



Some Applications of Trigonometry Ex 12.1 Q34

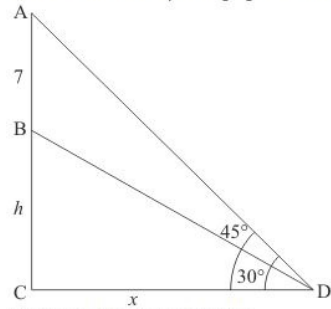
Answer :

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 $\angle BDC = 30^\circ$ and $\angle ADC = 45^\circ$.

We to find height of the tower

We have the corresponding figure as follows



So we use trigonometric ratios.

In a triangle BCD

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

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

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

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

Again in a triangle ADC

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

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

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

$$\Rightarrow x = h + 7$$

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

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

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

$$\Rightarrow h = 9.56$$

Hence the height of tower is 9.56 m.

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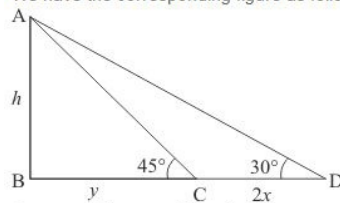
Answer :

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 ,

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

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

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

$$\Rightarrow y = h$$

Again in a triangle ADB

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

$$\Rightarrow \tan 30^\circ = \frac{h}{2x + y}$$

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

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

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

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

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

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

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

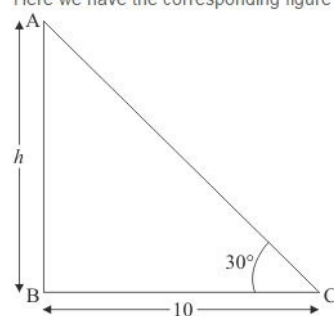
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Answer :

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 $\angle ACB = 30^\circ$.

Here we have to find height of tree.

Here we have the corresponding figure



So we use trigonometric ratios.

In a triangle ABC ,

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

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

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

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

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

Now in triangle ABC we have

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

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

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

So the length of the tree is

$$= AB + AC$$

$$= h + AC$$

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

$$= 10\sqrt{3}$$

$$= 17.3$$

Hence the height of tree is 17.3 m.

***** END *****