

Trigonometric Ratios Ex 5.2 Q14

Answer:

We have,

$$\frac{\sin 30^{\circ} - \sin 90^{\circ} + 2\cos 0^{\circ}}{\tan 30^{\circ} \tan 60^{\circ}} \dots (1)$$

Now

$$\sin 30^\circ = \frac{1}{2} \cdot \sin 90^\circ = \cos 0^\circ = 1 \cdot \tan 30^\circ = \frac{1}{\sqrt{3}} \cdot \tan 60^\circ = \sqrt{3}$$

So by substituting above values in equation (1)

We get,

$$\frac{\sin 30^{\circ} - \sin 90^{\circ} + 2\cos 0^{\circ}}{\tan 30^{\circ} \tan 60^{\circ}}$$

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

Now, $\sqrt{3}$ present in the denominator of above expression gets cancelled and we get,

$$\frac{\sin 30^{\circ} - \sin 90^{\circ} + 2\cos 0^{\circ}}{\tan 30^{\circ} \tan 60^{\circ}}$$

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

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

Now by taking LCM in the above expression we get,

$$\frac{\sin 30^{\circ} - \sin 90^{\circ} + 2\cos 0^{\circ}}{\tan 30^{\circ} \tan 60^{\circ}}$$

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

$$= \frac{1}{2} - \frac{2}{2} + \frac{4}{2}$$

$$= \frac{1 - 2 + 4}{2}$$

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

$$= \frac{3}{2}$$

Therefore,

$$\frac{\sin 30^{\circ} - \sin 90^{\circ} + 2\cos 0^{\circ}}{\tan 30^{\circ} \tan 60^{\circ}} = \frac{3}{2}$$

Trigonometric Ratios Ex 5.2 Q15

Answer:

We have,

$$\frac{4}{\cot^2 30^\circ} + \frac{1}{\sin^2 60^\circ} - \cos^2 45^\circ \dots (1)$$
Now

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

So by substituting above values in equation (1)

We get,

$$\frac{4}{\cot^2 30^\circ} + \frac{1}{\sin^2 60^\circ} - \cos^2 45^\circ$$

$$= \frac{4}{\left(\sqrt{3}\right)^2} + \frac{1}{\left(\frac{\sqrt{3}}{2}\right)^2} - \left(\frac{1}{\sqrt{2}}\right)^2$$

$$= \frac{4}{3} + \frac{1}{\left(\sqrt{3}\right)^2} - \frac{1^2}{\left(\sqrt{2}\right)^2}$$

$$= \frac{4}{3} + \frac{2^2}{\left(\sqrt{3}\right)^2} - \frac{1}{2}$$

$$=\frac{4}{3}+\frac{4}{3}-\frac{1}{2}$$

Now LCM of denominator of above expression is 6 Therefore by taking LCM we get,

$$\frac{4}{\cot^2 30^\circ} + \frac{1}{\sin^2 60^\circ} - \cos^2 45^\circ$$

$$= \frac{4 \times 2}{3 \times 2} + \frac{4 \times 2}{3 \times 2} - \frac{1 \times 3}{2 \times 3}$$

$$= \frac{8}{6} + \frac{8}{6} - \frac{3}{6}$$

$$= \frac{8 + 8 - 3}{6}$$

$$= \frac{16 - 3}{6}$$

$$= \frac{13}{6}$$

Hence,

$$\frac{4}{\cot^2 30^\circ} + \frac{1}{\sin^2 60^\circ} - \cos^2 45^\circ = \frac{13}{6}$$

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