



Trigonometric Ratios Ex 5.1 Q35

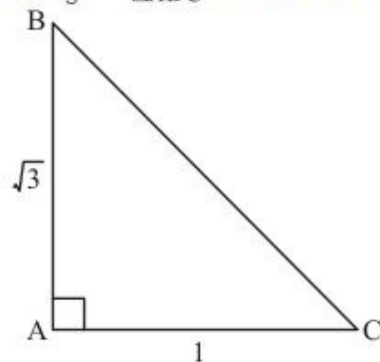
**Answer :**

Given:

$$\tan C = \sqrt{3}$$

To find:  $\sin B \cos C + \cos B \sin C$

The given  $\triangle ABC$  is as shown in figure below



Side  $BC$  is unknown and can be found using Pythagoras theorem

Therefore,

$$BC^2 = AB^2 + AC^2$$

Now by substituting the value of known sides from figure (a)

We get,

$$\begin{aligned} BC^2 &= (\sqrt{3})^2 + 1^2 \\ &= 3 + 1 \\ &= 4 \end{aligned}$$

Now by taking square root on both sides

We get,

$$BC = \sqrt{4}$$
$$= 2$$

Therefore Hypotenuse side  $BC = 2$  ..... (1)

$$\text{Now } \sin B = \frac{\text{Perpendicular side opposite to } \angle B}{\text{Hypotenuse}}$$

Therefore,

$$\sin B = \frac{AC}{BC}$$

Now by substituting the values from equation (1) and figure (a)

We get,

$$\sin B = \frac{1}{2} \text{ ..... (2)}$$

$$\text{Now } \cos B = \frac{\text{Base side adjacent to } \angle B}{\text{Hypotenuse}}$$

Therefore,

$$\cos B = \frac{AB}{BC}$$

Now by substituting the values from equation (1) and figure (a)

We get,

$$\cos B = \frac{\sqrt{3}}{2} \text{ ..... (3)}$$

$$\text{Now } \sin C = \frac{\text{Perpendicular side opposite to } \angle C}{\text{Hypotenuse}}$$

Therefore,

$$\sin C = \frac{AB}{BC}$$

Now by substituting the values from equation (1) and figure (a)

We get,

$$\sin C = \frac{\sqrt{3}}{2} \text{ ..... (4)}$$

Now by definition,

$$\tan C = \frac{\sin C}{\cos C}$$

Therefore,

$$\cos C = \frac{\sin C}{\tan C}$$

Now by substituting the value of  $\sin C$  and  $\tan C$  from equation (4) and given data respectively

We get,

$$\cos C = \frac{\frac{\sqrt{3}}{2}}{\frac{\sqrt{3}}{2}}$$
$$\cos C = \frac{\sqrt{3}}{2\sqrt{3}}$$

Now  $\sqrt{3}$  gets cancelled as it is present in both numerator and denominator

Therefore,

$$\cos C = \frac{1}{2} \text{ ..... (5)}$$

Now by substituting the value of  $\sin B$ ,  $\cos B$ ,  $\sin C$  and  $\cos C$  from equation (2), (3), (4) and (5) respectively in  $\sin B \cos C + \cos B \sin C$

We get,

$$\sin B \cos C + \cos B \sin C = \frac{1}{2} \times \frac{1}{2} + \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2}$$
$$= \frac{1}{4} + \frac{3}{4}$$
$$= \frac{4}{4}$$
$$= 1$$

$$\sin B \cos C + \cos B \sin C = 1$$

\*\*\*\*\* END \*\*\*\*\*

