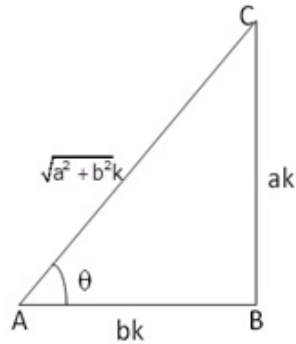




Question 13

Given: $\tan \theta = \frac{a}{b} = \frac{ak}{bk} = \frac{BC}{AB}$

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



By Pythagoras theorem, we have

$$AC^2 = AB^2 + BC^2 = b^2k^2 + a^2k^2$$

$$\therefore AC = \sqrt{a^2 + b^2} k$$

$$\sin \theta = \frac{BC}{AC} = \frac{ak}{\sqrt{a^2 + b^2}k} = \frac{a}{\sqrt{a^2 + b^2}}$$

$$\cos \theta = \frac{AB}{AC} = \frac{bk}{\sqrt{a^2 + b^2}k} = \frac{b}{\sqrt{a^2 + b^2}}$$

$$\text{L.H.S.} = \frac{a \sin \theta - b \cos \theta}{a \sin \theta + b \cos \theta}$$

$$= \frac{a \cdot \frac{a}{\sqrt{a^2 + b^2}} - b \cdot \frac{b}{\sqrt{a^2 + b^2}}}{a \cdot \frac{a}{\sqrt{a^2 + b^2}} + b \cdot \frac{b}{\sqrt{a^2 + b^2}}} = \frac{\frac{a^2 - b^2}{\sqrt{a^2 + b^2}}}{\frac{a^2 + b^2}{\sqrt{a^2 + b^2}}} = \frac{a^2 - b^2}{a^2 + b^2}$$

$$= \text{R.H.S.}$$

***** END *****