



Trigonometric Identities Ex 6.1 Q13

**Answer :**

We have to prove  $\frac{\sin \theta}{1 - \cos \theta} = \operatorname{cosec} \theta + \cot \theta$ .

We know that,  $\sin^2 \theta + \cos^2 \theta = 1$

Multiplying both numerator and denominator by  $(1 + \cos \theta)$ , we have

$$\begin{aligned}\frac{\sin \theta}{1 - \cos \theta} &= \frac{\sin \theta(1 + \cos \theta)}{(1 - \cos \theta)(1 + \cos \theta)} \\ &= \frac{\sin \theta(1 + \cos \theta)}{1 - \cos^2 \theta} \\ &= \frac{\sin \theta(1 + \cos \theta)}{\sin^2 \theta} \\ &= \frac{1 + \cos \theta}{\sin \theta} \\ &= \frac{1}{\sin \theta} + \frac{\cos \theta}{\sin \theta} \\ &= \operatorname{cosec} \theta + \cot \theta\end{aligned}$$

Trigonometric Identities Ex 6.1 Q14

**Answer :**

We have to prove  $\frac{1 - \sin \theta}{1 + \sin \theta} = (\sec \theta - \tan \theta)^2$

We know that,  $\sin^2 \theta + \cos^2 \theta = 1$

Multiplying both numerator and denominator by  $(1 - \sin \theta)$ , we have

$$\begin{aligned}\frac{1 - \sin \theta}{1 + \sin \theta} &= \frac{(1 - \sin \theta)(1 - \sin \theta)}{(1 + \sin \theta)(1 - \sin \theta)} \\ &= \frac{(1 - \sin \theta)^2}{1 - \sin^2 \theta} \\ &= \left( \frac{1 - \sin \theta}{\cos \theta} \right)^2 \\ &= \left( \frac{1}{\cos \theta} - \frac{\sin \theta}{\cos \theta} \right)^2 \\ &= (\sec \theta - \tan \theta)^2\end{aligned}$$

Trigonometric Identities Ex 6.1 Q15

**Answer :**

We have to prove  $(\operatorname{cosec} \theta + \sin \theta)(\operatorname{cosec} \theta - \sin \theta) = \cot^2 \theta + \cos^2 \theta$

We know that,

$$\sin^2 \theta + \cos^2 \theta = 1,$$

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

So,

$$\begin{aligned}(\operatorname{cosec} \theta + \sin \theta)(\operatorname{cosec} \theta - \sin \theta) &= \operatorname{cosec}^2 \theta - \sin^2 \theta \\&= (1 + \cot^2 \theta) - (1 - \cos^2 \theta) \\&= 1 + \cot^2 \theta - 1 + \cos^2 \theta \\&= \cot^2 \theta + \cos^2 \theta\end{aligned}$$

Trigonometric Identities Ex 6.1 Q16

**Answer :**

We have to prove  $\frac{(1 + \cot^2 \theta) \tan \theta}{\sec^2 \theta} = \cot \theta$

We know that,  $\sec^2 \theta - \tan^2 \theta = 1$

So,

$$\begin{aligned}\frac{(1 + \cot^2 \theta) \tan \theta}{\sec^2 \theta} &= \frac{(1 + \cot^2 \theta) \tan \theta}{(1 + \tan^2 \theta)} \\&= \frac{\left(1 + \frac{1}{\tan^2 \theta}\right) \tan \theta}{(1 + \tan^2 \theta)} \\&= \frac{\left(\frac{\tan^2 \theta + 1}{\tan^2 \theta}\right) \tan \theta}{(1 + \tan^2 \theta)} \\&= \frac{(1 + \tan^2 \theta) \tan \theta}{\tan^2 \theta (1 + \tan^2 \theta)} \\&= \frac{1}{\tan \theta} \\&= \cot \theta\end{aligned}$$

\*\*\*\*\* END \*\*\*\*\*