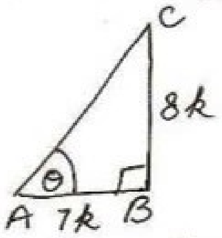
⑦ $\cot\theta = \frac{7}{8}$ $\left(\frac{a.s.}{o.s.}\right)$



let $AB = 7k$

$BC = 8k$

In rt $\triangle ABC$

$AC^2 = AB^2 + BC^2$ (py. th.)

$= (7k)^2 + (8k)^2$

$= 49k^2 + 64k^2$

$= 113k^2$

$AC = \sqrt{113}\,k$

(i) $\dfrac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$

$= \dfrac{\left(1+\frac{8k}{\sqrt{113}k}\right)\left(1-\frac{8k}{\sqrt{113}k}\right)}{\left(1+\frac{7k}{\sqrt{113}k}\right)\left(1-\frac{7k}{\sqrt{113}k}\right)}$

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

$= \dfrac{113-64}{\cancel{113}} \times \dfrac{\cancel{113}}{113-49}$

$= \dfrac{49}{64}$

$\cot^2\theta = \left(\dfrac{7k}{8k}\right)^2$

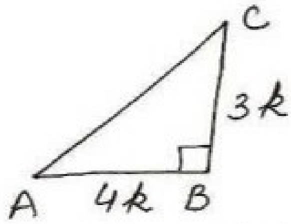
$= \dfrac{49}{64}$

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

$= \dfrac{49}{64}$

8 ① $3\cot A = 4$

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



In right $\triangle ABC$

$AC^2 = AB^2 + BC^2$ (Py. th.)

$= (4k)^2 + (3k)^2$

$= 16k^2 + 9k^2$

$= 25k^2$

LHS $= \dfrac{1-\tan^2 A}{1+\tan^2 A}$

$= \dfrac{1-\left(\frac{3}{4}\right)^2}{1+\left(\frac{3}{4}\right)^2}$

$= \dfrac{1-\frac{9}{16}}{1+\frac{9}{16}}$

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

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

$= \dfrac{7}{25}$

$\cos^2 A - \sin^2 A = \left(\frac{4}{5}\right)^2 - \left(\frac{3}{5}\right)^2$

$= \dfrac{16}{25} - \dfrac{9}{25}$

$= \dfrac{7}{25}$ $\therefore$ LHS = RHS