



Trigonometric Identities Ex 6.1 Q33

**Answer :**

We need to prove  $\frac{(1+\tan^2\theta)\cot\theta}{\operatorname{cosec}^2\theta} = \tan\theta$

Solving the L.H.S, we get

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

Using  $\sec\theta = \frac{1}{\cos\theta}$ ,  $\cot\theta = \frac{\cos\theta}{\sin\theta}$  and  $\operatorname{cosec}\theta = \frac{1}{\sin\theta}$ , we get

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

Hence proved.

Trigonometric Identities Ex 6.1 Q34

**Answer :**

We need to prove  $\frac{1+\cos A}{\sin^2 A} = \frac{1}{1-\cos A}$

Using the property  $\cos^2\theta + \sin^2\theta = 1$ , we get

$$\text{LHS} = \frac{1+\cos A}{\sin^2 A} = \frac{1+\cos A}{1-\cos^2 A}$$

Further using the identity,  $a^2 - b^2 = (a+b)(a-b)$ , we get

$$\begin{aligned}\frac{1+\cos A}{1-\cos^2 A} &= \frac{1+\cos A}{(1-\cos A)(1+\cos A)} \\ &= \frac{1}{1-\cos A} \\ &= \text{RHS}\end{aligned}$$

Hence proved.

Trigonometric Identities Ex 6.1 Q35

**Answer :**

We need to prove  $\frac{\sec A - \tan A}{\sec A + \tan A} = \frac{\cos^2 A}{(1 + \sin A)^2}$

Here, we will first solve the LHS.

Now, using  $\sec \theta = \frac{1}{\cos \theta}$  and  $\tan \theta = \frac{\sin \theta}{\cos \theta}$ , we get

$$\begin{aligned}\frac{\sec A - \tan A}{\sec A + \tan A} &= \frac{\frac{1}{\cos A} - \frac{\sin A}{\cos A}}{\frac{1}{\cos A} + \frac{\sin A}{\cos A}} \\&= \frac{\frac{1 - \sin A}{\cos A}}{\frac{1 + \sin A}{\cos A}} \\&= \frac{1 - \sin A}{1 + \sin A}\end{aligned}$$

Further, multiplying both numerator and denominator by  $1 + \sin A$ , we get

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

Now, using the property  $\cos^2 \theta + \sin^2 \theta = 1$ , we get

So,

$$\frac{1 - \sin^2 A}{(1 + \sin A)^2} = \frac{\cos^2 A}{(1 + \sin A)^2} = \text{RHS}$$

Hence proved.

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