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

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

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

$\Rightarrow \quad P = 4$

Now, x lies on third quad.

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

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

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

Which means $x/2$ lies in second quadrant

so, $\cos x/2 = \sqrt{\frac{1+\cos x}{2}}$ $\quad \left[\because 1+\cos 2\theta = 2\cos^2\theta\right.$

$= \sqrt{\frac{1-3/5}{2}} = \frac{-1}{\sqrt{5}}$ $\quad \left(\begin{array}{l}-ve \text{ sign because of second quad.}\\ \text{where } \cos D \text{ is } -ve\end{array}\right)$

Also,

$\sin x/2 = \frac{\sin x}{2\cos x/2}$ $\quad [\because \sin 2A = 2 \sin A \cos A]$

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

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

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

$\because$ x lies in IInd quadrant.

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

$\Rightarrow \quad \pi < 2x < 2\pi \quad \Rightarrow \quad 2x$ lies in Ist quad.

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

$h = 5$

$\Rightarrow \quad p = 4.$

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

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

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

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

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

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

********** END **********