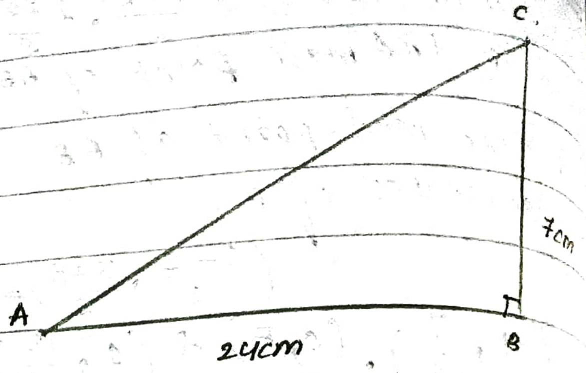
Q1. By the pythagoras Theorem,



$AC^2 = AB^2 + BC^2 = (24)^2 + (7)^2$

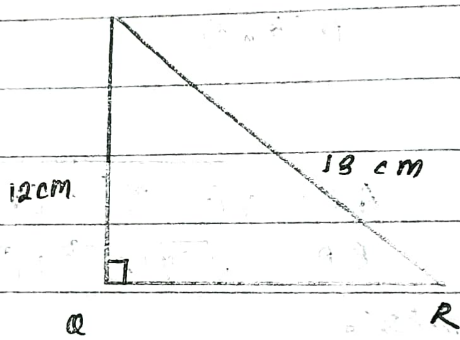
$= 576 + 49 = 625$.

$\Rightarrow$ $AC = \sqrt{625} = 25cm$.

(i) $\sin A = \frac{BC}{AC} = \frac{7}{25}$, $\cos A = \frac{AB}{AC} = \frac{24}{25}$.

(ii) $\sin C = \frac{AB}{AC}$, $\frac{24}{25}$, $\cos C = \frac{BC}{AC} = \frac{7}{25}$.

Q2. In ΔPQR,



$\Rightarrow$ $PR^2 = PQ^2 + QR^2$.

$\Rightarrow$ $(13)^2 = (12)^2 + QR^2$.

$\Rightarrow$ $169 - 144 = QR^2$.

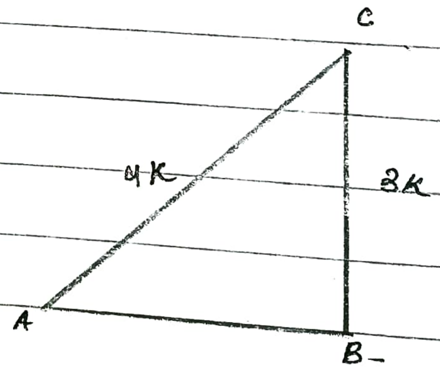
$\Rightarrow$ $25 = QR^2 \Rightarrow QR = 5cm$.

$\tan P = \frac{QR}{PQ} = \frac{5}{12}$.

$\cot R = \frac{QR}{PQ} = \frac{5}{12}$.

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

Q3. $\sin A = \frac{3}{4} = \frac{BC}{AC}$



$BC = 2k$

$AC = 4k$.

$AB^2 = AC^2 - BC^2$.

$= (4k)^2 - (3k)^2 A$.

$= 16k^2 - 9k^2 = 7k^2$.

$\Rightarrow$ $AB = k\sqrt{7}$.

$\therefore$ $\cos A = \frac{AB}{AC} = \frac{\sqrt{7}k}{4k} = \frac{\sqrt{7}}{4}$

$\tan A = \frac{BC}{AB} = \frac{3k}{\sqrt{7}k} = \frac{3}{\sqrt{7}}$.

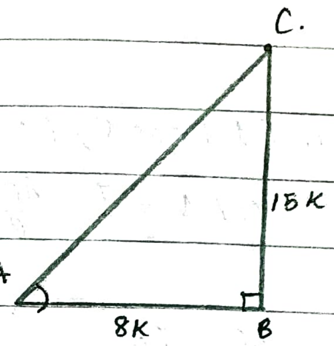
ΔABC, $AC^2 = AB^2 + BC^2$

$= (8k)^2 + (15k)^2 = 64k^2 + 225k^2 = 289k^2$.

$AC = \sqrt{289k^2} = 17k$.

$\sin A = \frac{BC}{AC} = \frac{15k}{17k} = \frac{15}{17}$.

$\sec c = \frac{AC}{BC} = \frac{17k}{8k} = \frac{17}{8}$.



Q5. $\sec\theta = \frac{13}{12} = \frac{AC}{AB}$.

$AC = 13k$.

$AB = 12k$.

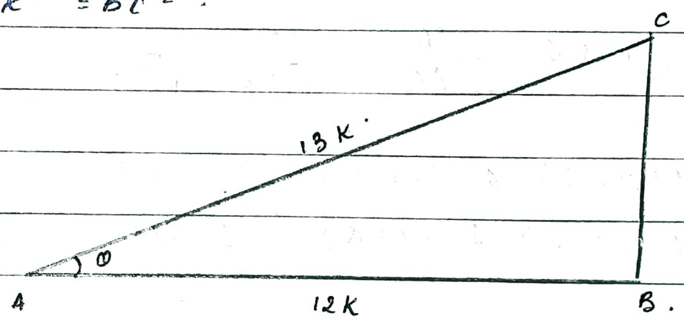
$AC^2 = AB^2 + BC^2 \Rightarrow 169k^2 = 144k^2 + BC^2$.

$\Rightarrow 169k^2 - 144k^2 = BC^2 \Rightarrow 25k^2 = BC^2$.

$\Rightarrow BC = \sqrt{25k^2} = 5k$.

$\sin\theta = \frac{BC}{AC} = \frac{5k}{13k} = \frac{5}{13}$.

$\cos\theta = \frac{AB}{AC} = \frac{12k}{13k} = \frac{12}{13}$.



$\tan\theta = \frac{BC}{AB} = \frac{5k}{12k} = \frac{5}{12}$.

$\operatorname{cosec}\theta = \frac{AC}{BC} = \frac{13k}{5k} = \frac{13}{5}$.

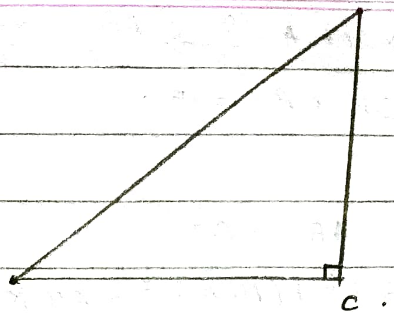
$\cot\theta = \frac{AB}{BC} = \frac{12k}{5k} = \frac{12}{5}$.

Q6. $\angle A$ & $\angle B$.

$\angle C = 90°$.

$\cos A = \cos B$.

Q6. $\frac{AC}{AB} = \frac{BC}{AB}$.

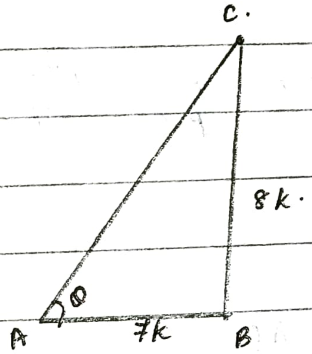


$\Rightarrow AC = BC$.

$\therefore \angle A = \angle B$.

Q7. $(1 + \cos\theta)(1 - \cos\theta)$.

$\cot\theta = \frac{7}{8} = \frac{AB}{BC}$.



$AB = 7k$.

$BC = 8k$.

ΔABC,

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

$$= (7k)^2 + (8k)^2 = 49k^2 + 64k^2 = 113k^2.$$

$\Rightarrow AC = k\sqrt{113}$.

$\therefore \sin\theta = \frac{BC}{AC} = \frac{8k}{\sqrt{113}k} = \frac{8}{\sqrt{113}}$.

and $\cos\theta = \frac{AB}{AC} = \frac{7k}{\sqrt{113}k} = \frac{7}{\sqrt{113}}$.

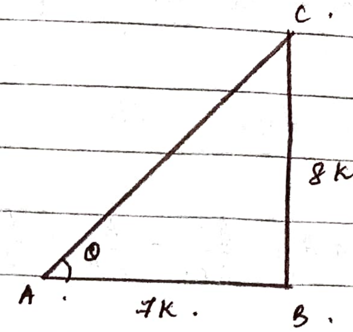
(i) $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)} = \frac{1-\sin^2\theta}{1-\cos^2\theta} = \frac{\cos^2\theta}{\sin^2\theta}$.

$$= \frac{\left(\frac{7}{\sqrt{113}}\right)^2}{\left(\frac{8}{\sqrt{113}}\right)^2} = \frac{\frac{49}{113}}{\frac{64}{113}} = \frac{49}{64}.$$

(ii) $\cot^2\theta = \frac{\cos^2\theta}{\sin^2\theta} = \frac{49}{64}$ -- from (i).

Q8. $(1+\cos\theta)(1-\cos\theta)$ ..

$\cot\theta = \frac{7}{8} = \frac{AB}{BC}$.



$AB = 7k$.

$BC = 8k$.

$\triangle ABC$, $AC^2 = AB^2 + BC^2$.

$= (7k)^2 + (8k)^2 = 49k^2 = 113k^2$.

$\Rightarrow AC = k\sqrt{113}$.

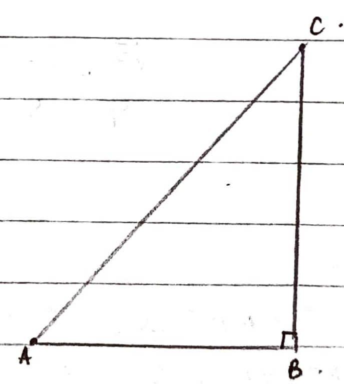
$\therefore \sin\theta = \frac{BC}{AC} = \frac{8k}{\sqrt{113}k} = \frac{8}{\sqrt{113}}$.

$\cos\theta = \frac{AB}{AC} = \frac{7k}{\sqrt{113}k} = \frac{7}{\sqrt{113}}$.

(i) $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)} = \frac{1-\sin^2\theta}{1-\cos^2\theta} = \frac{\cos^2\theta}{\sin^2\theta}$.

$$= \frac{\left(\frac{7}{\sqrt{113}}\right)^2}{\left(\frac{8}{\sqrt{113}}\right)^2} = \frac{\frac{49}{113}}{\frac{64}{113}} = \frac{49}{64}.$$

(ii) $\cot^2\theta = \frac{\cos^2\theta}{\sin^2\theta} = \frac{49}{64}$.



Q9. $\therefore \tan A = \frac{BC}{AB} = \frac{1}{\sqrt{3}}$.

$\therefore \frac{BC}{AB} = \frac{1}{\sqrt{3}}$

$AB = \sqrt{3}k$

$BC = k$.

Q9. $AC^2 = AB^2 + BC^2 = (\sqrt{3}k)^2 + (k)^2.$

$\Rightarrow AC = \sqrt{4k^2} = 2k.$

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

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

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

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

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

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

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

(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 ΔPQR,

$PR^2 = PQ^2 + QR^2 \Rightarrow PQ^2 = PR^2 - QR^2.$

$\Rightarrow (5)^2 = (PR + QR)(PR - QR).$

$\Rightarrow 25 = 25(PR - QR) \Rightarrow \frac{25}{25} = PR - QR.$

$\Rightarrow PR - QR = 1$ (i).

Q10: $\rightarrow PR + QR = 25$ (ii).

(i) and (ii).

$2PR = 26 \Rightarrow PR = \frac{26}{2} = 13cm$.

(i) $PR - QR = 1$

$QR = 13 - 1$

$QR = 12\ cm$.

$\sin P = \frac{QR}{PR} = \frac{12}{13}$.

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

$\tan P = \frac{QR}{PQ} = \frac{12}{5}$.