Trigonometric Ratios Ex 5.2 Q18

Answer :

We have,

$\frac{\sin 30^\circ}{\sin 45^\circ}+\frac{\tan 45^\circ}{\sec 60^\circ}-\frac{\sin 60^\circ}{\cot 45^\circ}-\frac{\cos 30^\circ}{\sin 90^\circ}$ ..... (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,

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

$=\frac{\frac{1}{2}}{\frac{1}{\sqrt{2}}}+\frac{1}{2}-\frac{\frac{\sqrt{3}}{2}}{1}-\frac{\frac{\sqrt{3}}{2}}{1}$

Now by further simplifying

We get,

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

$=\frac{1}{2}\times\frac{\sqrt{2}}{1}+\frac{1}{2}-\frac{\sqrt{3}}{2}-\frac{\sqrt{3}}{2}$

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

Therefore,

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

$=\frac{1}{\sqrt{2}\times\sqrt{2}}\times\frac{\sqrt{2}}{1}+\frac{1}{2}-\frac{\sqrt{3}}{2}-\frac{\sqrt{3}}{2}$

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

We get,

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

$=\frac{1}{\sqrt{2}}+\frac{1}{2}-\frac{\sqrt{3}}{2}-\frac{\sqrt{3}}{2}$

Now, by taking LCM

We get,

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

$$=\frac{1\times\sqrt{2}}{\sqrt{2}\times\sqrt{2}}+\frac{1}{2}-\frac{\sqrt{3}}{2}-\frac{\sqrt{3}}{2}$$

$$=\frac{\sqrt{2}}{2}+\frac{1}{2}-\frac{\sqrt{3}}{2}-\frac{\sqrt{3}}{2}$$

$$=\frac{\sqrt{2}+1-\sqrt{3}-\sqrt{3}}{2}$$

$$=\frac{\sqrt{2}+1-2\sqrt{3}}{2}$$

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,

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

Now,

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

So by substituting above values in equation (1)

We get,

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

$$=\frac{1}{2}+\frac{2}{1}-\frac{5\times 1}{2\times 1}$$

$$=\frac{1}{2}+\frac{2}{1}-\frac{5}{2}$$

Now by taking terms with denominator 2 together and solving

We get,

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

$$= \frac{1-5}{2} + \frac{2}{1}$$

$$= \frac{-4}{2} + 2$$

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

Therefore,

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

$$= -2 + 2$$

$$= 0$$

Therefore,

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

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