



Trigonometric Identities Ex 6.2 Q8

Answer :

Given: $\cot \theta = \sqrt{3}$

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

We know that,

$$\cot \theta = \sqrt{3} \Rightarrow \cot^2 \theta = 3$$

$$\operatorname{cosec}^2 \theta = 1 + \cot^2 \theta = 1 + (\sqrt{3})^2 = 4$$

$$\sec^2 \theta = \frac{1}{\cos^2 \theta} = \frac{1}{1 - \sin^2 \theta} = \frac{1}{1 - \frac{1}{\operatorname{cosec}^2 \theta}} = \frac{1}{1 - \frac{1}{4}} = \frac{4}{3}$$

Therefore,

$$\begin{aligned} \frac{\operatorname{cosec}^2 \theta + \cot^2 \theta}{\operatorname{cosec}^2 \theta - \sec^2 \theta} &= \frac{4 + 3}{4 - \frac{4}{3}} \\ &= \frac{21}{8} \end{aligned}$$

Hence, the value of the given expression is $\frac{21}{8}$.

Trigonometric Identities Ex 6.2 Q9

Answer :

Given: $3 \cos \theta = 1$

We have to find the value of the expression $\frac{6 \sin^2 \theta + \tan^2 \theta}{4 \cos \theta}$.

We have,

$$3 \cos \theta = 1$$

$$\Rightarrow \cos \theta = \frac{1}{3}$$

$$\sin \theta = \sqrt{1 - \cos^2 \theta} = \sqrt{1 - \left(\frac{1}{3}\right)^2} = \frac{\sqrt{8}}{3}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{\frac{\sqrt{8}}{3}}{\frac{1}{3}} = \sqrt{8}$$

Therefore,

$$\begin{aligned} \frac{6 \sin^2 \theta + \tan^2 \theta}{4 \cos \theta} &= \frac{6 \times \left(\frac{\sqrt{8}}{3}\right)^2 + (\sqrt{8})^2}{4 \times \frac{1}{3}} \\ &= 10 \end{aligned}$$

Hence, the value of the expression is 10.

Trigonometric Identities Ex 6.2 Q10

Answer :

Given: $\sqrt{3} \tan \theta = 3 \sin \theta$

We have to find the value of $\sin^2 \theta - \cos^2 \theta$.

$$\sqrt{3} \tan \theta = 3 \sin \theta$$

$$\Rightarrow \sqrt{3} \frac{\sin \theta}{\cos \theta} = 3 \sin \theta$$

$$\Rightarrow \cos \theta = \frac{\sqrt{3}}{3} = \frac{1}{\sqrt{3}}$$

Therefore,

$$\begin{aligned} \sin^2 \theta - \cos^2 \theta &= 1 - \cos^2 \theta - \cos^2 \theta && \text{(since, } \sin^2 \theta + \cos^2 \theta = 1) \\ &= 1 - 2 \cos^2 \theta \\ &= 1 - 2 \times \left(\frac{1}{\sqrt{3}}\right)^2 \\ &= \frac{1}{3} \end{aligned}$$

Hence, the value of the expression is $\frac{1}{3}$.

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