YAKEEN NEET 2.0

2026

Basic Maths and Calculus (Mathematical Tools)

PHYSICS | Lecture - 03

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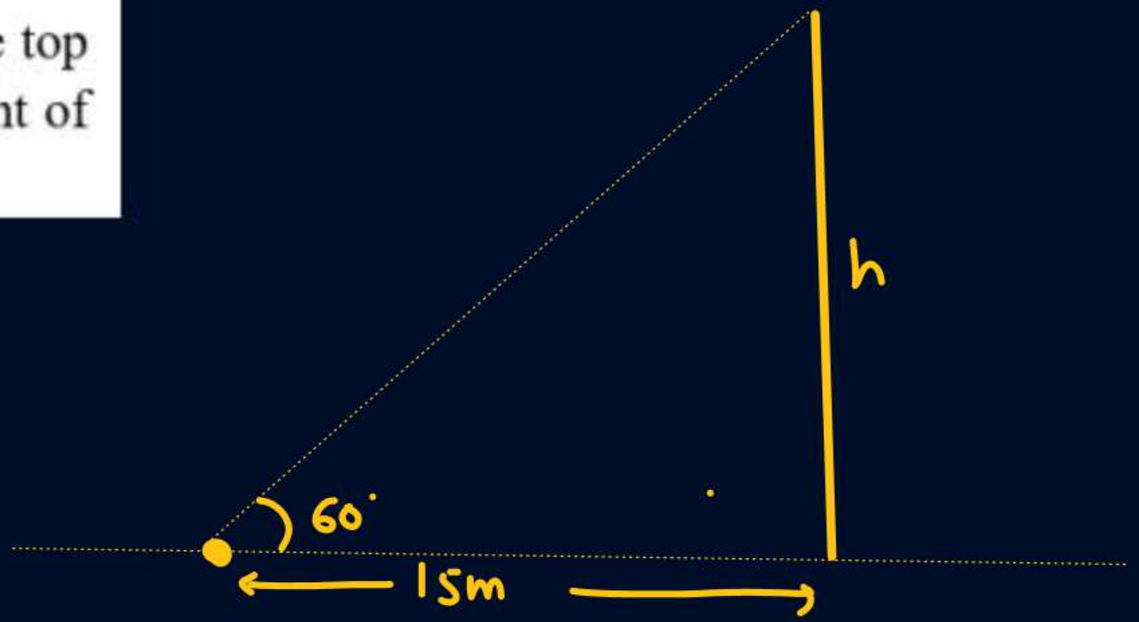
Question - 01

A tower stands vertically on the ground. From a point on the ground, which is 15 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60°. Find the height of the tower.

$$\tan 60^\circ = \frac{h}{15}$$

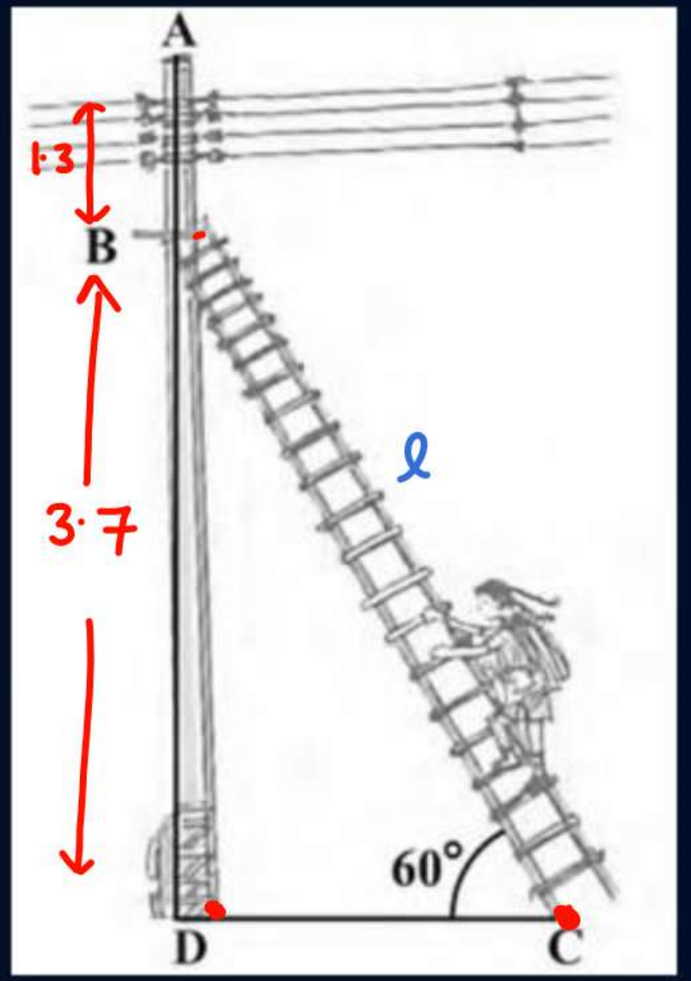
$$\sqrt{3} = \frac{h}{15}$$



Ans : $15\sqrt{3}m$

Question - 02

An electrician has to repair an electric fault on a pole of height 5 m. She needs to reach a point 1.3m below the top of the pole to undertake the repair work (see Fig.). What should be the length of the ladder that she should use which, when inclined at an angle of 60° to the horizontal, would enable her to reach the required position? Also, how far from the foot of the pole should she place the foot of the ladder? (You may take $\sqrt{3} = 1.73$)



$5 - 1.3 = 3.7$

$\tan 60 = \sqrt{3} = \frac{3.7}{CD}$

$CD = \frac{3.7}{1.73} \simeq 2.14$

$\sin 60 = \frac{3.7}{l}$

$\frac{\sqrt{3}}{2} = \frac{3.7}{l}$

$l = \frac{3.7 \times 2}{\sqrt{3}}$

$= \frac{7.4}{1.73} = \frac{740}{173}$

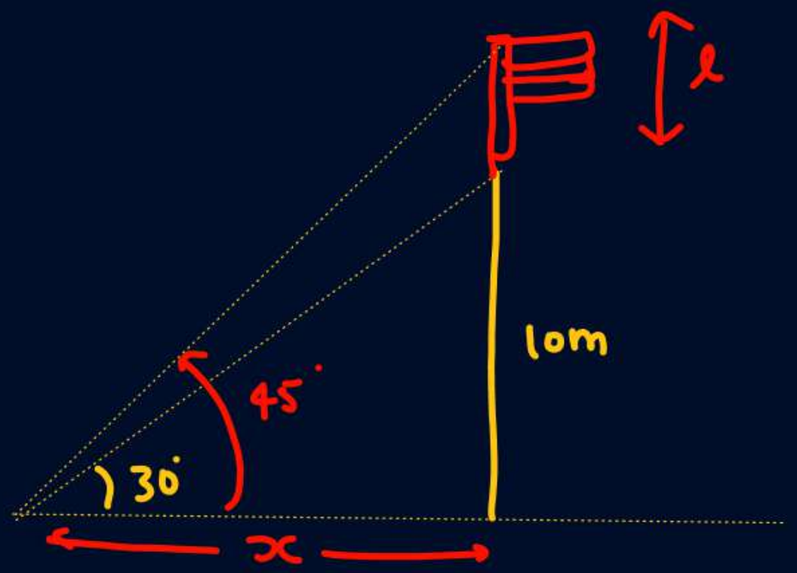
$\simeq 4.28$

Ans : 2.14 m

$$
\begin{array}{r}
4.28 \\
173\overline{)740.} \\
692 \\
\hline
480 \\
346 \\
\hline
1340
\end{array}
$$

Question - 04

From a point P on the ground the angle of elevation of the top of a 10 m tall building is 30°. A flag is hoisted at the top of the building and the angle of elevation of the top of the flagstaff from P is 45°. Find the length of the flagstaff and the distance of the building from the point P (You may take $\sqrt{3} = 1.732$)



$$\tan 30 = \frac{1}{\sqrt{3}} = \frac{10}{x}$$

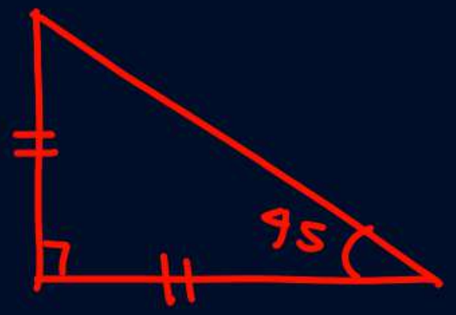
$$x = 10\sqrt{3} = 17.32\,m$$

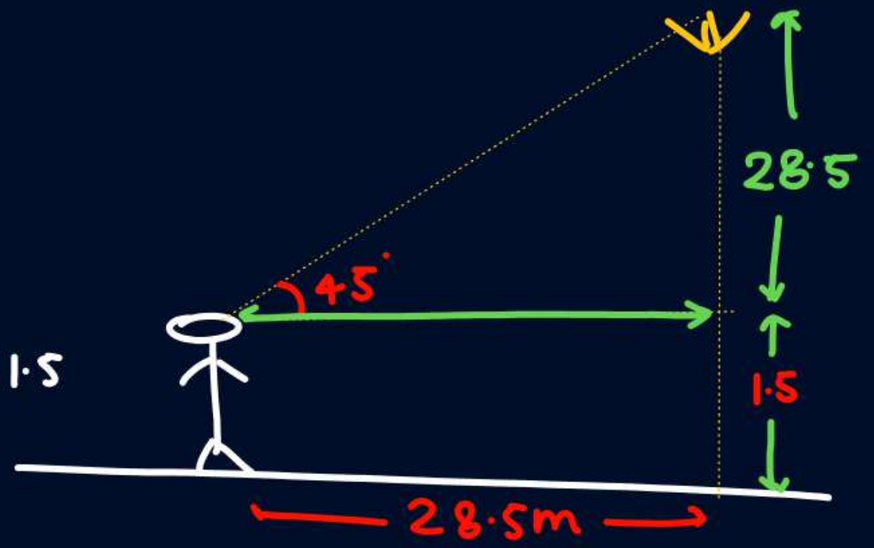
$$\tan 45 = \frac{l+10}{17.32} = 1$$

Ans : 7.32 m

Question - 03

An observer 1.5 m tall is 28.5 m away from a chimney. The angle of elevation of the top of the chimney from her eyes is 45°. What is the height of the chimney?





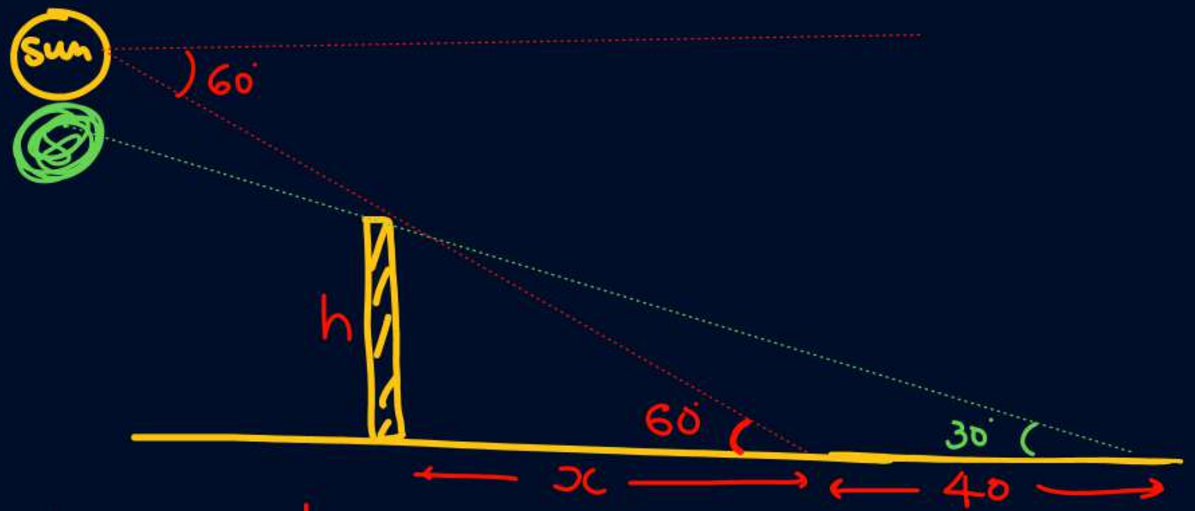
$28.5 + 1.5 = 30$

Ans : 30 m

Question - 05

The shadow of a tower standing on a level ground is found to be 40 m longer when the Sun's altitude is 30° than when it is 60°. Find the height of the tower.

30° ≡ तब 40 m ज्यादा है



$$\tan 60 = \frac{h}{x}$$

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

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

$$\tan 30 = \frac{h}{x+40}$$

$$\frac{1}{\sqrt{3}} = \frac{h}{x+40}$$

$$x + 40 = h\sqrt{3}$$

Ans : $20\sqrt{3}m$

$$x + 40 = h\sqrt{3}$$

$$\frac{h}{\sqrt{3}} + 40 = h\sqrt{3}$$

$$40 = h\sqrt{3} - \frac{h}{\sqrt{3}}\sqrt{3}$$

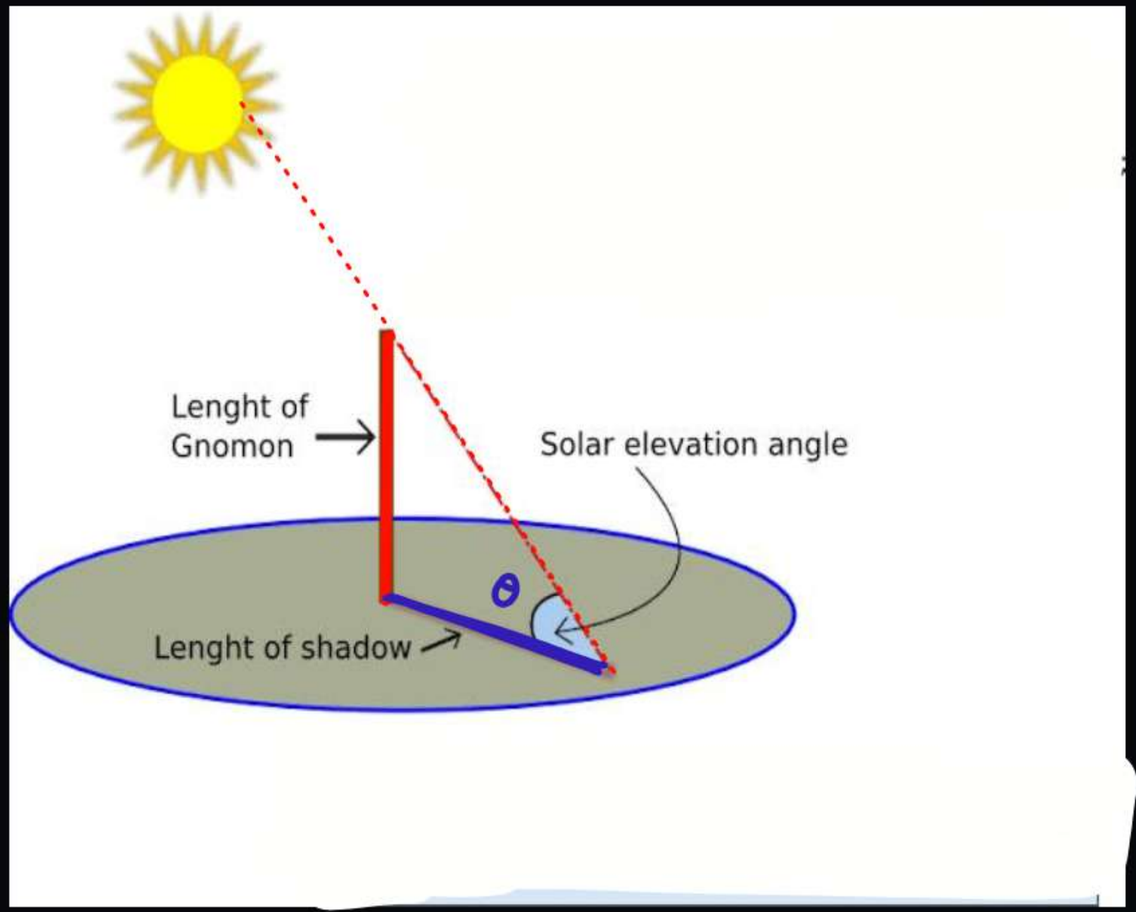
$$40 = \frac{3h\sqrt{3}}{3} - \frac{h\sqrt{3}}{3} = \frac{h(3\sqrt{3} - \sqrt{3})}{3}$$

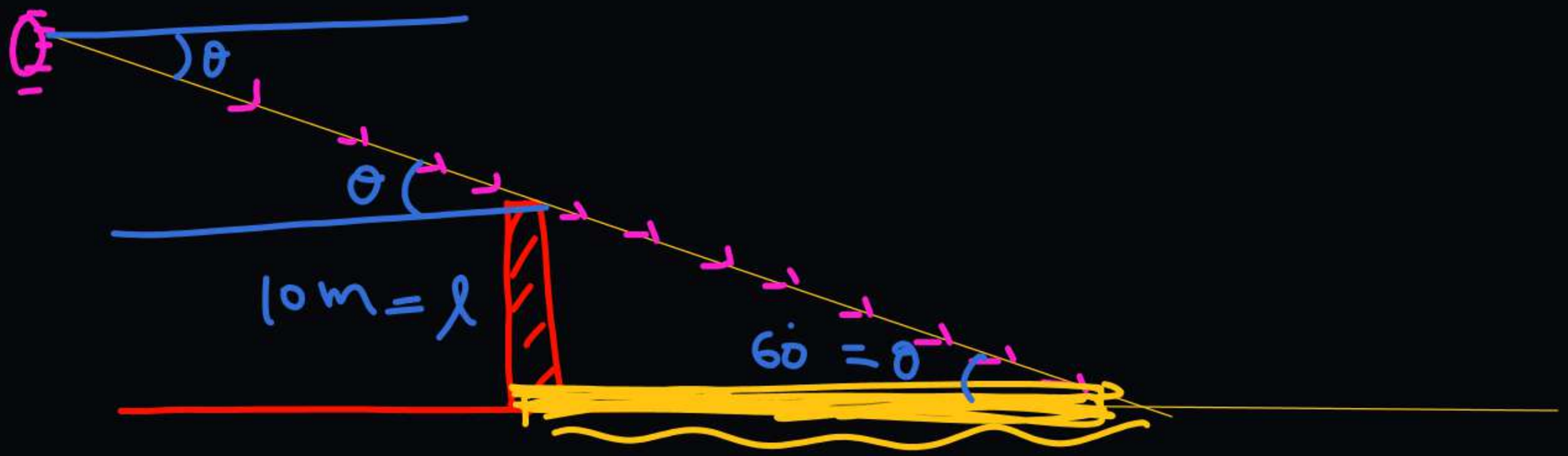
$$40 = \frac{h\,2\sqrt{3}}{3}$$

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

$$20 \times 1.73$$

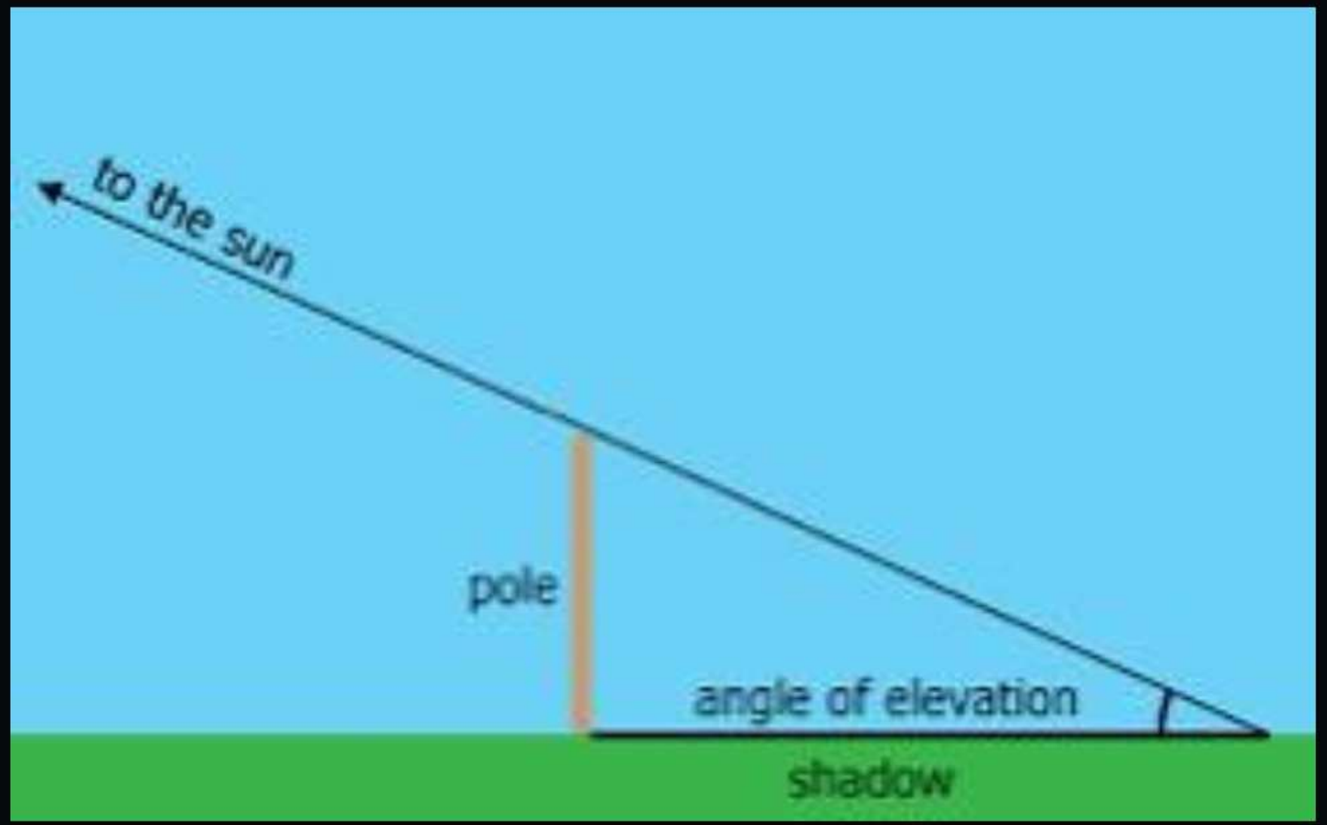
$$= 34.6$$

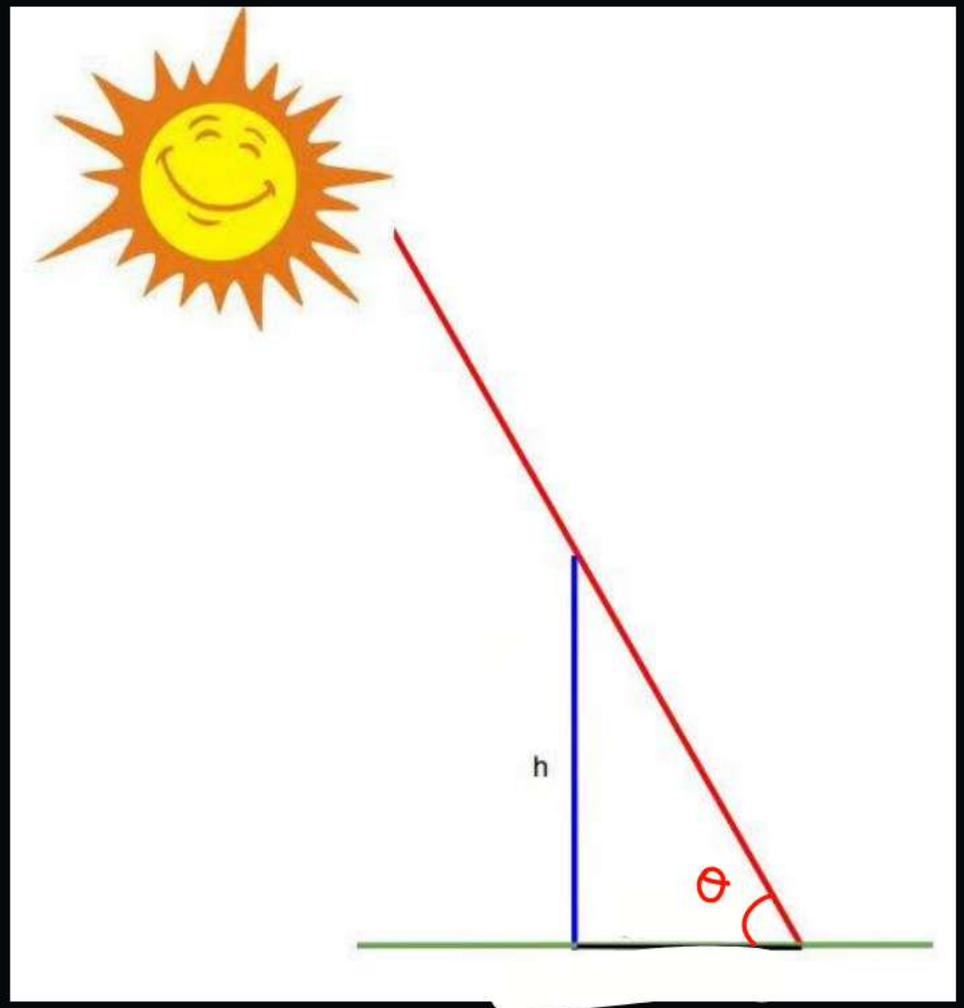

Lenght of
Gnomon
Solar elevation angle
θ
Lenght of shadow



$$\tan 60 = \frac{l}{x}$$

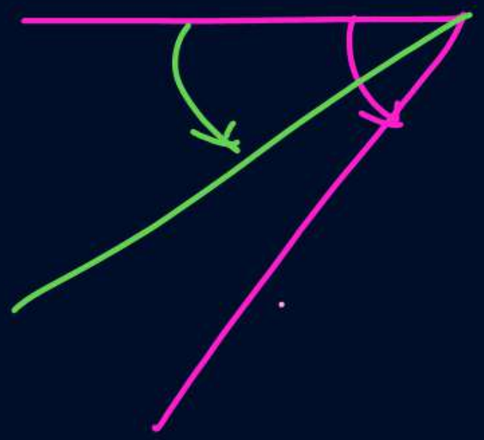
$$x = \checkmark$$

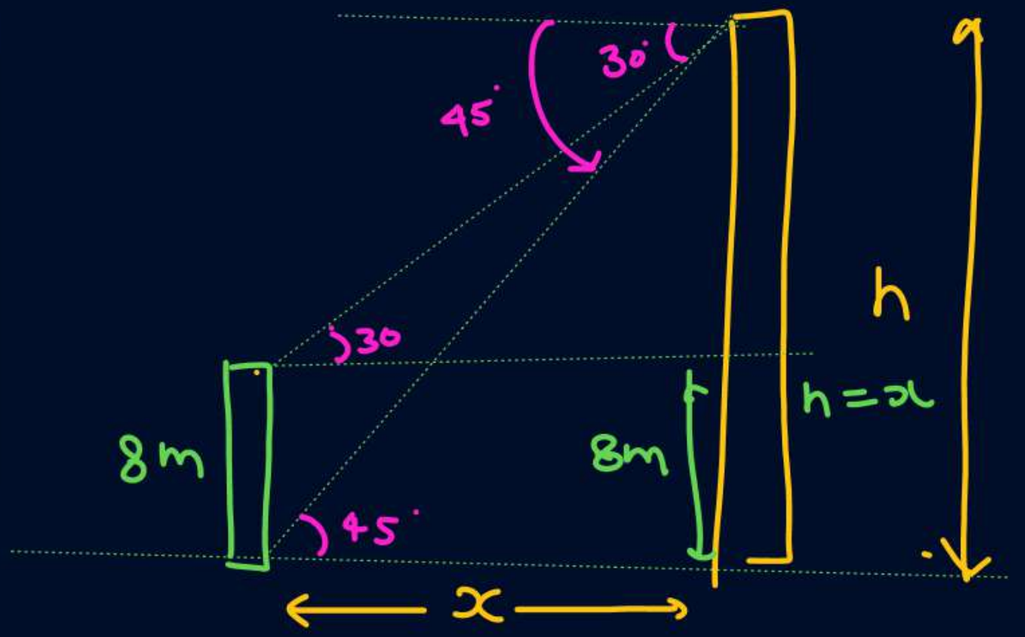

to the sun
pole
angle of elevation
shadow


h
θ

Question - 06

The angles of depression of the top and the bottom of an 8 m tall building from the top of a multi-storeyed building are 30° and 45°, respectively. Find the height of the multi-storeyed building and the distance between the two buildings.





$$\tan 30 = \frac{x-8}{x} = \frac{1}{\sqrt{3}}$$

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

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

Ans : $4(3+\sqrt{3})m$

$$a^2 - b^2 \equiv (a-b)(a+b)$$

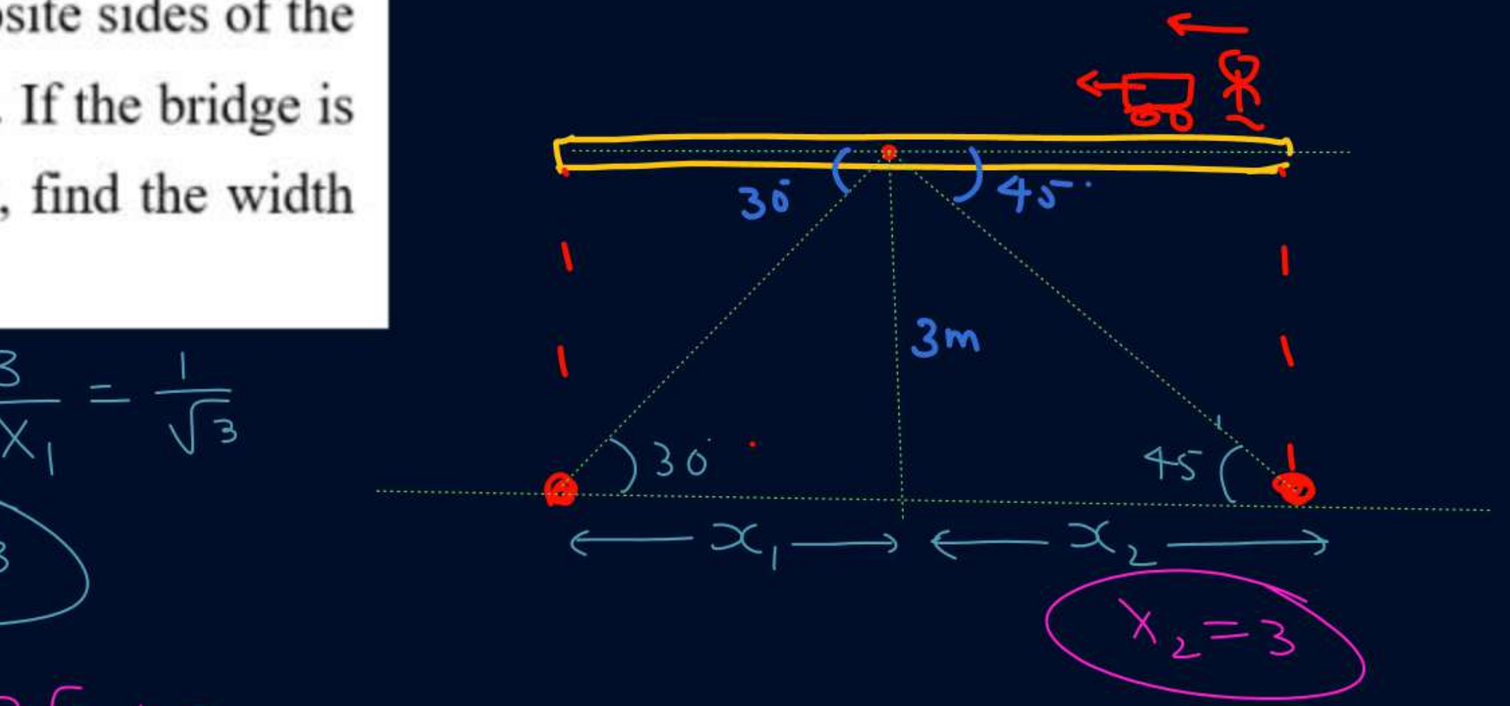
$$x\sqrt{3} - x = 8\sqrt{3}$$

$$x(\sqrt{3} - 1) = 8\sqrt{3}$$

$$x = \frac{8\sqrt{3}}{\sqrt{3}-1}\left(\frac{\sqrt{3}+1}{\sqrt{3}+1}\right) = \frac{8\sqrt{3}\,(\sqrt{3}+1)}{3-1} = 4(3+\sqrt{3})$$

Question - 07

From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30° and 45°, respectively. If the bridge is at a height of 3 m from the banks, find the width of the river.



$$\tan 30 = \frac{3}{x_1} = \frac{1}{\sqrt{3}}$$

$$x_1 = 3\sqrt{3}$$

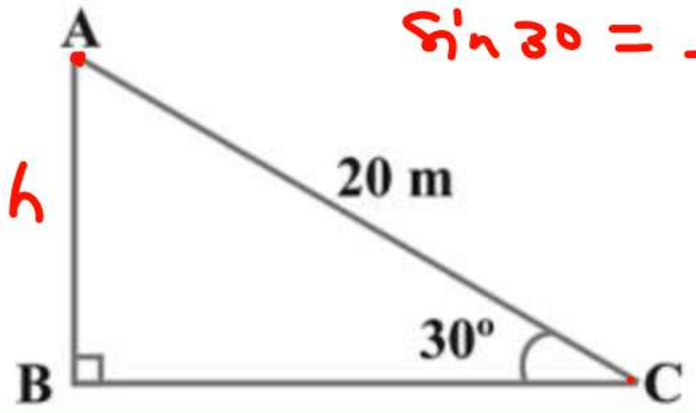
$$x_1 + x_2 = 3\sqrt{3} + 3$$

$x_2 = 3$

Ans : $3(\sqrt{3}+1)m$

Question - 08

A circus artist is climbing a 20 m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground. Find the height of the pole, if the angle made by the rope with the ground level is 30° (see Fig.).



$\sin 30 = \frac{h}{20}$

Ans : 10 m

Question - 09

$\frac{24\sqrt{3}}{\sqrt{3}\times\sqrt{3}} = 8\sqrt{3} = 8 \times 1.73 = 13.84$

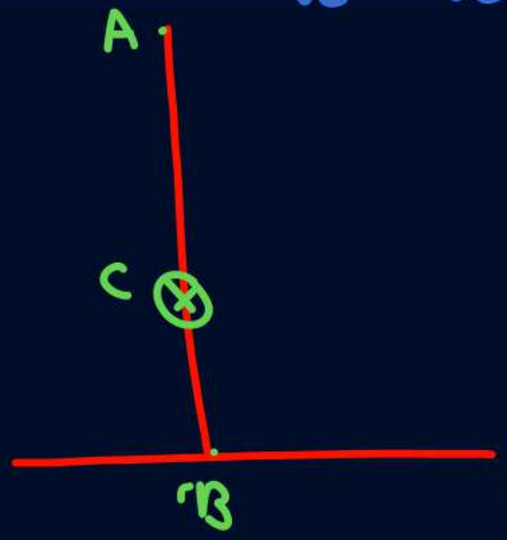
A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle 30° with it. The distance between the foot of the tree to the point where the top touches the ground is 8 m. Find the height of the tree.

$AB = AC + BC = \frac{16}{\sqrt{3}} + \frac{8}{\sqrt{3}} = \frac{24}{\sqrt{3}}$

before broken

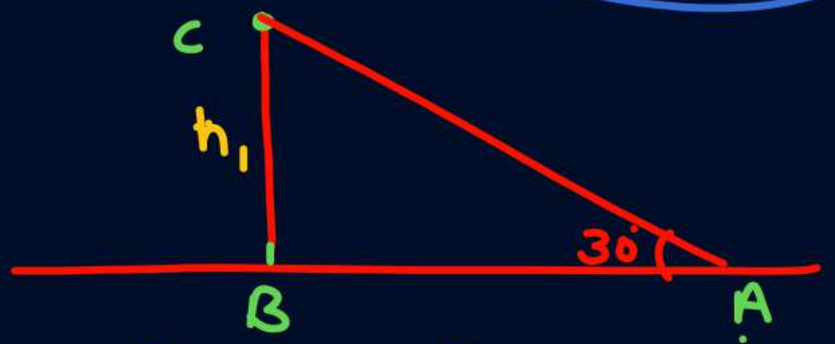
or

Actual length of tree.



$\cos 30 = \frac{8}{AC} = \frac{\sqrt{3}}{2}$

$AC = \frac{16}{\sqrt{3}}$



$\frac{1}{\sqrt{3}} = \tan 30 = \frac{h_1}{8}$

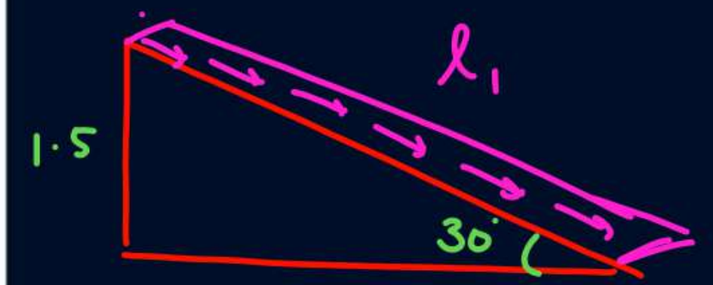
$h_1\sqrt{3} = 8$

$BC = h_1 = \frac{8}{\sqrt{3}}$

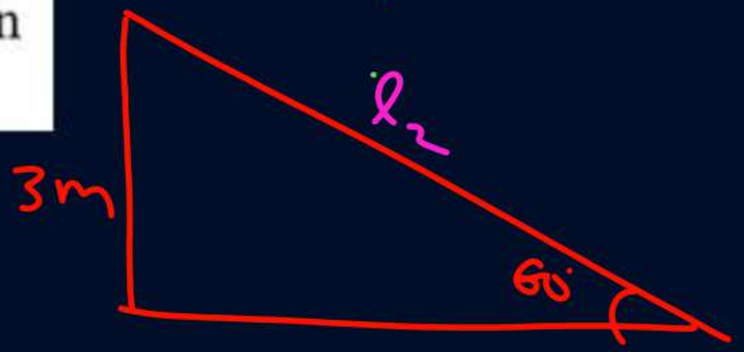
Ans : ~~4.62~~ m

Question - 10

A contractor plans to install two slides for the children to play in a park. For the children below the age of 5 years, she prefers to have a slide whose top is at a height of 1.5 m, and is inclined at an angle of 30° to the ground, whereas for elder children, she wants to have a steep slide at a height of 3m, and inclined at an angle of 60° to the ground. What should be the length of the slide in each case? 3, 3.46



$$\sin 30^\circ = \frac{1}{2} = \frac{1.5}{\ell_1}$$



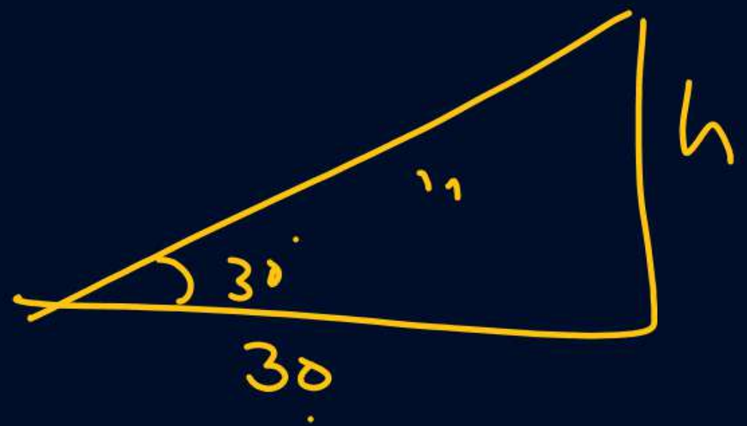
$$\frac{\sqrt{3}}{2} = \frac{3}{\ell_2}$$

$$\ell_2 = \frac{6}{\sqrt{3}} = \frac{6\sqrt{3}}{3} = 2\sqrt{3} = 2 \times 1.73 = 3.46$$

Ans : ~~3.46~~

Question - 11

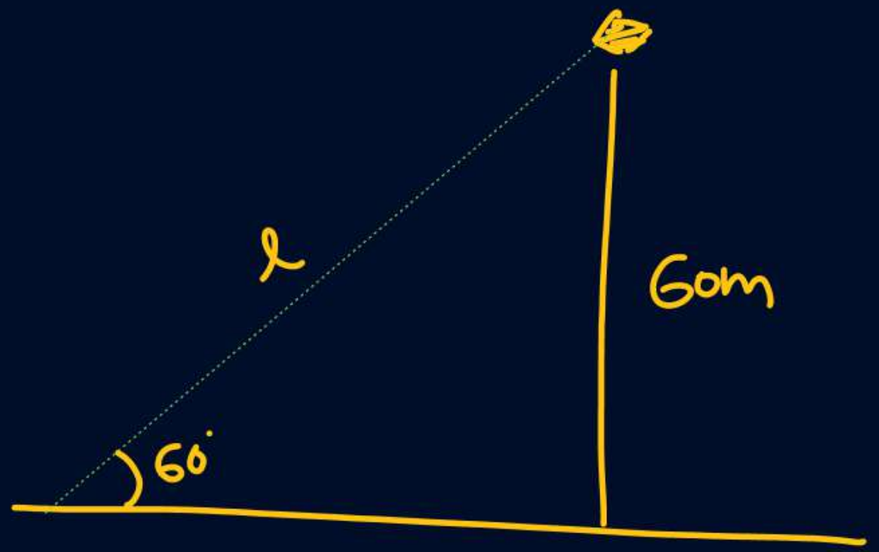
The angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of the tower, is 30°. Find the height of the tower.



Ans : $10\sqrt{3}$m

Question - 12

A kite is flying at a height of 60 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60°. Find the length of the string, assuming that there is no slack in the string.



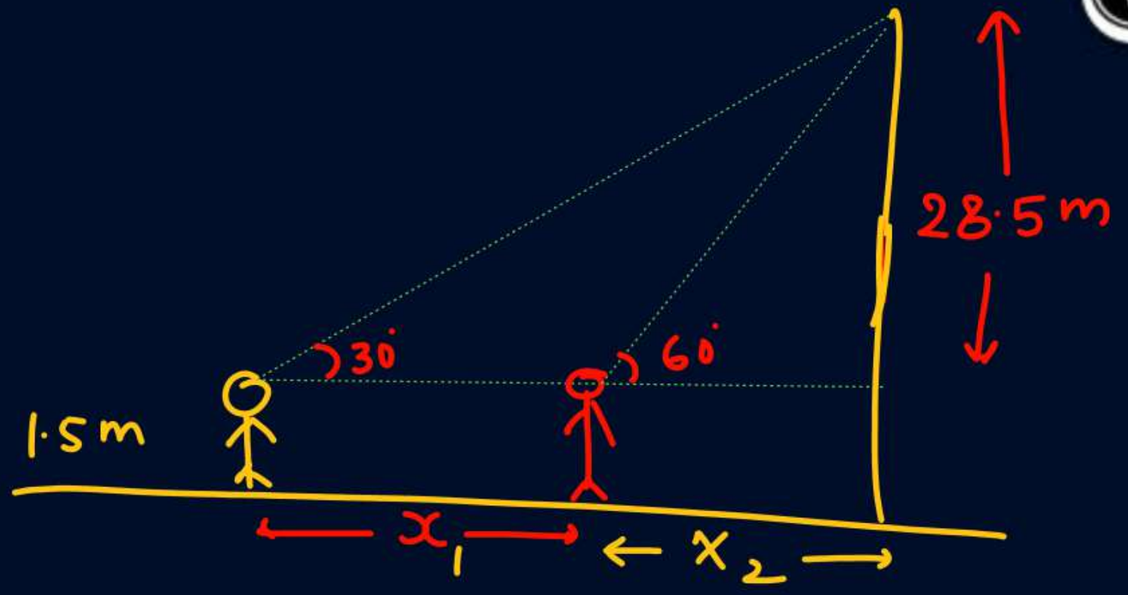
$$\sin 60 = \frac{60}{l}$$

$$\frac{\sqrt{3}}{2} = \frac{60}{l} \qquad l = \frac{120}{\sqrt{3}} = \frac{120\sqrt{3}}{3} = 40\sqrt{3}$$

Ans : $40\sqrt{3}m$

Question - 13

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 the building increases from 30° to 60° as he walks towards the building. Find the distance he walked towards the building.



$$\tan 60 = \sqrt{3} = \frac{28.5}{X_2}$$

$$\boxed{X_2 = \frac{28.5}{\sqrt{3}}}$$

$$\tan 30 = \frac{1}{\sqrt{3}} = \frac{28.5}{X_1 + X_2}$$

$$X_1 + X_2 = 28.5\sqrt{3}$$

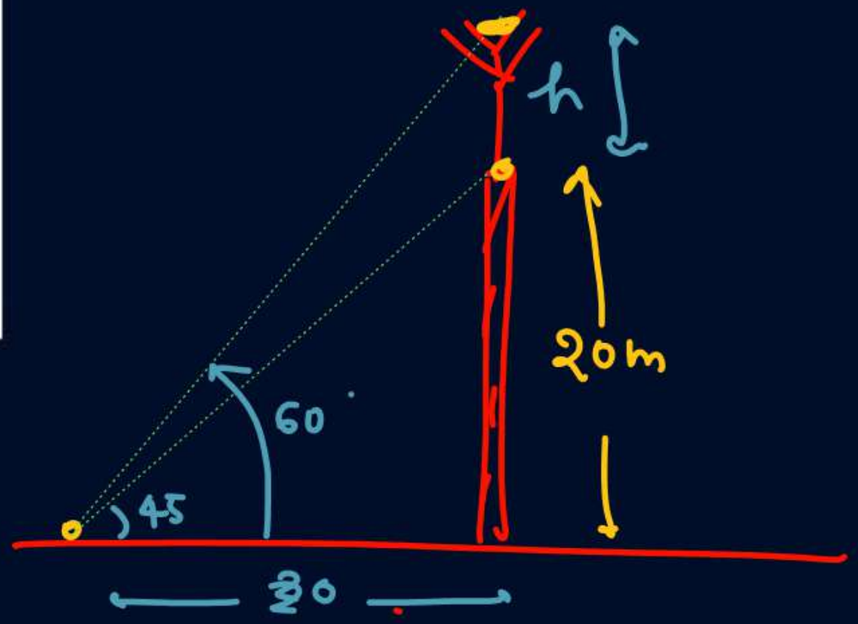
$$X_1 + \frac{28.5}{\sqrt{3}} = 28.5\sqrt{3}$$

$$X_1 = 28.5\left(\sqrt{3} - \frac{1}{\sqrt{3}}\right) = \frac{2}{\sqrt{3}} \times 28.5 = \frac{19}{\frac{2}{\sqrt{3}}\sqrt{3}} = 19\sqrt{3}$$

Ans : $19\sqrt{3}m$

Question - 14

From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower.



$$\tan 60 = \frac{h+20}{20} = \sqrt{3}$$

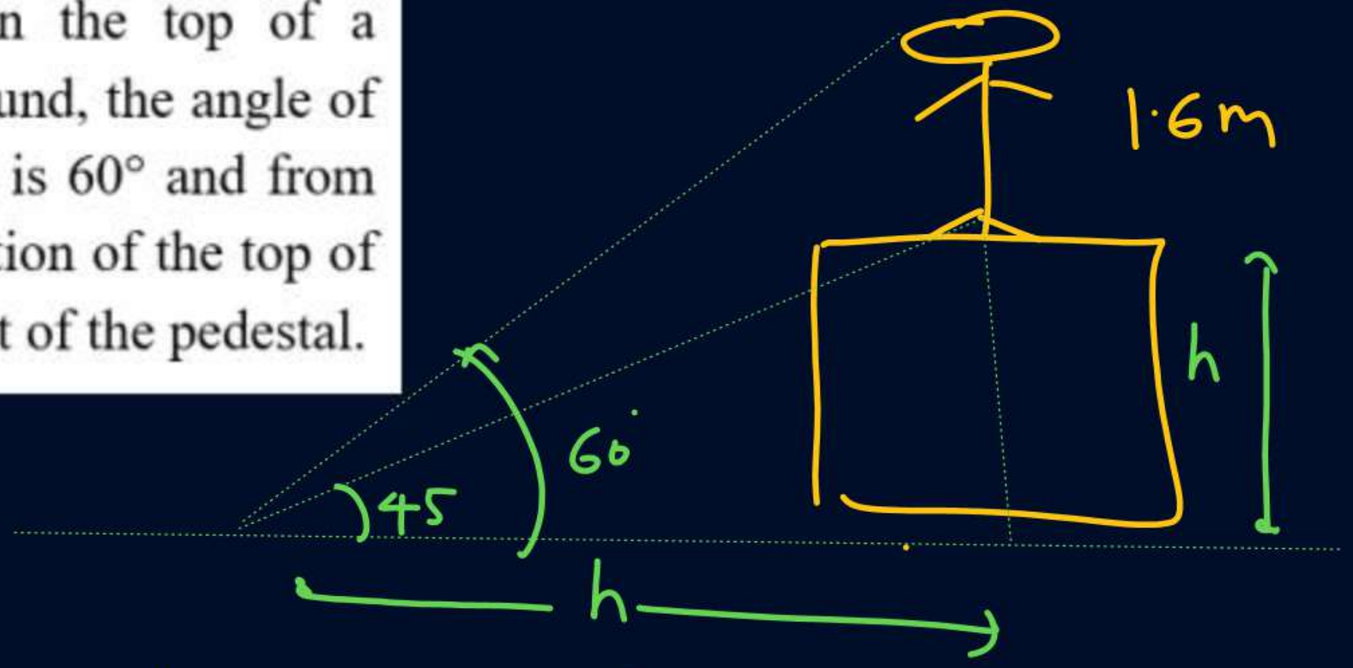
$$h = 20\sqrt{3} - 20$$

$$= 20(\sqrt{3} - 1)$$

Ans : $20(\sqrt{3} - 1)m$

Question - 15

A statue, 1.6 m tall, stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point the angle of elevation of the top of the pedestal is 45°. Find the height of the pedestal.



$$\tan 60^\circ = \frac{h+1.6}{h}$$

$$\sqrt{3} = \frac{h+1.6}{h}$$

$$h\sqrt{3} - h = 1.6$$

$$h = \frac{1.6}{\sqrt{3}-1}\frac{(\sqrt{3}+1)}{(\sqrt{3}+1)} = \frac{1.6(\sqrt{3}+1)}{3-1} = .8(\sqrt{3}+1)$$

Ans : $0.8(\sqrt{3}+1)$

THANK YOU