

Trigonometry 9

This class contains inverse trigonometry and trigonometric graphs.

Inverse Trigonometric Functions

When $\sin^{-1} x = A$ then $\sin A = x$

$\cos^{-1} x = A$ then $\cos A = x$

$\tan^{-1} x = A$ then $\tan A = x$

Note $\sin^{-1} x \neq (\sin x)^{-1}$ since $(\sin x)^{-1} = \frac{1}{\sin x}$

Example 1 Find $\cos\left(2\sin^{-1}\frac{3}{5}\right)$

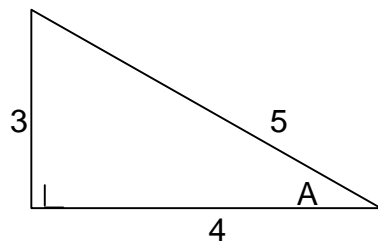
Let $\sin^{-1}\frac{3}{5} = A$

$$\sin A = \frac{3}{5}$$

So we really need to find $\cos 2A$

$$\cos 2A = \cos^2 A - \sin^2 A$$

From $\sin A = \frac{3}{5}$ we can draw our 3, 4, 5 right-angled triangle.



$$\cos A = \frac{4}{5}$$

$$\cos 2A = \cos^2 A - \sin^2 A$$

$$= \left(\frac{4}{5}\right)^2 - \left(\frac{3}{5}\right)^2$$

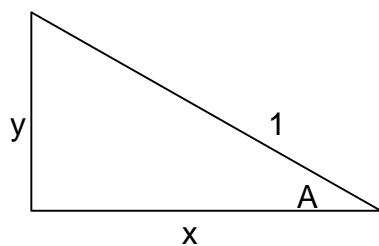
$$= \frac{7}{25}$$

Example 2 Express $\sin(\cos^{-1} x)$ in terms of x .

Let $\cos^{-1} x = A$ then $\cos A = x$

$$\cos A = x$$

$$\cos A = \frac{x}{1} = \frac{\text{adj}}{\text{hyp}}$$



$$x^2 + y^2 = 1$$

$$y^2 = 1 - x^2$$

$$y = \sqrt{1 - x^2}$$

We want $\sin(\cos^{-1} x) = \sin A = \sqrt{1 - x^2}$

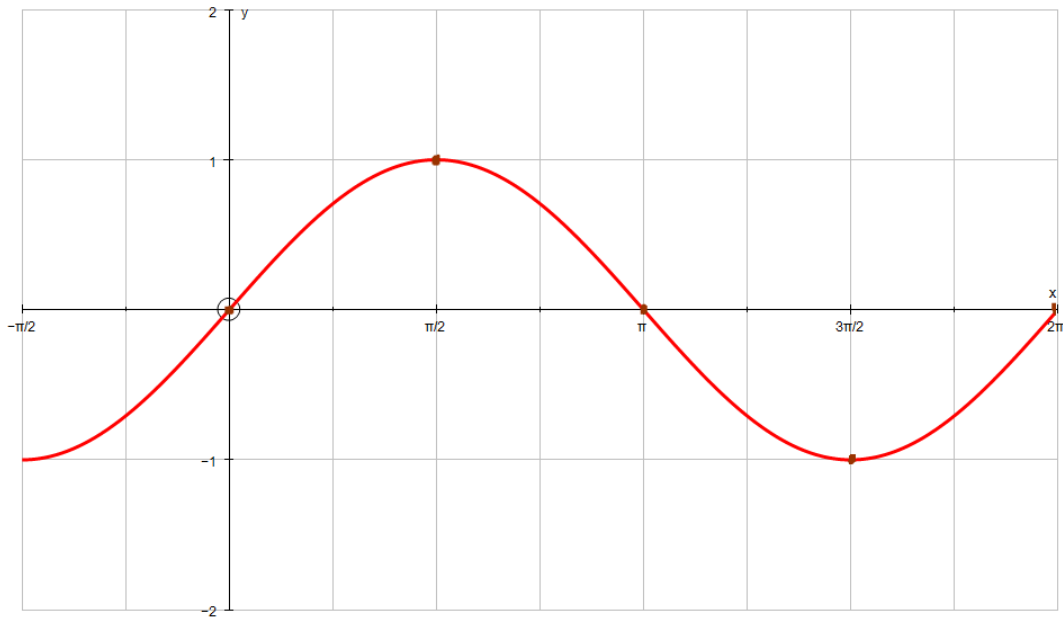
Graphs of trigonometric functions

Make sure you can do the basic graphs of sin, cos and tan

Example 3 Draw $y = \sin A$ in the domain $0 \leq A \leq 2\pi$

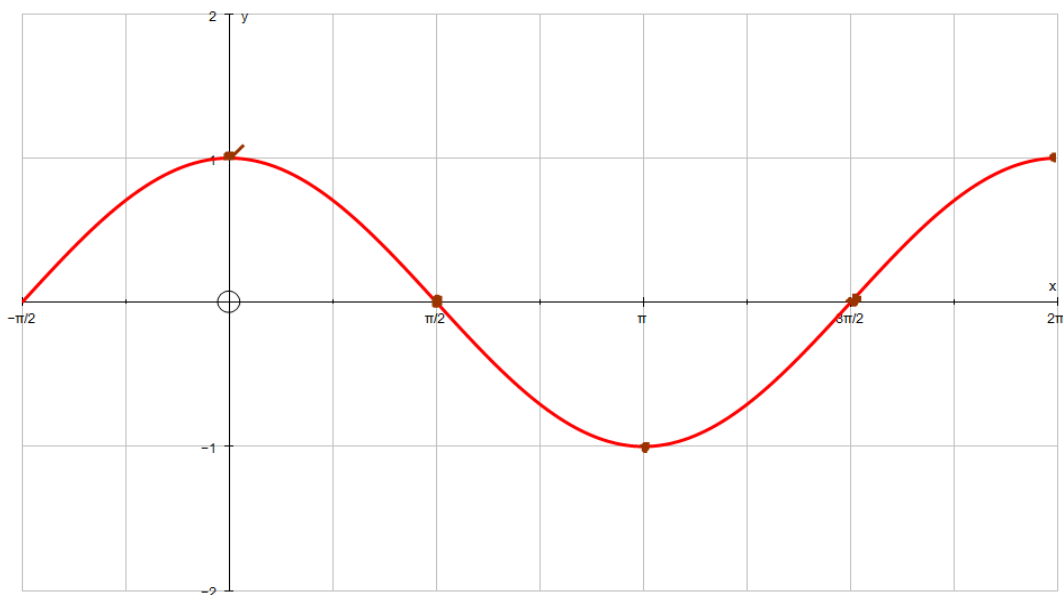
A	0	90	180	270	360
$\sin A$	0	1	0	-1	0

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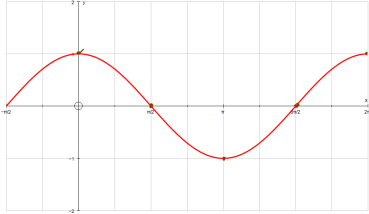
Example 4 Draw $y = \cos A$ in the domain $0 \leq A \leq 2\pi$

A	0	90	180	270	360
$\cos A$	1	0	-1	0	1



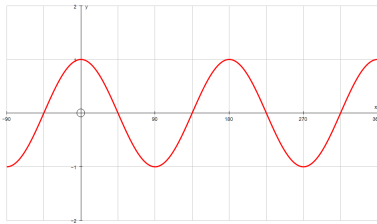
Period and Range

Period is how quick a graph repeats and range is the value from the lowest to the highest point



This is the graph for $y = \cos A$

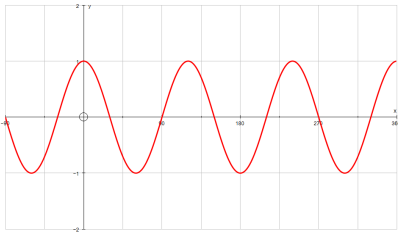
The period is 2π and range is -1 to 1



This is the graph for $y = \cos 2A$

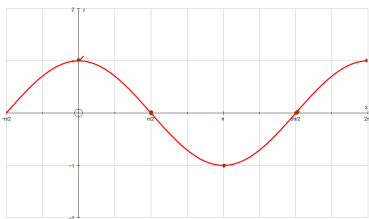
The period is $\frac{2\pi}{2} = \pi$ and range is -1 to 1

The period of $y = a \sin kx$ or $y = a \cos kx$ is $\frac{2\pi}{k} = \pi$ and the range is $(-a, a)$



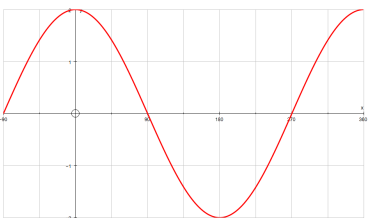
This is the graph for $y = \cos 3A$

The period is $\frac{2\pi}{3}$ and range is -1 to 1



This is the graph for $y = \cos A$

The period is 2π and range is -1 to 1



This is the graph for $y = 2 \cos A$

The period is 2π and range is -2 to 2

Example 5 Draw $y = \tan A$ in the domain $0 \leq A \leq 2\pi$

A	0	45	90	135	180	225	270	315	360
tan A	0	1	undefined	-1	0	1	undefined	-1	0

