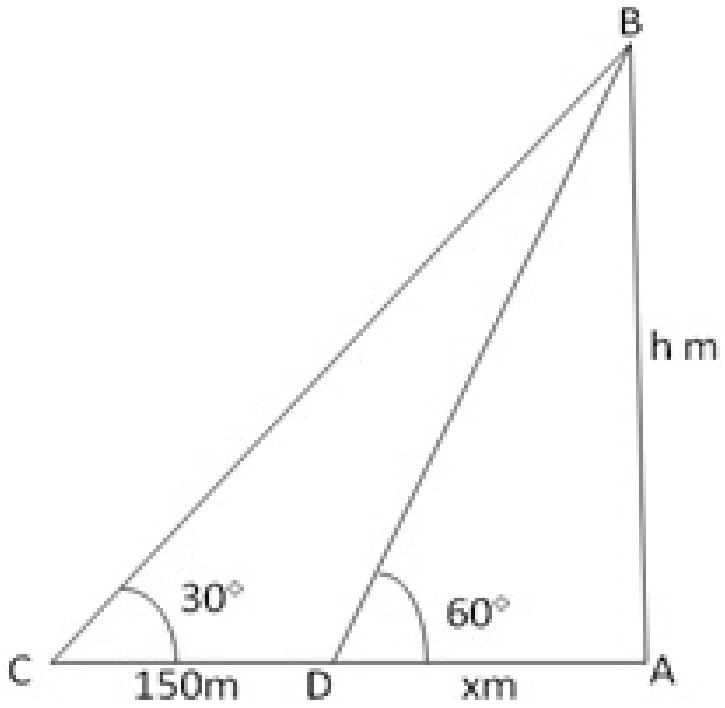
Question 13:
Let AB be the tower and let the angle of elevation of its top at C be 30°. Let D be a point at a distance 150 m from C such that the angle of elevation of the top of tower at D is 60°.
Let h m be the height of the tower and AD = x m



In Δ CAB, we have

$$\tan 30^\circ = \frac{AB}{AC}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{x+150} \quad -----(1)$$

In ΔDAB, we have

$$\tan 60^\circ = \frac{AB}{AD} \Rightarrow \sqrt{3} = \frac{h}{x} \Rightarrow x = \frac{h}{\sqrt{3}} \quad ---(2)$$

Putting the $x = \frac{h}{\sqrt{3}}$ in (1), we get

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{\frac{h}{\sqrt{3}} + 150} \Rightarrow \frac{1}{\sqrt{3}} = \frac{\sqrt{3}h}{h + 150\sqrt{3}}$$

$$\Rightarrow h + 150\sqrt{3} = 3h \Rightarrow 3h - h = 150\sqrt{3}$$

$$2h = 150\sqrt{3}$$

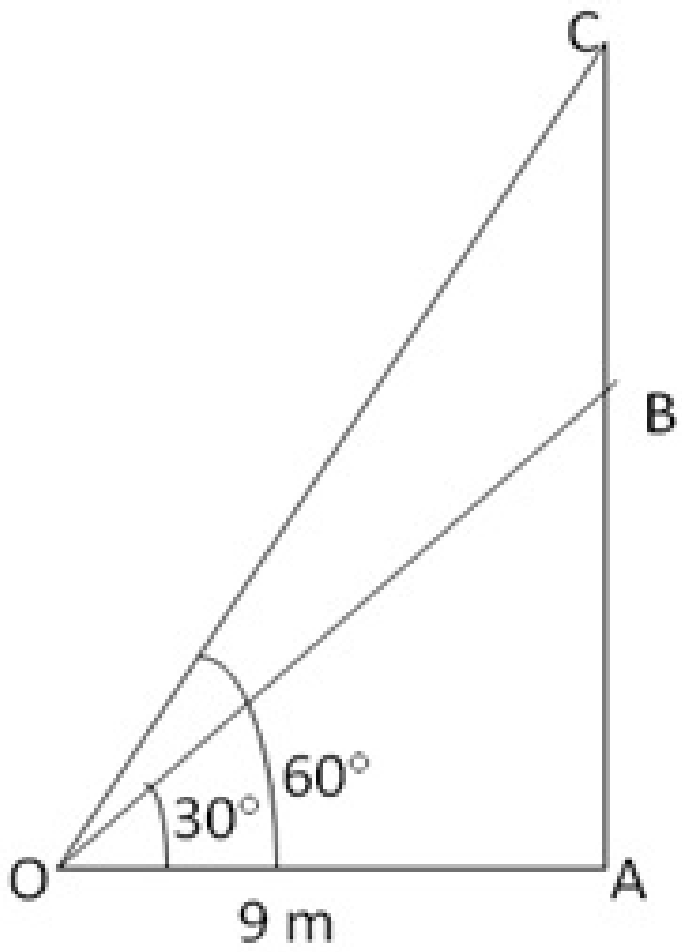
$$h = \frac{150}{2}\sqrt{3} = 75\sqrt{3}$$

$$h = (75 \times 1.732)\text{m}$$

$$h = 129.9$$

Hence the height of tower is 129.9 m

Question 14:
Let AB be the tower and BC be flagpole, Let O be the point of observation.
Then, OA = 9 m, ∠AOB = 30° and ∠AOC = 60°



From right angled Δ BOA

$$\frac{AB}{OA} = \tan 30^\circ$$

$$\Rightarrow \frac{AB}{9} = \frac{1}{\sqrt{3}} \Rightarrow AB = 3\sqrt{3}$$

From right angled Δ OAC

$$\frac{AC}{OA} = \tan 60^\circ$$

$$\frac{AC}{9} = \sqrt{3} \Rightarrow AC = 9\sqrt{3} \text{ m}$$

$$\therefore \quad BC = (AC - AB) = 6\sqrt{3} \text{ m}$$

Thus

$AB = 3\sqrt{3}\,m = 5.196\,m$ and $BC = 6\sqrt{3}\,m = 10.392m$

Hence, height of the tower= 5.196 m and the height of the flagpole = 10.392 m

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