



Trigonometric Ratios of multiple and Sub-multiple Angles Ex 9.1 Q 28(i)

$$\text{Since } \cos x = -\frac{3}{5} = \frac{b}{h}$$

$$\Rightarrow b = 3, h = 5$$

$$\Rightarrow p = 4$$

Now, x lies on third quad.

$$\begin{aligned} \therefore \sin 2x &= 2 \sin x \cdot \cos x \\ &= 2 \cdot \left(\frac{-4}{5}\right) \cdot \left(\frac{-3}{5}\right) = \frac{24}{25} \end{aligned}$$

$$\because \pi < x < \frac{3\pi}{2} \Rightarrow \frac{\pi}{2} < \frac{x}{2} < \frac{3\pi}{4}$$

Which means $\frac{x}{2}$ lies in second quadrant

$$\text{so, } \cos \frac{x}{2} = \sqrt{\frac{1 + \cos x}{2}}$$

$$[\because 1 + \cos 2\theta = 2 \cos^2 \theta]$$

$$= \sqrt{\frac{1 - \frac{3}{5}}{2}} = \frac{-1}{\sqrt{5}}$$

$$\left(\begin{array}{l} \text{-ve sign because of second quad.} \\ \text{where } \cos D \text{ is -ve} \end{array} \right)$$

Also,

$$\sin \frac{x}{2} = \frac{\sin x}{2 \cos \frac{x}{2}}$$

$$[\because \sin 2A = 2 \sin A \cos A]$$

$$= \left(\frac{-\frac{4}{5}}{2 \left(\frac{-1}{\sqrt{5}} \right)} \right)$$

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

Trigonometric Ratios of multiple and Sub-multiple Angles Ex 9.1 Q 28(ii)

$\therefore x$ lies in IInd quadrant.

$$\Rightarrow \frac{\pi}{2} < x < \pi$$

$$\Rightarrow \pi < 2x < 2\pi \Rightarrow 2x \text{ lies in 1st quad.}$$

$$\text{Also, } \cos x = \frac{-3}{5} = \frac{b}{h} \Rightarrow b = 3$$

$$h = 5$$

$$\Rightarrow p = 4,$$

$$\text{so, } \sin x = \frac{p}{h} = \frac{4}{5}$$

$$\therefore \sin 2x = 2 \sin x \cos x$$

$$= 2 \cdot \frac{4}{5} \cdot \left(\frac{-3}{5} \right) = \frac{-24}{25}$$

$$\sin \frac{x}{2} = \frac{\sin x}{2 \cos \frac{x}{2}} \text{ or } \sqrt{\frac{1 - \cos x}{2}}$$

$$= \sqrt{\frac{1 - \left(1 - \frac{3}{5}\right)}{2}}$$

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

***** END *****