Trigonometric Identities Ex 6.2 Q3

Answer :

Given: $\tan\theta = \frac{1}{\sqrt{2}}$

We have to find the value of the expression $\frac{\operatorname{cosec}^2\theta - \sec^2\theta}{\operatorname{cosec}^2\theta + \cot^2\theta}$

We know that,

$$1 + \cot^2\theta = \operatorname{cosec}^2\theta$$

$$\Rightarrow \operatorname{cosec}^2\theta - \cot^2\theta = 1$$

Therefore, the given expression can be written as

$$\frac{\operatorname{cosec}^2\theta - \sec^2\theta}{\operatorname{cosec}^2\theta + \cot^2\theta} = \frac{\operatorname{cosec}^2\theta - \sec^2\theta}{1 + \cot^2\theta + \cot^2\theta}$$

$$= \frac{\operatorname{cosec}^2\theta - \sec^2\theta}{1 + 2\cot^2\theta}$$

$$\tan\theta = \frac{1}{\sqrt{2}} \Rightarrow \cot\theta = \sqrt{2}$$

$$\frac{\operatorname{cosec}^2\theta - \sec^2\theta}{1 + 2\cot^2\theta} = \frac{1 + \cot^2\theta - (1 + \tan^2\theta)}{1 + 2\cot^2\theta} \qquad (\text{since } \sec^2\theta = 1 + \tan^2\theta)$$

$$= \frac{\cot^2\theta - \tan^2\theta}{1 + 2\cot^2\theta}$$

$$= \frac{(\sqrt{2})^2 - \left(\frac{1}{\sqrt{2}}\right)^2}{1 + 2\times(\sqrt{2})^2}$$

$$= \frac{3}{10}$$

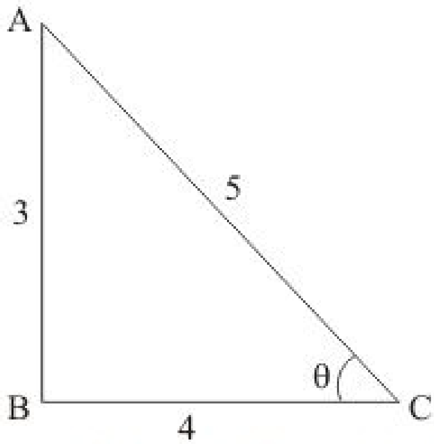
Hence, the value of the given expression is $\boxed{\frac{3}{10}}$.

Trigonometric Identities Ex 6.2 Q4

Answer :

Given: $\tan\theta = \frac{3}{4}$

We have to find the value of the expression $\frac{1-\cos\theta}{1+\cos\theta}$.



From the above figure, we have

$$\begin{aligned} AC &= \sqrt{AB^2 + BC^2} \\ &= \sqrt{3^2 + 4^2} \\ &= 5 \end{aligned}$$

$$\Rightarrow \cos\theta = \frac{4}{5}$$

Therefore,

$$\begin{aligned} \frac{1-\cos\theta}{1+\cos\theta} &= \frac{1-\frac{4}{5}}{1+\frac{4}{5}} \\ &= \frac{1}{9} \end{aligned}$$

Hence, the value of the given expression is $\frac{1}{9}$.

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