



Some Applications of Trigonometry Ex 12.1 Q22

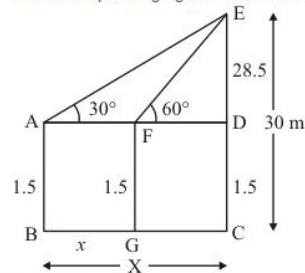
Answer :

Let BG be the distance of tall Boy x and he walks towards the building, makes an angle of elevation at top of building increase from 30° to 60° .

Therefore $\angle A = 30^\circ$ and $\angle F = 60^\circ$ given $CE = 30$ m, $AB = 1.5$ m, $FG = 1.5$ and $DE = 28.5$, $GC = X - x$ and $FD = X - x$

We have to find x

The corresponding figure is as follows



In $\triangle AED$,

$$\Rightarrow \tan A = \frac{ED}{AD}$$

$$\Rightarrow \tan 30^\circ = \frac{28.5}{X}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{28.5}{X}$$

$$\Rightarrow X = 49.36$$

Again in $\triangle EFD$,

$$\Rightarrow \tan F = \frac{DE}{FD}$$

$$\Rightarrow \tan 60^\circ = \frac{28.5}{X - x}$$

$$\Rightarrow \sqrt{3} = \frac{28.5}{49.36 - x}$$

$$\Rightarrow 28.5 = 49.36\sqrt{3} - \sqrt{3}x$$

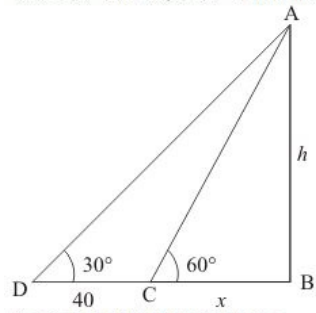
$$\Rightarrow x = \frac{57}{\sqrt{3}}$$

$$\Rightarrow x = 19\sqrt{3}$$

Hence the required distance is $\boxed{19\sqrt{3}}$ m.

Answer :

Let AB be the tower of height h .given the shadow of tower $DC = 40$ m. attitude of sun are $\angle D = 30^\circ$ and $\angle C = 60^\circ$. Here we have to find height of tower. Let $BC = x$ and $DC = 40$.



So we have trigonometric ratios

In $\triangle ACB$

$$\Rightarrow \tan C = \frac{AB}{BC}$$

$$\Rightarrow \tan 60^\circ = \frac{h}{x}$$

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

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

Again in $\triangle ADB$

$$\Rightarrow \tan D = \frac{AB}{DB}$$

$$\Rightarrow \tan 30^\circ = \frac{h}{40 + x}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{40 + x}$$

$$\Rightarrow 40 + x = \sqrt{3}h$$

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

$$\Rightarrow 40 + \frac{h}{\sqrt{3}} = \sqrt{3}h$$

$$\Rightarrow 40 = \sqrt{3}h - \frac{h}{\sqrt{3}}$$

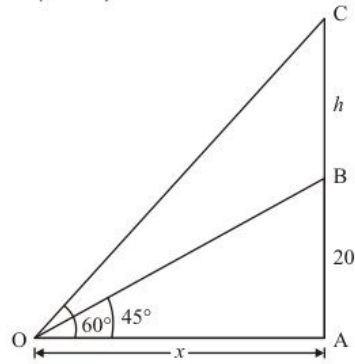
$$\Rightarrow 40 = \frac{2h}{\sqrt{3}}$$

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

Hence height of tower is $\boxed{20\sqrt{3}}$ m.

Answer :

Let AB be the building of height 20 m and BC the transmission tower of height h meter.
Again let the angle of elevation of the bottom and top of tower at the point O is 45° and 60° respectively.



In $\triangle OAB$

$$\Rightarrow \tan 45^\circ = \frac{AB}{OA}$$

$$\Rightarrow 1 = \frac{20}{x}$$

$$\Rightarrow x = 20$$

Again in $\triangle OAC$

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

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

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

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

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

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

Hence the height of tower is $\boxed{20(\sqrt{3} - 1)} \text{ m.}$

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