Some Applications of Trigonometry Ex 12.1 Q61

Answer :

Let AB be the building of height 60 and CD be the lamp post of height h, an angle of depression of the top and bottom of vertical lamp post are 30° and 60° respectively. Let $AE = h$, $AC = x$ and $AC = ED$. It is also given $AB = 60$ m. Then $BE = 60 - h$ And $\angle ACB = 60°$, $\angle BDE = 30°$

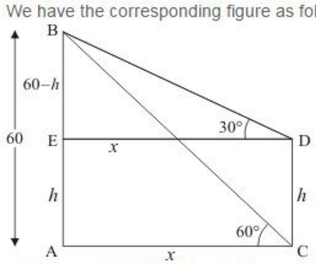
We have to find the following

(i) The horizontal distance between *AB* and *CD*

(ii) The height of lamp post

(iii) The difference between the heights of building and the lamp post

We have the corresponding figure as follows



(*i*) So we use trigonometric ratios.

In ΔABC

$$\Rightarrow \quad \tan 60° = \frac{AB}{AC}$$

$$\Rightarrow \quad \sqrt{3} = \frac{60}{x}$$

$$\Rightarrow \quad x = \frac{60}{\sqrt{3}}$$

$$\Rightarrow \quad x = 34.64$$

Hence the distance between AB and CD is $\boxed{34.64}$

(*ii*) Again in ΔBDE

$$\Rightarrow \quad \tan 30° = \frac{BE}{DE}$$

$$\Rightarrow \quad \frac{1}{\sqrt{3}} = \frac{60 - h}{x}$$

$$\Rightarrow \quad \frac{60}{\sqrt{3}} = (60 - h)\sqrt{3}$$

$$\Rightarrow \quad 60 = 180 - 3h$$

$$\Rightarrow \quad 60 = 180 - 3h$$

$$\Rightarrow \quad 3h = 180 - 60$$

$$\Rightarrow \quad 3h = 120$$

$$\Rightarrow \quad h = 40$$

Hence the height of lamp post is $\boxed{40}$ m.

(*iii*) Since BE = 60 − *h*

$$\Rightarrow \quad BE = 60 - 40$$

$$\Rightarrow \quad BE = 20$$

Hence the difference between height of building and lamp post is $\boxed{20}$ m.

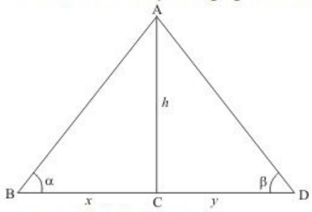
Some Applications of Trigonometry Ex 12.1 Q62

Answer :

Let h be the height of light house AC. And an angle of depression of the top of light house from two ships are α and β respectively. Let $BC = x$, $CD = y$. And $\angle ABC = \alpha$, $\angle ADC = \beta$.

We have to find distance between the ships

We have the corresponding figure as follows



We use trigonometric ratios.

In ΔABC

$$\Rightarrow \quad \tan\alpha = \frac{AC}{BC}$$

$$\Rightarrow \quad \tan\alpha = \frac{h}{x}$$

$$\Rightarrow \quad x = \frac{h}{\tan\alpha}$$

Again in ΔADC

$$\Rightarrow \quad \tan\beta = \frac{AC}{CD}$$

$$\Rightarrow \quad \tan\beta = \frac{h}{y}$$

$$\Rightarrow \quad y = \frac{h}{\tan\beta}$$

Now,

$$\Rightarrow \quad BD = x + y$$

$$\Rightarrow \quad BD = \frac{h}{\tan\alpha} + \frac{h}{\tan\beta}$$

$$\Rightarrow \quad BD = \frac{h(\tan\alpha + \tan\beta)}{\tan\alpha\tan\beta}$$

Hence the distance between ships is $\boxed{\frac{h(\tan\alpha + \tan\beta)}{\tan\alpha\tan\beta}}$.

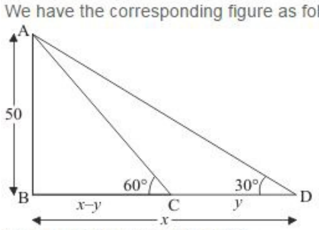
Some Applications of Trigonometry Ex 12.1 Q63

Answer :

Let AB be the height of tower 50 m and angle of depression from the top of tower are $60°$ and $30°$ respectively at two observing Car C and D.

Let $BD = x$ m, $CD = y$ m and $\angle ADB = 30°$, $\angle ACB = 60°$

We have the corresponding figure as follows



So we use trigonometric ratios.

In a triangle ABD,

$$\Rightarrow \quad \tan D = \frac{AB}{BD}$$

$$\Rightarrow \quad \tan 30° = \frac{50}{x}$$

$$\Rightarrow \quad \frac{1}{\sqrt{3}} = \frac{50}{x}$$

$$\Rightarrow \quad x = 50\sqrt{3}$$

Since $x = 86.6$

Again in a triangle ABC

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

$$\Rightarrow \quad \tan 60^\circ = \frac{50}{x-y}$$

$$\Rightarrow \quad \sqrt{3} = \frac{50}{x-y}$$

$$\Rightarrow \sqrt{3} \times 50\sqrt{3} - \sqrt{3}y = 50$$

$$\Rightarrow \quad y = 57.67$$

Therefore $x - y = 86.6 - 57.67$

$$\Rightarrow \quad x - y = 28.93$$

Hence the distance of first car from tower is $\boxed{86.6}$ m

And the distance of second car from tower is $\boxed{57.67}$ m

And the distance between cars is $\boxed{28.93}$ m.

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