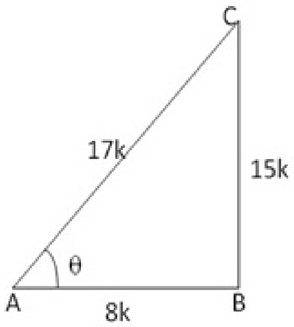
Question 15

Given: $sec\theta = \frac{17}{8} = \frac{17k}{8k}$

Let us draw a ΔABC in which $\angle B = 90^0$ and $\angle A = \theta$



By Pythagoras theorem, we have

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

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

$\therefore$ $$BC^2 = (17k)^2 - (8k)^2$$

$$= 289k^2 - 64k^2 = 225k^2$$

$$BC = 15k$$

$$\therefore \sin\theta = \frac{AC}{BC} = \frac{15k}{17k} = \frac{15}{17}$$

$$\cos\theta = \frac{AB}{AC} = \frac{8k}{17k} = \frac{8}{17}, \tan\theta = \frac{15k}{8k} = \frac{15}{8}$$

$$\text{L.H.S.} = \frac{3 - 4\sin^2\theta}{4\cos^2\theta - 3} = \frac{3 - 4\times\left(\frac{15}{17}\right)^2}{4\times\left(\frac{8}{17}\right)^2 - 3} = \frac{3 - \frac{4\times225}{289}}{4\times\frac{64}{289} - 3}$$

$$= \frac{\frac{3\times289 - 4\times225}{289}}{\frac{4\times64 - 3\times289}{289}} = \frac{867 - 900}{256 - 867} = \frac{-33}{-611} = \frac{33}{611}$$

$$\text{R.H.S.} = \frac{3 - \tan^2\theta}{1 - 3\tan^2\theta} = \frac{3 - \left(\frac{15}{8}\right)^2}{1 - 3\times\left(\frac{15}{8}\right)^2} = \frac{3 - \frac{225}{64}}{1 - 3\times\frac{225}{64}} = \frac{\frac{3\times64 - 225}{64}}{\frac{64 - 3\times225}{64}}$$

$$= \frac{192 - 225}{64 - 675} = \frac{-33}{-611} = \frac{33}{611}$$

Hence, L.H.S. = R.H.S

*********** END **********