

Exemplar Problem
Trigonometry Functions

Example 15: If $\tan \theta = \frac{-4}{3}$, then $\sin \theta$ is

a) $\frac{-4}{5}$ but not $\frac{4}{5}$

b) $\frac{-4}{5}$ or $\frac{4}{5}$

c) $\frac{4}{5}$ but not $\frac{-4}{5}$

d) None of these

Ans: The correct answer is option (b) $\frac{-4}{5}$ or $\frac{4}{5}$

Given that, $\tan \theta = \frac{-4}{3} = \frac{P}{B}$.

By Pythagoras theorem, we have

$$\rightarrow H^2 = P^2 + B^2$$

$$\rightarrow H^2 = 4^2 + 3^2$$

(Here, we have taken positive value of perpendicular because length can't be negative)

$$\rightarrow H^2 = 16 + 9$$

$$\rightarrow H^2 = 25$$

$$\rightarrow H = 5$$

Since $\tan \theta = \frac{-4}{3}$ is negative, θ lies either in second quadrant or in fourth quadrant.

We know that $\sin \theta = \frac{P}{H}$. Therefore, we get

If θ lies in second quadrant, $\sin \theta = \frac{4}{5}$ and if θ lies in fourth quadrant, $\sin \theta = -\frac{4}{5}$.

Hence, the required answer is (b) $\frac{-4}{5}$ or $\frac{4}{5}$