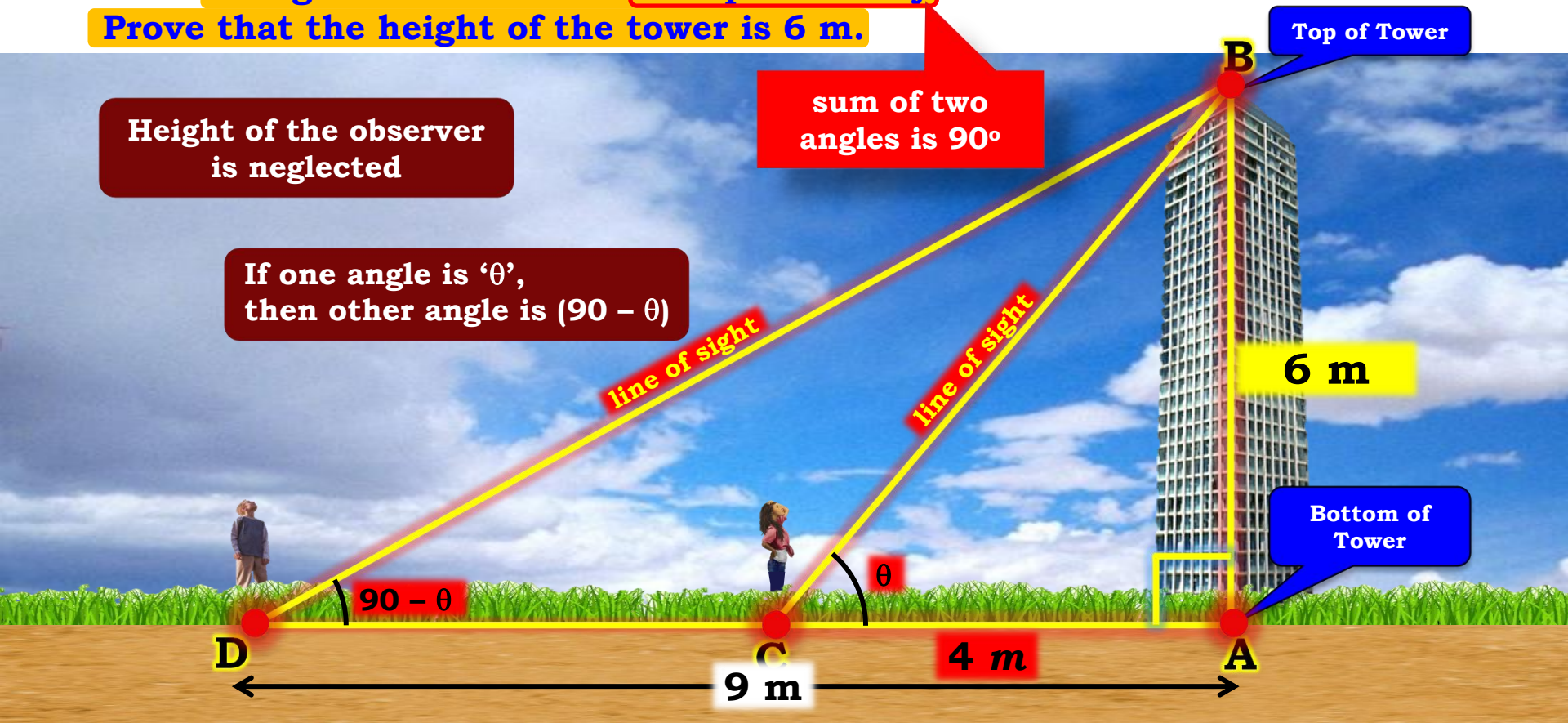
TOPIC

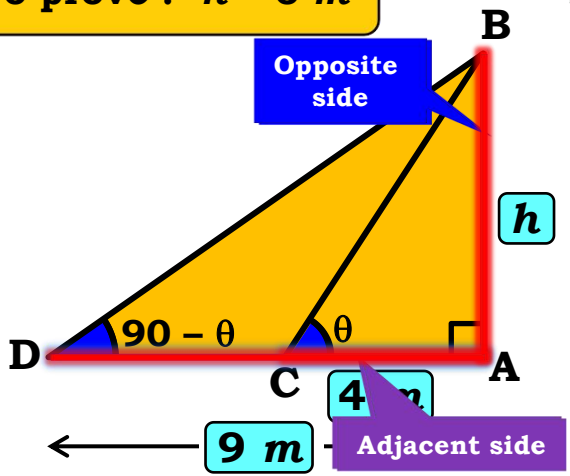
Solved Example 3

Q. The angles of elevation of the top of a tower from two points at a distance of 4 m and 9 m from the base of the tower and in the same straight line with it are complementary.
Prove that the height of the tower is 6 m.



Q. The ang… of elevation of the top of a tower … from t… R… Ac… …nd 9 m … from t… …same … straigh… …y. … Prove t… …6 m.

To prove : $h = 6\ m$



Sol. Let the height of tower (AB) be 'h' m

Distance of point C from the base of tower = 4 m

Distance of point D from the base of tower = 9 m

Let $\angle ACB = \theta$

So, $\angle ADB = (90 - \theta)$

In right ΔBAC,

$$\tan\theta = \frac{AB}{AC}$$

$$\therefore \quad \tan\theta = \frac{h}{4} \quad ...(i)$$

Now, consider ΔBAD

'tan'

We know that, $\tan(90-\theta) = \cot\theta$

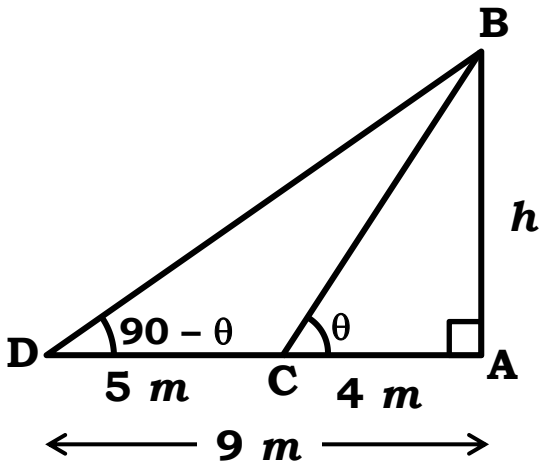
$\therefore$ tan … AB / AD …

$\cot\theta = \frac{1}{\tan\theta}$

$$\therefore \quad \cot\theta = \frac{h}{9}$$

$$\therefore \quad \frac{1}{\tan\theta} = \frac{h}{9}$$

Q. The angles of elevation of the top of a tower from two points at a distance of 4 m and 9 m from the base of the tower and in the same straight line with it are complementary. Prove that the height of the tower is 6 m.



Sol.

$\therefore \quad \frac{1}{\tan\theta} = \frac{h}{9}$

$\tan\theta = \frac{h}{4}$ ...(i)

$\therefore \quad \frac{9}{h} = \tan\theta$

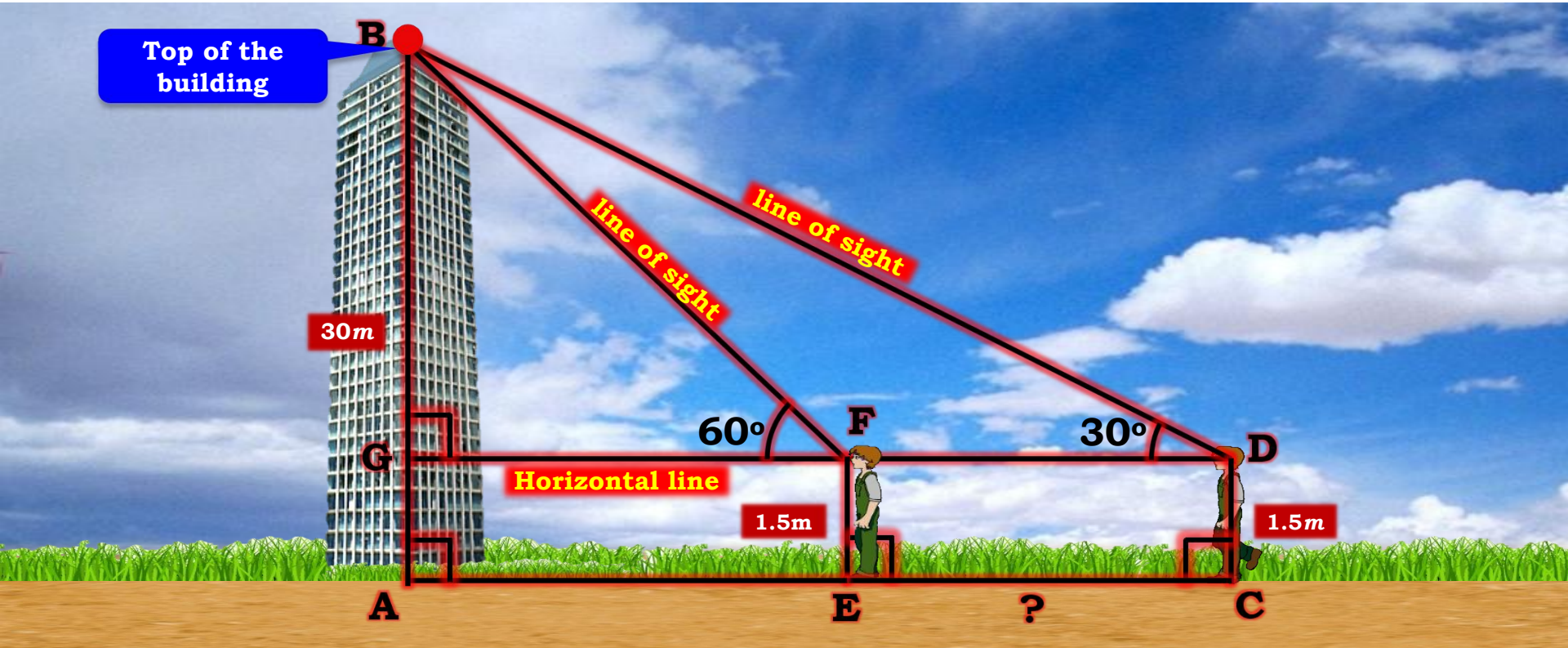
$\therefore \quad \frac{9}{h} = \frac{h}{4}$

$\therefore \quad 36 = h^2$

$\therefore \quad h = 6$

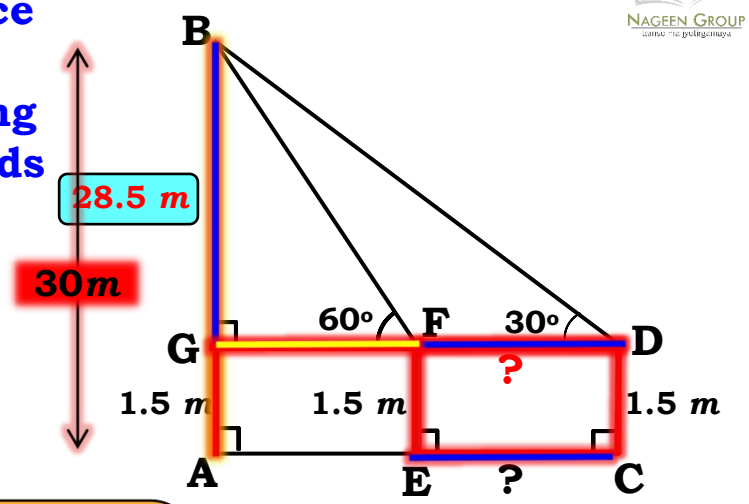
$\therefore$ **Height of the tower is 6 *m***

Q. A 1.5 m tall boy is standing at some distance from a 30 m tall building. The angle of elevation from his eyes to the top of building increases from 30° to 60° as he walks towards the building. Find the distance he walked towards the building.



Q. A 1.5 m tall boy is standing at some distance from a 30 m tall building. The angle of elevation of building increases ks towards the build walked towards the building.

BG is a part of BA



Sol. Height of tower (AB) = 30 *m*

Height of boy (CD) = 1.5 *m*

But, CD = EF = AG = 1.5 *m*

BG = AB – AG

∴ BG = 30 – 1.5

∴ BG = 28.5 *m*

□FECD is a rectangle

GD = GF + FD

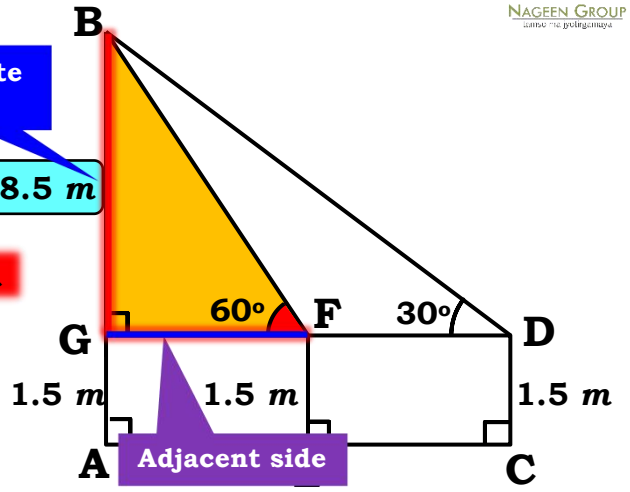
FD = GD – GF

? ?

Q. A 1.5 m tall boy is standing at some distance from a 3 … elevatio… dir… increase… …vards the building. Find the distance he walked towards the building.

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

Sol.



FD = GD − GF

? ✓

In right …

tan 60° = √3

$$\tan 60^\circ = \frac{BG}{GF}$$

$$\therefore \quad \sqrt{3} = \frac{28.5}{GF}$$

$$\therefore \quad GF = \frac{28.5}{\sqrt{3}}$$

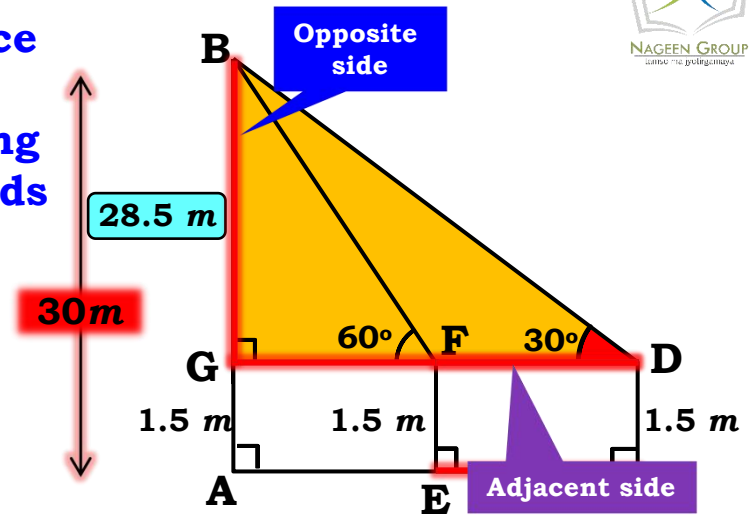
$$\therefore \quad GF = \frac{28.5 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}}$$

$$\therefore \quad GF = \frac{9.5 \; 28.5 \times \sqrt{3}}{3}$$

$$\therefore \quad GF = 9.5\sqrt{3}\ m$$

Q. A 1.5 … e distance
from … f
eleva… uilding
incre… towards
the bu… walked
towar…

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



Sol. In ri… ,

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

$\tan 30^\circ = \frac{BG}{GD}$

$\therefore \quad \frac{1}{\sqrt{3}} = \frac{28.5}{GD}$

$\therefore \quad GD = 28.5\sqrt{3}\ m$

$FD = GD - GF$ ✓ ✓

$GF = 9.5\sqrt{3}\ m$

$FD = $ …

$\therefore \quad FD = 28.5\sqrt{3} - 9.5\sqrt{3}$

$= 19\sqrt{3}\ m$

$\sqrt{3} = 1.73$

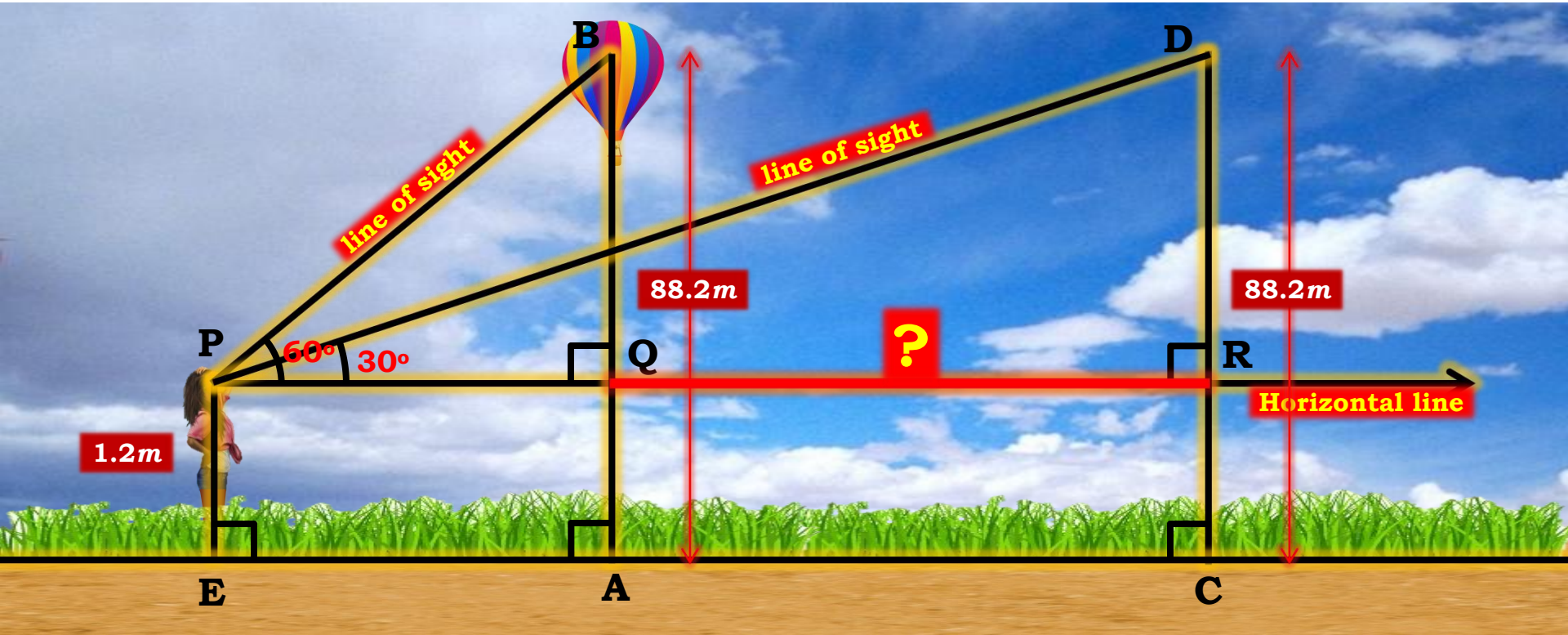
$= 19 \times 1.73$

$\therefore \quad FD = 32.87\ m$

$\therefore \quad FD = EC = 32.87\ m$

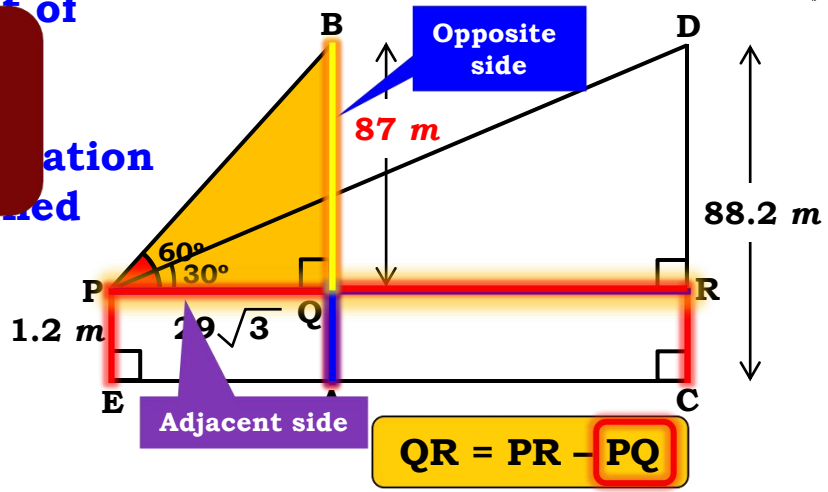
$\therefore$ Distance walked towards the building is 32.87m

Q. A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eye of girl is 60°. After some time, angle of elevation reduces to 30° Find the distance travelled by the balloon during the interval.



Q. A 1.2 m tall girl spots a balloon moving with the wind in ... ight of 88.2 ... elev... girl ... ation reduc... ...ed by the balloon during the interval.

Find : QR



Now, let us rationalise the denominator

Sol. Height of balloon from the ground (AB) = 88.2 *m*

Height of the girl (PE) = 1.2 *m*

PE = QA = RC = 1.2*m*

BQ = BA – QA

∴ BQ = ...

In ... ΔBQP,

tan 60° = √3

$$\tan 60^\circ = \frac{BQ}{PQ}$$

$$\therefore \quad \sqrt{3} = \frac{87}{PQ}$$

$$\therefore \quad PQ = \frac{87}{\sqrt{3}}$$

$$\therefore \quad PQ = \frac{87}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

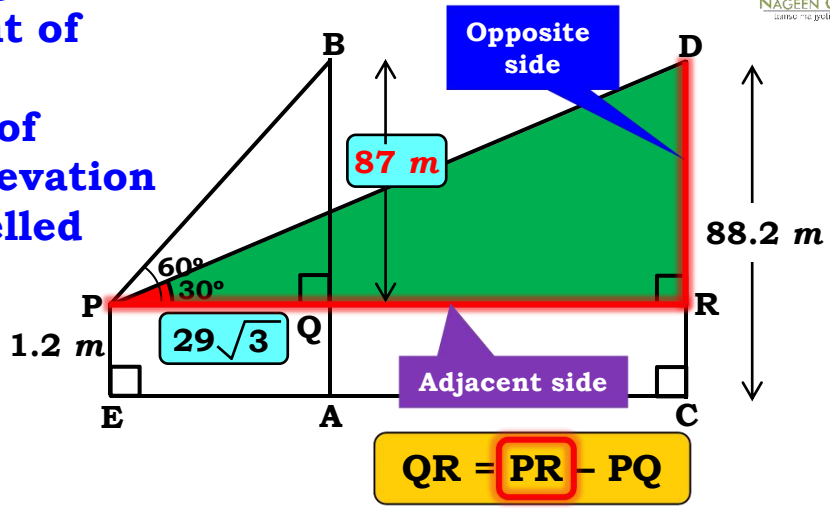
$$\therefore \quad PQ = \frac{87\sqrt{3}}{3}$$

$$\therefore \quad PQ = 29\sqrt{3}$$

Q. A 1.2 m tall girl spots a balloon moving with the v… eight of 88.… f ele… s of gi… elevation re… velled by… g the interval.

For ∠P
Opposite side → DR
Adjacent side → PR

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



Sol. In right ΔPRD,

$\tan 30^\circ = \frac{DR}{PR}$

$\therefore \quad \frac{1}{\sqrt{3}} = \frac{87}{PR}$

$\therefore \quad PR = 87\sqrt{3}$

$QR = PR - PQ$

$\therefore \quad QR = 8… \sqrt{3}$

$\sqrt{3} = 1.73$

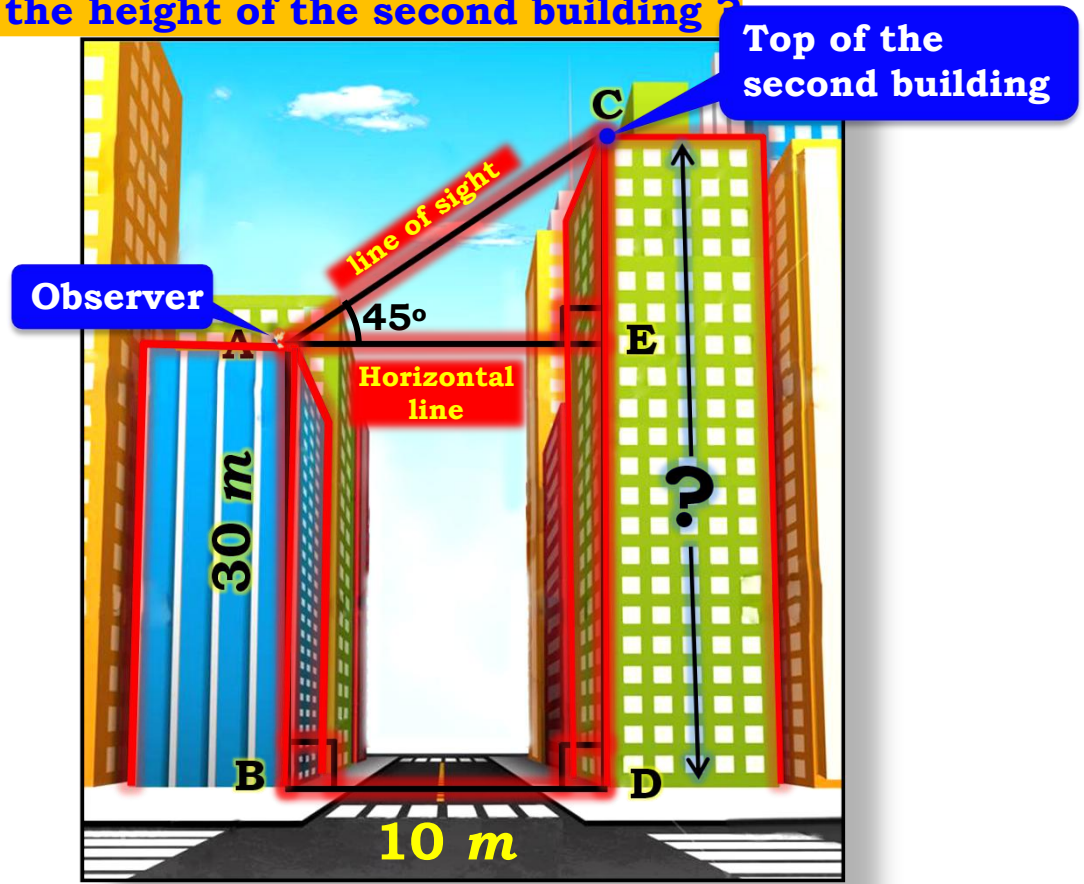
$\therefore \quad QR = 58\sqrt{3}$

$\therefore \quad QR = 58 \times 1.73$

$\therefore \quad QR = 100.34\ m$

Distance travelled by the balloon is 100.34 *m*

Q. Two buildings are in front of each other on either side of a road of width 10 metres. From the top of the first building, which is 30 metres high, the angle of elevation of top of the second is 45°. What is the height of the second building ?



Q. Two buildings are in front of each other on e metres. From which is 30 n on of top What is the height of the second building ?

Rat Adja f

CD is made up of CE and ED

E

Sol. AB and CD represents the heights of two buildings.

AB = 30 *m*

BD represents the width of the road.

BD = 10 *m*

A represents the position of the observer.

∠CAE is the angle of elevation.

∠CAE = 45°

□ABDE is a rectangle.

Al

Bl

In ri t angled ΔCEA,

tan 45° = P

$\tan 45^\circ = \frac{CE}{AE}$

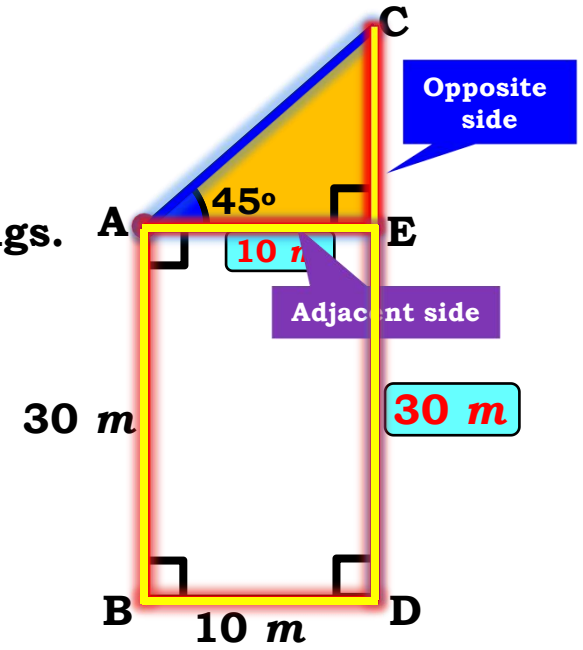
$\therefore \quad 1 = \frac{CE}{10}$

$\therefore \quad CE = 10\ m$

$CD = CE + ED$

$\therefore \quad CD = 10 + 30$

$\therefore \quad CD = 40\ m$



∴ The height of the second building is 40 *m*

Thank You