



Some Applications of Trigonometry Ex 12.1 Q16

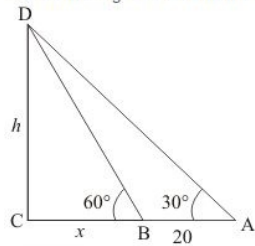
Answer :

Let h be height of tower and the angle of elevation of the top of tower from a point A on the ground is 30° and on moving with distance 20 m towards the foot of tower on the point B is 60° .

Let $AB = 20$ and $BC = x$

Now we have to find height of tower and distance of tower from point A .

So we use trigonometrical ratios.



In $\triangle DBC$,

$$\Rightarrow \tan D = \frac{CD}{BC}$$

$$\Rightarrow \tan 60^\circ = \frac{CD}{BC}$$

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

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

Again in $\triangle DAC$,

$$\Rightarrow \tan A = \frac{CD}{BC + BA}$$

$$\Rightarrow \tan 30^\circ = \frac{h}{x + 20}$$

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

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

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

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

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

$$\Rightarrow -2h = -20\sqrt{3}$$

$$\Rightarrow h = 10\sqrt{3}$$

$$\Rightarrow h = 17.32$$

$$\Rightarrow x = \frac{10\sqrt{3}}{\sqrt{3}}$$

$$\Rightarrow x = 10$$

So distance

$$\Rightarrow AC = x + 20$$

$$\Rightarrow AC = 30$$

Hence the required height is $\boxed{17.32}$ m and distance is $\boxed{30}$ m.

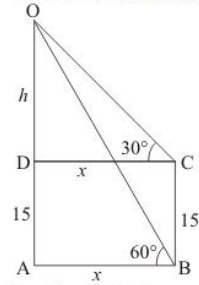
Answer :

In the figure let $OD = h$ and AD be the tower. The angle of elevation from the top of building to the top of tower is to be found 30° . Height of building is 15 m and an angle of elevation from the bottom of same building is found to be 60° .

Let $DC = x$ and $\angle C = 30^\circ$, $\angle B = 60^\circ$, $AD = 15$

Here we have to find height of tower and distance between the tower and building.

The corresponding diagram is as follows



In a triangle ODC ,

$$\Rightarrow \tan C = \frac{OD}{DC}$$

$$\Rightarrow \tan 30^\circ = \frac{OD}{DC}$$

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

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

Again in a triangle OAB ,

$$\Rightarrow \tan B = \frac{AD + DO}{AB}$$

$$\Rightarrow \tan 60^\circ = \frac{h + 15}{x}$$

$$\Rightarrow \sqrt{3} = \frac{h + 15}{x}$$

$$\Rightarrow \sqrt{3} = \frac{h + 15}{\sqrt{3}h}$$

$$\Rightarrow 3h = h + 15$$

$$\Rightarrow 2h = 15$$

$$\Rightarrow h = 7.5$$

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

$$\Rightarrow x = 7.5 \times 1.732$$

$$\Rightarrow x = 12.9$$

So height of the tower is as follows:

$$\Rightarrow OA = h + 15$$

$$\Rightarrow OA = 7.5 + 15$$

$$\Rightarrow OA = 22.5$$

Hence the required height is 22.5 meter and distance is 12.9 meter.

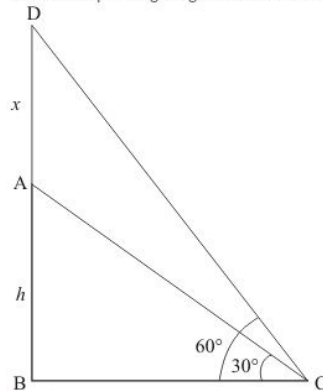
Some Applications of Trigonometry Ex 12.1 Q18

Answer :

Let AB be the tower of height h and AD be the flag pole on tower. At the point 9m away from the foot of tower, the angle of elevation of the top and bottom of flag pole are 60° and 30° . Let $AD = x$, $BC = 9$ and $\angle ACB = 30^\circ$, $\angle DCB = 60^\circ$.

Here we have to find height of tower and height of flag pole.

The corresponding diagram is as follows



In a triangle ABC ,

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

$$\Rightarrow \tan 30^\circ = \frac{h}{9}$$

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

$$\Rightarrow h = \frac{9}{\sqrt{3}}$$

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

Again in a triangle DBC ,

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

$$\Rightarrow \tan 60^\circ = \frac{h + x}{9}$$

$$\Rightarrow \sqrt{3} = \frac{h + x}{9}$$

$$\Rightarrow 9\sqrt{3} = h + x$$

$$\Rightarrow 9\sqrt{3} = 3\sqrt{3} + x$$

$$\Rightarrow x = 6\sqrt{3}$$

So height of tower is $3\sqrt{3}$ meter and height of flag pole is $6\sqrt{3}$ meters.

***** END *****