



## Exercise 8.1

$$= \sqrt{25k^2} = 5k$$

$$\therefore \sin A = \frac{BC}{AC} = \frac{3k}{5k} = \frac{3}{5}$$

$$\cos A = \frac{AB}{AC} = \frac{4k}{5k} = \frac{4}{5}$$

$$\text{And } \tan A = \frac{BC}{AB} = \frac{3k}{4k} = \frac{3}{4}$$

$$\text{Now, L.H.S. } \frac{1 - \tan^2 A}{1 + \tan^2 A} = \frac{1 - \frac{9}{16}}{1 + \frac{9}{16}}$$

$$= \frac{16 - 9}{16 + 9} = \frac{7}{25}$$

$$\text{R.H.S. } \cos^2 A - \sin^2 A = \left(\frac{4}{5}\right)^2 - \left(\frac{3}{5}\right)^2$$

$$= \frac{16}{25} - \frac{9}{25} = \frac{7}{25}$$

$$\therefore \text{L.H.S.} = \text{R.H.S.}$$

$$\therefore \frac{1 - \tan^2 A}{1 + \tan^2 A} = \cos^2 A - \sin^2 A$$

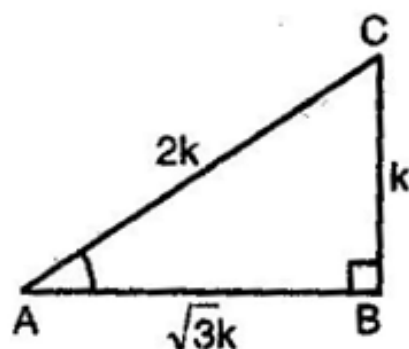
**Q9.** In  $\triangle ABC$  right angles at B, if  $\tan A = \frac{1}{\sqrt{3}}$ ,  
find value of:

(i)  $\sin A \cos C + \cos A \sin C$

(ii)  $\cos A \cos C - \sin A \sin C$

**Ans:** Consider a triangle ABC in which  $\angle B = 90^\circ$ .

Let  $BC = k$  and  $AB = \sqrt{3}k$



Then, using Pythagoras theorem,

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

$$\therefore \sin A = \frac{BC}{AC} = \frac{k}{2k} = \frac{1}{2}$$

$$\cos A = \frac{AB}{AC} = \frac{\sqrt{3}k}{2k} = \frac{\sqrt{3}}{2}$$

For  $\angle C$ , Base = BC, Perpendicular = AB and Hypotenuse = AC

$$\therefore \sin C = \frac{AB}{AC} = \frac{\sqrt{3}k}{2k} = \frac{\sqrt{3}}{2}$$

$$\cos C = \frac{BC}{AC} = \frac{k}{2k} = \frac{1}{2}$$

$$(i) \sin A \cos C + \cos A \sin C = \frac{1}{2} \times \frac{1}{2} + \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2}$$

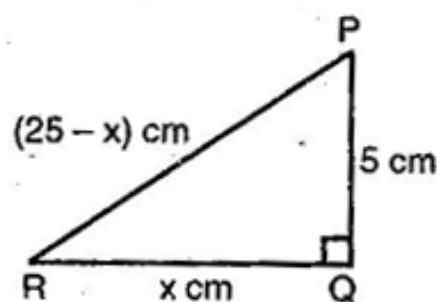
$$= \frac{1}{4} + \frac{3}{4} = \frac{4}{4} = 1$$

$$(ii) \cos A \cos C - \sin A \sin C = \frac{\sqrt{3}}{2} \times \frac{1}{2} - \frac{1}{2} \times \frac{\sqrt{3}}{2}$$

$$= \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4} = 0$$

**Q10.** In  $\triangle PQR$ , right angled at Q,  $PR + QR = 25$  cm and  $PQ = 5$  cm. Determine the values of  $\sin P$ ,  $\cos P$  and  $\tan P$ .

**Ans:** In  $\triangle PQR$ , right angled at Q.



$PR + QR = 25$  cm and  $PQ = 5$  cm

Let  $QR = x$  cm and  $PR = (25 - x)$  cm

Using Pythagoras theorem,

$$RP^2 = RQ^2 + QP^2$$

$$\Rightarrow (25-x)^2 = (x)^2 + (5)^2$$

$$\Rightarrow 625 - 50x + x^2 = x^2 + 25$$

$$\Rightarrow -50x = -600$$

$$\Rightarrow x = 12$$

$$\therefore RQ = 12 \text{ cm and } RP = 25 - 12 = 13 \text{ cm}$$

$$\therefore \sin P = \frac{RQ}{RP} = \frac{12}{13}$$

$$\cos P = \frac{PQ}{RP} = \frac{5}{13}$$

$$\text{And } \tan P = \frac{RQ}{PQ} = \frac{12}{5}$$

**Q11.** State whether the following are true or false. Justify your answer.

(i) The value of  $\tan A$  is always less than 1.

(ii)  $\sec A = \frac{12}{5}$  for some value of angle A.

(iii)  $\cos A$  is the abbreviation used for the cosecant of angle A.

(iv)  $\cot A$  is the product of  $\cot$  and A.

(v)  $\sin \theta = \frac{4}{3}$  for some angle  $\theta$ .

**Ans: (i) False** because sides of a right triangle may have any length, so  $\tan A$  may have any value.

**(ii) True** as  $\sec A$  is always greater than 1.

**(iii) False** as  $\cos A$  is the abbreviation of cosine A.

**(iv) False** as  $\cot A$  is not the product of 'cot' and A. 'cot' is separated from A has no meaning.

**(v) False** as  $\sin \theta$  cannot be  $> 1$ .

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

