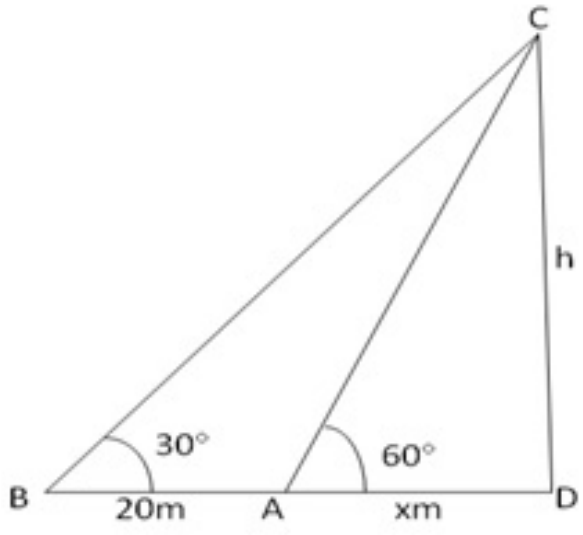
Question 7:
Let CD be the tower and BD be the ground
Then, ∠CBD = 30°, ∠CAD = 60°
∠BDC = 90°, AB = 20 m, CD = h metre and AD = x metre



From Δ BCD

$$\frac{CD}{BD} = \tan 30° = \frac{1}{\sqrt{3}}$$

$$\frac{h}{20+x} = \frac{1}{\sqrt{3}} \Rightarrow \sqrt{3}h = 20 + x$$

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

From right Δ CAD, we have

$$\frac{CD}{AD} = \tan 60^\circ$$

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

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

$$\Rightarrow \frac{h}{\sqrt{3}} = x ----(2)$$

from (1) & (2) we get

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

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

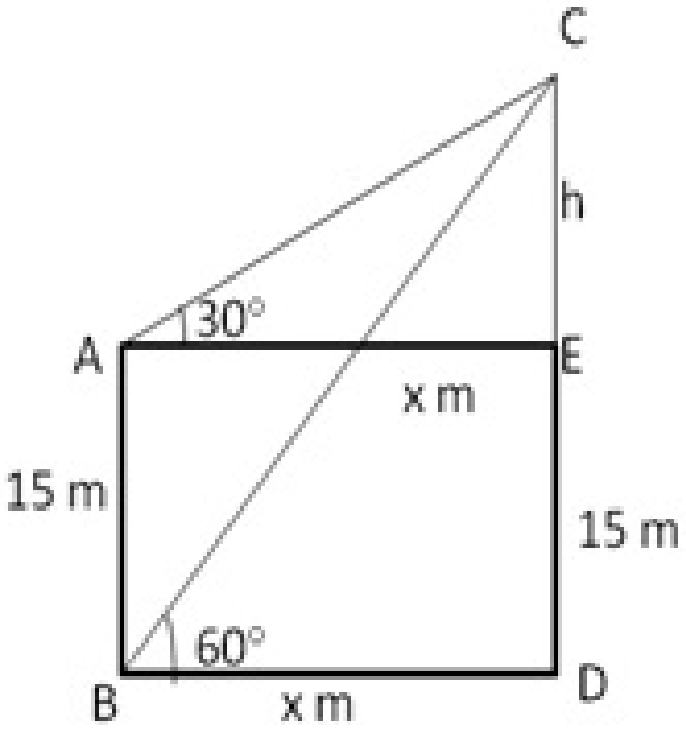
$$\Rightarrow h = 10\sqrt{3} = 10 \times 1.732 = 17.32$$

$$BD = (20 + x)\,m = \left(20 + \frac{h}{\sqrt{3}}\right)m = 30\,m$$

$$\therefore \; h = 17.32\,m \quad \text{and} \quad BD = 30\,m$$

Hence, the height of the tower = 17.32m and the distance of the tower from the point A = 30m.

Question 8:
Let AB and CD be the building and the tower respectively.
AB = 15 m, AE $\perp$ CD
ED = AB = 15 m
Let EC = h m
And BD = AE = x m



In CAE,
∠CAE = 30°and ∠AEC = 90°

$$\frac{CE}{AE} = \tan 30°$$

$$\Rightarrow \frac{h}{x} = \frac{1}{\sqrt{3}}$$

$$\therefore \sqrt{3}h = x \ldots.(1)$$

In CBD, ∠CBD = 60° and ∠CDB = 90°

$$\therefore \frac{CD}{BD} = \tan 60° \Rightarrow \frac{h+15}{x} = \sqrt{3}$$

$$\text{or} \quad h + 15 = \sqrt{3}x \text{ - - - - - } (2)$$

Eliminating x from (1) and (2), we get

$$h + 15 = \sqrt{3}\left(\sqrt{3}\right)h = 3h$$

$$\Rightarrow 2h = 15 \quad \text{or} \quad h = 7.5$$

$$\text{From}(1),\ x = \sqrt{3}h = \sqrt{3} \times 7.5 = 12.99\,\text{m}$$

Height of tower = CE + ED = (h + 15) m
= (7.5 + 15) m = 22.5m
Hence, Height of the tower = 22.5 m and the distance between the tower and the building = 12.99 m

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