



Sahi Prep Hai Toh Life Set Hai

# TRIGONOMETRIC RATIOS

## Agenda

Trigonometric Ratios

How many Trigonometric Ratios

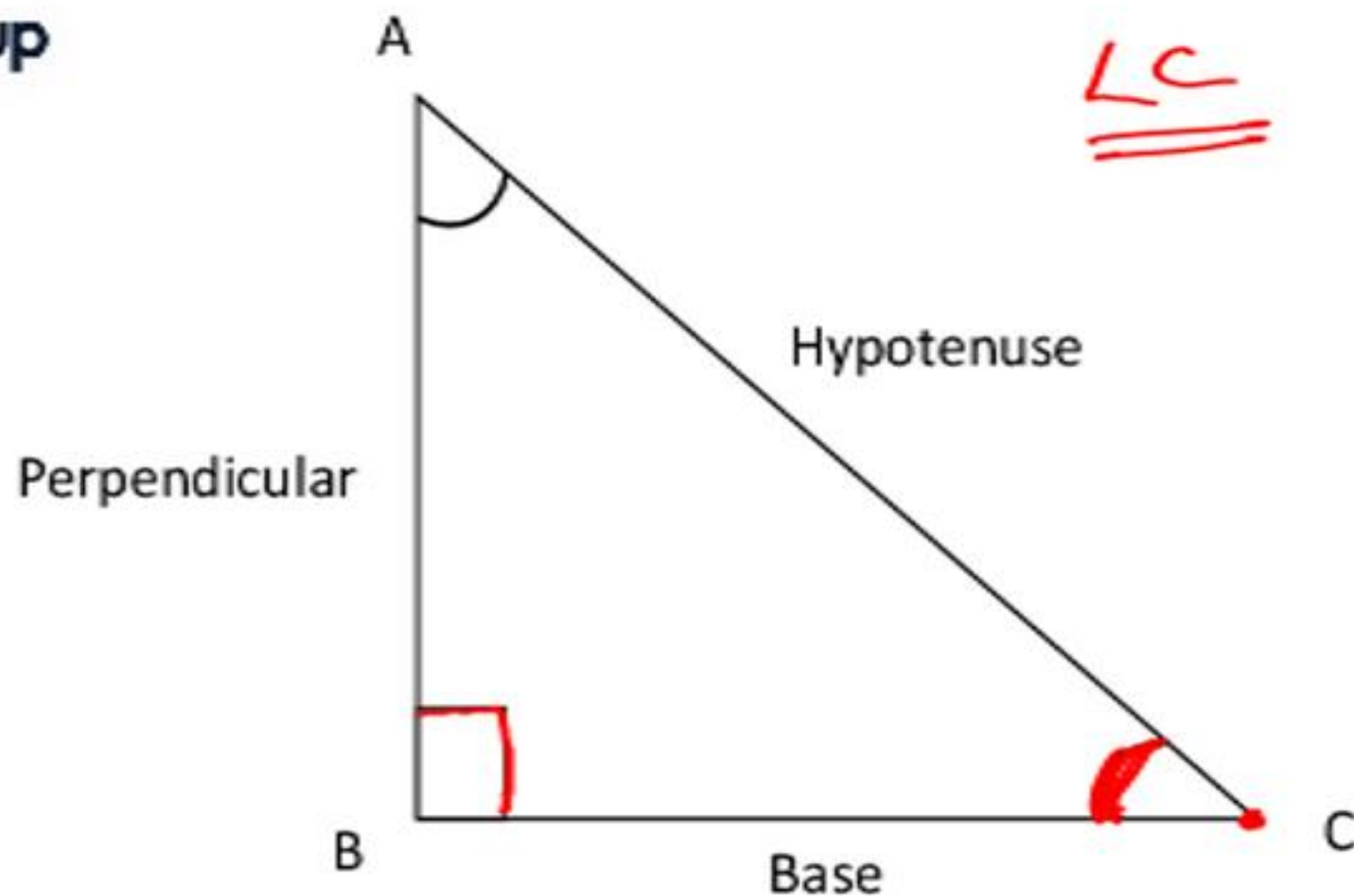
How they are related

Values at specific Angle

0-90 [ 0 | 30 | 45 | 60 | 90 ]

→ Table in Detail

0-360 or Any Angle

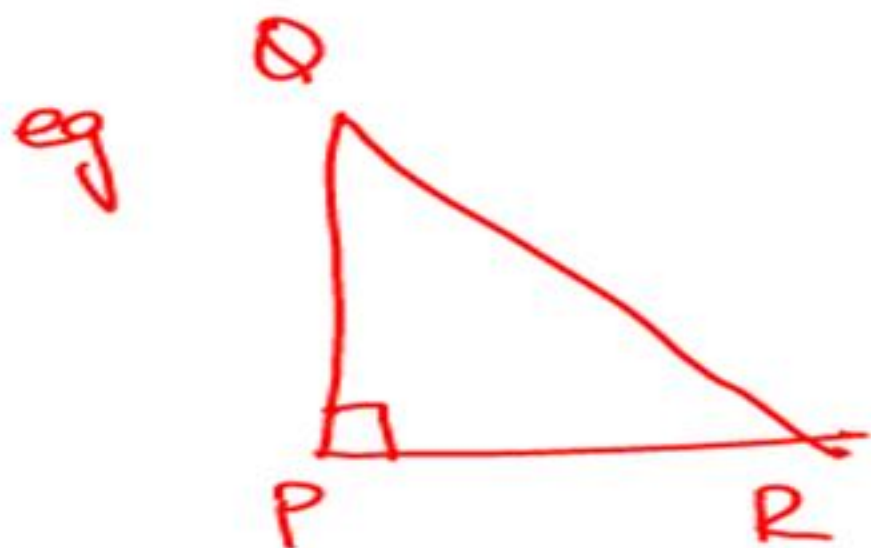


BC  $\rightarrow$  Base

AB  $\rightarrow$  Perpendicular

AC  $\rightarrow$  Hypotenuse

$$(\text{Base})^2 + (\text{Perpendicular})^2 = (\text{Hypotenuse})^2$$



$\angle A \rightarrow$

If PQ = 5cm

QR = 13cm

PR = ??

AB  $\rightarrow$  Base

BC  $\rightarrow$  Perpendicular

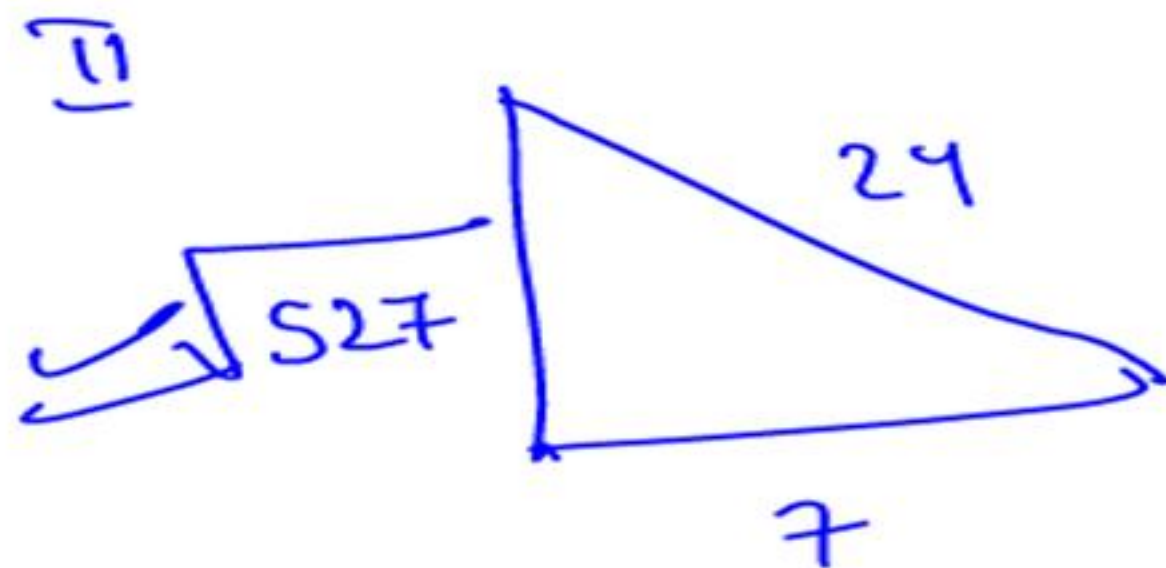
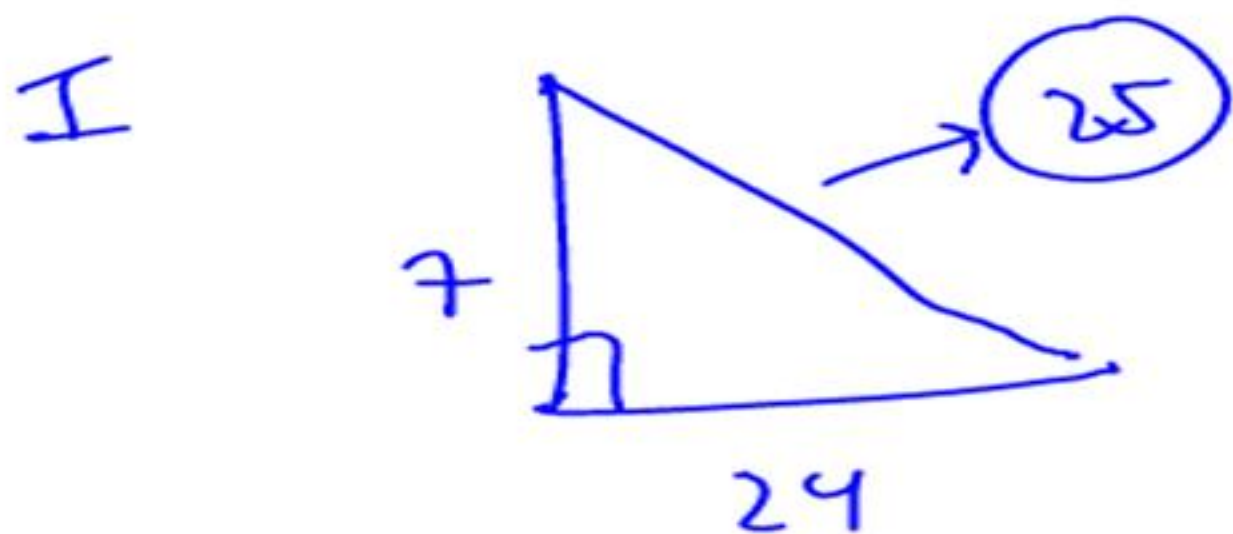
$$5^2 + (\text{PR})^2 = 13^2$$

PR = 12



Eg. In a right angle  $\triangle$ , if two sides are 24 cm and 7 cm then find the 3<sup>rd</sup> side.

Here we don't know which angle is  $90^\circ$



Can't be determined

## HOW MANY TRIGONOMETRIC RATIOS ARE THERE?

P = Perpendicular

B = Base

H = Hypotenuse

(P/B/H)

$3 \times 2$

$= 6$

**B → Base**

**P → Perpendicular**

**H → Hypotenuse**

$$\sin \theta = \frac{P}{H}$$

$$\cos \theta = \frac{B}{H}$$

$$\tan \theta \left( \frac{\sin \theta}{\cos \theta} \right) = \frac{P}{B}$$

$$\operatorname{cosec} \theta \left( \frac{1}{\sin \theta} \right) = \frac{H}{P}$$

$$\sec \theta \left( \frac{1}{\cos \theta} \right) = \frac{H}{B}$$

$$\cot \theta \left( \frac{1}{\tan \theta} \right) = \frac{B}{P}$$

**Note:** It should be noted that :

sin  $\theta$  is an abbreviation for "sine of angle  $\theta$ ", it is not the product of sin and  $\theta$ .

and,  $\sin^2 \theta = (\sin \theta)^2$ ,  $\sin^3 \theta = (\sin \theta)^3$ ,  $\cos^3 \theta = (\cos \theta)^3$ , etc.

$\sin \theta$

$$\sin^2 \theta = (\sin \theta)^2$$

If

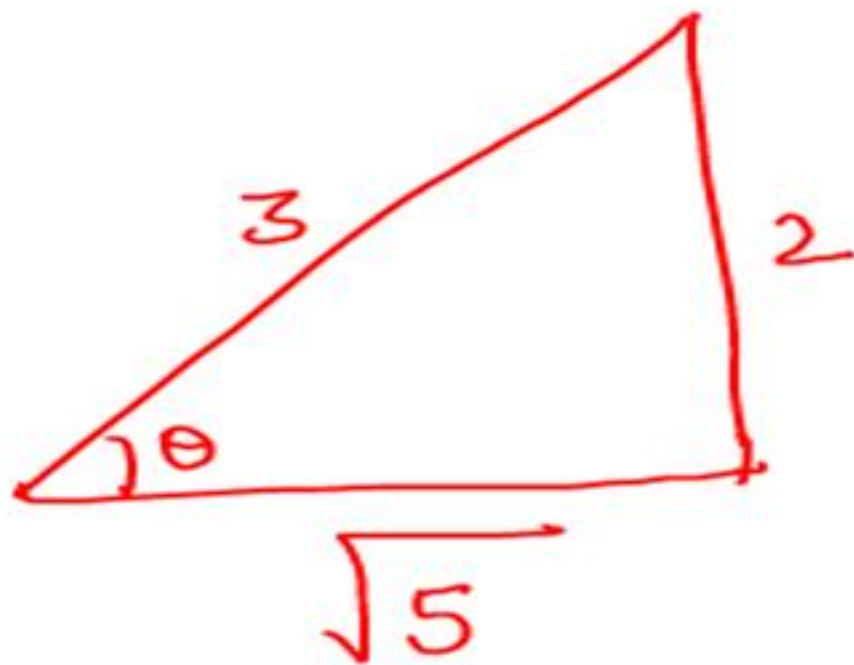
$$\sin \theta = \frac{2}{3}$$

$$\begin{aligned} \sin^3 \theta &= \left(\frac{2}{3}\right)^3 \\ &= \frac{8}{27} \end{aligned}$$



If you know one trigonometric ratio, then you can find all the remaining five trigonometric ratios.

Eg. If  $\sin \theta = 2/3$ , then find all the remaining trigonometric ratios.



$$\sin \theta = \frac{2}{3}$$

$$\csc \theta = \frac{3}{2}$$

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

$$\sec \theta = \frac{3}{\sqrt{5}}$$

$$\tan \theta = \frac{2}{\sqrt{5}}$$

$$\cot \theta = \frac{\sqrt{5}}{2}$$



Eg. In a  $\triangle ABC$ ,  $\angle B = 90^\circ$ ,  $AB = 5$  cm,  $BC = 11$  cm, find :

(i)  $\csc A$

$$= \frac{\sqrt{146}}{11}$$

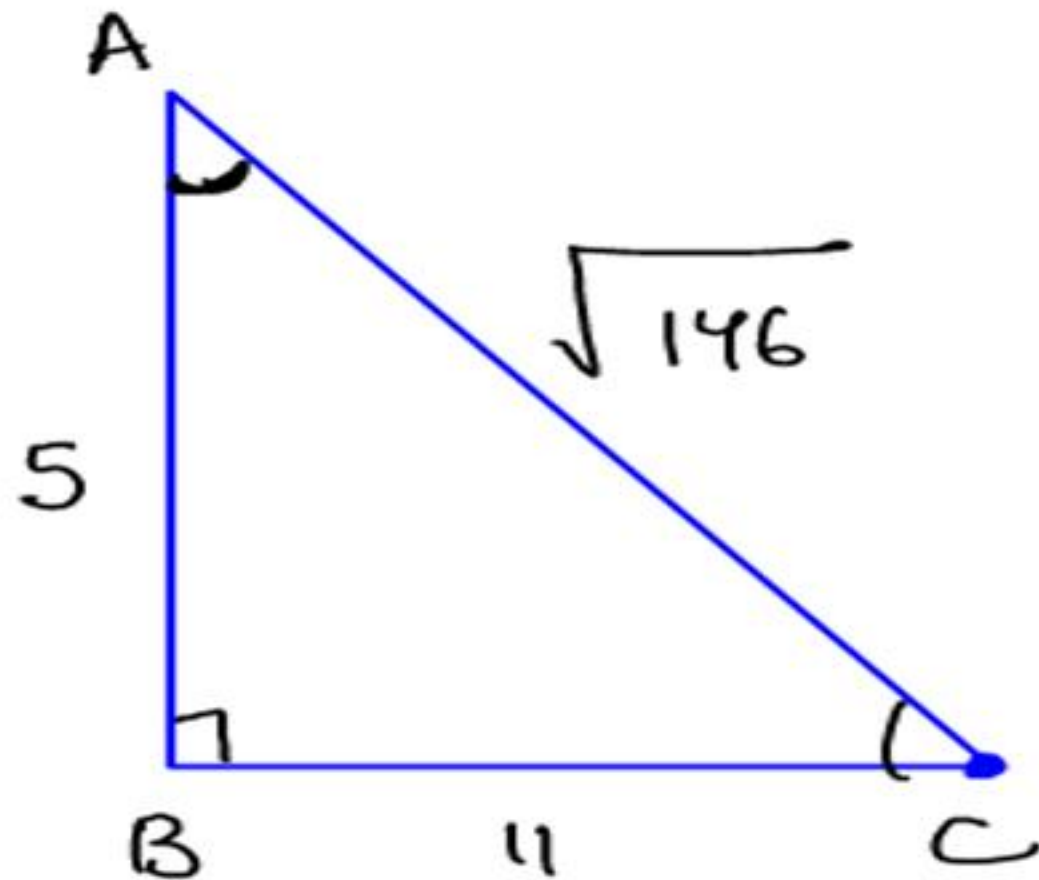
(ii)  $\tan C$

$$\frac{5}{11}$$

(iii)  $\sec C - \csc A$

$$\cancel{\frac{\sqrt{146}}{11}} - \cancel{\frac{\sqrt{146}}{11}}$$

$$= 0$$



Eg. If  $\tan \theta = 5/8$

Find the value of  $\frac{8 \sin \theta - 7 \cos \theta}{8 \sin \theta + 7 \cos \theta} = ??$

I<sup>st</sup>

Divide N<sup>r</sup>s & D<sup>r</sup> by  $\cos \theta$

$$\frac{8 \tan \theta - 7}{8 \tan \theta + 7}$$

$$\frac{8 \cdot \frac{5}{8} - 7}{8 \cdot \frac{5}{8} + 7}$$

$$\frac{8 \cdot \frac{5}{8} - 7}{8 \cdot \frac{5}{8} + 7} = \frac{-1}{6}$$

II<sup>nd</sup>

$$\frac{\sin \theta}{\cos \theta} = \frac{5}{8}$$

$$8 \sin \theta = 5 \cos \theta$$

$$\frac{5 \cos \theta - 7 \cos \theta}{5 \cos \theta + 7 \cos \theta}$$

$$\frac{-2 \cos \theta}{12 \cos \theta} = \frac{-1}{6}$$

$$\tan \theta = \frac{5}{8}$$

$$\frac{\sin \theta}{\cos \theta} = \frac{5}{8}$$

$$\frac{8 \sin \theta - 7 \cos \theta}{8 \sin \theta + 7 \cos \theta}$$

$$\frac{8 \cdot 5 - 7 \cdot 8}{8 \cdot 5 + 7 \cdot 8}$$

$$= \frac{-16}{96} = \frac{1}{6}$$

This method is

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Ans.  $-\frac{1}{6}$



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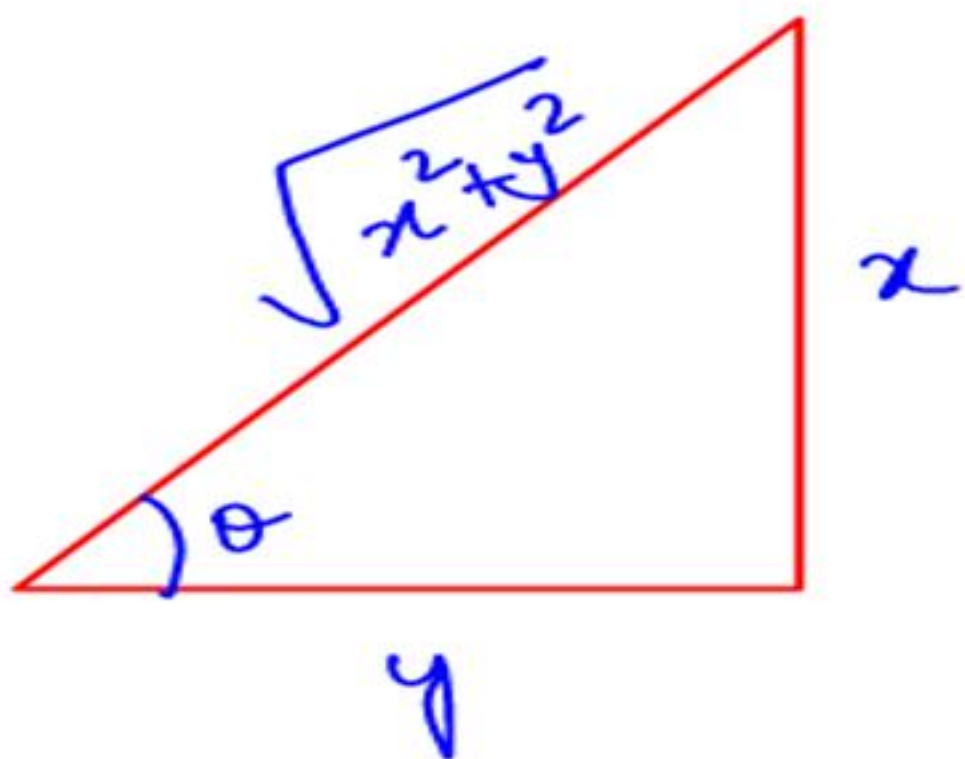
Eg. If  $\tan \theta = \frac{x}{y}$ , find  $\sin \theta - \cos \theta = ?$

(a)  $x - y$

~~(b)~~  $\frac{x - y}{\sqrt{x^2 + y^2}}$

✓ (c)  $\frac{x + y}{\sqrt{x^2 + y^2}}$

(d) None of these



PYQ of SSC

$$\frac{x}{\sqrt{x^2 + y^2}} - \frac{y}{\sqrt{x^2 + y^2}}$$

$$\frac{x - y}{\sqrt{x^2 + y^2}}$$

Ans. (b)

# TRIGONOMETRIC RATIOS TABLE

$\angle A$	<u><math>0^\circ</math></u>	<u><math>30^\circ</math></u>	<u><math>45^\circ</math></u>	<u><math>60^\circ</math></u>	<u><math>90^\circ</math></u>
<u><math>\sin A</math></u>	<u>0</u>	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	<u>1</u>
<u><math>\cos A</math></u>	<u>1</u>	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	<u>0</u>
<u><math>\tan A</math></u>	<u>0</u>	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	not defined
<u><math>\cot A</math></u>	<u>not defined</u>	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	<u>0</u>
<u><math>\sec A</math></u>	<u>1</u>	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	<u>not defined</u>
<u><math>\operatorname{cosec} A</math></u>	<u>not defined</u>	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	<u>1</u>



	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$
$\sin \theta$	$\sqrt{\frac{0}{4}}$	$\sqrt{\frac{1}{4}}$	$\sqrt{\frac{2}{4}}$	$\sqrt{\frac{3}{4}}$	$\sqrt{\frac{4}{4}}$
	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1

1.

$$\sin \theta = \frac{1}{2}$$

$$\rightarrow \underline{\theta = 30^\circ}$$

$$\tan \theta = \sqrt{3}$$

$$\rightarrow \underline{\theta = 60^\circ}$$

$$\underline{\operatorname{cosec} \theta} = \frac{2}{\sqrt{3}}$$

$$\rightarrow \underline{\theta = 60^\circ}$$

Note : If nothing is given about angle  
In general question of trigonometry we  
will take angle  $\sim \dots$

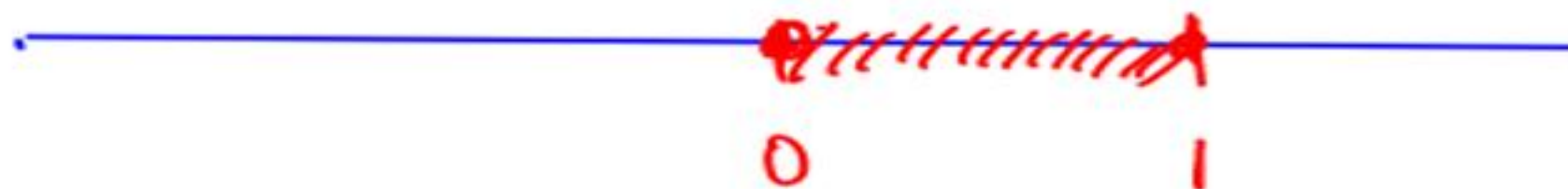
$$0 < \underline{\theta} < \underline{90}$$

If  $0^\circ \leq \theta \leq 90^\circ$

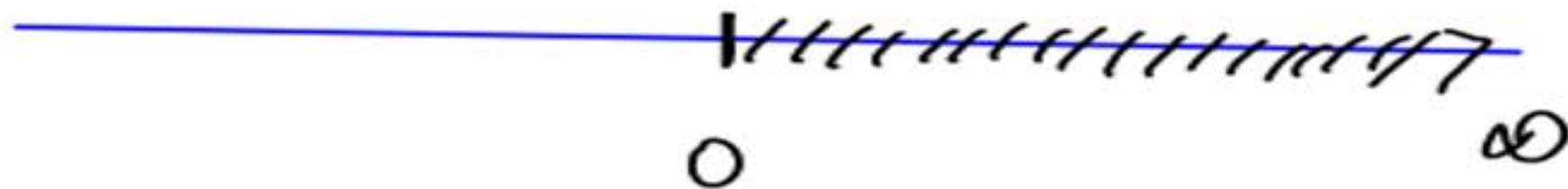
	Min	Max
<u><math>\sin \theta / \cos \theta</math></u>	0	1
<u><math>\tan \theta / \cot \theta</math></u>	0	$\infty$
<u><math>\sec \theta / \operatorname{cosec} \theta</math></u>	1	$\infty$

$$0 < \theta < 90$$

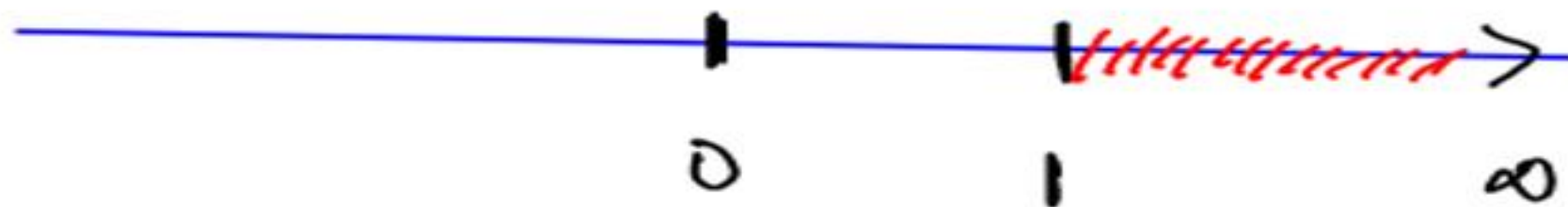
for  $\sin \theta$  &  $\cos \theta$



for  $\tan \theta$  &  $\sec \theta$



for  $\csc \theta$  &  $\cot \theta$





3.

$$\text{If } 0^\circ \leq \theta \leq 90^\circ$$

Increasing Function

If

$$\theta_1 > \theta_2$$

$$\sin \theta_1 > \sin \theta_2$$

Decreasing Function

If

$$\theta_1 > \theta_2$$

$$\cos \theta_1 < \cos \theta_2$$

sin  $\theta$ , tan  $\theta$  and sec  $\theta$  are increasing functions.  
cos  $\theta$ , cot  $\theta$  and cosec  $\theta$  are decreasing functions.

Eg. State whether the following are True or False.

(i)  $\sin \underline{77^\circ} > \sin \underline{50^\circ}$

TRUE

(ii)  $\cos \underline{20^\circ} > \cos 29^\circ$

TRUE

(iii)  $\cot \underline{42^\circ} > \cot 57^\circ$

TRUE

(iv)  $\operatorname{cosec} 25^\circ < \operatorname{cosec} 52^\circ$

FALSE

(v)  $\sec 86^\circ < \sec 23^\circ$

FALSE

(vi)  $\tan 49^\circ > \tan 73^\circ$

FALSE

Eg. Which of the following is true?

(a)  $\cos 1^c > \cos 1^\circ$

☒ (b)  $\cos 1^c < \cos 1^\circ$

(c)  $\cos 1^c = \cos 1^\circ$

(d) Can't be determined

$$1^c \approx \underline{\underline{57^\circ}}$$

$$\cos 1^c < \cos 1^\circ$$



**Ans. (b)**



Eg.  $\cos 20^\circ - \cos 70^\circ$

- ☒ (a) +ve
- (b) -ve
- (c) 0
- (d) Can't be determined

$$\cos 20^\circ > \cos 70^\circ$$

$$\cos 20^\circ - \cos 70^\circ$$

Ans. (a)

Eg.  $A = \sin 64^\circ + \sin 76^\circ$

(a)  $0 < A < 1$

(c)  $\frac{\sqrt{3}}{2} < A < 1$

(b)  $\frac{\sqrt{3}}{2} < A < 2$

☒ (d)  $\sqrt{3} < A < 2$

$$\sin 60^\circ < \sin 64^\circ < \sin 90^\circ \quad \text{--- (1)}$$

$$\sin 60^\circ < \sin 76^\circ < \sin 90^\circ \quad \text{--- (2)}$$

---


$$\sqrt{3} < \textcircled{A} < 2$$



Ans. (d)

4.

$0^\circ - 45^\circ$	$45^\circ$	$45^\circ - 90^\circ$
<u><math>\cos \theta</math></u>	$\sin \theta = \cos \theta$	<u><math>\sin \theta</math></u>
<u><math>\cot \theta</math></u>	$\tan \theta = \cot \theta$	<u><math>\tan \theta</math></u>
<u><math>\operatorname{cosec} \theta</math></u>	$\sec \theta = \operatorname{cosec} \theta$	<u><math>\sec \theta</math></u>





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Eg. State whether the following are True or False.

(i) sec  $49^\circ > \text{cosec } 49^\circ$

TRUE

(ii)  $\tan 23^\circ > \text{cot } 23^\circ$

FALSE

(iii) sec  $19^\circ < \text{cosec } 19^\circ$

TRUE

(iv)  $\cot 52^\circ > \tan 52^\circ$

FALSE

(v)  $\cos 13^\circ > \sin 13^\circ$

TRUE





5. If,

V.V. Imp

$$\sin \underline{x} = \cos \underline{y}$$

$$\tan \underline{x} = \cot \underline{y}$$

$$\sec \underline{x} = \operatorname{cosec} \underline{y}$$

$$x + y = 90^\circ$$

$$0^\circ \leq x, y \leq 90^\circ$$

eg

$$\sin \underline{20^\circ} = \cos \underline{\theta}$$

$$20 + \theta = 90$$

$$\theta = 70 \quad \checkmark$$

Eg1. If  $\sin \underline{2\theta} = \cos \underline{7\theta}$

Find  $\theta = ??$

$$2\theta + 7\theta = 90$$

$$9\theta = 90$$

$$\theta = 10^\circ$$

---

**Ans.**

**10**

**Eg2. If**  $\sec\left(\frac{11\theta}{4}\right) = \operatorname{cosec}\left(\frac{7\theta}{2}\right)$

**Find  $\theta = ??$**

$$\frac{11\theta}{4} + \frac{7\theta}{2} = 90$$

$$\frac{11\theta + 14\theta}{4} = 90$$

$$\theta = \frac{\cancel{380} 72}{\cancel{28} 5}$$

$$\theta = \underline{\underline{14.4^\circ}}$$



**Ans.**  $\frac{72}{5}$

Eg3. If,  $\tan(\underline{5x - 8}) = \cot(\underline{8x + 20})$

Find :  $\sec(18 + 2x)$

$$\sec(18 + 12)$$

$$\sec 30$$

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

$$5x - 8 + 8x + 20 = 90$$

$$13x = 78$$

$$\underline{\underline{x = 6}}$$

**Ans.**  $\frac{2}{\sqrt{3}}$

Eg4. If,  $\tan 2\theta \tan 4\theta = 1$

Find :  $\sqrt{2} \sin \underline{3\theta}$

$$\sqrt{2} \cdot \sin 45$$

$$\cancel{\sqrt{2}} \cdot 1$$

$$\cancel{\sqrt{2}}$$

$$= 1$$

$$\tan 2\theta = \frac{1}{\tan 4\theta}$$

$$\underline{\tan 2\theta} = \underline{\cot 4\theta}$$

$$2\theta + 4\theta = 90$$

$$6\theta = 90$$

$$\theta = 15$$

**Ans.**

**1**



Eg5. If,  $\sin 5\theta \sec 10\theta = 1$

Find  $\theta$ .

$$\sin \underline{5\theta} = \cos \underline{10\theta}$$

$$5\theta + 10\theta = 90$$

$$15\theta = 90$$

$$\underline{\underline{\theta = 6^\circ}} \checkmark$$

$$\sin 20^\circ \rightarrow$$

(i) If you don't want to change the Angle

$$\frac{1}{\csc 20^\circ}$$

(ii) If you want to change the Angle to its complementary Angle

$$\rightarrow \cos 70^\circ$$

$$\sin \underline{34^\circ} \longrightarrow \cos 56^\circ$$

$$\tan \underline{23^\circ} \longrightarrow \cot 67^\circ$$

$$\sec \underline{65^\circ} \longrightarrow \csc 25^\circ$$



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$$\underline{\tan 41^\circ} \tan 42^\circ \tan 43^\circ \tan 44^\circ \tan 45^\circ \tan 46^\circ \tan 47^\circ \underline{\tan 48^\circ} \underline{\tan 49^\circ}$$

$$\cancel{\tan 41^\circ} \cancel{\tan 42^\circ} \cancel{\tan 43^\circ} \cancel{\tan 44^\circ} \tan 45^\circ \cancel{\cot 44^\circ} \cancel{\cot 43^\circ} \cancel{\cot 42^\circ} \cancel{\cot 41^\circ}$$

$$= 1 \quad \checkmark$$

**Ans.**

**1**





Eg7. Find:

$$(\sin 1^\circ \sin 2^\circ \sin 3^\circ \dots \sin 45^\circ) (\sec 46^\circ \sec 47^\circ \dots \sec 89^\circ)$$

$$\cancel{\sin 1^\circ} \quad \cancel{\sin 2^\circ}$$

$$\cancel{\sin 44^\circ} \quad \sin 45^\circ \quad \cancel{\sec 44^\circ} \quad \cancel{\sec 43^\circ} \quad \cancel{\sec 42^\circ} \quad \cancel{\sec 41^\circ}$$

$$\frac{1}{\sqrt{2}} \quad \checkmark \checkmark$$

**Ans.**  $\frac{1}{\sqrt{2}}$

Eg8. Find :

$$\cos 1^\circ \cos 2^\circ \cos 3^\circ \dots \cos 179^\circ$$

$$\cos 1^\circ \cos 2^\circ \cos 3^\circ \dots \cos 90^\circ \dots \cos 179^\circ$$

↓

0

→

0

**Ans.**

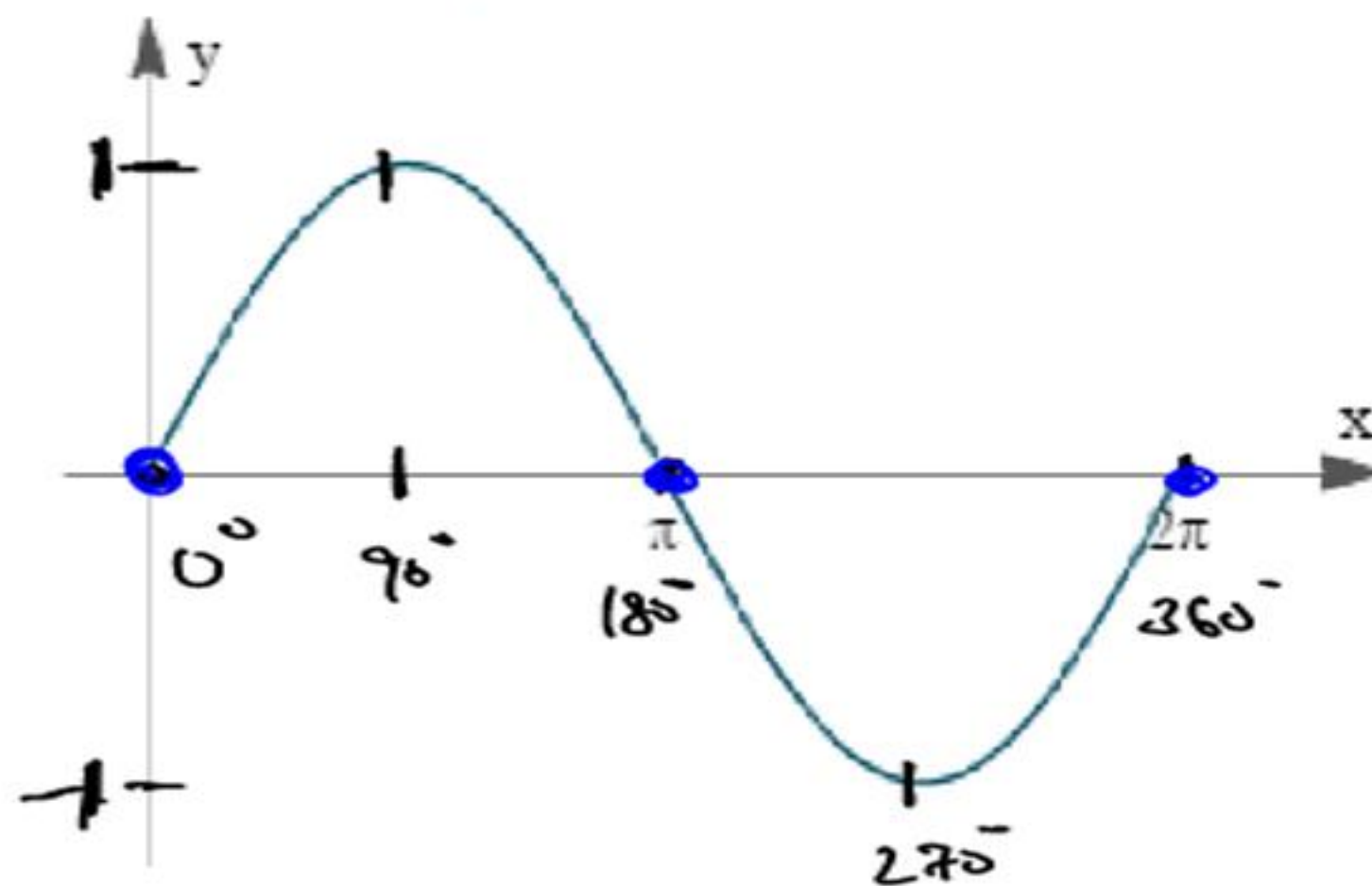
**0**

# Trigonometry Ratio Table ( $0^\circ$ to $360^\circ$ )

Degree	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$	<u><math>180^\circ</math></u>	<u><math>270^\circ</math></u>	<u><math>360^\circ</math></u>
Radian	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
✓ <b>sin</b>	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	0	-1	0
✓ <b>cos</b>	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	-1	0	1
<b>tan</b>	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined	0	Not defined	0
<b>cosec</b>	Not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1	Not defined	-1	Not defined
<b>sec</b>	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not defined	-1	Not defined	1
<b>cot</b>	Not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0	Not defined	0	Not defined



$$y = \sin x$$



$$\sin 0^\circ = 0$$

$$\sin 90^\circ = 1$$

$$\sin 180^\circ = 0$$

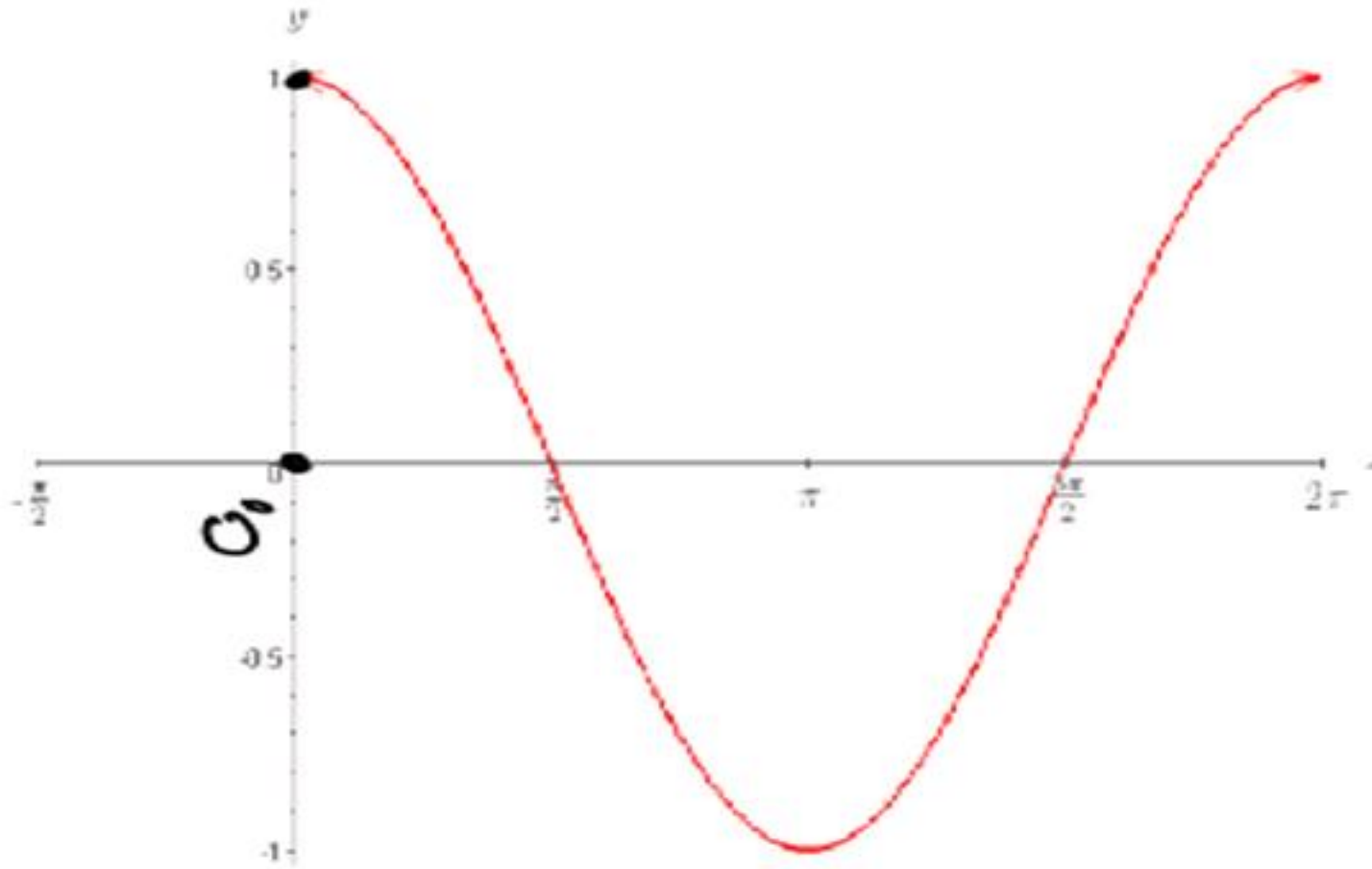
$$\sin 270^\circ = -1$$

$$\sin 360^\circ = 0$$

$$\underline{\underline{\sin x = 0}}, \quad \text{if } \underline{\underline{x = n\pi}}$$

$x \rightarrow$  multiple of  $180^\circ$

$$y = \cos x$$



$$\cos x = 0, \quad \text{if } x = (2n+1) \pi/2$$

$$y = \cos \theta$$

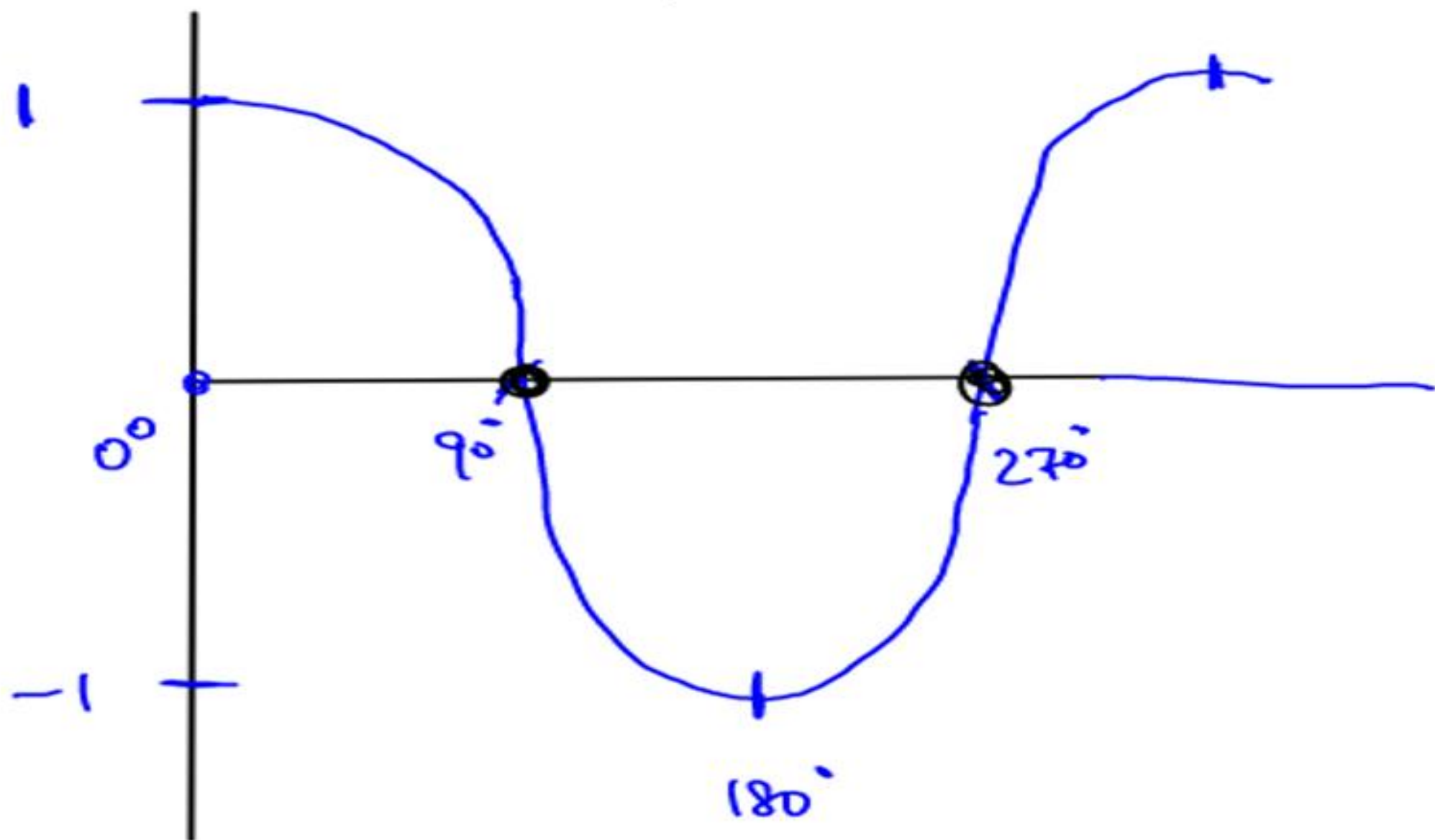
$$\cos 0^\circ = 1$$

$$\cos 90^\circ = 0$$

$$\cos 180^\circ = -1$$

$$\cos 270^\circ = 0$$

$$\cos 360^\circ = 1$$



$$\cos \theta = 0$$

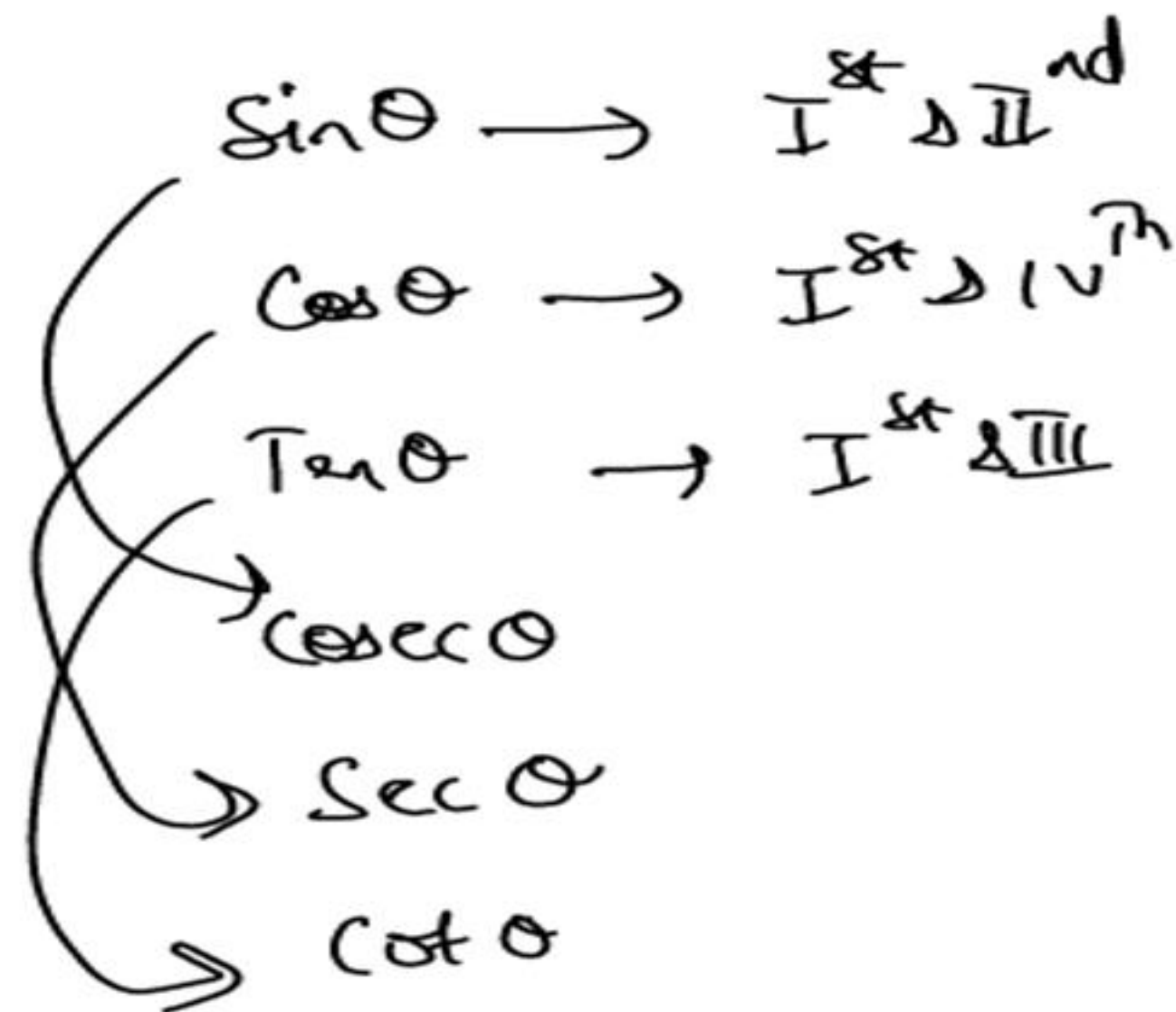
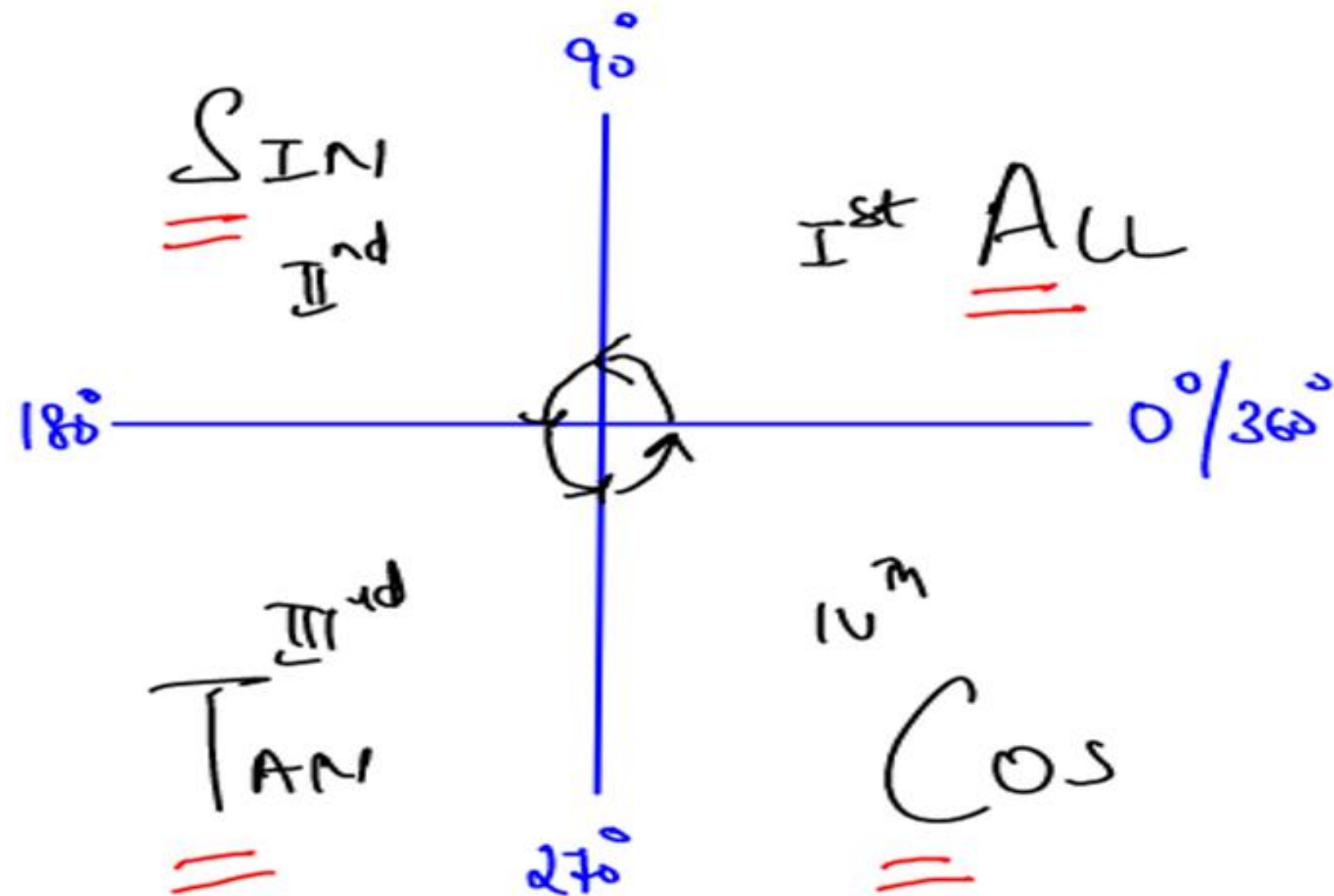
$$\theta = \underline{\underline{(2n+1) \cdot 90^\circ}}$$







# VALUES OF TRIGONOMETRIC RATIOS ACCORDING TO DIFFERENT QUADRANTS



$$120^\circ \rightarrow \underline{90} + 30$$

$$150^\circ \rightarrow 90 + 60$$

$$210^\circ \rightarrow 180 + 30$$

$$240^\circ \rightarrow 180 + 60$$

$$300^\circ \rightarrow 270 + 30$$

$$330^\circ \rightarrow 270 + 60$$

$$\frac{90 + \_}{270 + \_}$$

Trigonometric  
Ratios  
will change

$$\frac{180}{\_}$$

Trigonometric  
Ratios

will not change

$90^\circ / 270^\circ$

## Trigonometry Ratio Change

$\sin \theta$	$\cos \theta$
$\cos \theta$	$\sin \theta$
$\tan \theta$	$\cot \theta$
$\operatorname{cosec} \theta$	$\sec \theta$
$\sec \theta$	$\operatorname{cosec} \theta$
$\cot \theta$	$\tan \theta$

$$180^\circ / 360^\circ$$



**Trigonometric Ratio doesn't Change**



Eg.

Find the value of  $\sin 120^\circ$


$$\sin(120^\circ) \Rightarrow \sin(90^\circ + 30^\circ) \Rightarrow \cos 30^\circ$$

$$\cos 30^\circ$$

$$\frac{\sqrt{3}}{2}$$

Eg.

Find the value of  $\cos 210^\circ$

$$\begin{aligned}
 \cos 210^\circ &= \cos (\underline{180} + 30) \\
 &= \cos 30 \\
 &= -\frac{\sqrt{3}}{2}
 \end{aligned}$$




Eg. Find the values.

Time  $\rightarrow$  2min

$$(i) \sin \underline{240^\circ} \rightarrow \sin(180+60) \Rightarrow -\frac{\sqrt{3}}{2}$$

$$(ii) \tan 300^\circ \rightarrow \tan(\underline{270}+30) \Rightarrow -\sqrt{3}$$

$$(iii) \sec 330^\circ \rightarrow \sec(270+60) \Rightarrow \frac{2}{\sqrt{3}}$$

$$(iv) \operatorname{cosec} 150^\circ \rightarrow \operatorname{cosec}(90+60) \Rightarrow 2$$

$$(v) \cot 240^\circ \rightarrow \cot(180+60) \Rightarrow \frac{1}{\sqrt{3}}$$

$$(vi) \cos 120^\circ \rightarrow \cos(90+30) \rightarrow -\frac{1}{2}$$

$$0^\circ < \theta < 90^\circ$$

$$\sin(\underline{90} - \theta) = \cos \theta$$

$$\cos(\underline{90} - \theta) = \sin \theta$$

$$\tan(\underline{90} - \theta) = \cot \theta$$

$$\operatorname{cosec}(\underline{90} - \theta) = \sec \theta$$

$$\sec(\underline{90} - \theta) = \operatorname{cosec} \theta$$

$$\cot(\underline{90} - \theta) = \tan \theta$$

$$\sin(\underline{90} + \theta) = +\cos \theta$$

$$\cos(\underline{90} + \theta) = -\sin \theta$$

$$\tan(\underline{90} + \theta) = -\cot \theta$$

$$\operatorname{cosec}(\underline{90} + \theta) = +\sec \theta$$

$$\sec(\underline{90} + \theta) = -\operatorname{cosec} \theta$$

$$\cot(\underline{90} + \theta) = -\tan \theta$$

$$\sin (180 - \theta) = +\sin \theta$$

$$\cos (180 - \theta) = -\cos \theta$$

$$\tan (180 - \theta) = -\tan \theta$$

$$\operatorname{cosec} (180 - \theta) = +\operatorname{cosec} \theta$$

$$\sec (180 - \theta) = -\sec \theta$$

$$\cot (180 - \theta) = -\cot \theta$$

$$\sin (180 + \theta) = -\sin \theta$$

$$\cos (180 + \theta) = -\cos \theta$$

$$\tan (180 + \theta) = +\tan \theta$$

$$\operatorname{cosec} (180 + \theta) = -\operatorname{cosec} \theta$$

$$\sec (180 + \theta) = -\sec \theta$$

$$\cot (180 + \theta) = +\cot \theta$$



$$\sin (270 - \theta) = -\cos \theta$$

$$\cos (270 - \theta) = -\sin \theta$$

$$\tan (270 - \theta) = +\cot \theta$$

$$\operatorname{cosec} (270 - \theta) = -\sec \theta$$

$$\sec (270 - \theta) = -\operatorname{cosec} \theta$$

$$\cot (270 - \theta) = +\tan \theta$$

$$\sin (270 + \theta) = -\cos \theta$$

$$\cos (270 + \theta) = +\sin \theta$$

$$\tan (270 + \theta) = -\cot \theta$$

$$\operatorname{cosec} (270 + \theta) = -\sec \theta$$

$$\sec (270 + \theta) = +\operatorname{cosec} \theta$$

$$\cot (270 + \theta) = -\tan \theta$$

$$\sin (360 - \theta) = -\sin \theta$$

$$\cos (360 - \theta) = +\cos \theta$$

$$\tan (360 - \theta) = -\tan \theta$$

$$\operatorname{cosec} (360 - \theta) = -\operatorname{cosec} \theta$$

$$\sec (360 - \theta) = +\sec \theta$$

$$\cot (360 - \theta) = -\cot \theta$$

$$\sin (360 + \theta) = \sin \theta$$

$$\cos (360 + \theta) = \cos \theta$$

$$\tan (360 + \theta) = \tan \theta$$

$$\operatorname{cosec} (360 + \theta) = \operatorname{cosec} \theta$$

$$\sec (360 + \theta) = \sec \theta$$

$$\cot (360 + \theta) = \cot \theta$$

$$\sin(180 - \theta) = \sin \theta$$

If 2 angles are supplementary.

$$A + B = 180$$

$$\sin A = \sin B$$

$$\sin(\underline{180 - \theta}) \rightarrow \underline{\sin \theta}$$

eg 1

$$\sin 120 \rightarrow \sin 60 = \frac{\sqrt{3}}{2}$$

eg 2

$$\frac{\sin 55^\circ}{\sin 125^\circ} = ?? \quad ?$$



$$\cos(180 - \theta) = -\cos \theta$$

$$\cos(180 - \theta) = -\cos \theta$$

If 2 angles are supplementary angles

$$A + B = 180$$

$$\cos A + \cos B = 0$$

$$\cos 40 + \cos 140 = 0$$

$$\cos 70 = -\cos 140$$

$$\cos 40 = -\cos 140$$

eg 1

$$\cos 110 + \cos 70 = 0$$

eg 2

$$1 + \frac{2 \sin 50}{\sin 130} + \frac{3 \cos 40}{\cos 140}$$

$$\Rightarrow 1 + 2 + (-3) = 0$$

$$\sin(\underline{360} - \theta) = -\sin \theta$$

$$\tan(360 - \theta) = -\tan \theta$$

$$\cos(360 - \theta) = \cos \theta$$

$$\sin(-\theta) = -\sin \theta$$

$$\tan(-\theta) = -\tan \theta$$

$$\cos(-\theta) = \cos \theta$$

eg  $\sin(-30) = -\sin 30 = -\frac{1}{2}$

$$\tan(-30) = -\tan 30 = -1/\sqrt{3}$$

$$\cos(-30) = \cos 30 = \sqrt{3}/2$$

Eg. Find the value of  $\sin(-240^\circ)$ .

I<sup>st</sup>

$$\begin{aligned}
 \sin(-240) &= -\sin(240) \\
 &= -[\sin(180+60)] \\
 &= -[-\sin 60] = \underline{\underline{\frac{\sqrt{3}}{2}}}
 \end{aligned}$$

II<sup>nd</sup>

$$\begin{aligned}
 \sin(-240) &= \sin(120) \\
 &= \sin(90+30) \\
 &= \frac{\sqrt{3}}{2} \quad \checkmark
 \end{aligned}$$

Eg. Find the value of  $\sin (1560^\circ)$ .



Eg. Find the value of  $\tan(-1500^\circ)$ .

Eg. Find the value of :

(i)  $\sec (1320^\circ)$

(ii)  $\cot (1050^\circ)$

(iii)  $\sin (840^\circ)$

(iv)  $\tan (17\pi/6^\circ)$





Sahi Prep Hai Toh Life Set Hai

Practise  
topic-wise quizzes

Keep attending  
live classes

