Q.1. In $\triangle ABC$, right angled at B. Find the other sides.

$AB = 24\text{cm}$ $BC = 7\text{cm}$

$AC = \sqrt{(24)^2 + (7)^2} = \sqrt{576 + 49} = \sqrt{625} = 25\text{ cm}$

$\sin\theta = \frac{p}{h} = \frac{7}{25}$ $\cos\theta = \frac{b}{h} = \frac{24}{25}$ $\tan\theta = \frac{p}{b} = \frac{7}{24}$

$\text{cosec}\,\theta = \frac{h}{p} = \frac{25}{7}$ $\sec\theta = \frac{h}{b} = \frac{25}{24}$ $\cot\theta = \frac{b}{p} = \frac{24}{7}$

2. $PQ = 12\text{cm}$ $PR = 13\text{ cm}$

$QR = PR^2 - PQ^2 = \sqrt{(13)^2 - (12)^2} = \sqrt{169 - 144} = \sqrt{25} = 5\text{ cm}$

$\tan P = \frac{p}{b} = \frac{5}{12}$ $\cot R = \frac{b}{p} = \frac{5}{12}$

$\tan P - \cot R = \frac{5}{12} - \frac{5}{12} = 0$

3. $\sin A = \frac{3}{4} = \frac{P}{H}$ $\quad \cos A = \frac{b}{H} = \frac{\sqrt{7}}{4}$

$\operatorname{cosec} A = \frac{4}{3} = \frac{H}{P}$ $\quad \tan A = \frac{P}{b} = \frac{3}{\sqrt{7}}$

$H^2 - P^2 = b^2$

$16 - 9 = 7$

$b = \sqrt{7}$

4. $15 \cot A = 8$

$\cot A = \frac{8}{15} = \frac{b}{P}$

$H^2 = P^2 + b^2$

$H^2 = (15)^2 + (8)^2 = 225 + 64 = \sqrt{289} = 17$

$\sin A = \frac{P}{H} = \frac{15}{17}$ $\quad \sec A = \frac{H}{b} = \frac{17}{8}$

5. $\sec \theta = \frac{13}{12}$ $\quad \sin = \frac{P}{H} = \frac{5}{13}$ $\quad \tan \theta = \frac{P}{b} = \frac{5}{12}$

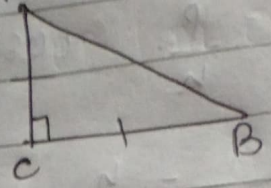
$\cos \theta = \frac{b}{H} = \frac{12}{13}$ $\quad \operatorname{cosec} = \frac{H}{P} = \frac{13}{5}$ $\quad \cot \theta = \frac{b}{P} = \frac{12}{5}$

6. $\cos A = \cos B$

$\frac{AC}{AB} = \frac{BC}{AB}$ — given.

$AC = BC$

$\angle A = \angle B$ (proved)



7. $\cot\theta = \frac{7}{8} = \frac{b}{p}$ $\quad h = \sqrt{64+49} = \sqrt{113}$

(i) $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)} = \frac{(1)^2 - \left(\frac{8}{\sqrt{113}}\right)^2}{(1)^2 - \left(\frac{7}{\sqrt{113}}\right)^2}$

$= \frac{1 - \frac{64}{113}}{1 - \frac{7}{113}} = \frac{\frac{113-64}{113}}{\frac{113-49}{113}} = \frac{\frac{49}{113}}{\frac{64}{113}} = \frac{49}{64}$

(ii) $\cot^2\theta = \left(\frac{7}{8}\right)^2 = \frac{49}{64}$

8. $3\cot A = 4$

$\cot A = \frac{4}{3} = \frac{b}{p}$ $\quad h = 5$

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

$= \frac{1 - \left(\frac{3}{4}\right)^2}{1 + \left(\frac{3}{4}\right)^2} = \frac{16}{25} - \frac{9}{25} = \frac{7}{25}$

$= \frac{7}{25}$ proved

9. $\tan A = \frac{1}{\sqrt{3}} = \frac{p}{b}$ $\quad h = 2$

(i) $\sin A = \frac{p}{h} = \frac{1}{2}$ $\quad \cos A = \frac{b}{h} = \frac{\sqrt{3}}{2}$

$\sin C = \frac{p}{h} = \frac{\sqrt{3}}{2}$ $\quad \cos C = \frac{b}{h} = \frac{1}{2}$

$\sin A \cdot \cos C + \sin C \cdot \cos A$

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

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

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

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

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

10. $PQ = 5\text{cm}$

$PR + QR = 25$

$PR = 25 - QR$

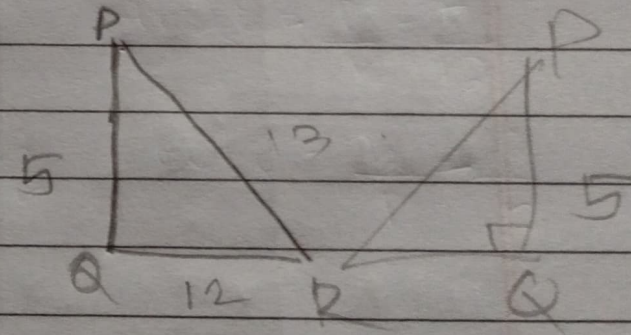
$PR^2 = PQ^2 - QR^2$

$(25 - QR)^2 = 25 - QR^2$

$625 + QR^2 - 50QR = 25 - QR^2$

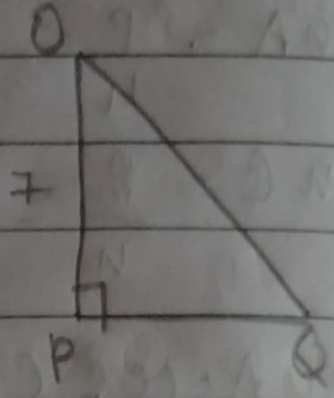
$600 = 50QR$

$12 = QR$



$\sin P = \frac{p}{h} = \frac{12}{13}$ $\quad \cos P = \frac{b}{h} = \frac{5}{13}$ $\quad \tan P = \frac{p}{b} = \frac{12}{5}$

In $\triangle OPQ$ right angled angle at P. $OP = 7cm$ $OQ - PQ = 1cm$. find $\sin Q$ and $\cos Q$



$OP = 7cm$

$OQ = 1 + PQ$

$(OQ)^2 = (OP)^2 + (PQ)^2$

$1 + PQ^2 + 2PQ = 49 + PQ^2$

$2PQ = 48$

$PQ = 24\ cm$

4. (i) False (ii) True (iii) false (iv) false (v) false