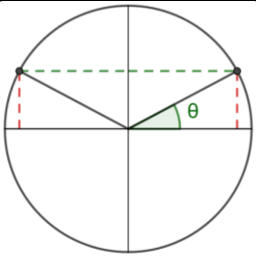
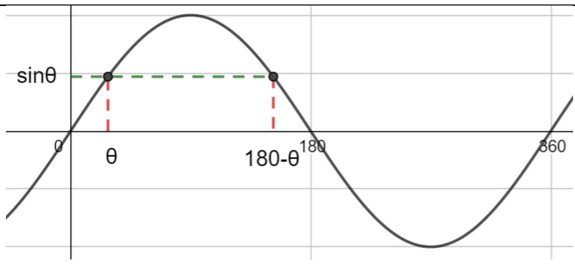
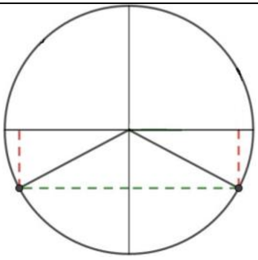
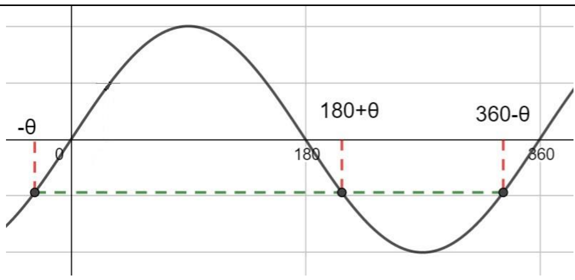
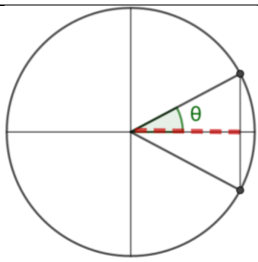
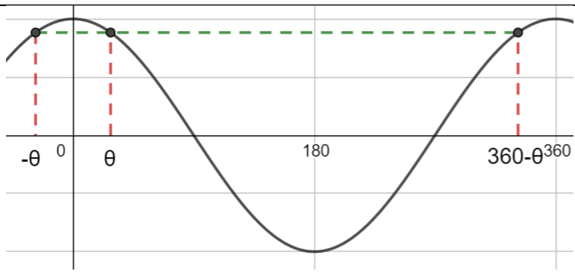
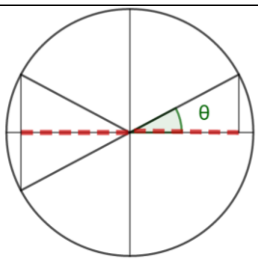
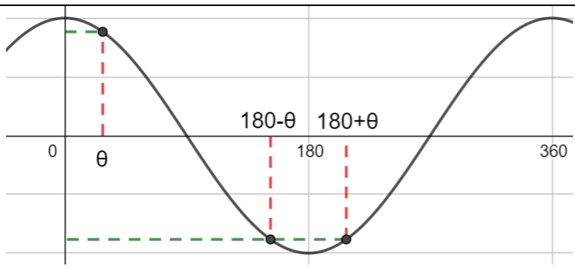
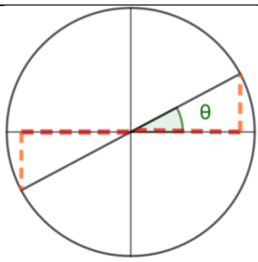
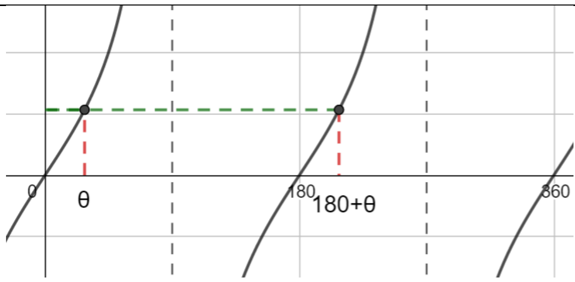
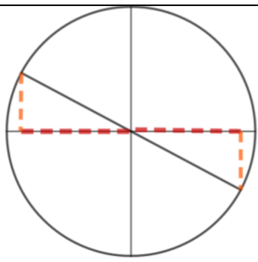
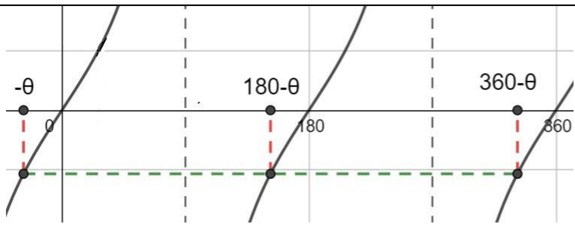
cosine of an angle is given by the **adjacent side**, or the **x coordinate** on the unit circle $cos\theta = \frac{adjacent}{hypotenuse} = \frac{adjacent}{1}$





tangent of an angle $tan\theta = \frac{opposite}{adjacent} = \frac{sin\theta}{cos\theta}$

There are many properties of the sin, cos and tan functions. However, all of these can be derived and remembered from either the unit circle or the graphs of the functions:

$sin\theta$ $= \sin(180° - \theta)$		
$\sin(180° + \theta)$ $= \sin(360° - \theta)$ $= \sin(-\theta)$		
$\cos\theta$ $= \cos(360° - \theta)$ $= \cos(-\theta)$		
$\cos(180 - \theta)$ $= \cos(180 + \theta)$ $= -\cos(\theta)$		
$\tan\theta$ $= \tan(180 + \theta)$		
$\tan(180 - \theta)$ $= \tan(360 - \theta)$ $= \tan(-\theta)$		

There are exact values for certain angles that should be learnt (they are not provided in the formula booklet). Remember that **180° = π radians**

θ in degrees	0	30	45	60	90
θ in radians	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$sin\theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$tan\theta$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	undefined

The table is easier to remember if you recognise the pattern $\frac{\sqrt{0}}{2}, \frac{\sqrt{1}}{2}, \frac{\sqrt{2}}{2}, \frac{\sqrt{3}}{2}, \frac{\sqrt{4}}{2}$ in the first two rows