



Trigonometric Ratios Ex 5.2 Q18

**Answer :**

We have,

$$\frac{\sin 30^\circ}{\sin 45^\circ} + \frac{\tan 45^\circ}{\sec 60^\circ} - \frac{\sin 60^\circ}{\cot 45^\circ} - \frac{\cos 30^\circ}{\sin 90^\circ} \dots\dots (1)$$

Now,

$$\sin 45^\circ = \frac{1}{\sqrt{2}}, \sin 30^\circ = \frac{1}{2}, \sin 90^\circ = 1, \tan 45^\circ = \cot 45^\circ = 1, \sin 60^\circ = \cos 30^\circ = \frac{\sqrt{3}}{2},$$

$$\sec 60^\circ = 2$$

So by substituting above values in equation (1)

We get,

$$\begin{aligned} & \frac{\sin 30^\circ}{\sin 45^\circ} + \frac{\tan 45^\circ}{\sec 60^\circ} - \frac{\sin 60^\circ}{\cot 45^\circ} - \frac{\cos 30^\circ}{\sin 90^\circ} \\ &= \frac{\frac{1}{2}}{\frac{1}{\sqrt{2}}} + \frac{1}{2} - \frac{\frac{\sqrt{3}}{2}}{1} - \frac{\frac{\sqrt{3}}{2}}{1} \end{aligned}$$

Now by further simplifying

We get,

$$\begin{aligned} & \frac{\sin 30^\circ}{\sin 45^\circ} + \frac{\tan 45^\circ}{\sec 60^\circ} - \frac{\sin 60^\circ}{\cot 45^\circ} - \frac{\cos 30^\circ}{\sin 90^\circ} \\ &= \frac{1}{2} \times \frac{\sqrt{2}}{1} + \frac{1}{2} - \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} \end{aligned}$$

$$\text{Since, } 2 = \sqrt{2} \times \sqrt{2}$$

Therefore,

$$\begin{aligned} & \frac{\sin 30^\circ}{\sin 45^\circ} + \frac{\tan 45^\circ}{\sec 60^\circ} - \frac{\sin 60^\circ}{\cot 45^\circ} - \frac{\cos 30^\circ}{\sin 90^\circ} \\ &= \frac{1}{\sqrt{2} \times \sqrt{2}} \times \frac{\sqrt{2}}{1} + \frac{1}{2} - \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} \end{aligned}$$

Now, one  $\sqrt{2}$  gets cancelled and

We get,

$$\begin{aligned} & \frac{\sin 30^\circ}{\sin 45^\circ} + \frac{\tan 45^\circ}{\sec 60^\circ} - \frac{\sin 60^\circ}{\cot 45^\circ} - \frac{\cos 30^\circ}{\sin 90^\circ} \\ &= \frac{1}{\sqrt{2}} + \frac{1}{2} - \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} \end{aligned}$$

Now, by taking LCM

We get,

$$\begin{aligned} & \frac{\sin 30^\circ}{\sin 45^\circ} + \frac{\tan 45^\circ}{\sec 60^\circ} - \frac{\sin 60^\circ}{\cot 45^\circ} - \frac{\cos 30^\circ}{\sin 90^\circ} \\ &= \frac{1 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} + \frac{1}{2} - \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} \\ &= \frac{\sqrt{2}}{2} + \frac{1}{2} - \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} \\ &= \frac{\sqrt{2} + 1 - \sqrt{3} - \sqrt{3}}{2} \\ &= \frac{\sqrt{2} + 1 - 2\sqrt{3}}{2} \end{aligned}$$

Therefore,

$$\frac{\sin 30^\circ}{\sin 45^\circ} + \frac{\tan 45^\circ}{\sec 60^\circ} - \frac{\sin 60^\circ}{\cot 45^\circ} - \frac{\cos 30^\circ}{\sin 90^\circ} = \frac{\sqrt{2} + 1 - 2\sqrt{3}}{2}$$

Trigonometric Ratios Ex 5.2 Q19

**Answer :**

We have,

$$\frac{\tan 45^\circ}{\operatorname{cosec} 30^\circ} + \frac{\sec 60^\circ}{\cot 45^\circ} - \frac{5 \sin 90^\circ}{2 \cos 0^\circ} \dots\dots (1)$$

Now,

$$\sin 90^\circ = \cos 0^\circ = 1 \cdot \tan 45^\circ = \cot 45^\circ = 1 \cdot \operatorname{cosec} 30^\circ = \sec 60^\circ = 2$$

So by substituting above values in equation (1)

We get,

$$\begin{aligned} & \frac{\tan 45^\circ}{\operatorname{cosec} 30^\circ} + \frac{\sec 60^\circ}{\cot 45^\circ} - \frac{5 \sin 90^\circ}{2 \cos 0^\circ} \\ &= \frac{1}{2} + \frac{2}{1} - \frac{5 \times 1}{2 \times 1} \\ &= \frac{1}{2} + \frac{2}{1} - \frac{5}{2} \end{aligned}$$

Now by taking terms with denominator 2 together and solving

We get,

$$\begin{aligned}& \frac{\tan 45^\circ}{\operatorname{cosec} 30^\circ} + \frac{\sec 60^\circ}{\cot 45^\circ} - \frac{5 \sin 90^\circ}{2 \cos 0^\circ} \\&= \frac{1-5}{2} + \frac{2}{1} \\&= \frac{-4}{2} + 2\end{aligned}$$

Now  $\frac{-4}{2}$  gets reduced to -2

Therefore,

$$\begin{aligned}& \frac{\tan 45^\circ}{\operatorname{cosec} 30^\circ} + \frac{\sec 60^\circ}{\cot 45^\circ} - \frac{5 \sin 90^\circ}{2 \cos 0^\circ} \\&= -2 + 2 \\&= 0\end{aligned}$$

Therefore,

$$\boxed{\frac{\tan 45^\circ}{\operatorname{cosec} 30^\circ} + \frac{\sec 60^\circ}{\cot 45^\circ} - \frac{5 \sin 90^\circ}{2 \cos 0^\circ} = 0}$$

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