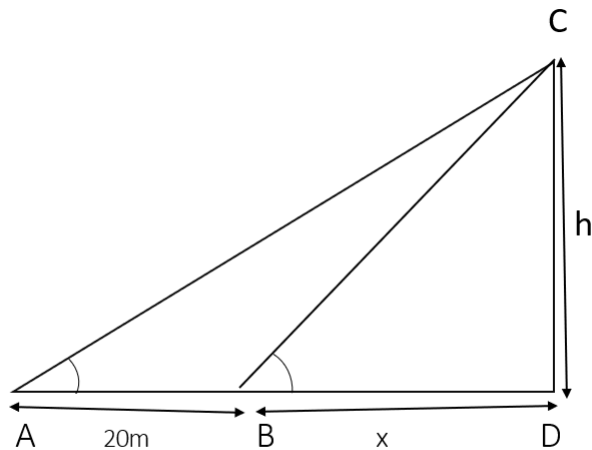# Assignment 1

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Q10(b) : A man observes the angle of elevation of the top of the tower to be 45°. He walks towards it in a horizontal line through its base. On covering 20 m the angle of elevation changes to 60°. Find the height of the tower correct to 2 significant figures.

Solution: Let the height of the tower be 'h'

Given that, $\angle CAD = 45°$ and $\angle CBD = 60°$.
In ΔADC,

$$\tan 45° = \frac{h}{20 + x}$$

$$1 = \frac{h}{20 + x}$$

$$\implies h = 20 + x \qquad (1)$$

In ΔBDC,

$$\tan 60° = \frac{h}{x}$$

$$\sqrt{3} = \frac{h}{x}$$

$$\implies x = \frac{h}{\sqrt{3}} \qquad (2)$$

From equations (1) and (2),

$$h = 20 + \frac{h}{\sqrt{3}}$$

$$h - \frac{h}{\sqrt{3}} = 20$$

$$h \left(\frac{\sqrt{3} - 1}{\sqrt{3}} \right) = 20$$

$$h = \frac{20\sqrt{3}}{(\sqrt{3} - 1)} \times \frac{(\sqrt{3} + 1)}{(\sqrt{3} + 1)}$$

$$h = 20 \frac{(3 + \sqrt{3})}{(3 - 1)}$$

$$h = 20 \times \frac{(3 + 1.732)}{2}$$

$$h = 10(4.732)$$

$$h = 47.32m$$

$\therefore$ The height of the tower is 47.32 m