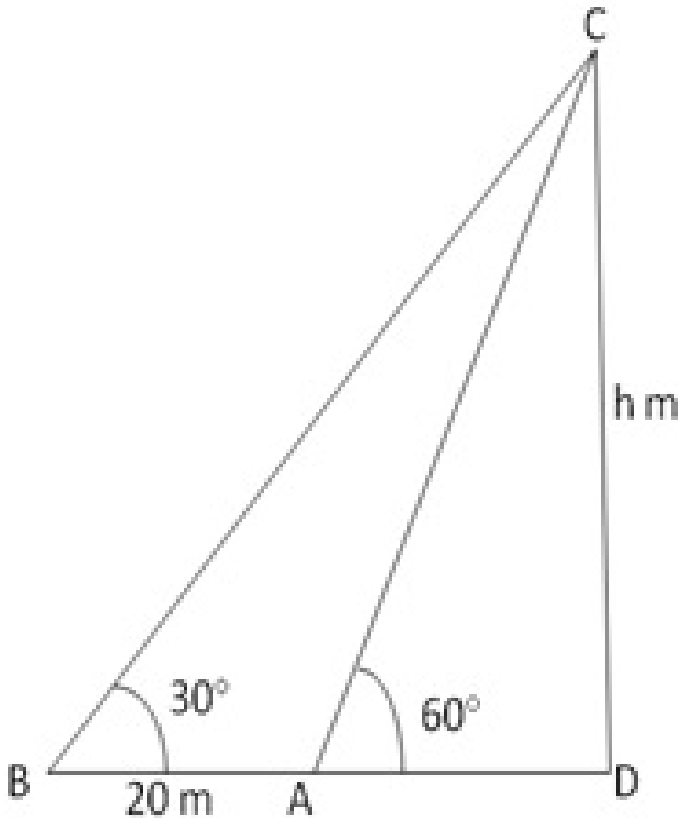
Question 21:
Let CD be a tree. Angle of elevation from A and B are 60° and 30° respectively.
Let AD = x m and CD = h m



In right ΔACD,

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

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

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

In right ΔBCD,

$$\frac{CD}{BD} = \tan 30^\circ$$

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

$$\therefore \sqrt{3}h = 20 + x - - - (2)$$

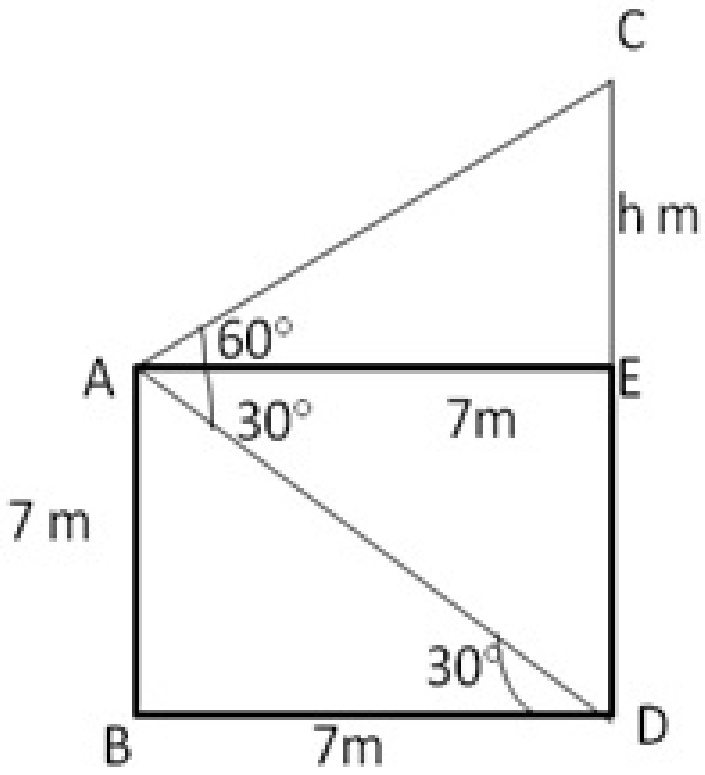
Eliminating x from (1) & (2),

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

$$\text{or } h = 10\sqrt{3} = 17.32$$

Height of the tree = 17.32 m

Question 22:
Let AB be the building 7 meters high. AE ⊥ CD, where CD is the cable tower.



In ΔAED,
∠EAD = 30° = Angle of depression

$$\therefore \frac{AE}{ED} = \cot 30°$$

$$\Rightarrow \frac{x}{7} = \sqrt{3}$$

$$\therefore \quad x = 7\sqrt{3}\ m$$

In ΔACE,

$$\angle CAE = 60° = \text{Angle of elevation of C}$$

$$\angle AEC = 90°$$

$$\therefore \frac{CE}{AE} = \tan 60°$$

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

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

$$h = \sqrt{3} \times 7\sqrt{3} = 21\ m$$

Height of the tower = CD = CE + ED = (21 + 7) m = 28 m

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