Some Applications of Trigonometry Ex 12.1 Q40

Answer :

Let *AB* be the building of height *h*. *P* Observes that the fire is at an angle of 60° to the road and *Q* observes that the fire is at an angle of 45° to the road.

Let *QA* = *x*, *AP* = *y*. And $\angle BPA = 60°$, $\angle BQA = 45°$, given *PQ* = 20.

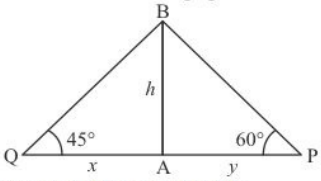
Here, clearly $\angle APB > \angle AQB$.

$\Rightarrow \quad \angle ABP < \angle ABQ$

$\Rightarrow \quad AP < AQ$

So station *P* is near to the building. Hence station *P* must send its team.

We sketch the following figure



So we use trigonometric ratios.

In ΔPAB

$$\tan P = \frac{AB}{AP}$$
$$\Rightarrow \tan 60^\circ = \frac{h}{y}$$
$$\Rightarrow \sqrt{3} = \frac{h}{y}$$
$$\Rightarrow h = \sqrt{3}y$$

Again in ΔQAB,

$$\Rightarrow \quad \tan Q = \frac{AB}{QA}$$
$$\Rightarrow \quad \tan 45° = \frac{h}{x}$$
$$\Rightarrow \quad 1 = \frac{h}{x}$$
$$\Rightarrow \quad x = h$$

Now,

$$x + y = 20$$
$$\Rightarrow h + y = 20 \qquad [\because x = h]$$
$$\Rightarrow \sqrt{3}y + y = 20 \qquad [\because h = \sqrt{3}y]$$
$$\Rightarrow y = \frac{20}{(\sqrt{3}+1)} = 10\left(\sqrt{3}-1\right)$$

Hence, the team from station P will have to travel $10\left(\sqrt{3}-1\right)$ km.

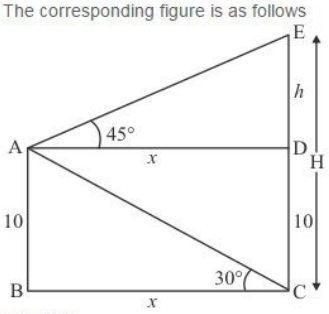
Some Applications of Trigonometry Ex 12.1 Q41

Answer :

Let *H* be the height of the cliff *CE*. And a man is standing on the ships at the height of 10 meter above from the water level. Let *AB* = 10, *BC* = *x*, *AD* = *BC*, *AB* = *DC*, *DE* = *h*. $\angle ACB = 30°$ and $\angle DAE = 45°$

We have to find *H* and *x*

The corresponding figure is as follows



In ΔABC,

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

$$\Rightarrow \quad \tan 30° = \frac{10}{x}$$

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

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

Again in ΔDAE,

$$\Rightarrow \quad \tan A = \frac{DE}{AD}$$

$$\Rightarrow \quad \tan 45° = \frac{h}{x}$$

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

$$\Rightarrow \quad x = h$$

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

Therefore $H = h + 10$

$$\Rightarrow \quad H = 10\sqrt{3} + 10$$

$$\Rightarrow \quad H = 10\left(\sqrt{3} + 1\right)$$

$$\Rightarrow \quad H = 27.32$$

Hence the required distance is $\boxed{10\sqrt{3}}$ m. and height is $\boxed{27.32}$ m.

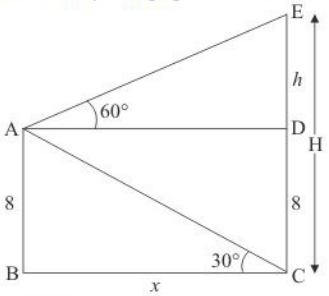
Some Applications of Trigonometry Ex 12.1 Q42

Answer :

Let *H* be height of hill *CE* and a man is standing on a ships at the height of 8meter above from the water level. Let *AB* = 8, *BC* = *x*, *AD* = *BC*, *AB* = *DC*, *DE* = *h*. $\angle ACB = 30°$, and $\angle DAE = 60°$

We have to find *x* and *H*

The corresponding figure is as follows



In ΔABC,

$$\Rightarrow \quad \tan 30 = \frac{8}{x}$$

$$\Rightarrow \quad \frac{1}{\sqrt{3}} = \frac{8}{x}$$

$$\Rightarrow \quad x = 8\sqrt{3}$$

Again in ΔDAE,

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

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

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

$$\Rightarrow \quad h = 24$$

Therefore $H = h + 8$

$$\Rightarrow \quad H = 24 + 8$$

$$\Rightarrow \quad H = 32$$

Hence the required distance is $\boxed{8\sqrt{3}}$ m and height is $\boxed{32}$ m.

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