

YAKEEN NEET 2.0

2026

Basic Maths and Calculus (Mathematical Tools)

PHYSICS

Lecture - 04

By- Saleem Ahmed Bhaia





Topics to be covered



- Trigonometry
- Maximum and minimum value of function

$$\sin 120^\circ = \sin(90^\circ + 30^\circ) = +\cos 30 = \frac{\sqrt{3}}{2}$$

$$\sin 210^\circ = \sin(270^\circ - 60^\circ) = -\cos 60 = -\frac{1}{2}$$

$$\sin 240^\circ = \sin(270^\circ - 30^\circ) = -\cos 30 = -\frac{\sqrt{3}}{2}$$

$$\tan 300^\circ = \tan(270^\circ + 30^\circ) = -\cot 30 = -\sqrt{3}$$

$$\cos 240^\circ = \cos(270^\circ - 30^\circ) = -\sin 30 = -\frac{1}{2}$$

$$\cos 210^\circ = \cos(270^\circ - 60^\circ) = -\sin 60 = -\frac{\sqrt{3}}{2}$$

180

S

A

6

360

T

C

270

SKC

अगर हमें $90^\circ, 270^\circ$ में तोड़ा
fxn पलट दी

$$\sin \longleftrightarrow \cos$$

$$\tan \longleftrightarrow \cot$$

$$\csc \longleftrightarrow \sec$$

$$* -1 \leq \sin \theta \leq 1$$

$$* -1 \leq \cos \theta \leq 1$$

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

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

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

CKL

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

$$\cos(-45^\circ) = \cos 45^\circ = \frac{1}{\sqrt{2}}$$

$$\sin(-120^\circ) = -\sin 120^\circ = -\frac{\sqrt{3}}{2}$$

$$\begin{aligned} \cos(-300^\circ) &= \cos 300^\circ = \cos(360^\circ - 60^\circ) \\ &= +\frac{1}{2} \end{aligned}$$

CKL ≡ Copy kar Lia

$$\tan 0 = 0$$

$$\tan 90 = \infty$$

$$\cos 0 = 1$$

$$\cos 30 = \frac{\sqrt{3}}{2} = 0.86$$

$$\cos 45 = 0.7$$

$$\cos 60 = 0.5$$

$$\sin 0 = 0$$

$$\sin 30 = \frac{1}{2} = 0.5$$

$$\sin 45 = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} = \frac{1.4}{2} = 0.7$$

$$\sin 60 = \frac{\sqrt{3}}{2} = \frac{1.73}{2} = 0.865$$

$$\sin 90 = 1$$

$\Rightarrow *$ value of $\sin\theta$ will increase by increasing value of θ from 0° to 90° .
 $\theta \uparrow \Rightarrow \sin\theta \uparrow$ (from 0° to 90°)

$\Rightarrow *$ $\theta \uparrow \Rightarrow \tan\theta \uparrow$ (from 0° to 90°) (Graph \rightarrow SHM)

$\Rightarrow *$ $\theta \uparrow \Rightarrow \cos\theta \downarrow$ (from 0° to 90°)

Q

$$y = 2 + 3 \sin \theta$$

$$y_{\max} \rightarrow (\sin \theta)_{\max} = 1$$

$$y_{\max} = 2 + 3 \times 1 = 5$$

$$y_{\min} = 2 + 3(-1) = -1$$

$$Q \quad y = 5 + 3 \sin \theta$$

$$y_{\max} = 5 + 3 \times 1 = 8$$

$$y_{\min} = 5 - 3 = 2$$

$$(\cos \theta)_{\min} = -1$$

$$\text{at } \theta = 180^\circ$$

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

$$Q \quad y = 3 + 4 \cos \theta$$

$$y_{\max} = 3 + 4 \times 1 = 7$$

$$y_{\min} = 3 - 4 = -1$$

$$* \quad x = \frac{1}{y}$$

min

max

$$x = \frac{1}{y}$$

max

min

$$Q \quad y = 5 + 3 \tan \theta$$

$$y_{\max} = \infty$$

$$y_{\min} = -\infty$$

$$Q \quad y = \frac{8}{5 + 3 \sin \theta}$$

$$y_{\min} = \frac{8}{5+3} = 1$$

$$y_{\max} = \frac{8}{5-3} = 4$$

$$Q \quad y = \frac{10}{3 + 2 \cos \theta}$$

$$y_{\max} = \frac{10}{3-2} = 10$$

$$y_{\min} = \frac{10}{3+2} = 2$$

*

$\text{Q} \quad y = 3 + 4 \sin^2 \theta$

$$y_{\max} =$$

$$y_{\min} =$$

Q,

$$y = 3 + 4 \sin^2 \theta$$

$$y_{\max} = 3 + 4(1) = 7$$

$$y_{\min} = 3 + 4(0) = 3$$

Q, $y = 4 + 3 \cos^2 \theta$

$$y_{\min} = 4 + 0 = 4$$

$$y_{\max} = 4 + 3 = 7$$

Q, $y = (4 + 3 \cos \theta)^2$

$$y_{\max} = (4+3)^2 = 49$$

$$y_{\min} = (4-3)^2 = 1$$

$\hookrightarrow y = x^2$

$\max \sqrt{d} \propto \max |x|$

$$(\sin^2 \theta)_{\max} = 1$$

$$(\sin^2 \theta)_{\min} = 0$$

$$(\cos^2 \theta)_{\max} = 1$$

$$(\cos^2 \theta)_{\min} = 0$$

Q

$$x = 5 + 3 \sin \omega t$$

position

$$x_{\max} = 5 + 3 = 8$$

$$x_{\min} = 5 - 3 = 2$$

$$\# y = a \sin \theta + b \cos \theta$$

$$y_{\max} = \sqrt{a^2 + b^2}$$

$$y_{\min} = -\sqrt{a^2 + b^2}$$

Q

$$y = 3 \sin \theta + 4 \cos \theta$$

$$y_{\max} = \sqrt{3^2 + 4^2} = 5$$

$$y_{\min} = -\sqrt{3^2 + 4^2} = -5$$

$$\text{Q} \quad y = \sin \theta + 3 \cos \theta = \sqrt{1^2 + 3^2} \sin(\theta + 30^\circ)$$

$$y_{\max} = \sqrt{1^2 + 3^2} = \sqrt{10}$$

$$y_{\min} = -\sqrt{10}$$

$$\text{Q} \quad y = \sin \theta + \sqrt{3} \cos \theta$$

$$y_{\max} = \sqrt{1^2 + (\sqrt{3})^2} = 2$$

$$y_{\min} = -2$$

$$\text{Q} \quad y = \sin 3\theta$$

find value of y_{\max} & when

Sol $y_{\max} = 1$ $3\theta = 90^\circ$
 $\theta = 30^\circ$

$$\text{Q} \quad y = 10 \cos(5\theta) = 10 \cos \alpha$$

find value of y_{\max} & when

Sol $y_{\max} = 10$, $5\theta = 0^\circ$
 $\theta = 0^\circ$

- π radian = 180 degree
- 1 degree = $\frac{\pi}{180}$ rad
- 1 degree = 60 minute = 3600 sec.
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join it

Homework

- KPP-02
- DPP
- Revise your notes.

**THANK
YOU**