



Trigonometric Identities Ex 6.1 Q64

**Answer :**

We have to prove  $\frac{\sin A}{\sec A + \tan A - 1} + \frac{\cos A}{\operatorname{cosec} A + \cot A - 1} = 1$

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

So,

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

Hence proved.

Trigonometric Identities Ex 6.1 Q65

**Answer :**

We have to prove  $\frac{\tan A}{(1 + \tan^2 A)^2} + \frac{\cot A}{(1 + \cot^2 A)^2} = \sin A \cos A$

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

So,

$$\begin{aligned} & \frac{\tan A}{(1 + \tan^2 A)^2} + \frac{\cot A}{(1 + \cot^2 A)^2} \\ &= \frac{\tan A}{(\sec^2 A)^2} + \frac{\cot A}{(\operatorname{cosec}^2 A)^2} \\ &= \frac{\tan A}{\sec^4 A} + \frac{\cot A}{\operatorname{cosec}^4 A} \\ &= \frac{\sin A}{\frac{1}{\cos^4 A}} + \frac{\cos A}{\frac{1}{\sin^4 A}} \\ &= \frac{\sin A \cos^4 A}{\cos A} + \frac{\cos A \sin^4 A}{\sin A} \\ &= \sin A \cos^3 A + \cos A \sin^3 A \\ &= \sin A \cos A (\cos^2 A + \sin^2 A) \\ &= \sin A \cos A \end{aligned}$$

Hence proved.

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