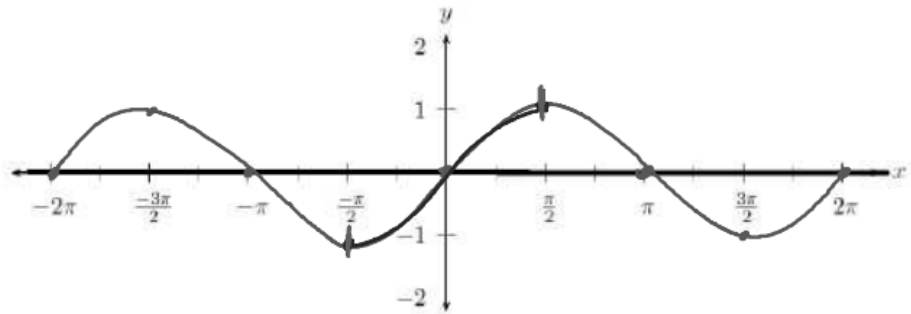


What you'll Learn About

- Inverse Trigonometric Functions and their Graphs

The graph of  $y = \sin x$

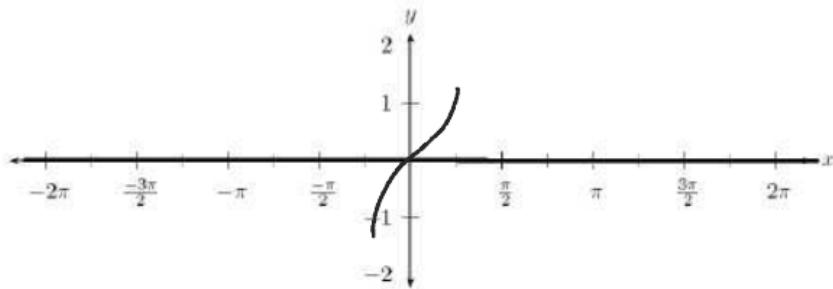


$f^{-1}(x)$

$\sin^{-1} \rightarrow$  Inverse  
Sin

$\arcsin \rightarrow$  Inverse  
Sin

The graph of  $y = \sin^{-1} x = \arcsin x$



The Unit Circle and Inverse Functions

$$y = \sin x$$

$(-\infty, \infty) \rightarrow \text{Domain}$

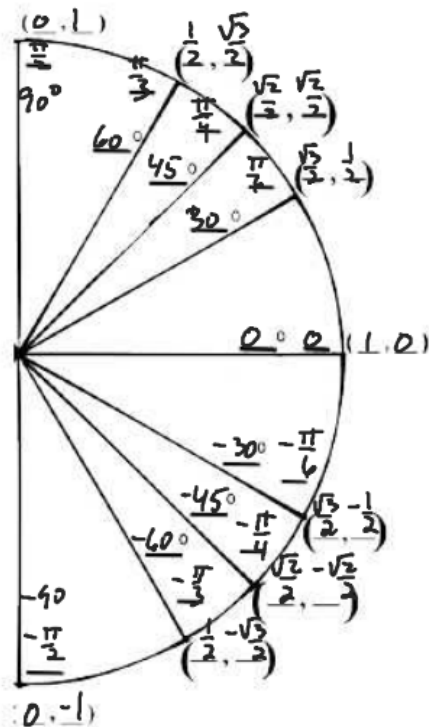
$[-1, 1] \rightarrow \text{Range}$

$$y = \sin^{-1}(x)$$

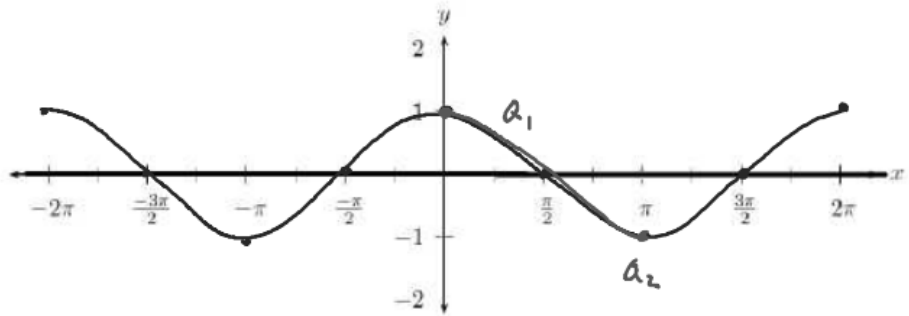
Domain  $[-1, 1]$

Range  $(-\infty, \infty)$

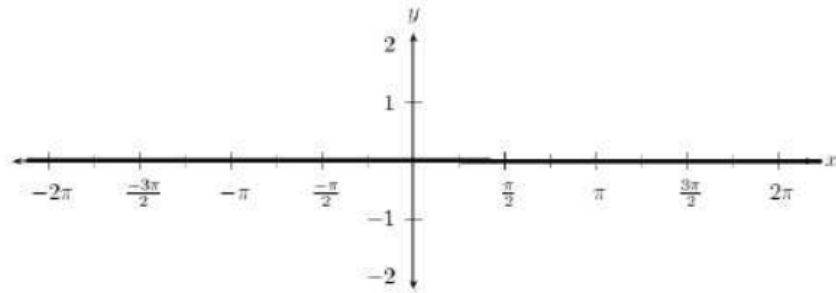
$$-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$$



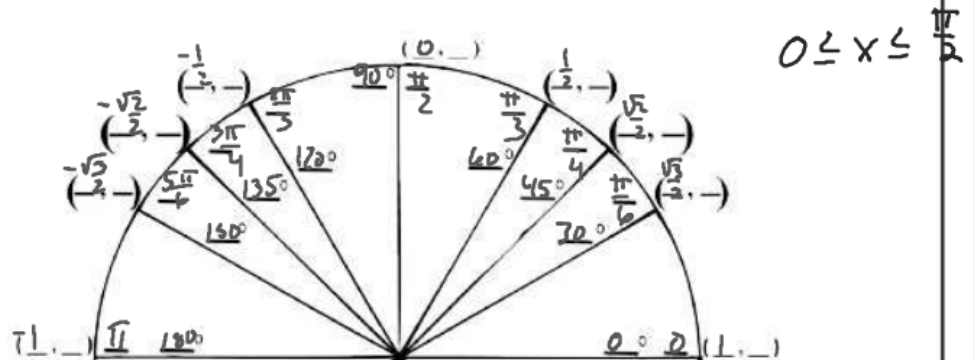
The graph of  $y = \cos x$



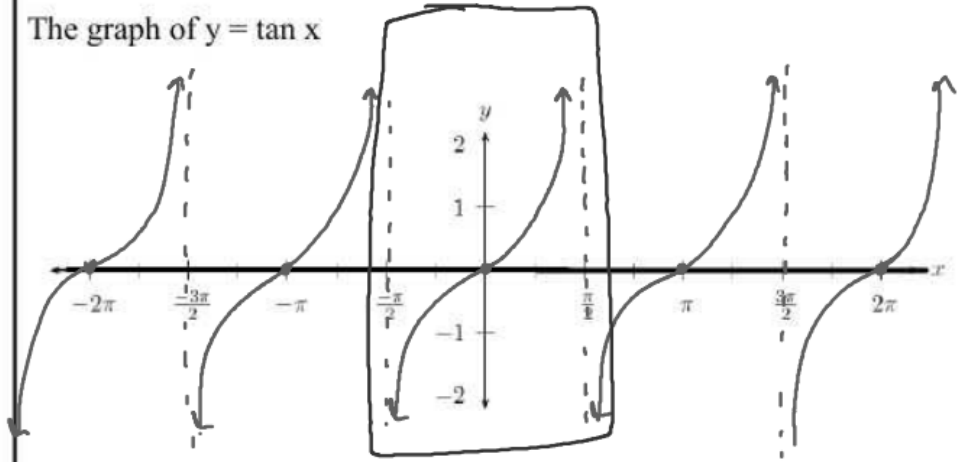
The graph of  $y = \cos^{-1} x = \arccos x$



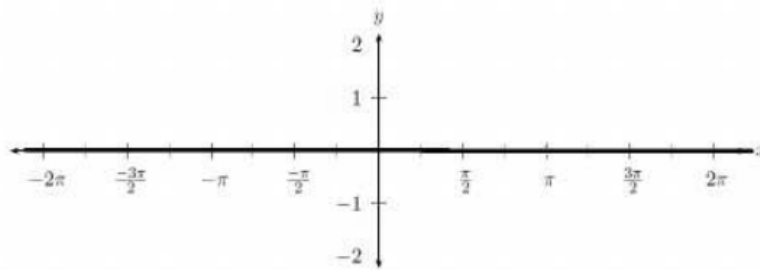
The Unit Circle and Inverse Functions



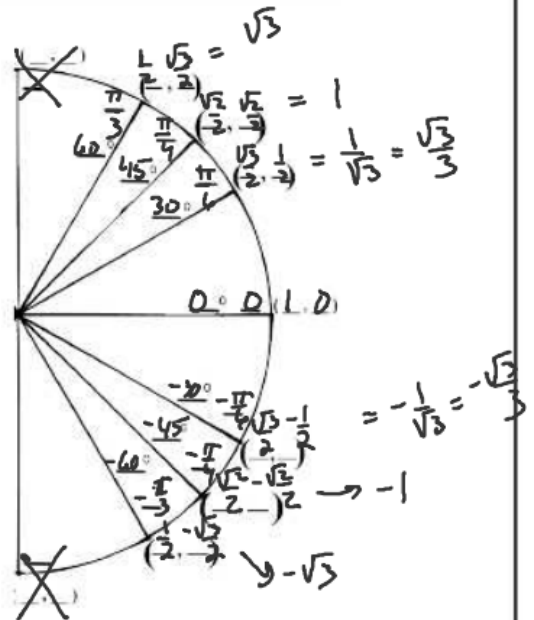
The graph of  $y = \tan x$



The graph of  $y = \tan^{-1} x = \arctan x$



$$-\frac{\pi}{2} < x < \frac{\pi}{2}$$



When we use  
Inverse Looking for  
Angle measure

Find the exact value

$$A) \cos^{-1} \frac{\sqrt{3}}{2} = \theta$$

$$\cos \theta = \frac{\sqrt{3}}{2}$$

$$\theta = 30^\circ$$

$$B) \cos^{-1} \frac{1}{2} = \theta$$

$$\theta = 60^\circ$$

$$C) \cos^{-1} \left( \frac{-1}{2} \right)$$

$$\theta = 120^\circ$$

$$D) \sin^{-1} \frac{-\sqrt{3}}{2}$$

$$\theta = -60^\circ$$

$$\theta = -\frac{\pi}{3}$$

$$E) \sin^{-1} \frac{1}{2}$$

$$\theta = 30^\circ$$

$$\theta = \frac{\pi}{6}$$

$$F) \sin^{-1} \left( \frac{1}{\sqrt{2}} \right)$$

$$\theta = 45^\circ$$

$$\theta = \frac{\pi}{4}$$

$$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$G) \tan^{-1}(1)$$

$$\theta = 45^\circ$$

$$\theta = \frac{\pi}{4}$$

$$H) \tan^{-1}(\sqrt{3})$$

$$\theta = 60^\circ$$

$$\theta = \frac{\pi}{3}$$

$$I) \tan^{-1} \left( \frac{-1}{\sqrt{3}} \right)$$

$$\theta = -30^\circ$$

$$\theta = -\frac{\pi}{6}$$

$$J) \cos^{-1}(0)$$

$$\theta = 90^\circ$$

$$\theta = \frac{\pi}{2}$$

$$K) \sin^{-1}(-1)$$

$$\theta = -90^\circ$$

$$\theta = -\frac{\pi}{2}$$

$$L) \tan^{-1}(0)$$

$$\theta = 0^\circ$$

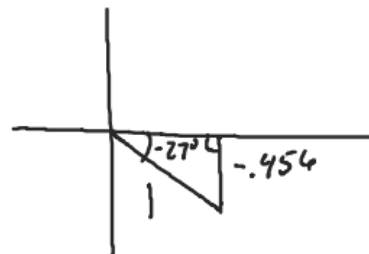
$$\theta = 0$$

Use a calculator to find the approximate value in degrees. Draw the triangle that represents the situation.

A)  $\arccos(.456) = 62.87$



B)  $\arcsin(-.456) = -27.13$



C)  $\arctan(-5.768) = -80.16$

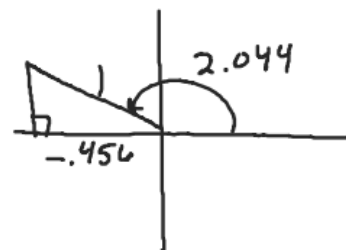


Use a calculator to find the approximate value in radians. Draw the triangle that represents the situation.

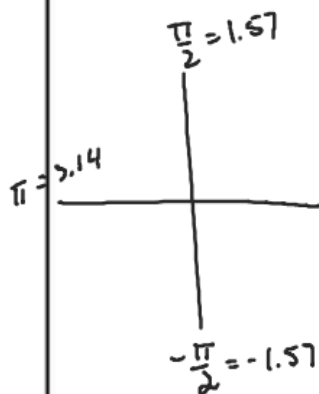
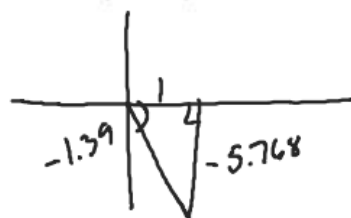
A)  $\arcsin(.456) = .47$



B)  $\arccos(-.456) = 2.044$



C)  $\arctan(-5.768)$



Find the exact value without a calculator.

A)  $\sin(\cos^{-1}(1/2))$

$\sin 60^\circ$   
 $\frac{\sqrt{3}}{2}$

$\cos^{-1} \frac{1}{2} = 60$

B)  $\cos(\tan^{-1}(0))$

$\cos(0) = 1$

C)  $\tan\left(\sin^{-1}\left(\frac{\sqrt{2}}{2}\right)\right)$

$\tan 45^\circ = 1$

D)  $\sin(\tan^{-1}(-\sqrt{3}))$

$\sin(-60^\circ)$   
 $-\frac{\sqrt{3}}{2}$

E)  $\cos^{-1}\left(\sin\left(\frac{\pi}{4}\right)\right)$

$\cos^{-1}\left(\frac{\sqrt{2}}{2}\right)$   
 $\frac{\pi}{4}$

F)  $\sin^{-1}\left(\cos\left(\frac{\pi}{6}\right)\right)$

$\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$   
 $60^\circ$   
 $\frac{\pi}{3}$