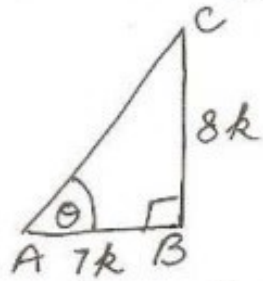


7) $\cot \theta = \frac{7}{8}$ (a.s.)



let $AB = 7k$
 $BC = 8k$

In rt ΔABC

$$\begin{aligned} AC^2 &= AB^2 + BC^2 \text{ (Py. th.)} \\ &= (7k)^2 + (8k)^2 \\ &= 49k^2 + 64k^2 \\ &= 113k^2 \end{aligned}$$

$AC = \sqrt{113}k$

$$\begin{aligned} (1) & \frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)} \\ &= \frac{\left(1 + \frac{8k}{\sqrt{113}k}\right)\left(1 - \frac{8k}{\sqrt{113}k}\right)}{\left(1 + \frac{7k}{\sqrt{113}k}\right)\left(1 - \frac{7k}{\sqrt{113}k}\right)} \end{aligned}$$

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

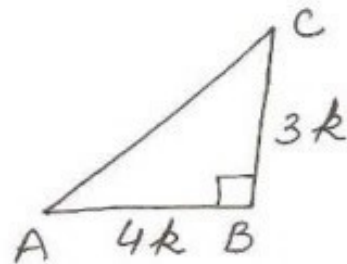
$$= \frac{113 - 64}{113} \times \frac{113}{113 - 49}$$

$$= \frac{49}{64}$$

$$\begin{aligned} \cot^2 \theta &= \left(\frac{7k}{8k}\right)^2 \\ &= \frac{49}{64} \end{aligned}$$

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

8) $3 \cot A = 4$
 $\Rightarrow \cot A = \frac{4}{3}$ (a.s.)



In right ΔABC

$$\begin{aligned} AC^2 &= AB^2 + BC^2 \text{ (Py. th.)} \\ &= (4k)^2 + (3k)^2 \\ &= 16k^2 + 9k^2 \\ &= 25k^2 \end{aligned}$$

$$\begin{aligned} \text{LHS} &= \frac{1 - \tan^2 A}{1 + \tan^2 A} \\ &= \frac{1 - \left(\frac{3}{4}\right)^2}{1 + \left(\frac{3}{4}\right)^2} \\ &= \frac{1 - \frac{9}{16}}{1 + \frac{9}{16}} \\ &= \frac{\frac{7}{16}}{\frac{25}{16}} \end{aligned}$$

$$= \frac{7}{16} \times \frac{16}{25}$$

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

$$\begin{aligned} \cos^2 A - \sin^2 A &= \left(\frac{4}{5}\right)^2 - \left(\frac{3}{5}\right)^2 \\ &= \frac{16}{25} - \frac{9}{25} \end{aligned}$$

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

$\therefore \text{LHS} = \text{RHS}$