Some Applications of Trigonometry Ex 12.1 Q34

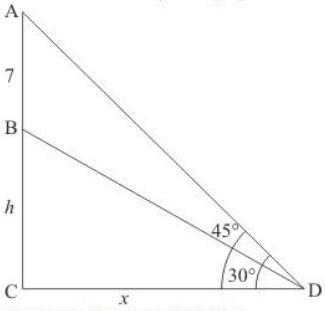
Answer :

Let *BC* be the tower of height *h* m. *AB* be the flag staff of height 7 m on tower and *D* be the point on the plane making an angle of elevation of the top of the flag staff is 45° and angle of elevation of the bottom of the flag staff is 30°.

Let *CD* = *x*, *AB* = 7 and $\angle BDC = 30°$ and $\angle ADC = 45°$.

We to find height of the tower

We have the corresponding figure as follows



So we use trigonometric ratios.

In a triangle BCD

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

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

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

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

Again in a triangle ADC

$$\Rightarrow \quad \tan D = \frac{AB + BC}{CD}$$

$$\Rightarrow \quad \tan 45^\circ = \frac{h+7}{x}$$

$$\Rightarrow \quad 1 = \frac{h+7}{x}$$

$$\Rightarrow \quad x = h+7$$

$$\Rightarrow \quad \sqrt{3}h = h+7$$

$$\Rightarrow \quad h\left(\sqrt{3}-1\right) = 7$$

$$\Rightarrow \quad h = \frac{7}{\sqrt{3}-1}$$

$$\Rightarrow \quad h = 9.56$$

Hence the height of tower is $\boxed{9.56}$ m.

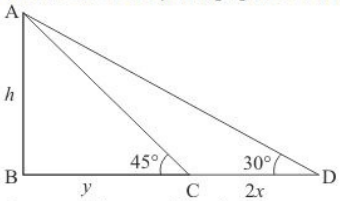
Some Applications of Trigonometry Ex 12.1 Q35

Answer :

Let AB be the tower of height h m. the length of shadow of tower to be found $2x$ meters at the plane longer when sun's altitude is 30° than when it was 45°. Let $BC = y$ m, $CD = 2x$ m and $\angle ADB = 30^\circ$, $\angle ACB = 45^\circ$

We have to find the height of the tower

We have the corresponding figure as follows



So we use trigonometric ratios.

In a triangle ABC,

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

$$\Rightarrow \quad \tan 45^\circ = \frac{h}{y}$$

$$\Rightarrow \quad 1 = \frac{h}{y}$$

$$\Rightarrow \quad y = h$$

Again in a triangle ADB

$$\Rightarrow \quad \tan D = \frac{AB}{BC + CD}$$

$$\Rightarrow \quad \tan 30° = \frac{h}{2x + y}$$

$$\Rightarrow \quad \frac{1}{\sqrt{3}} = \frac{h}{2x + y}$$

$$\Rightarrow \quad \sqrt{3}h = 2x + y$$

$$\Rightarrow \quad \sqrt{3}h = 2x + h$$

$$\Rightarrow \quad h\left(\sqrt{3} - 1\right) = 2x$$

$$\Rightarrow \quad h = \frac{2x}{\left(\sqrt{3} - 1\right)}$$

$$\Rightarrow \quad h = x\left(\sqrt{3} + 1\right)$$

Hence the height of tower is $\boxed{x\left(\sqrt{3} + 1\right)}$ m.

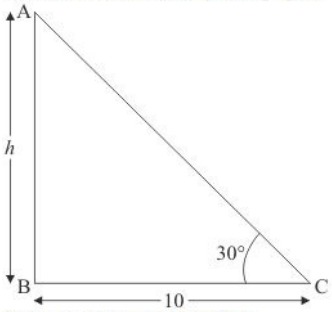
Some Applications of Trigonometry Ex 12.1 Q36

Answer :

Let *AB* be the tree of height *h*. And the top of tree makes an angle 30° with ground. The distance between foot of tree to the point where the top touches the ground is 10 m. Let *BC* = 10. And $\angle ACB = 30°$.

Here we have to find height of tree.

Here we have the corresponding figure



So we use trigonometric ratios.

In a triangle ABC,

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

$$\Rightarrow \quad \tan 30° = \frac{AB}{BC}$$

$$\Rightarrow \quad \tan 30^\circ = \frac{AB}{BC}$$

$$\Rightarrow \quad \frac{1}{\sqrt{3}} = \frac{h}{10}$$

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

Now in triangle *ABC* we have

$$\sin 30^\circ = \frac{h}{AC}$$

$$\Rightarrow \quad \frac{1}{2} = \frac{10}{\sqrt{3}AC}$$

$$\Rightarrow AC = \frac{20}{\sqrt{3}}$$

So the length of the tree is

$$= AB + AC$$

$$= h + AC$$

$$= \frac{10}{\sqrt{3}} + \frac{20}{\sqrt{3}}$$

$$= 10\sqrt{3}$$

$$= 1.73$$

Hence the height of tree is $\boxed{17.3}$ m.

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