

NDA 1 2025

LIVE

MATHS

TRIGONOMETRY

CLASS 1

NAVJYOTI SIR

SSBCrack
CLAMS

Crack
EXAMS



08 Oct 2024 Live Classes Schedule

8:00AM -- 08 OCTOBER 2024 DAILY CURRENT AFFAIRS RUBY MA'AM

9:00AM -- 08 OCTOBER 2024 DAILY DEFENCE UPDATES DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

9:30AM -- OVERVIEW ON TAT & WAT ANURADHA MA'AM

NDA 1 2025 LIVE CLASSES

11:30AM -- GK - AGRICULTURE RUBY MA'AM

1:00PM -- BIOLOGY - MCQ - CLASS 1 SHIVANGI MA'AM

4:00PM -- MATHS - TRIGONOMETRY - CLASS 1 NAVJYOTI SIR

5:30PM -- ENGLISH - SPOTTING ERRORS - CLASS 4 ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

11:30AM -- GK - AGRICULTURE RUBY MA'AM

1:00PM -- BIOLOGY - MCQ - CLASS 1 SHIVANGI MA'AM

5:30PM -- ENGLISH - SPOTTING ERRORS - CLASS 4 ANURADHA MA'AM

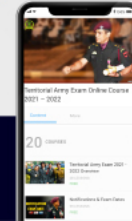
7:00PM -- MATHS - TIME & WORK - CLASS 3 NAVJYOTI SIR

AFCAT 1 2025 LIVE CLASSES

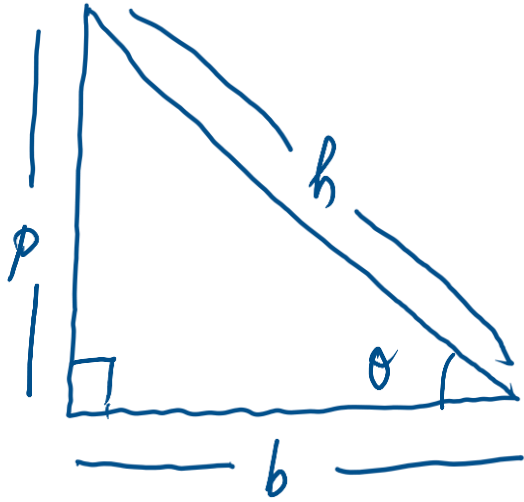
4:00PM -- STATIC GK - AWARDS & HONOURS DIVYANSHU SIR

5:30PM -- ENGLISH - SPOTTING ERRORS - CLASS 4 ANURADHA MA'AM

7:00PM -- MATHS - TIME & WORK - CLASS 3 NAVJYOTI SIR



INTRODUCTION



opposite to θ — perpendicular (p)

adjacent to θ — base (b) h — hypotenuse

$$\left(\underline{\sin \theta} = \frac{p}{h} \right) \longrightarrow \frac{1}{\sin \theta} = \frac{h}{p} = \underline{\text{cosec } \theta}$$

$$\left(\underline{\cos \theta} = \frac{b}{h} \right) \longrightarrow \frac{1}{\cos \theta} = \frac{h}{b} = \underline{\text{sec } \theta}$$

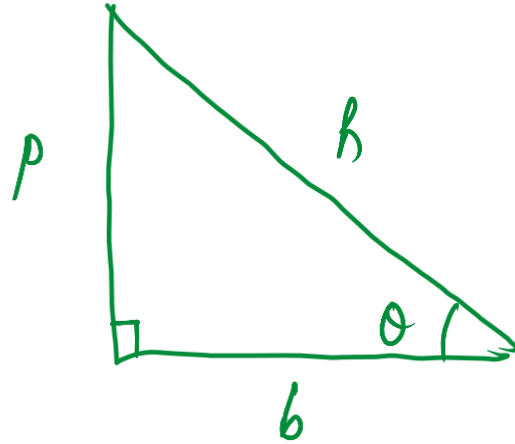
$$\underline{\tan \theta} = \frac{p}{b} = \frac{\sin \theta}{\cos \theta} \longrightarrow \frac{1}{\tan \theta} = \frac{\cos \theta}{\sin \theta} = \frac{b}{p} = \underline{\text{cot } \theta}$$

BASIC IDENTITIES

$$1) \sin^2 \theta + \cos^2 \theta = 1$$

$$2) 1 + \tan^2 \theta = \sec^2 \theta \checkmark$$

$$3) 1 + \cot^2 \theta = \operatorname{cosec}^2 \theta \checkmark$$



Pythagoras theorem,

$$h^2 = p^2 + b^2$$

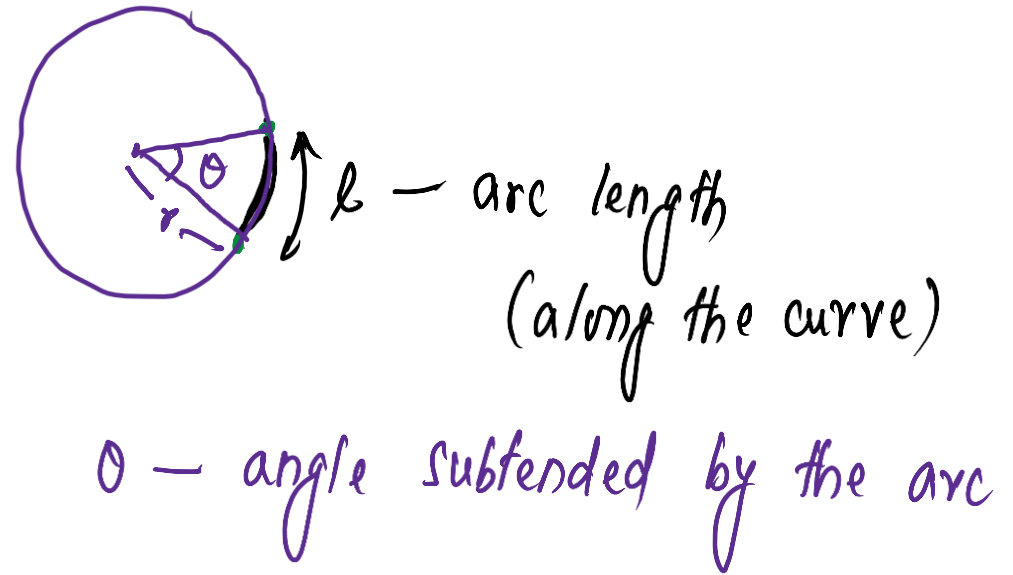
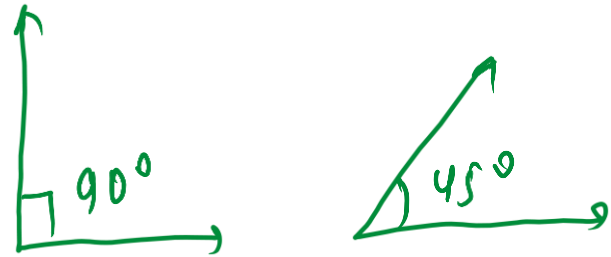
$$\frac{h^2}{h^2} = \frac{p^2 + b^2}{h^2}$$

$$1 = \frac{p^2}{h^2} + \frac{b^2}{h^2}$$

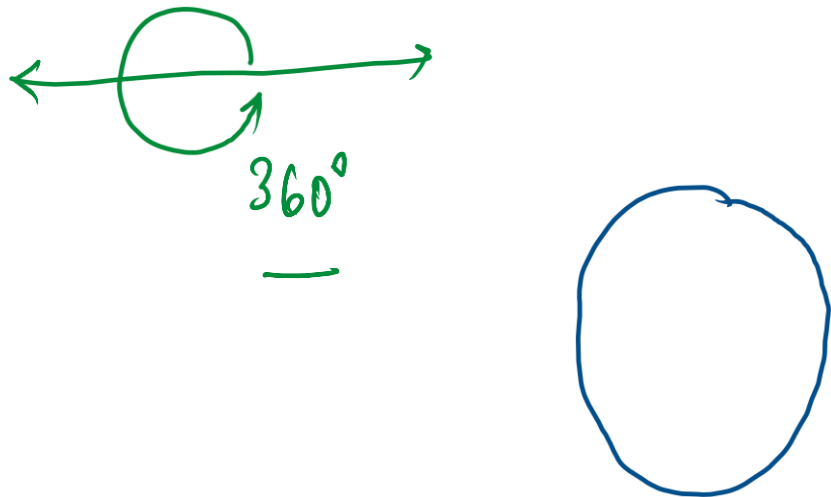
$$1 = \left(\frac{p}{h}\right)^2 + \left(\frac{b}{h}\right)^2$$

ANGLE MEASURE

- Measured in degrees, and radians.



$$\theta \text{ (radian)} = \frac{(l)}{(r)}$$



$$360^\circ = \frac{2\pi r}{r}$$

$$360^\circ = (2\pi)^c \rightarrow (2\pi \text{ radian})$$

ANGLE MEASURE

$$360^\circ = 2\pi \Rightarrow 180^\circ = \pi$$

<u>Degree</u>		<u>Radian</u>
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$$180^\circ \text{ ————— } \pi$$

$$90^\circ \text{ ————— } \frac{\pi}{2}$$

$$45^\circ \text{ ————— } \frac{\pi}{4}$$

$$30^\circ \text{ ————— } \frac{\pi}{6}$$

$$60^\circ \text{ ————— } \frac{\pi}{3}$$

$$1^\circ = \left(\frac{\pi}{180}\right)^\circ$$

$$1^\circ = \left(\frac{180}{\pi}\right)^\circ$$

$$54^\circ \text{ ————— } 54 \times \left(\frac{\pi}{180}\right)^\circ$$

$$\left(\frac{3\pi}{2}\right)^\circ \text{ ————— } \left(\frac{3\pi}{2} \times \frac{180}{\pi}\right)^\circ$$

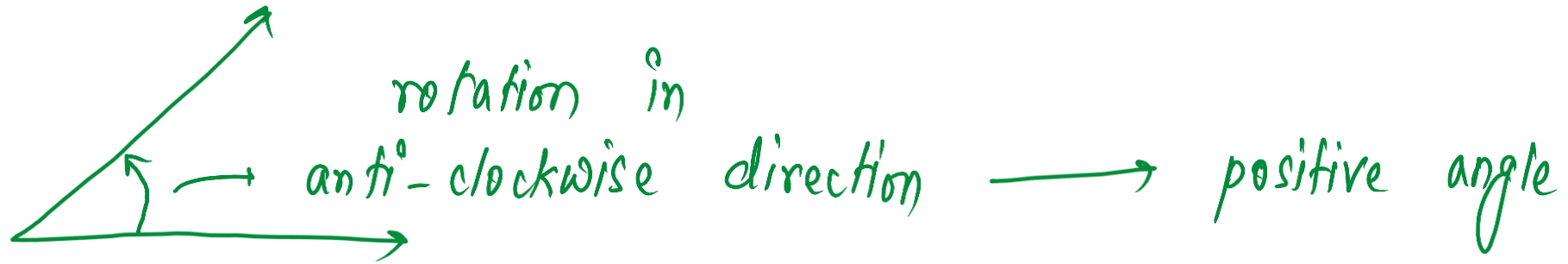
ANGLE MEASURE

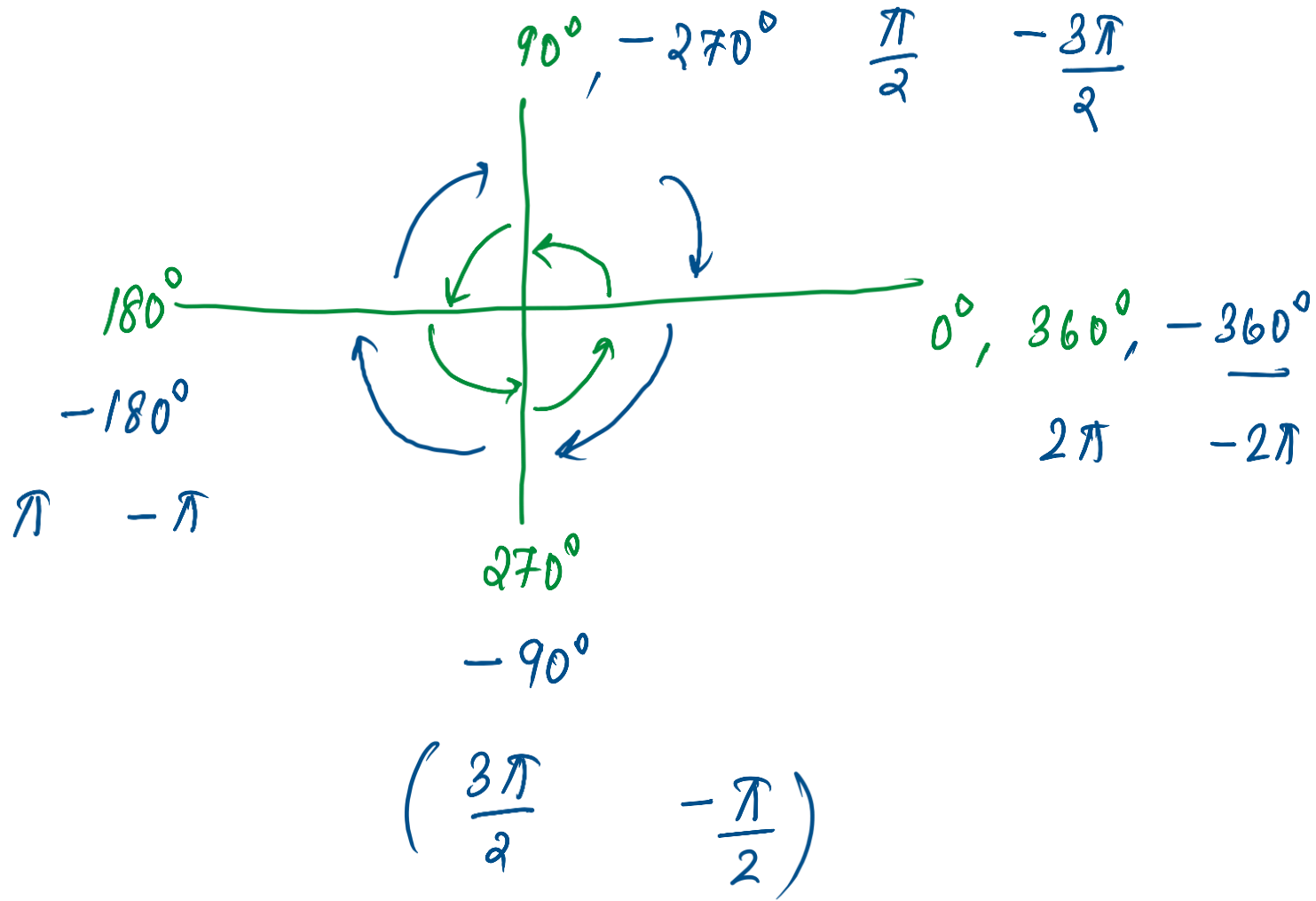
$$2 \text{ right angle} = 180^\circ = \pi \text{ radians} \quad \checkmark$$

$$1 \text{ radian} = \frac{180^\circ}{\pi} = \underline{57^\circ 16'} \text{ (approx)}$$

$$1^\circ = \frac{\pi}{180} \text{ radian} = \underline{0.01746} \text{ radians (approx)}$$

POSITIVE AND NEGATIVE ANGLE

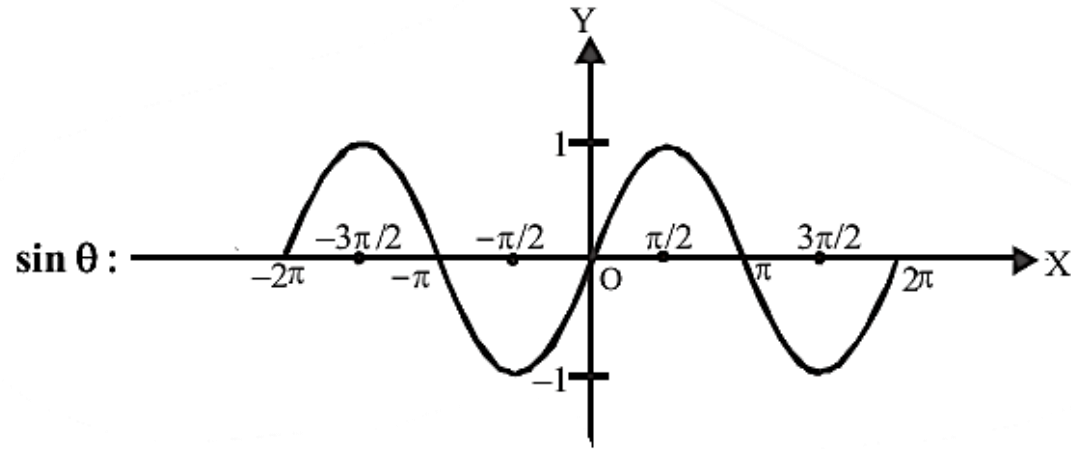




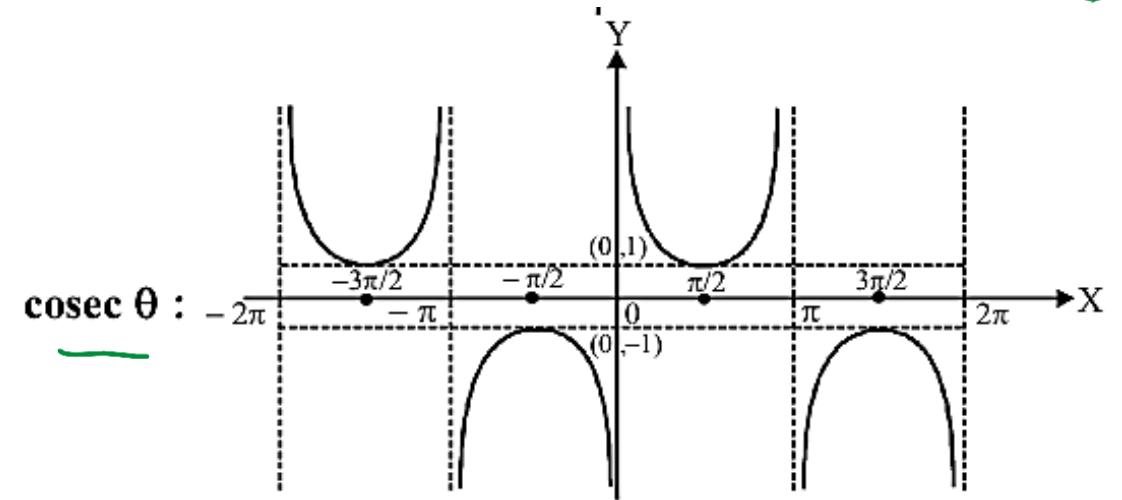
	0°	30°	45°	60°	90°
$\sin \theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos \theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0 (Reverse direction of $\sin \theta$)
$\tan \theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	<u>n.d.</u> (∞) (not defined) ($\tan \theta = \frac{\sin \theta}{\cos \theta}$)
$\operatorname{cosec} \theta$	<u>n.d.</u>	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1 ($\operatorname{cosec} \theta = \frac{1}{\sin \theta}$)
$\sec \theta$					
$\cot \theta$					($\sec \theta = \frac{1}{\cos \theta}$ $\cot \theta = \frac{1}{\tan \theta}$)

TRIGONOMETRIC FUNCTIONS – DOMAIN AND RANGE

sine	\mathbb{R} ✓	$[-1, 1]$
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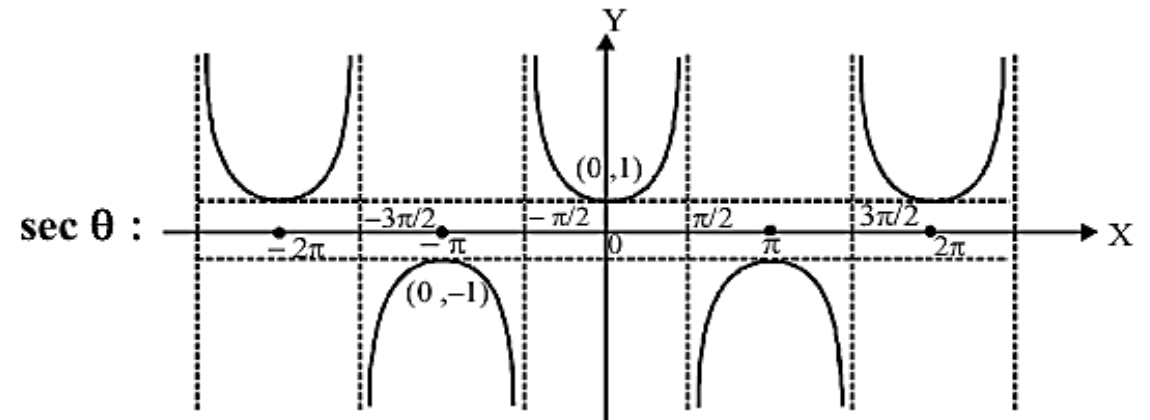
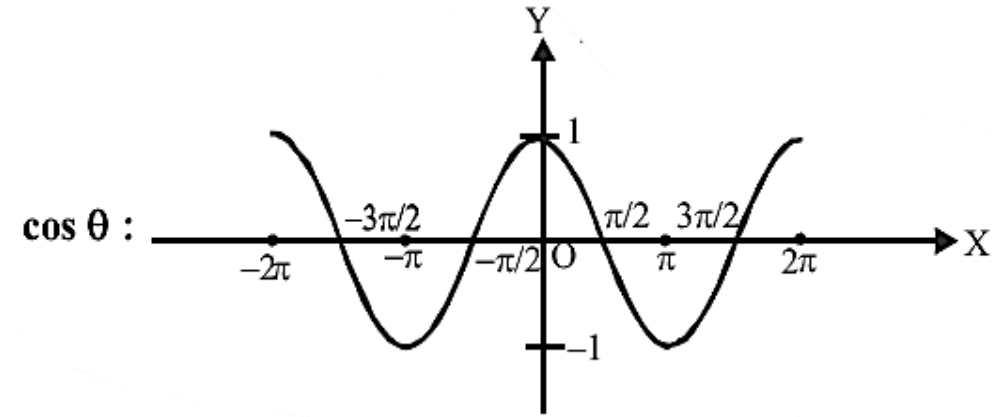
cosec	$\mathbb{R} - \{n\pi : n \in \mathbb{Z}\}$	$\mathbb{R} - (-1, 1)$
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TRIGONOMETRIC FUNCTIONS

cosine	\mathbf{R} ✓	$[-1, 1]$ ✓
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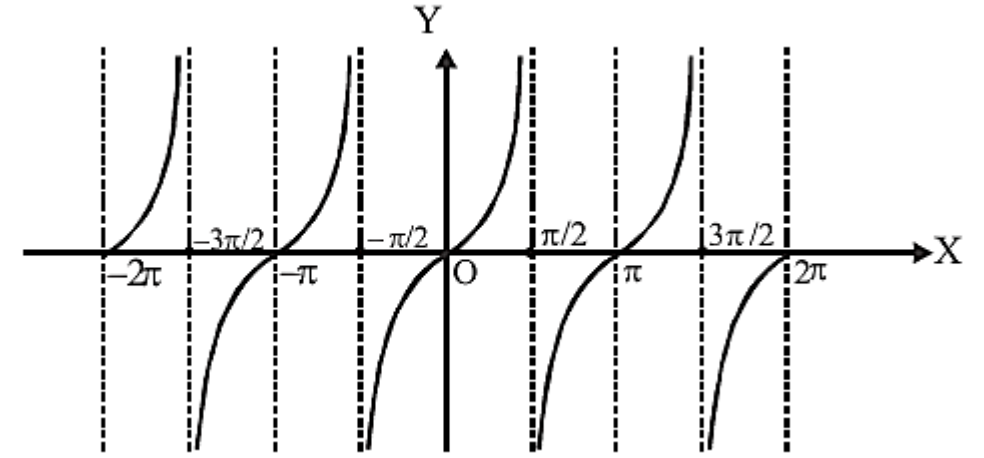
sec	$\mathbf{R - \{(2n + 1) \frac{\pi}{2} : n \in \mathbf{Z}\}}$ ✓	$\mathbf{R - (-1, 1)}$ ✓
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TRIGONOMETRIC FUNCTIONS

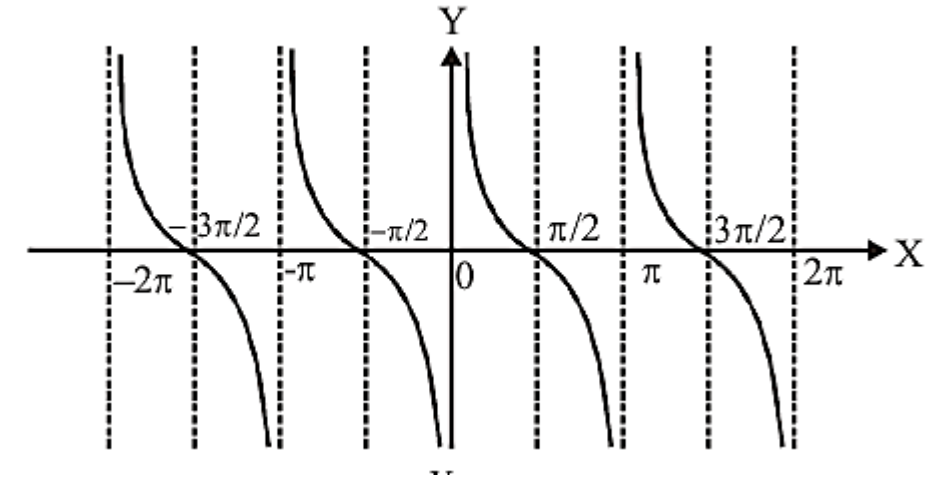
	Domain	Range
tan	$\mathbf{R} - \{(2n + 1) \frac{\pi}{2} : n \in \mathbf{Z}\}$	\mathbf{R}

tan θ :

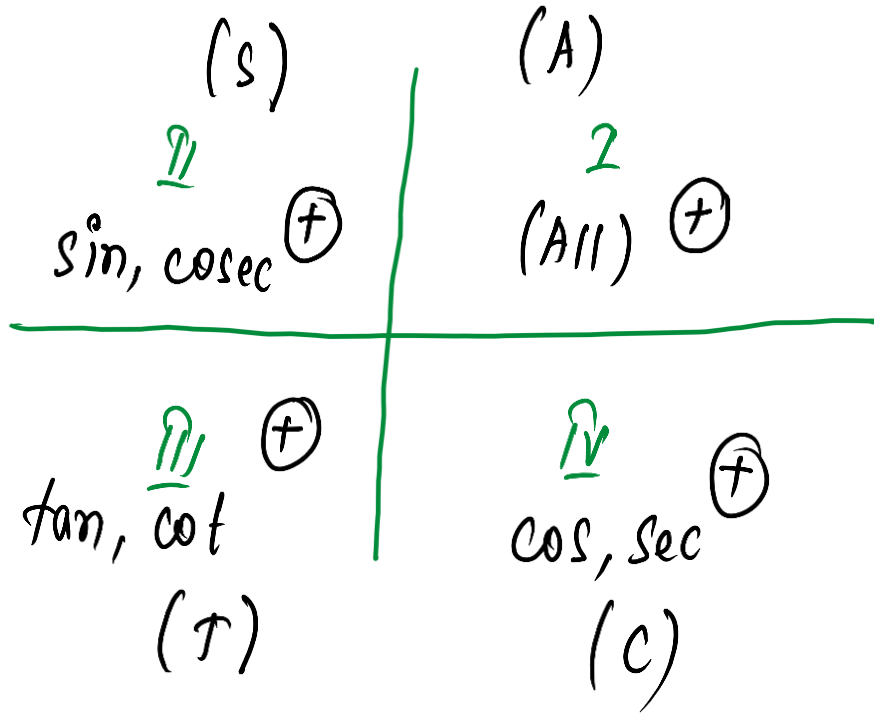


cot	$\mathbf{R} - \{n\pi : n \in \mathbf{Z}\}$	\mathbf{R}
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cot θ :



TRIGONOMETRIC FUNCTIONS IN DIFFERENT QUADRANT



(ASTC)

EXAMPLE

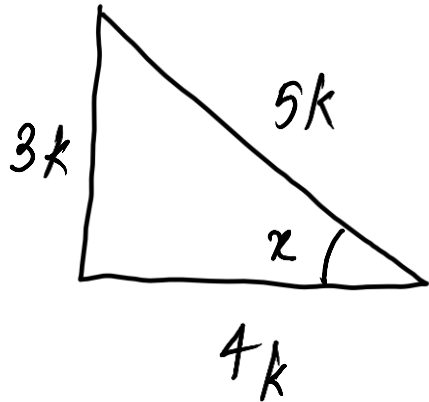
Q. If $\tan x = -\frac{3}{4}$ and x is in the second quadrant, then what is the value of $\sin x \cdot \cos x$?

(a) $\frac{6}{25}$

(b) $\frac{12}{25}$

(c) $-\frac{6}{25}$

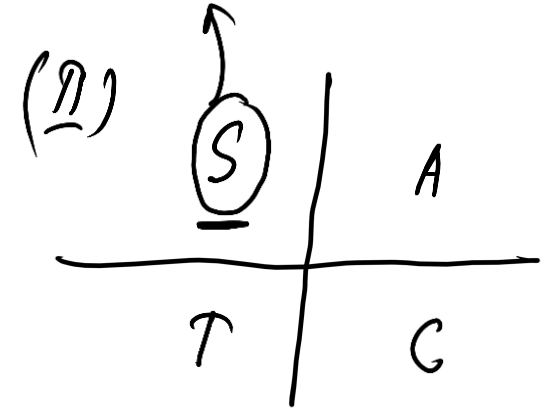
(d) $-\frac{12}{25}$



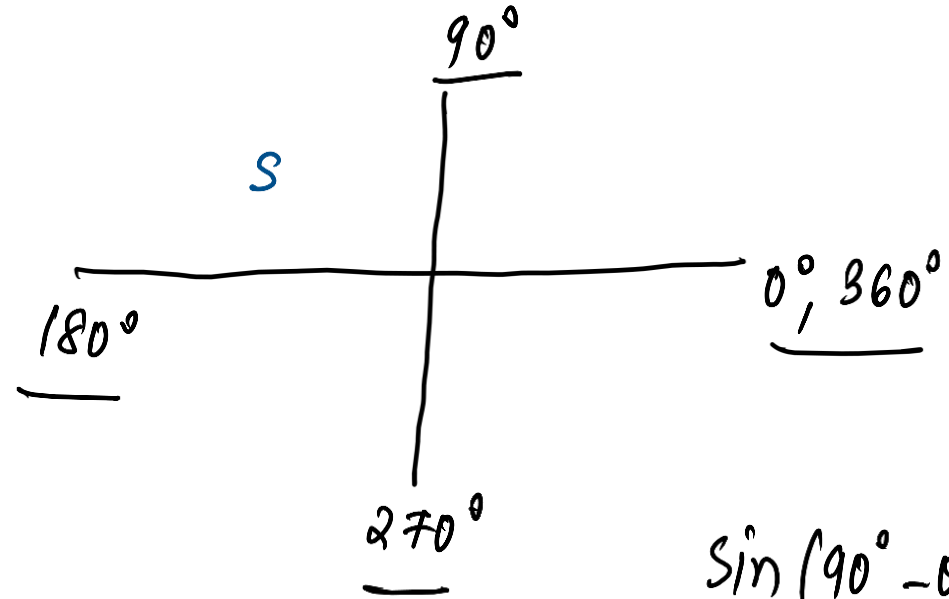
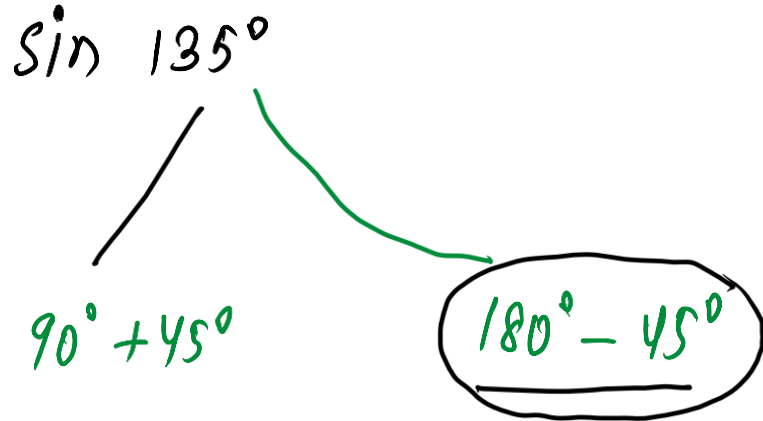
$$\sin x = \frac{3k}{5k} = +\frac{3}{5}$$

$$\cos x = \frac{4k}{5k} = -\frac{4}{5}$$

$$\sin x \cdot \cos x = \left(\frac{3}{5}\right) \left(-\frac{4}{5}\right) = -\frac{12}{25}$$



ALLIED OR RELATED ANGLES



$\sin(90^\circ - 0) = \cos 0$

$\sin 135^\circ = \sin(90^\circ + 45^\circ) = +\cos 45^\circ = +\frac{1}{\sqrt{2}}$

$\sin(180^\circ - 45^\circ) = +\sin 45^\circ = \frac{1}{\sqrt{2}}$

$$\tan 150^\circ$$

$$\left(\underbrace{180^\circ \pm \theta} \right) \text{ or } \left(\underbrace{360^\circ \pm \theta} \right) \longrightarrow$$

180° or 360°
(base angles)

Function remains the same ($180^\circ, 360^\circ$)

$$\tan (180^\circ - 30^\circ)$$

$$= -\tan 30^\circ$$

$$= -\frac{1}{\sqrt{3}}$$

2nd quadrant

$90^\circ, 270^\circ$

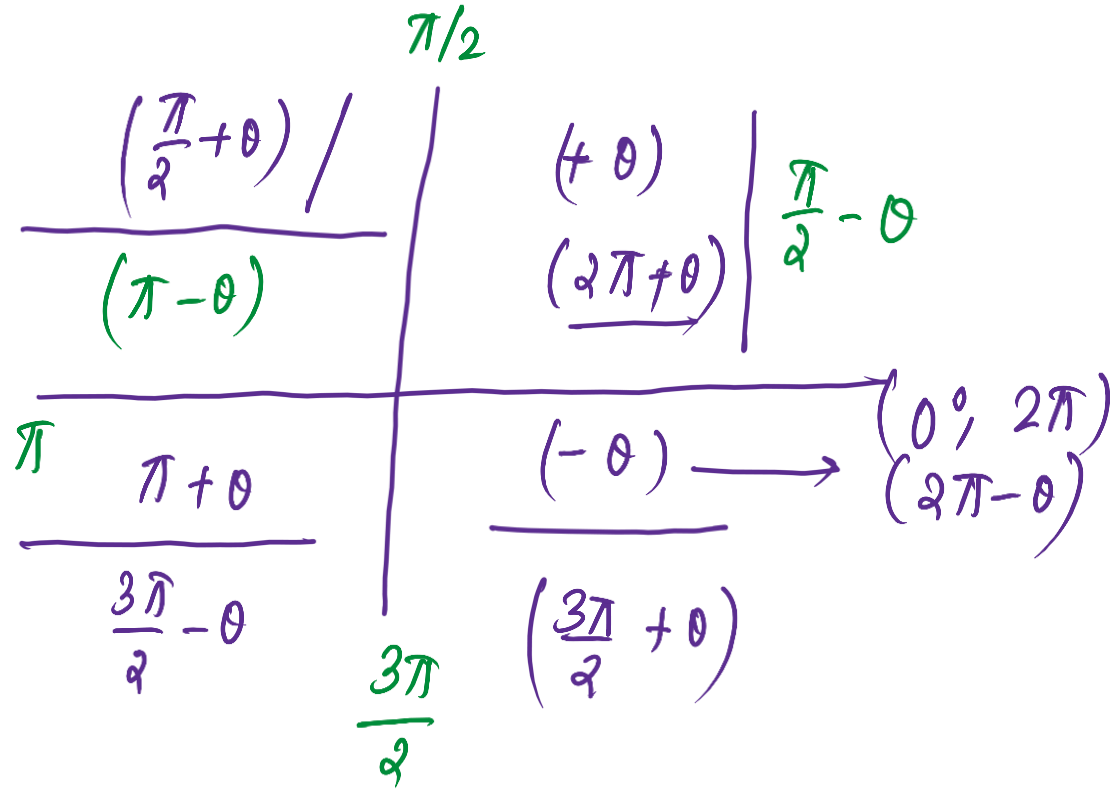
$\sin \longleftrightarrow \cos$

$\tan \longleftrightarrow \cot$

$\operatorname{cosec} \longleftrightarrow \operatorname{cosec}$

} function changes

$$(360^\circ \pm \theta) \longrightarrow \left(n \times 360^\circ + \theta \right)$$



EXAMPLE

Q. What is the value of $\sin 1920^\circ$?

$$\sin (360^\circ \times n + \theta)$$

$$\sin (\underline{5 \times 360^\circ} + \underline{120^\circ})$$

$$= + \sin 120^\circ$$

$$= + \sin (180^\circ - 60^\circ)$$

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

$$\begin{array}{r} 5 \\ 360 \overline{) 1920} \\ \underline{-1800} \\ 120 \end{array}$$

$$\left. \begin{array}{l} n \times 360^\circ + \theta \\ (360^\circ + \theta) \end{array} \right/ 360^\circ$$

FUNCTIONS OF NEGATIVE ANGLE

$$\rightarrow \sin(-30^\circ) = -\sin 30^\circ$$

$$\rightarrow \cos(-120^\circ) = \cos 120^\circ$$

$$\sin(-x) = -\sin x$$

$$\operatorname{cosec}(-x) = -\operatorname{cosec} x$$

$$\tan(-x) = -\tan x$$

$$\cot(-x) = -\cot x$$

$$f(-x) = -f(x)$$

(odd function)

$$f(-x) = f(x)$$

(even function)

$$\cos(-x) = \cos x$$

$$\sec(-x) = \sec x$$

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