Trigonometric Ratios Ex 5.2 Q24

Answer :

We have,

$$\sqrt{3}\,\tan 2x = \cos 60^\circ + \sin 45^\circ \cos 45^\circ \quad \cdots\cdots (1)$$

Now we know that

$$\sin 45^\circ = \cos 45^\circ = \frac{1}{\sqrt{2}} \text{ and } \cos 60^\circ = \frac{1}{2}$$

Now by substituting above values in equation (1), we get,

$$\sqrt{3}\,\tan 2x = \cos 60^\circ + \sin 45^\circ \cos 45^\circ$$

$$\sqrt{3}\,\tan 2x = \frac{1}{2} + \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}}$$

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

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

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

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

$$= 1$$

Therefore,

$$\sqrt{3}\tan 2x = 1$$

$$\Rightarrow \tan 2x = \frac{1}{\sqrt{3}} \quad \cdots\cdots (2)$$

Since,

$$\tan 30° = \frac{1}{\sqrt{3}} \quad \cdots\cdots (3)$$

Therefore by comparing equation (2) and (3)

We get,

$$2x = 30°$$

$$\Rightarrow x = \frac{30°}{2}$$

$$\Rightarrow x = 15°$$

Therefore,

$$x = 15°$$

Trigonometric Ratios Ex 5.2 Q25

Answer :

We have,

$$\cos 2x = \cos 60° \cos 30° + \sin 60° \sin 30° \quad \cdots\cdots (1)$$

Now we know that

$$\sin 60° = \cos 30° = \frac{\sqrt{3}}{2} \text{ and } \sin 30° = \cos 60° = \frac{1}{2}$$

Now by substituting above values in equation (1), we get,

$$\cos 2x = \cos 60° \cos 30° + \sin 60° \sin 30°$$

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

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

$$= \frac{2\sqrt{3}}{4}$$

Therefore,

$$\cos 2x = \frac{2\sqrt{3}}{4}$$

Now $\frac{2\sqrt{3}}{4}$ gets reduced to $\frac{\sqrt{3}}{2}$

Therefore,

$$\cos 2x = \frac{2\sqrt{3}}{4}$$

Now $\frac{2\sqrt{3}}{4}$ gets reduced to $\frac{\sqrt{3}}{2}$

Therefore,

$$\cos 2x = \frac{\sqrt{3}}{2} \quad \ldots\ldots (2)$$

Since,

$$\cos 30° = \frac{\sqrt{3}}{2} \quad \ldots\ldots (3)$$

Therefore by comparing equation (2) and (3)

We get,

$$2x = 30°$$

$$\Rightarrow x = \frac{30°}{2}$$

$$\Rightarrow x = 15°$$

Therefore,

$$x = 15°$$

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