Trigonometric Ratios Ex 5.2 Q6

Answer :

We have to find the following expression

$$\tan^2 30^\circ + \tan^2 60^\circ + \tan^2 45 \quad \cdots\cdots (1)$$

Now,

$$\tan 30^\circ = \frac{1}{\sqrt{3}}, \tan 60^\circ = \sqrt{3}, \tan 45^\circ = 1$$

So by substituting above values in equation (1)

We get,

$$\tan^2 30^\circ + \tan^2 60^\circ + \tan^2 45$$

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

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

$$= \frac{1}{3} + 3 + 1$$

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

Now by taking LCM

We get,

$$\tan^2 30^\circ + \tan^2 60^\circ + \tan^2 45$$

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

$$= \frac{1}{3} + \frac{12}{3}$$

$$= \frac{1+12}{3}$$

$$= \frac{13}{3}$$

Therefore,

$$\tan^2 30^\circ + \tan^2 60^\circ + \tan^2 45^\circ = \frac{13}{3}$$

Trigonometric Ratios Ex 5.2 Q7

Answer :

We have to find the following expression

$2\sin^2 30^\circ - 3\cos^2 45^\circ + \tan^2 60^\circ$ …… (1)

Now,

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

So by substituting above values in equation (1)

We get,

$$2\sin^2 30^\circ - 3\cos^2 45^\circ + \tan^2 60^\circ$$

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

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

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

In the above equation the first term $\frac{2}{4}$ gets reduced to $\frac{1}{2}$

Therefore,

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

In the above equation the first term $\frac{-2}{2}$ gets reduced to $\frac{-1}{1} = -1$

Therefore,

$$2\sin^2 30^\circ - 3\cos^2 45^\circ + \tan^2 60^\circ$$
$$= -1 + 3$$
$$= 2$$

Therefore,

$$2\sin^2 30^\circ - 3\cos^2 45^\circ + \tan^2 60^\circ = 2$$

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