

Trigonometry in Circular System

Trigonometry

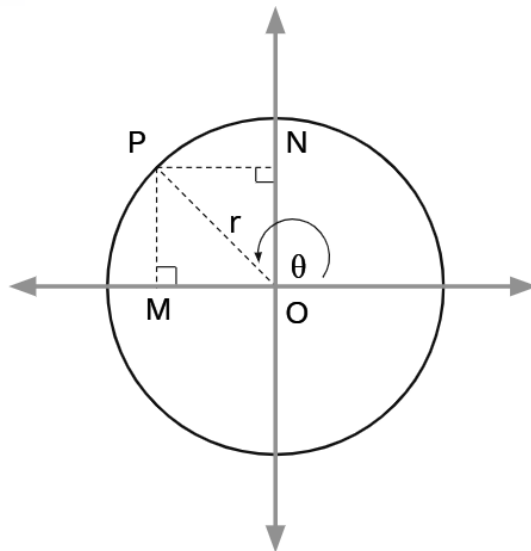


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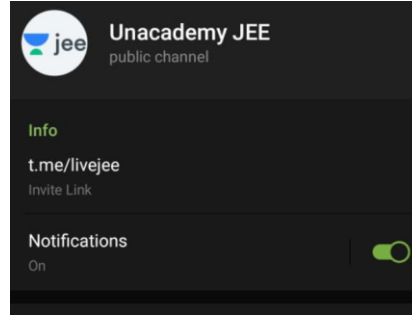
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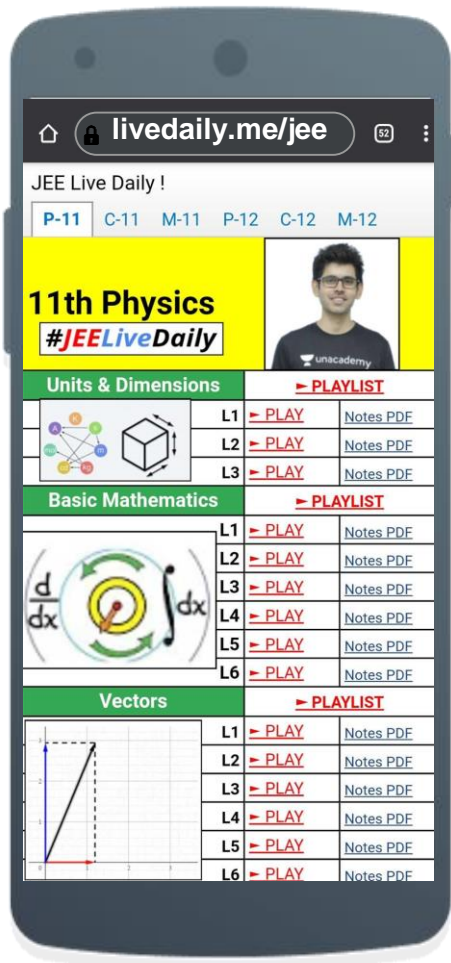
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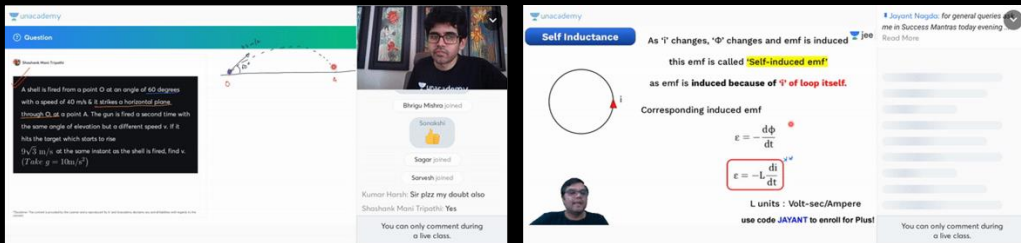
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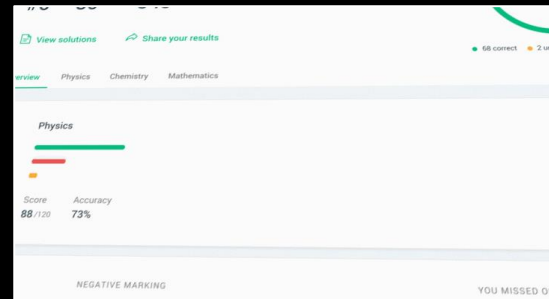
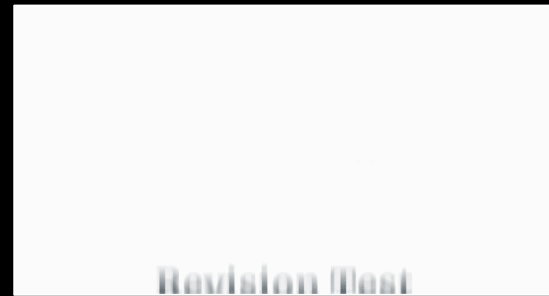


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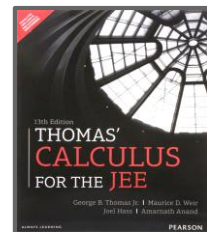
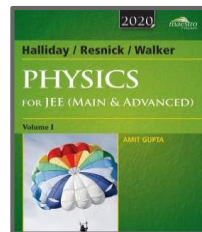
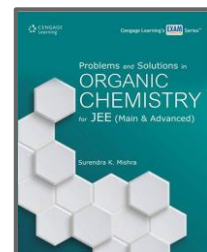
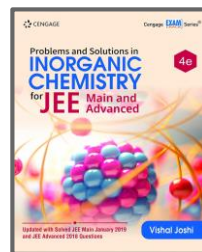
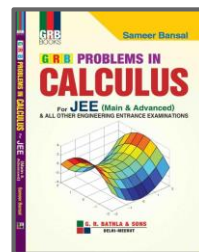
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LET'S BEGIN!!



The angle of a quadrilateral are in **A.P.** and the greatest angle is **120**, the angles in radian are

✓ **A.** $\frac{\pi}{3}, \frac{4\pi}{9}, \frac{5\pi}{9}, \frac{2\pi}{3}$

B. $\frac{\pi}{3}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{3}$

C. $\frac{5\pi}{18}, \frac{8\pi}{18}, \frac{11\pi}{18}, \frac{12\pi}{18}$

D. None of these

$$120, 120-d, 120-2d, 120-3d$$

$$\Rightarrow (4 \times 120) - 6d = 360$$

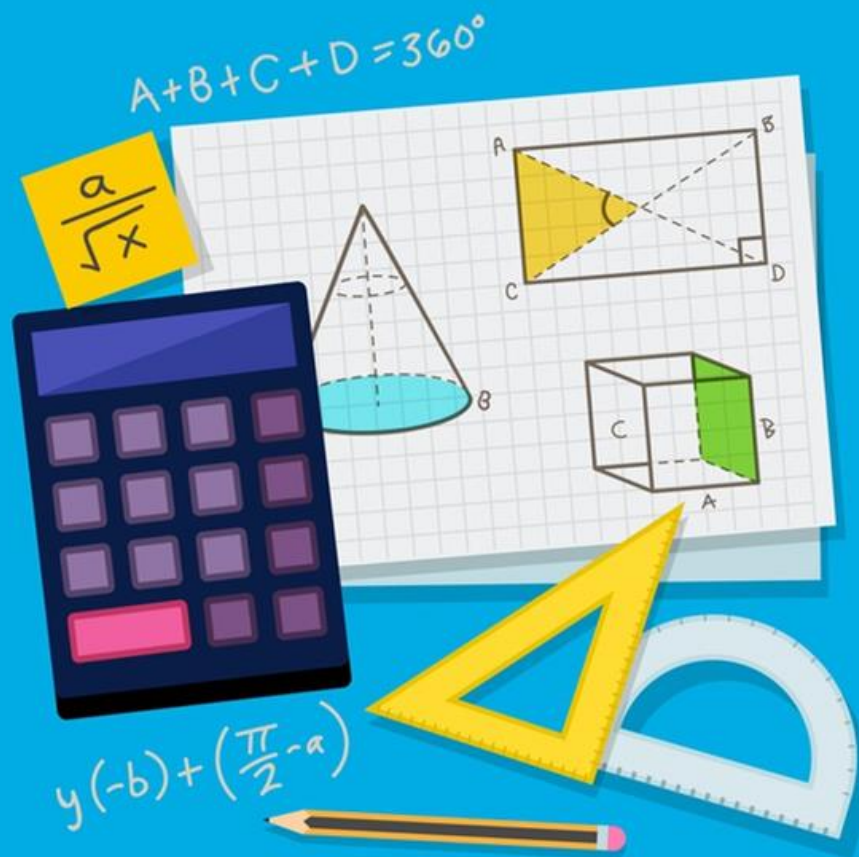
$$d = 20^\circ$$

$$120^\circ \times \frac{\pi}{180} = \frac{2\pi}{3}$$

$$100^\circ \times \frac{\pi}{180} = \frac{5\pi}{9}$$

$$80^\circ \times \frac{\pi}{180} = \frac{4\pi}{9}$$

$$60^\circ \times \frac{\pi}{180} = \frac{\pi}{3}$$



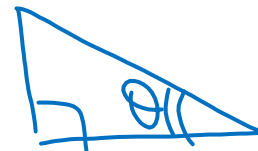
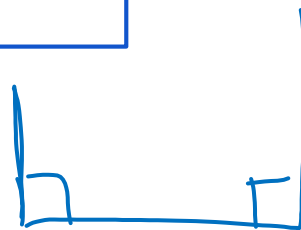
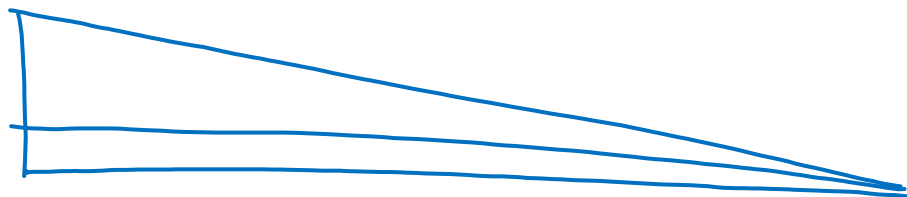
TRIGONOMETRY in Circular System



Limitations of Trigonometry in Right Angled Triangle

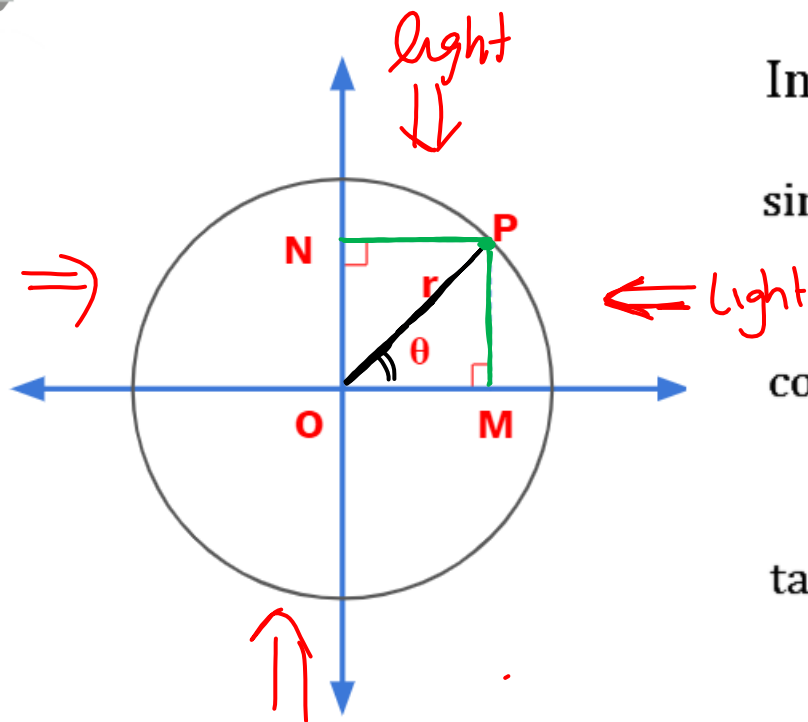
❑ Explanation for values of 0 degrees and 90 degrees

❑ Values of T - ratios for angles other than acute angles eg: $\sin 120^\circ$





New Definitions of T-Ratios



In $\triangle OPM$

$$\sin \theta = \frac{PM}{OP} = \frac{ON}{OP} = \frac{\left(\begin{array}{l} \text{Proj. of } OP \text{ on} \\ \text{Y-axis} \end{array} \right)}{\left(\begin{array}{l} \text{length of} \\ \text{radius} \end{array} \right)}$$

$$\cos \theta = \frac{OM}{OP}$$

$$\tan \theta = \frac{PM}{OM} = \frac{ON}{OM}$$



New Definitions of T-Ratios

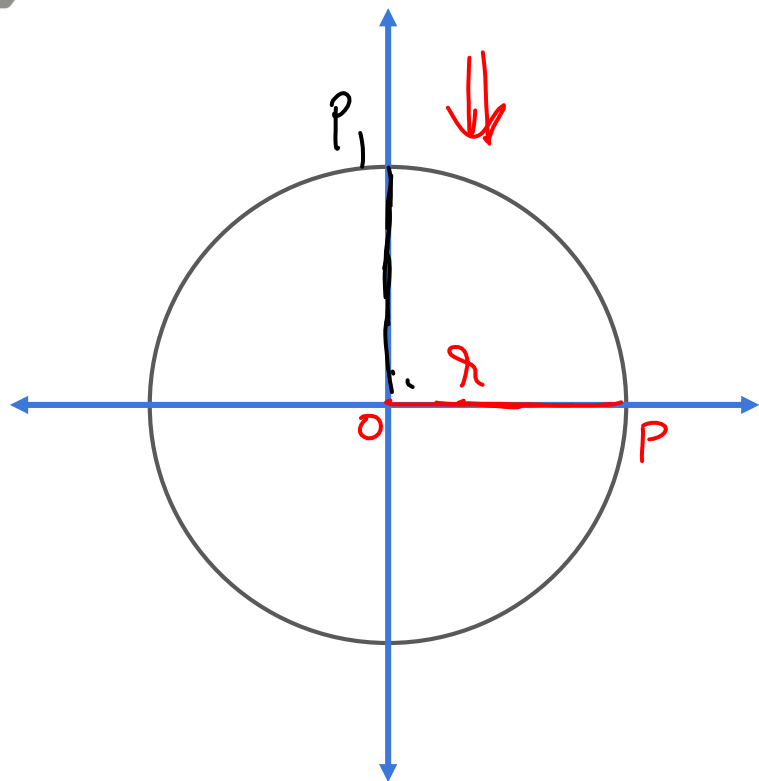
1. $\sin \theta$ = $\frac{\text{Projection of radius on Y - axis}}{\text{Length of radius}}$

2. $\cos \theta$ = $\frac{\text{Projection of radius on X - axis}}{\text{Length of radius}}$

3. $\tan \theta$ = $\frac{\text{Projection of radius on Y - axis}}{\text{Projection of radius on X - axis}}$



Can we now explain T-Ratios for 0° and 90° ?



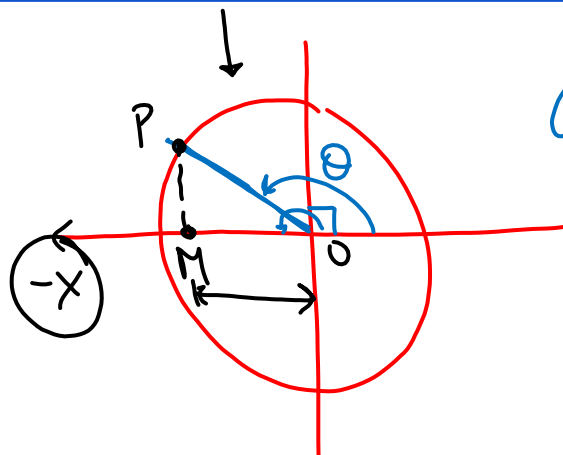
$$\left. \begin{aligned} \sin 0 &= \frac{0}{r} = 0 \\ \cos 0 &= \frac{r}{r} = 1 \end{aligned} \right\} \rightarrow \tan 0 = 0$$

$$\left. \begin{aligned} \sin 90^\circ &= \frac{r}{r} = 1 \\ \cos 90^\circ &= \frac{0}{r} = 0 \end{aligned} \right\} \rightarrow \begin{aligned} &\tan 90^\circ \\ &\text{Not defined} \end{aligned}$$



Limitations of Trigonometry in Right Angled Triangle

- ❑ Projection on positive x-axis and positive y-axis is considered with a **positive sign**
- ❑ Projection on negative x-axis and negative y-axis is considered with a **negative sign**



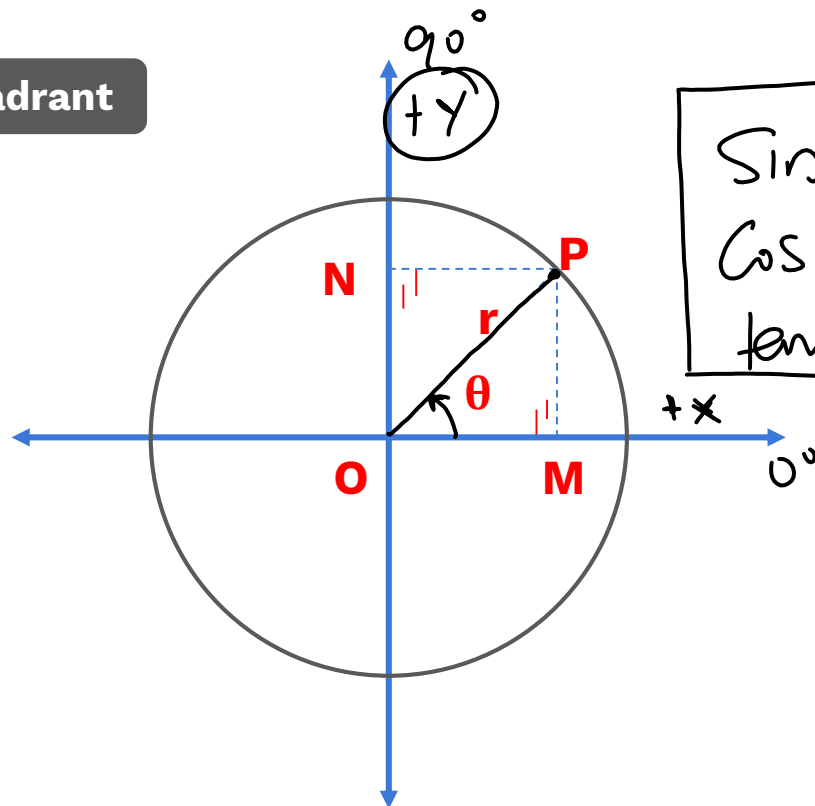
$$\cos \theta = - \frac{(OM)}{OP}$$



Signs of T-Ratios in 4 Quadrants



1st Quadrant



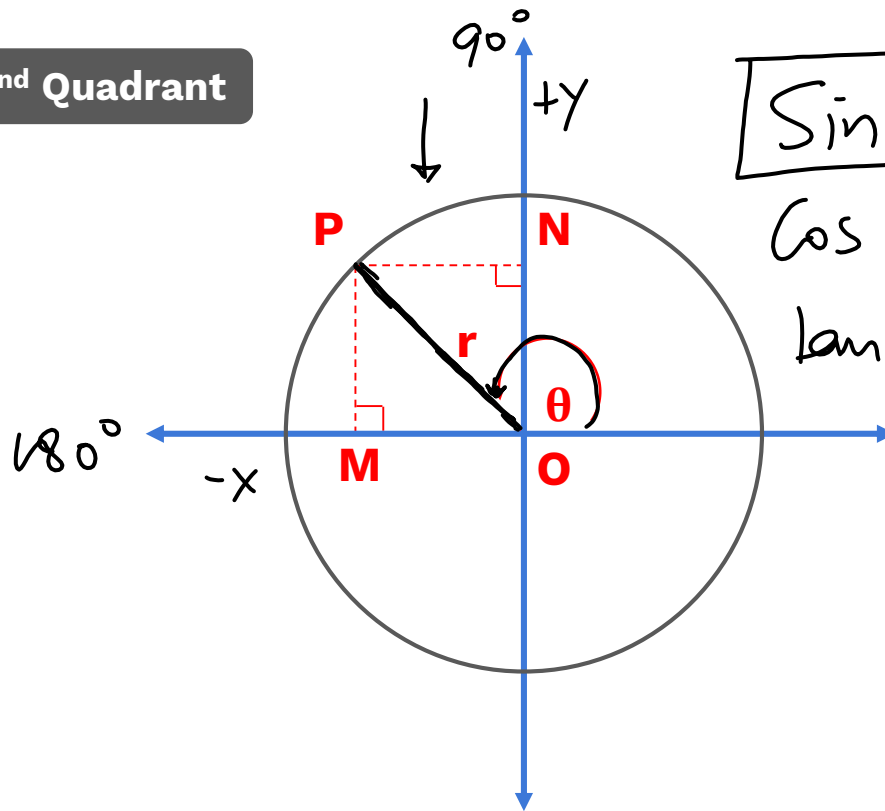
Sin	:	+ve
Cos	:	+ve
Tan	:	+ve



Signs of T-Ratios in 4 Quadrants



2nd Quadrant



$$\boxed{\sin : +ve}$$

$$\cos : -ve$$

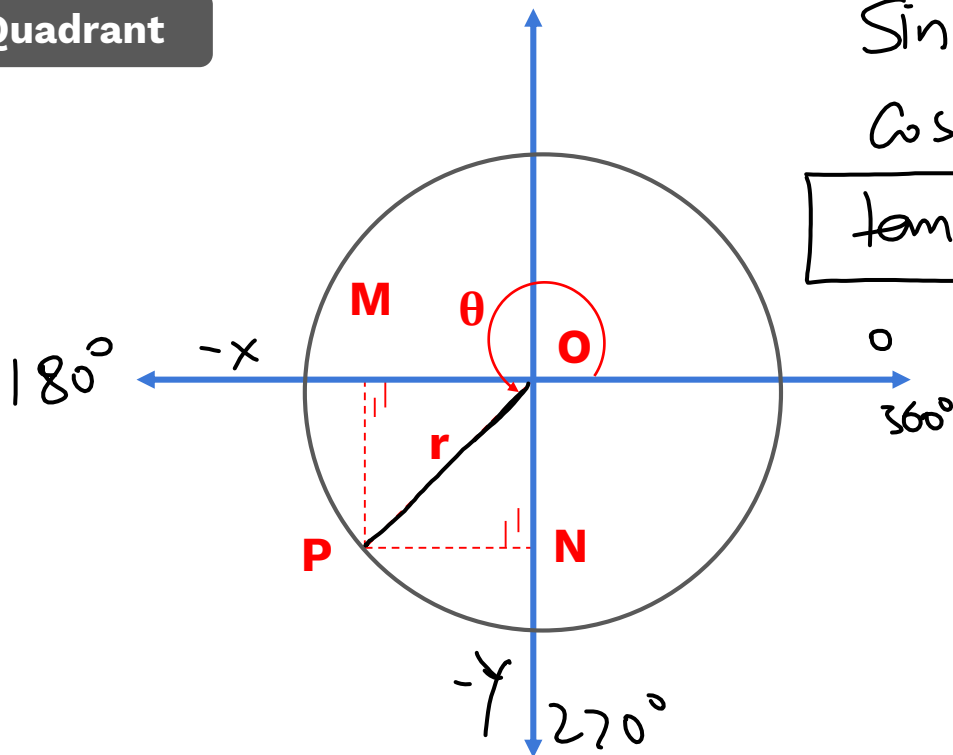
$$\tan : -ve$$



Signs of T-Ratios in 4 Quadrants



3rd Quadrant



$$\sin : -ve$$

$$\cos : -ve$$

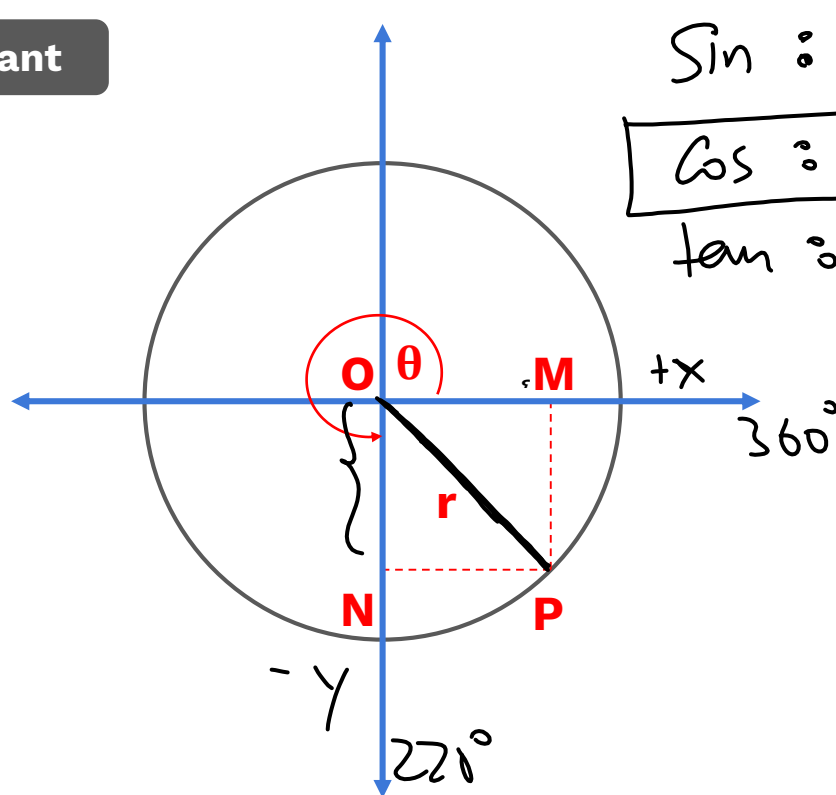
$$\tan : +ve$$



Signs of T-Ratios in 4 Quadrants



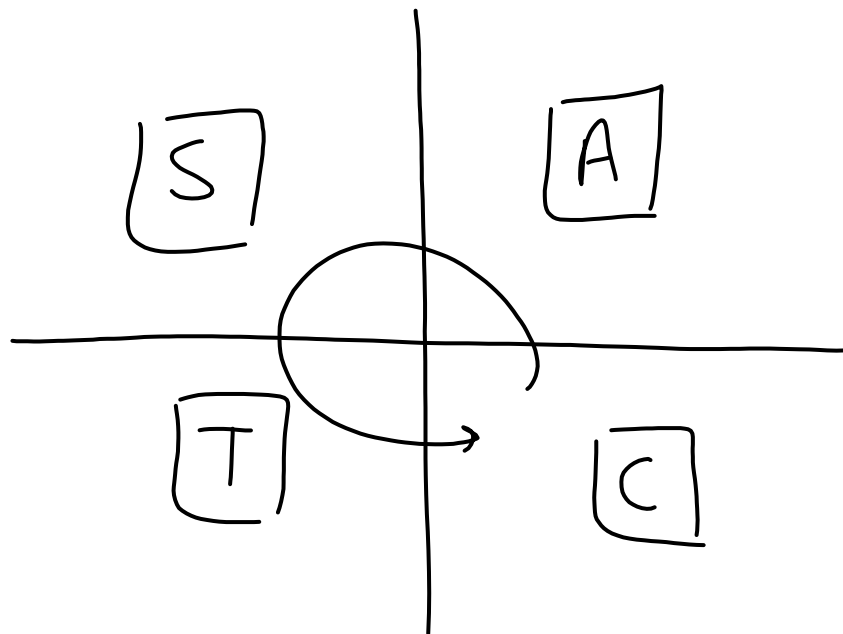
4th Quadrant



$$\sin : -ve$$

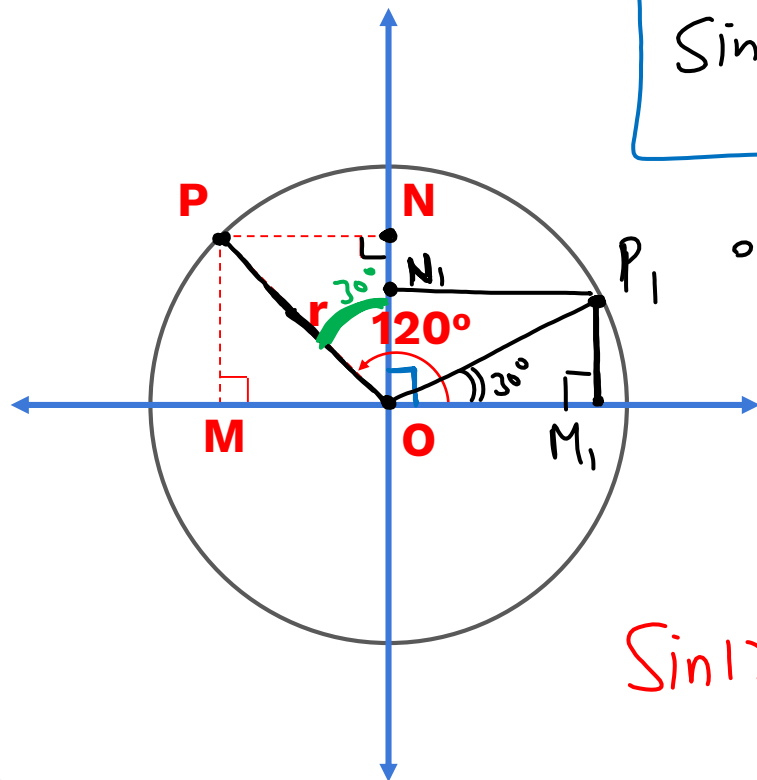
$$\cos : +ve$$

$$\tan : -ve$$





How much is $\sin 120^\circ$?



$$\sin 120^\circ = \frac{ON}{OP}$$

(1)

$$P_1 \because \triangle ONP \cong \triangle OM_1P_1$$

$$\frac{ON}{OP} = \frac{OM_1}{OP_1}$$

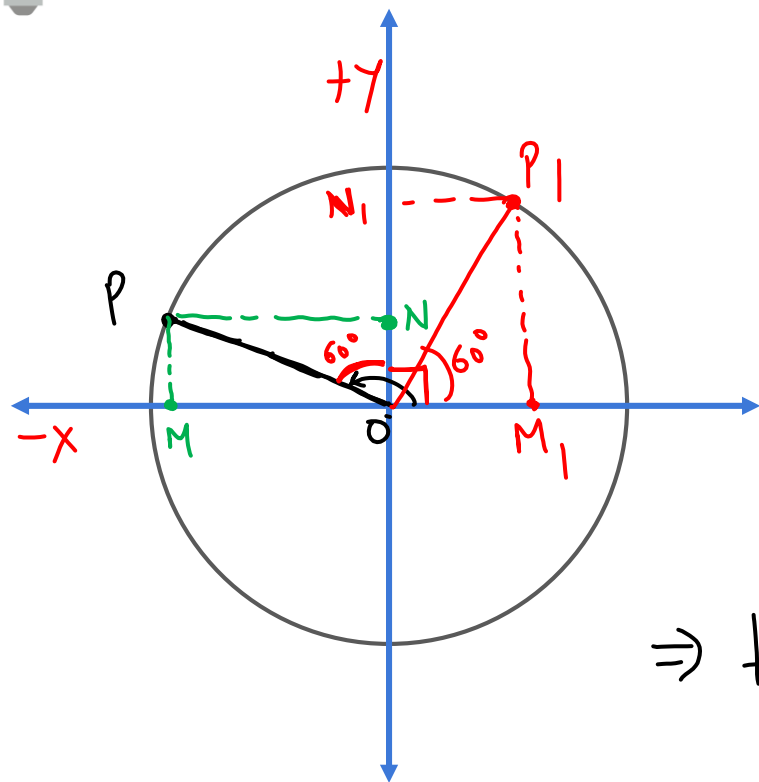
(2)

$$\sin 120^\circ = \frac{OM_1}{OP_1} = \cos 30^\circ = \frac{\sqrt{3}}{2}$$





How much is $\tan 150^\circ$?



$$\tan 150^\circ = \frac{ON}{-(OM)} = -\left(\frac{ON}{OM}\right)$$

$$\begin{cases} \triangle ONP \cong \triangle OM_1P_1 \\ \frac{ON}{NP} = \frac{OM_1}{PM_1} \end{cases} = -\left(\frac{ON}{NP}\right)$$

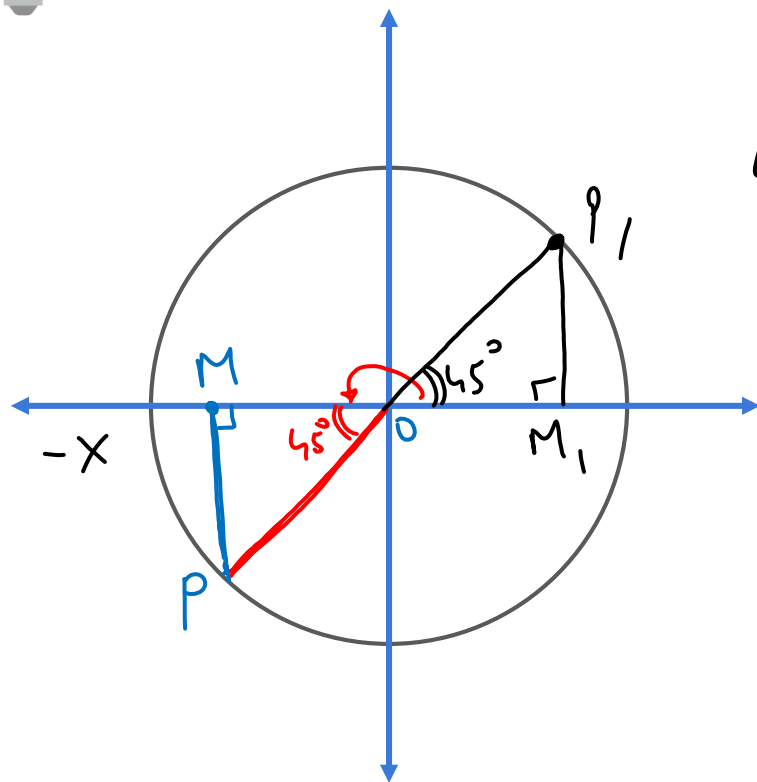
$$\Rightarrow \tan 150^\circ = -\left(\frac{OM_1}{PM_1}\right) = -\cot 60^\circ = \boxed{-\frac{1}{\sqrt{3}}}$$





How much is $\cos 225^\circ$?

$180 + 45$



$$\begin{aligned}\cos 225^\circ &= \frac{-(OM)}{OP} \\&= - \left(\frac{OM_1}{OP_1} \right) \\&= - (\cos 45^\circ) \\&= -\frac{1}{\sqrt{2}}\end{aligned}$$





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11th



Namo Sir | Physics

6:00 - 7:30 PM



Ashwani Sir | Chemistry

7:30 - 9:00 PM



Sameer Sir | Maths

9:00 - 10:30 PM

12th



Jayant Sir | Physics

1:30 - 3:00 PM



Anupam Sir | Chemistry

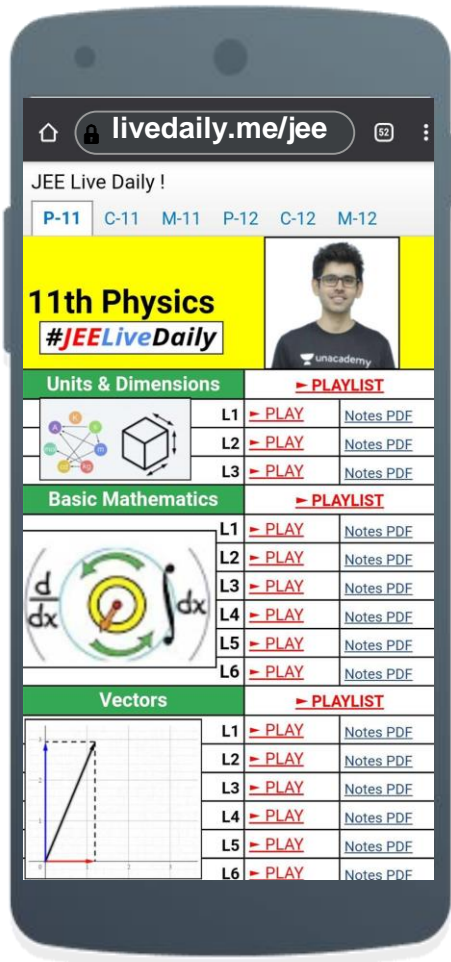
3:00 - 4:30 PM



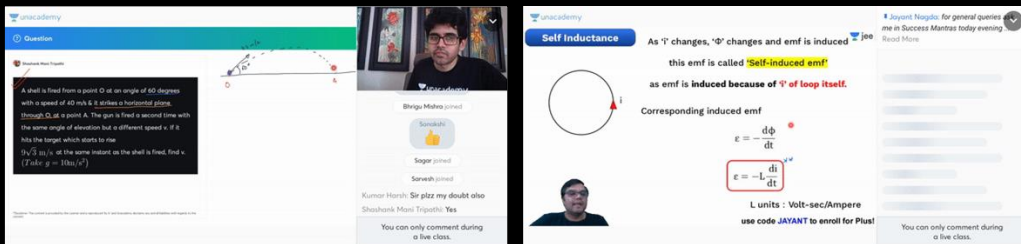
Nishant Sir | Maths

4:30 - 6:00 PM

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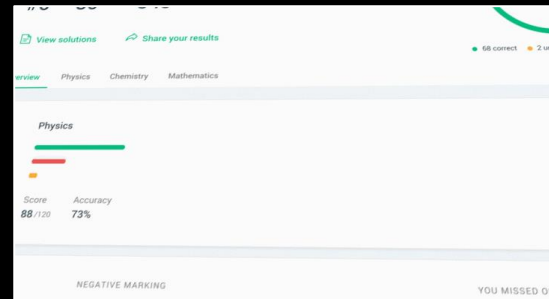
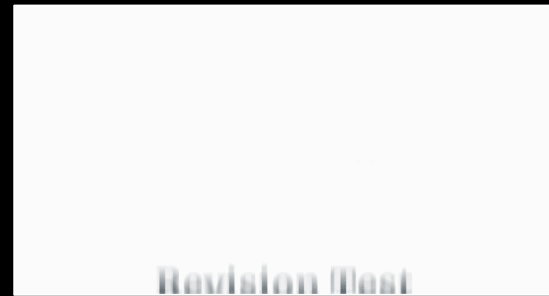


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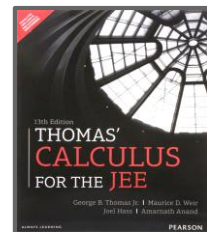
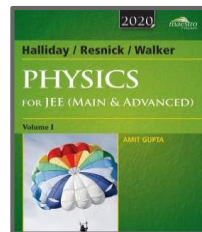
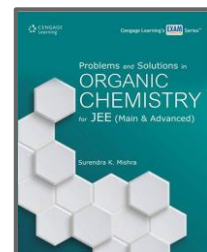
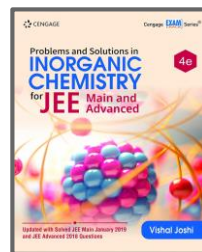
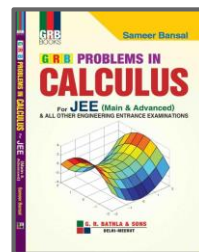
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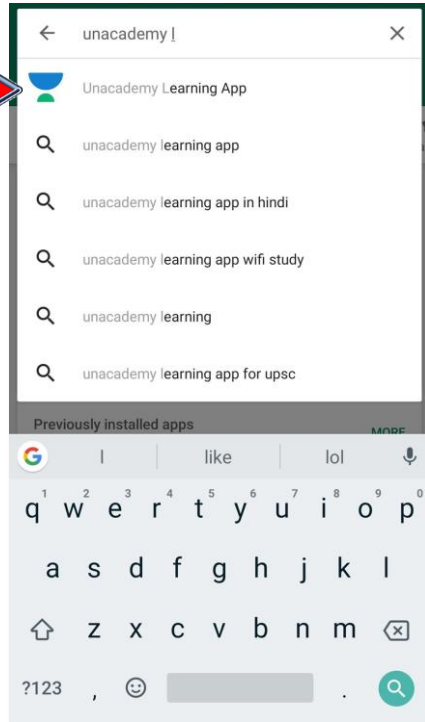


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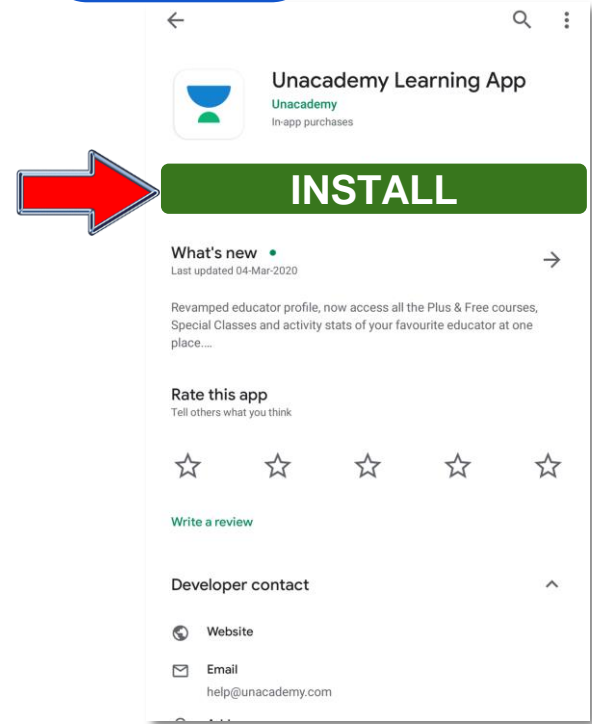


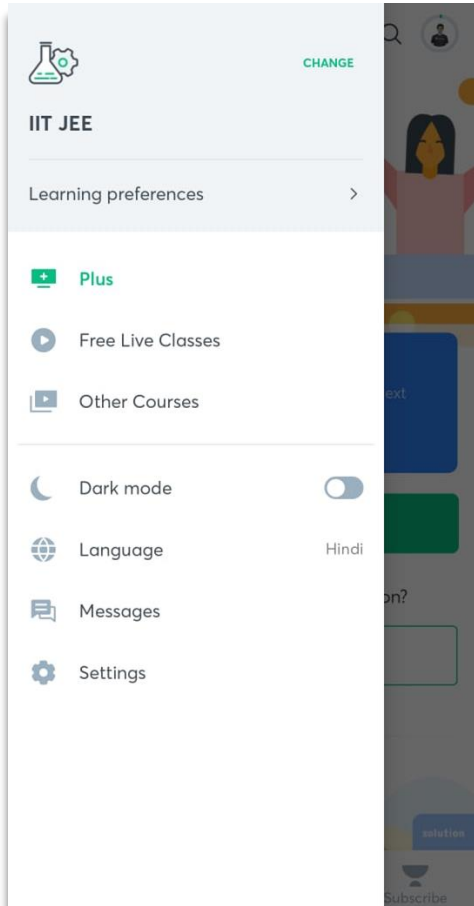
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