

# Trigonometric Function 4

Monday, October 6, 2025 10:41 PM

## Trigonometric ratios of some special angles

In the figure opposite: the unit circle intersected the two axes at the points

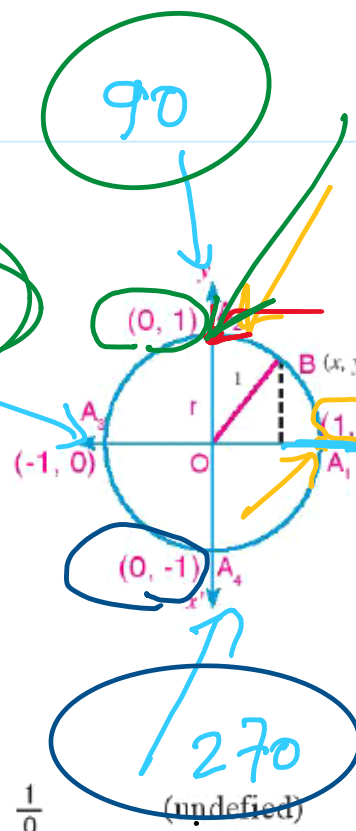
$A_1(1, 0), A_2(0, 1), A_3(-1, 0), A_4(0, -1)$ .

and  $\theta$  is the measure of the directed angle  $\widehat{A_1 O B}$  in the standard position and its terminal side  $\overrightarrow{OB}$  intersects the unit circle at B.

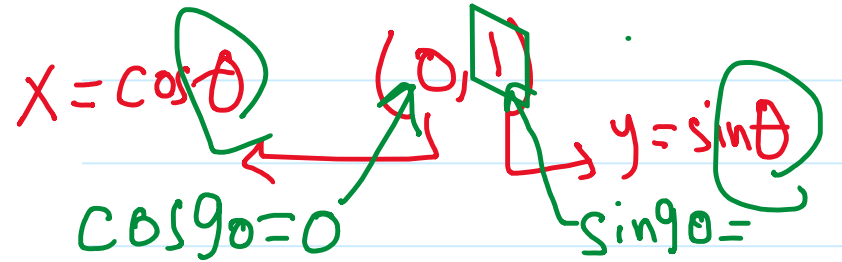
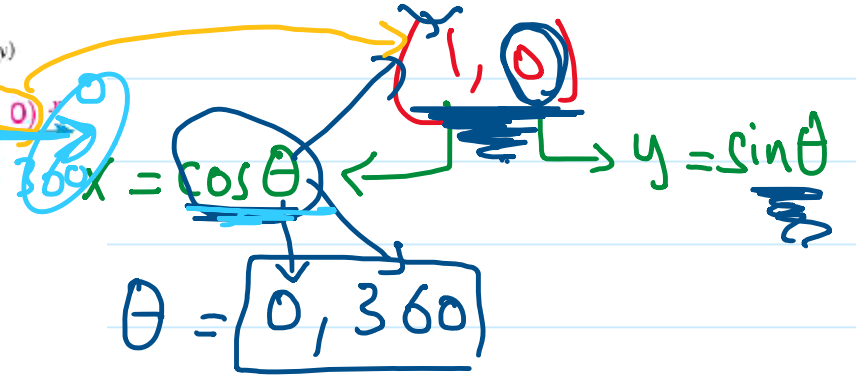
first: If  $\theta = 0^\circ$  or  $\theta = 360^\circ$  at:  $B(1, 0)$   
 then:  $\cos 0^\circ = \cos 360^\circ = 1$ ,  $\sin 0^\circ = \sin 360^\circ = 0$ ,  
 $\tan 0^\circ = \tan 360^\circ = 0$

second: If  $\theta = 90^\circ = \frac{\pi}{2}$  at:  $B(0, 1)$   
 then:  $\cos 90^\circ = 0$ ,  $\sin 90^\circ = 1$ ,  $\tan = \frac{1}{0}$  (undefined)

third: If  $\theta = 180^\circ = \pi$  at:  $B(-1, 0)$   
 then:  $\cos 180^\circ = -1$ ,  $\sin 180^\circ = 0$ ,  $\tan 180^\circ = 0$



$0^\circ, 90^\circ, 180^\circ, 270^\circ, 360^\circ$



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$x = \cos \theta$   $y = \sin \theta$   
 $\cos 180$   $\sin 180$

$x = \cos \theta$   $y = \sin \theta$   
 $\cos 270$   $\sin 270$

5 Prove without using the calculator that:  $\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ = \sin^2 \frac{\pi}{4}$

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L.H.S =  $\frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} - \frac{1}{2} \times \frac{1}{2}$   
 $= \frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$

R.H.S =  $\sin^2 \frac{\pi}{4}$   
 $= \left(\frac{\sqrt{2}}{2}\right)^2 = \frac{2}{4} = \frac{1}{2}$

Rad [R] shift → Mode  
 $\therefore \text{L.H.S} = \text{R.H.S}$

# Trigonometric Function 5

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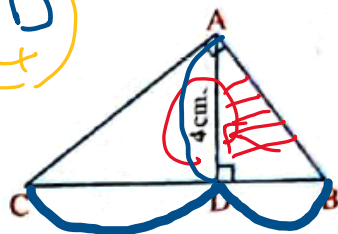
In the opposite figure :

If  $\tan B + \tan C = \frac{5}{2}$

, then BC = ..... cm.

- (a) 6      (b) 8      (c) 10      (d) 14

~~AB~~ · ~~AC~~ = ~~CB~~ · AD



Ecl. →  $AD^2 = DC \cdot DB$

$CD + DB = ?$   
 $CD \cdot DB = 16x$

$\tan B = \frac{\text{opp.}}{\text{adj.}} = \frac{4}{DB}$  /  $\tan C = \frac{4}{CD}$

$\frac{4}{DB} + \frac{4}{CD} = \frac{5}{2} \Rightarrow \frac{4CD + 4DB}{DB \cdot CD} = \frac{5}{2} \Rightarrow \frac{4(CD + DB)}{DB \cdot CD} = \frac{5}{2}$

common den.

~~$\frac{4BC}{AD^2} = \frac{5}{2}$~~

$4AD^2 = 8BC$   
 $4 \cdot 16 = 8BC$   
 $\frac{64}{8} = \frac{8BC}{8}$

$BC = 8a$

10 If  $\theta$  is the measure of the directed angle in the standard position and its terminal side intersects the unit circle at the given point, find all trigonometric function of the angle  $\theta$  in each of the following cases :

A  $(3a, -4a)$

where  $a > 0$

B  $(\frac{3}{2}a, -2a)$

where  $\frac{3\pi}{2} < \theta < 2\pi$

$x^2 + y^2 = 1$

$25a^2 = 1$

$a = \frac{1}{5}$

$\sin \theta = -\frac{4}{5}$

$\cos \theta = \frac{3}{5}$

$\sin, \cos, \tan, \csc, \sec, \cot$

$\sin \theta = -4a$  /  $\cos \theta = 3a$

$\tan \theta = \frac{-4a}{3a} = -\frac{4}{3}$        $\csc \theta = -\frac{1}{4a}$

$\sec \theta = \frac{1}{3a}$        $\cot \theta = -\frac{3}{4}$

