



### 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  $60^\circ$  to the road and  $Q$  observes that the fire is at an angle of  $45^\circ$  to the road.

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

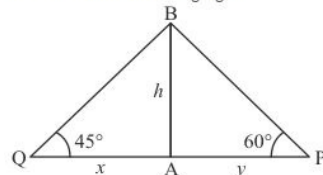
Here, clearly  $\angle APB > \angle AQB$ .

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

$$\Rightarrow AP < AQ$$

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  $\triangle PAB$

$$\tan P = \frac{AB}{AP}$$

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

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

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

Again in  $\triangle QAB$ ,

$$\Rightarrow \tan Q = \frac{AB}{QA}$$

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

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

$$\Rightarrow x = h$$

Now,

$$x + y = 20$$

$$\Rightarrow h + y = 20 \quad [\because x = h]$$

$$\Rightarrow \sqrt{3}y + y = 20 \quad [\because h = \sqrt{3}y]$$

$$\Rightarrow y = \frac{20}{(\sqrt{3}+1)} = 10(\sqrt{3}-1)$$

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

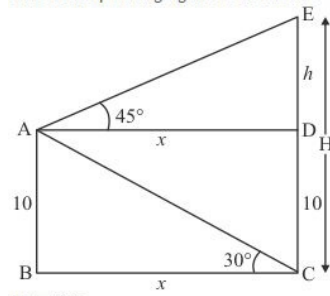
### Some Applications of Trigonometry Ex 12.1 Q41

**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  $AB = 10$ ,  $BC = x$ ,  $AD = BC$ ,  $AB = DC$ ,  $DE = h$ .  $\angle ACB = 30^\circ$  and  $\angle DAE = 45^\circ$

We have to find  $H$  and  $x$

The corresponding figure is as follows



In  $\triangle ABC$ ,

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

$$\Rightarrow \tan 30^\circ = \frac{10}{x}$$

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

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

Again in  $\triangle DAE$ ,

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

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

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

$$\Rightarrow x = h$$

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

Therefore  $H = h + 10$

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

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

$$\Rightarrow H = 27.32$$

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

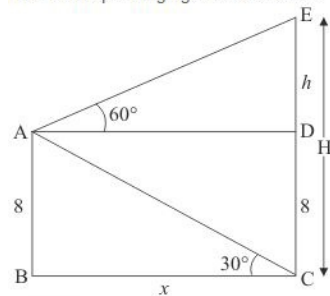
### Some Applications of Trigonometry Ex 12.1 Q42

**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  $AB = 8$ ,  $BC = x$ ,  $AD = BC$ ,  $AB = DC$ ,  $DE = h$ .  $\angle ACB = 30^\circ$ , and  $\angle DAE = 60^\circ$

We have to find  $x$  and  $H$

The corresponding figure is as follows



In  $\triangle ABC$ ,

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

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

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

Again in  $\triangle DAE$ ,

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

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

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

$$\Rightarrow h = 24$$

$$\text{Therefore } H = h + 8$$

$$\Rightarrow H = 24 + 8$$

$$\Rightarrow H = 32$$

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

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