Trigonometric Identities Ex 6.2 Q8

Answer :

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

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

We know that,

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

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

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

Therefore,

$$\frac{\text{cosec}^2\theta + \cot^2\theta}{\text{cosec}^2\theta - \sec^2\theta} = \frac{4+3}{4-\frac{4}{3}}$$

$$= \frac{21}{8}$$

Hence, the value of the given expression is 218.

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,

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

$$= 10$$

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,

$$\sin^2\theta - \cos^2\theta = 1 - \cos^2\theta - \cos^2\theta \qquad \left(\text{since, } \sin^2\theta + \cos^2\theta = 1\right)$$

$$= 1 - 2\cos^2\theta$$

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

$$= \frac{1}{3}$$

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

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