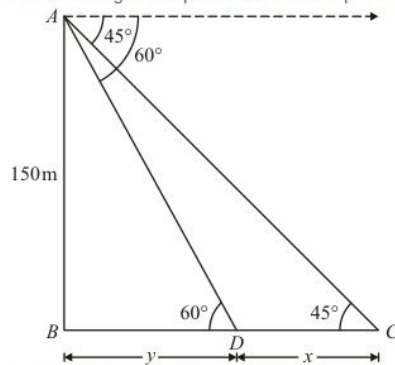




Some Applications of Trigonometry Ex 12.1 Q13

Answer :

Let AB be the tower of height 150m and Two objects are located when top of tower are observed, makes an angle of depression from the top and bottom of tower are 45° and 60° respectively.



Let $CD = x$, $BD = y$ and $\angle ADB = 60^\circ$, $\angle ACB = 45^\circ$

So we use trigonometric ratios.

In a triangle ABC,

$$\tan 45^\circ = \frac{150}{x+y}$$

$$\Rightarrow x+y = 150 \quad \dots\dots(1)$$

Again in a triangle ABD,

$$\tan 60^\circ = \frac{150}{y}$$

$$\Rightarrow \sqrt{3} = \frac{150}{y}$$

$$\Rightarrow \sqrt{3}y = 150 \quad \dots\dots(2)$$

So from (1) and (2) we get

$$x + \frac{150}{\sqrt{3}} = 150$$

$$\Rightarrow \sqrt{3}x = 150(\sqrt{3} - 1)$$

$$\Rightarrow x = 63.39$$

Hence the required distance is approximately 63.4 m.

Some Applications of Trigonometry Ex 12.1 Q14

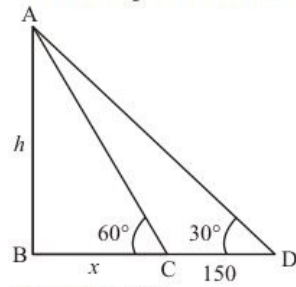
Answer :

Let h be height of tower and angle of elevation of foot of tower is 30° , on advancing 150 m towards the foot of tower then angle of elevation becomes 60° .

We assume that $BC = x$ and $CD = 150$ m.

Now we have to prove height of tower is 129.9 m.

So we use trigonometrical ratios.



In a triangle ABC ,

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

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

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

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

Again in a triangle ABD ,

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

$$\Rightarrow \tan 30^\circ = \frac{h}{x + 150}$$

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

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

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

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

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

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

$$\Rightarrow h = \frac{150 \times 1.732}{2}$$

$$\Rightarrow h = 129.9$$

Hence the height of tower is **129.9** m proved.

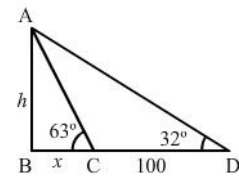
Answer :

Let h be height of tower and the angle of elevation as observed from the foot of tower is 32° and observed move towards the tower with distance 100 m then angle of elevation becomes 63° .

Let $BC = x$ and $CD = 100$

Now we have to find height of tower

So we use trigonometrical ratios.



In a triangle ABC ,

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

$$\Rightarrow \tan 63^\circ = \frac{AB}{BC}$$

$$\Rightarrow 1.9626 = \frac{h}{x}$$

$$\Rightarrow x = \frac{h}{1.9626}$$

Again in a triangle ABD ,

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

$$\Rightarrow \tan 32^\circ = \frac{h}{x + 100}$$

$$\Rightarrow 0.6248 = \frac{h}{x + 100}$$

$$\Rightarrow x + 100 = \frac{h}{0.6248}$$

$$\Rightarrow 100 = \frac{h}{0.6248} - \frac{h}{1.9626}$$

$$\Rightarrow 100 = \frac{h \times 1.9626 - h \times 0.6248}{0.6248 \times 1.9626}$$

$$\Rightarrow 100 = \frac{h(1.9626 - 0.6248)}{0.6248 \times 1.9626}$$

$$\Rightarrow 100 = \frac{h(1.3378)}{0.6248 \times 1.9626}$$

$$\begin{aligned}
 \Rightarrow 100 \times 0.6248 \times 1.9626 &= h \times 1.3378 \\
 \Rightarrow h &= \frac{100 \times 0.6248 \times 1.9626}{1.3378} \\
 \Rightarrow &= \frac{122.6232}{1.3378} \\
 \Rightarrow &= 91.66 \\
 \Rightarrow x &= \frac{91.66}{1.9626} \\
 \Rightarrow &= 46.7
 \end{aligned}$$

So distance of the first position from the tower is = $100 + 46.7 = 146.7$ m

Hence the height of tower is 91.66 m and the desired distance is 146.7 m.

***** END *****