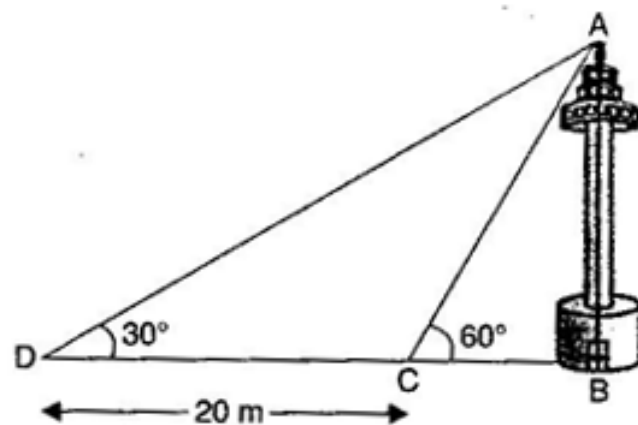




Exercise 9.1

Q11. A TV tower stands vertically on a bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of the tower is 60° . From another point 20 m away from this point on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30° (see figure). Find the height of the tower and the width of the canal.



Ans: In right triangle ABC,

$$\tan 60^\circ = \frac{AB}{BC} \Rightarrow \sqrt{3} = \frac{AB}{BC}$$

$$\Rightarrow AB = BC\sqrt{3} \text{ m.....(i)}$$

In right triangle ABD,

$$\tan 30^\circ = \frac{AB}{BD}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{AB}{BC + CD}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{AB}{BC + 20}$$

$$\Rightarrow AB = \frac{BC + 20}{\sqrt{3}} \text{ m.....(ii)}$$

From eq. (i) and (ii),

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

$$\Rightarrow 3BC = BC + 20$$

$$\Rightarrow BC = 10 \text{ m}$$

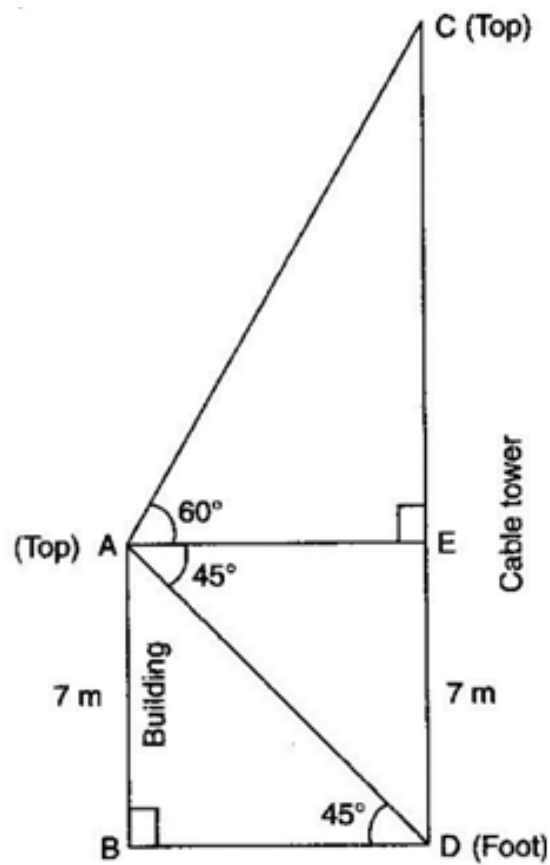
From eq. (i), $AB = 10\sqrt{3} \text{ m}$

Hence height of the tower is $10\sqrt{3} \text{ m}$ and the width of the canal is 10 m.

12. From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 45° . Determine the height of the tower.

Ans: In right triangle ABD,

$$\tan 45^\circ = \frac{AB}{BD}$$



$$\Rightarrow 1 = \frac{7}{BD}$$

$$\Rightarrow BD = 7 \text{ m}$$

$$\Rightarrow AE = 7 \text{ m}$$

In right triangle AEC,

$$\tan 60^\circ = \frac{CE}{AE}$$

$$\Rightarrow \sqrt{3} = \frac{CE}{7}$$

$$\Rightarrow CE = 7\sqrt{3} \text{ m}$$

$$\therefore CD = CE + ED$$

$$= CE + AB$$

$$= 7\sqrt{3} + 7 = 7(\sqrt{3} + 1) \text{ m}$$

Hence height of the tower is $7(\sqrt{3} + 1) \text{ m}$.

Q13. As observed from the top of a 75 m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 45° . If one ship is exactly behind the other on the same side of the lighthouse, find the distance between two ships.

Ans: In right triangle ABQ,

***** END *****