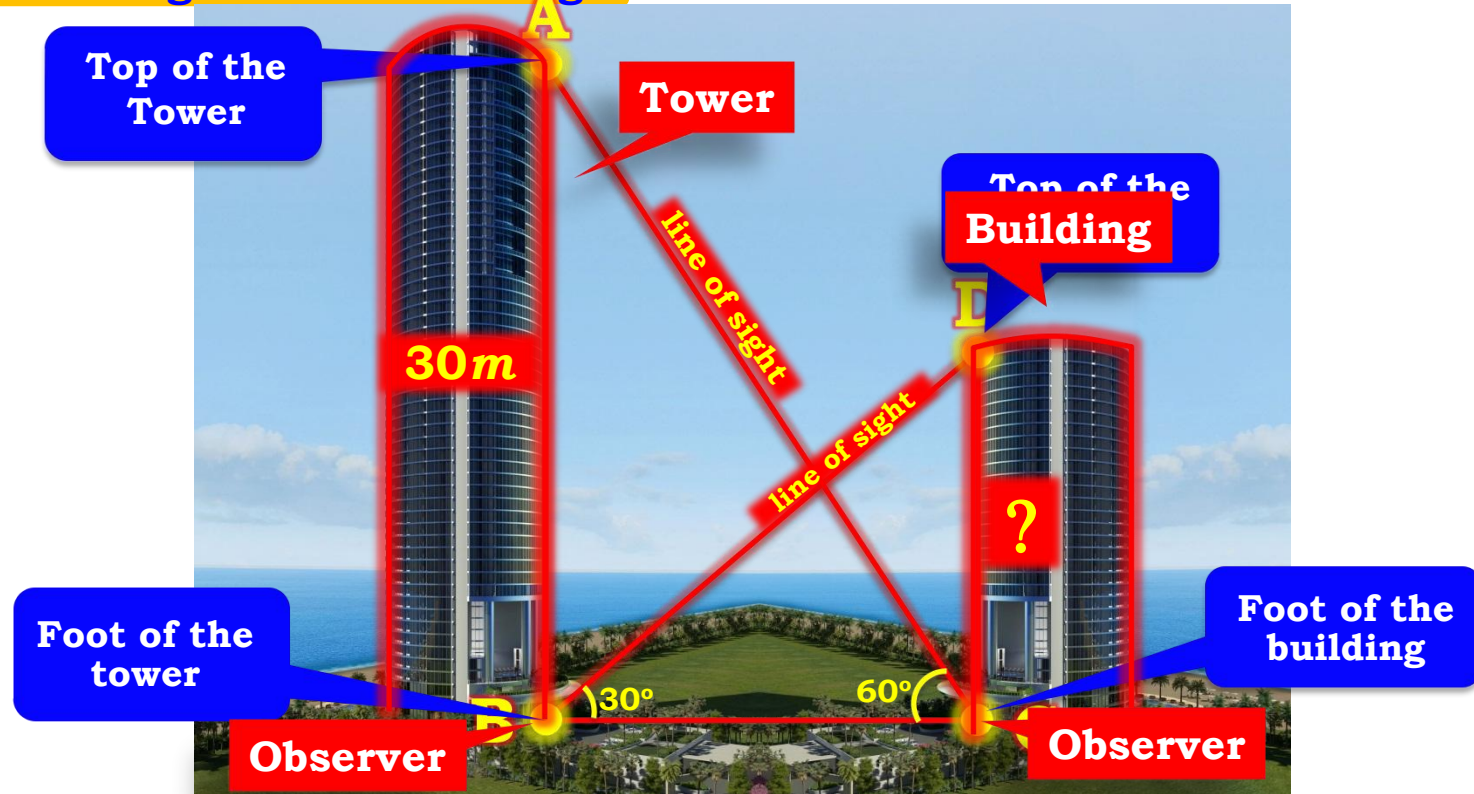


TOPIC

Solved Example

Q. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of tower from the foot of the building is 60° . If the tower is 30m high, find the height of the building ?



Q. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60° . Find the height of the tower.

Now, let us rationalise the denominator

Sol. AB represents the height of the tower.

$$AB = 30m$$

CD represents the height of the building.

$$\angle DPC = 30^\circ$$

$$\tan 60^\circ = \sqrt{3}$$

In the right-angled $\triangle ABC$,

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

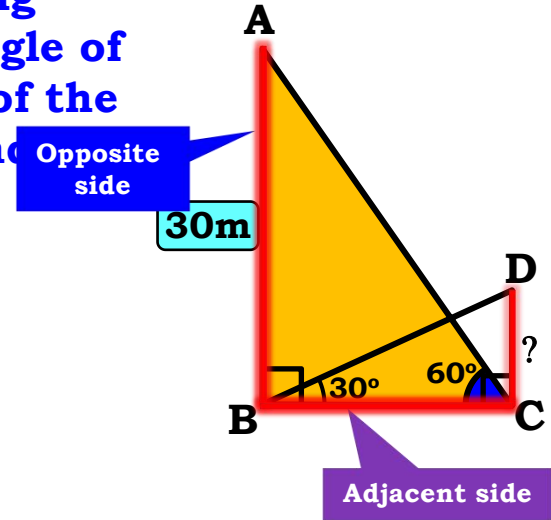
$$\therefore \sqrt{3} = \frac{30}{BC}$$

$$\therefore BC = \frac{30}{\sqrt{3}}$$

$$\therefore BC = \frac{30}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$\therefore BC = \frac{10 \cancel{30} \sqrt{3}}{\cancel{3}}$$

$$\therefore BC = 10\sqrt{3} m$$



Q. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60° . Find the height of the building.

$$\tan 30^\circ =$$

Ratio of opposite side and Adjacent side reminds us of **'tan'**

Sol. B

In right angled $\triangle DBC$,

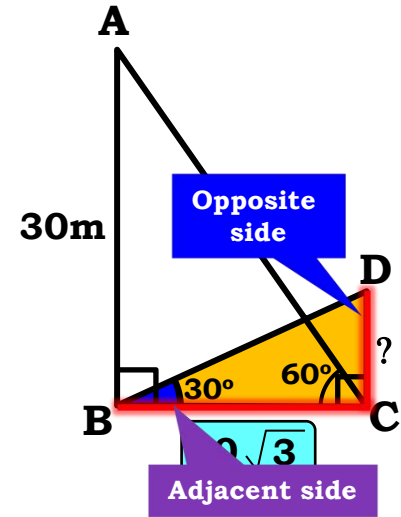
$$\tan 30^\circ = \frac{DC}{BC}$$

$$\therefore \frac{1}{\sqrt{3}} = \frac{DC}{10\sqrt{3}}$$

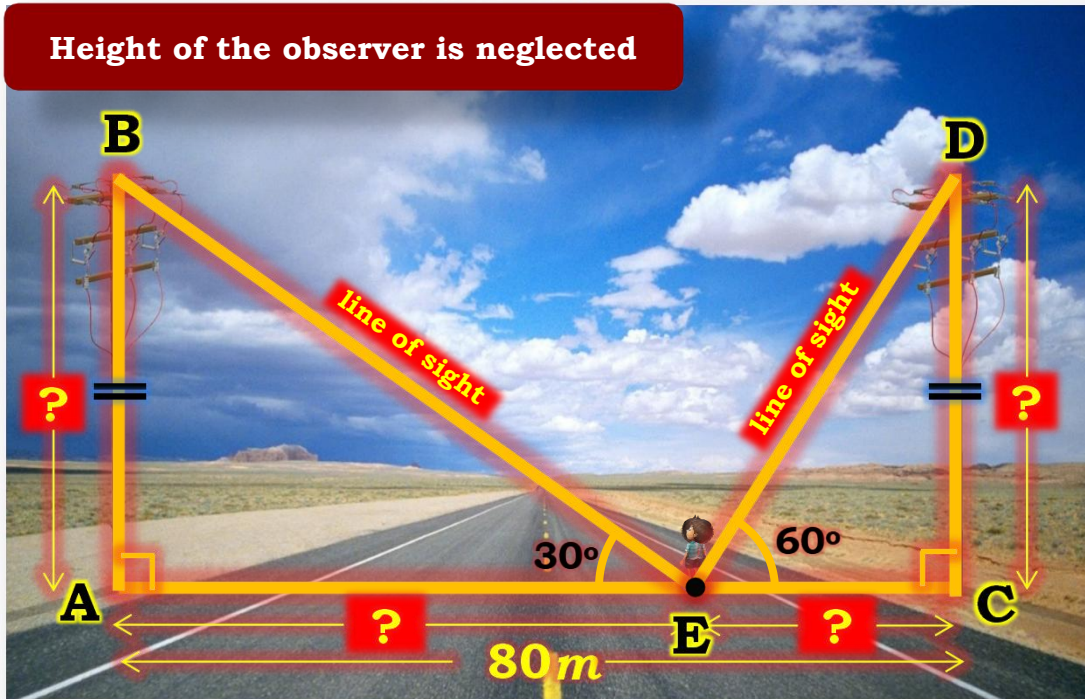
$$\therefore DC = \frac{10\sqrt{3}}{\sqrt{3}}$$

$$\therefore DC = 10 \text{ m}$$

Height of the building is 10m

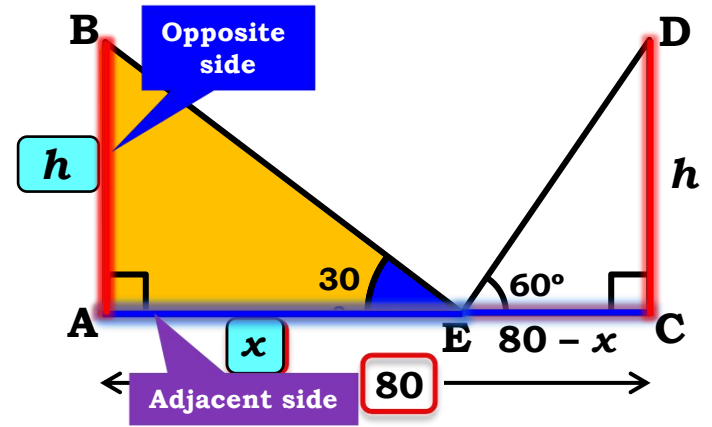


Q. Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles and the distances of the point from the poles.



Q. Two poles of equal heights are standing opposite each other on either side of the road. A point is marked on the road between the poles such that the angles of elevation of the top of the poles from this point are 30° and 60° respectively. Find the height of the poles from the poles.

Ratio For $\angle AEB$ $\frac{\text{Opposite side}}{\text{Adjacent side}} = \tan 30^\circ$
Opposite side $\rightarrow AB$
Adjacent side $\rightarrow AE$



Sol. Let the height of poles be ' h ' m
 Width of the road (AC) = 80 m
 Let the distance of the point E from pole AB i.e. AE be ' x ' m
 \therefore The distance of point E from pole DC is $(80 - x)$ m
 In right $\triangle AEB$

$$\tan 30^\circ = \frac{1}{\sqrt{3}}$$

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

$$\begin{aligned} AE + EC &= AC \\ \therefore x + EC &= 80 \\ \therefore EC &= (80 - x) \text{ m} \end{aligned}$$

$$\begin{aligned} \therefore \frac{1}{\sqrt{3}} &= \frac{h}{x} \\ \therefore x &= \sqrt{3} h \quad \dots(i) \end{aligned}$$

Q. Two poles of equal heights are standing opposite each other on either side of a road between them. The height of the poles is h m. The distance between the poles is 80 m. The angle of elevation of the top of the pole on the right from the point on the ground between the poles is 60° . Find the height of the poles.

Ratio of opposite side and Adjacent side reminds us of **'tan'**

$\tan 60^\circ = \sqrt{3}$

$x = \sqrt{3} h \dots (i)$

Sol. In right $\triangle DCE$,

$\tan 60^\circ = \frac{CD}{EC}$

$\therefore \sqrt{3} = \frac{h}{80 - x}$

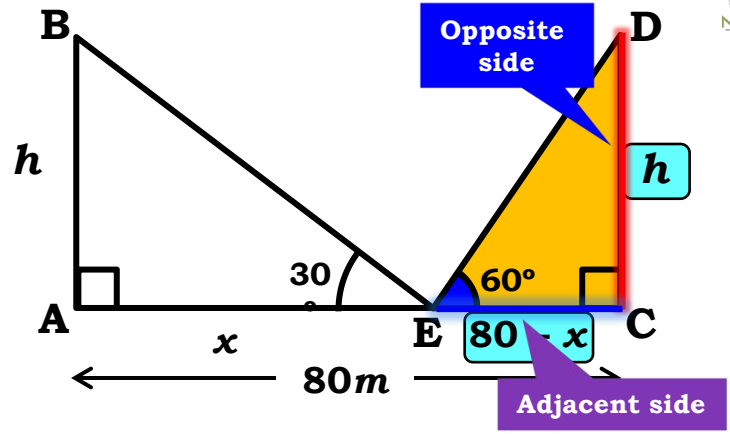
$\therefore \sqrt{3} (80 - x) = h$

$\therefore h = \sqrt{3} (80 - \sqrt{3} h)$ [From (i)]

$\therefore h = 80\sqrt{3} - 3h$

$\therefore h + 3h = 80\sqrt{3}$

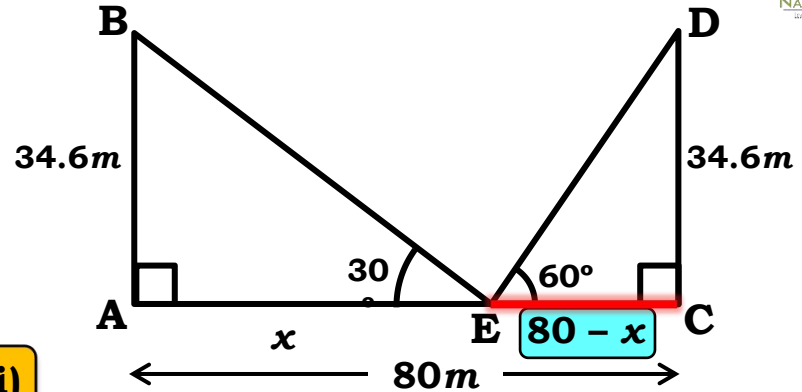
$\therefore 4h = 80\sqrt{3}$



$\therefore \sqrt{3} = 1.73$

$\therefore h = 20\sqrt{3}$
 $= 20 \times 1.73$
 $= 34.6m$

Q. Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles and the distances of the point from the poles.



Sol. $AE = x = \sqrt{3} h$ $x = \sqrt{3} h \dots(i)$

$$= \sqrt{3} \times 20\sqrt{3}$$

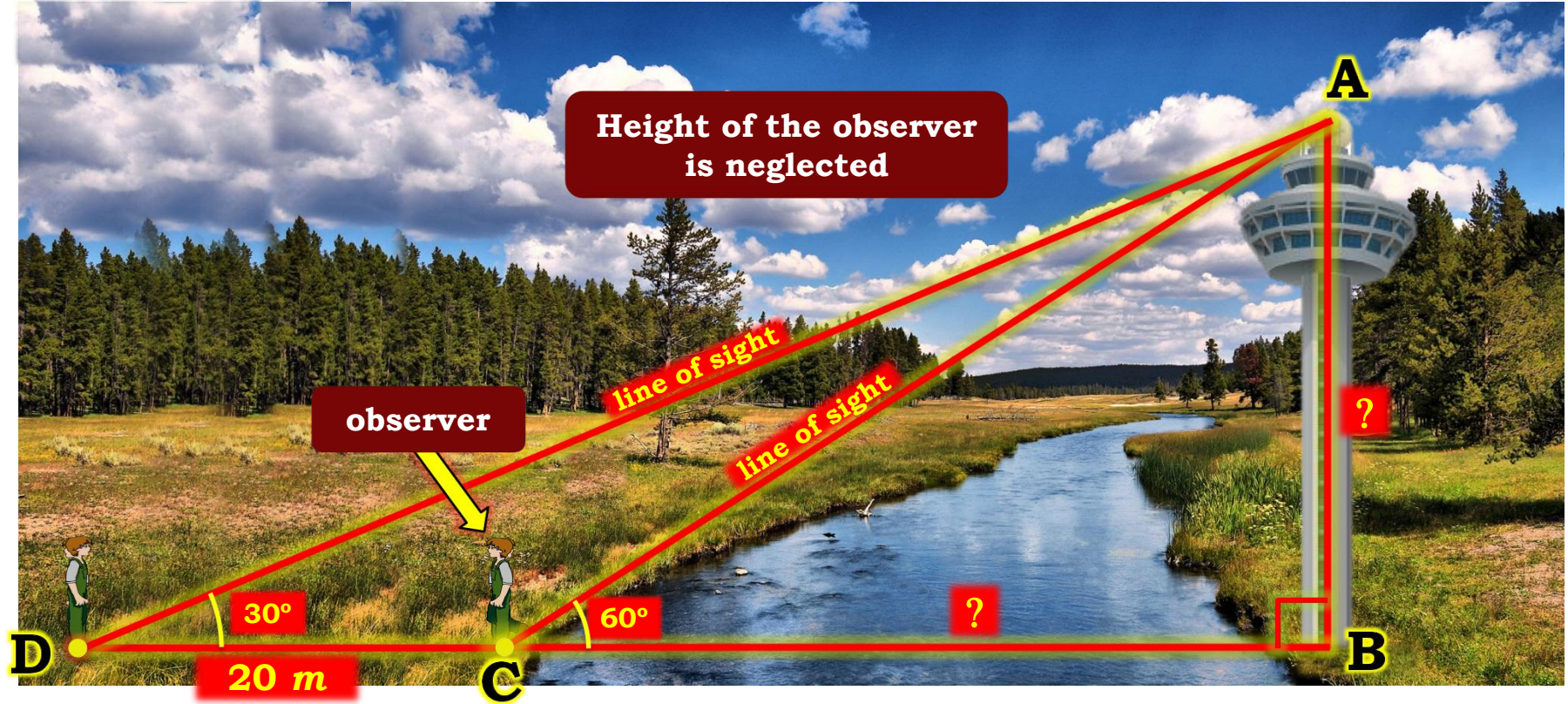
$$= 20 \times 3$$

$x = 60$

$$EC = 80 - x = 80 - 60 = 20m$$

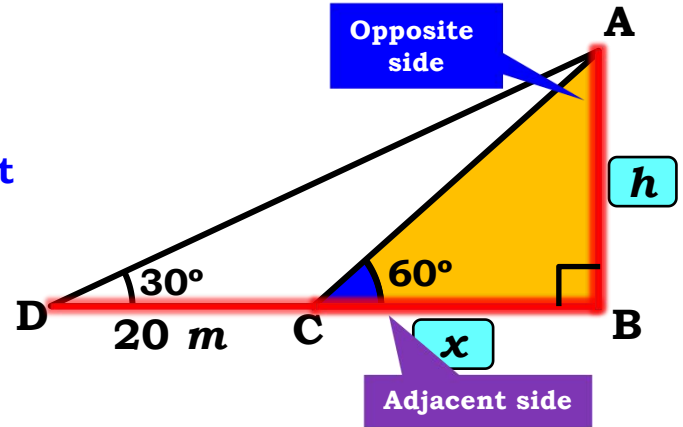
**\therefore Height of the poles are 34.6 m each
 Distance of the point from pole AB is 60 m and
 Distance of the point from pole CD is 20 m**

Q. 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° . Find the height of the tower and the width of the canal.



Q. A TV tower stands vertically on a bank of a canal. From a point D on the ground directly opposite the tower, the angle of elevation of the top of the tower is 60° . From another point C on the ground between D and the tower, the angle of elevation of the top of the tower is 30° . Find the height of the tower and the width of the canal.

Consider $\triangle ABC$ where AB is the height of the tower and BC is the width of the canal. $AB \perp BC$.
 Opposite side $\rightarrow AB$
 Adjacent side $\rightarrow BC$



Sol. Let the height of tower be ' h ' m
 Let the width of the canal be ' x ' m

$\tan 60^\circ = \sqrt{3}$ m

In $\triangle ABC$,

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

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

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

Q. A TV tower stands vertically on a bank of a canal. From a point D on the opposite bank of the canal, the angle of elevation of the top of the tower is 30° . From a point C, 10 m away from D towards the foot of the tower, the angle of elevation of the top of the tower is 60° . Find the height of the tower and the width of the canal.

Ratio of opposite side and Adjacent side reminds us of **'tan'**

$$\tan 30^\circ = \frac{1}{\sqrt{3}}$$

Sol. In right

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

$$\therefore \frac{1}{\sqrt{3}} = \frac{h}{x + 20}$$

$$\therefore x + 20 = h\sqrt{3}$$

$$\therefore x + 20 = \sqrt{3}x \times \sqrt{3}$$

$$\therefore x + 20 = 3x$$

$$\therefore 20 = 2x$$

$$\therefore x = 10$$

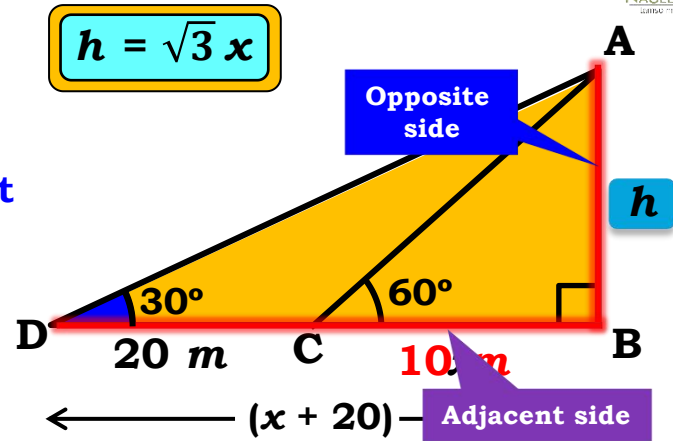
$$h = \sqrt{3}x$$

$$\sqrt{3} = 1.73$$

$$h = 10\sqrt{3}$$

$$h = 10 \times 1.73 = 17.3$$

Width of the canal is 10 m
and Height of the tower is 17.3 m



Thank You