

SOME APPLICATIONS OF

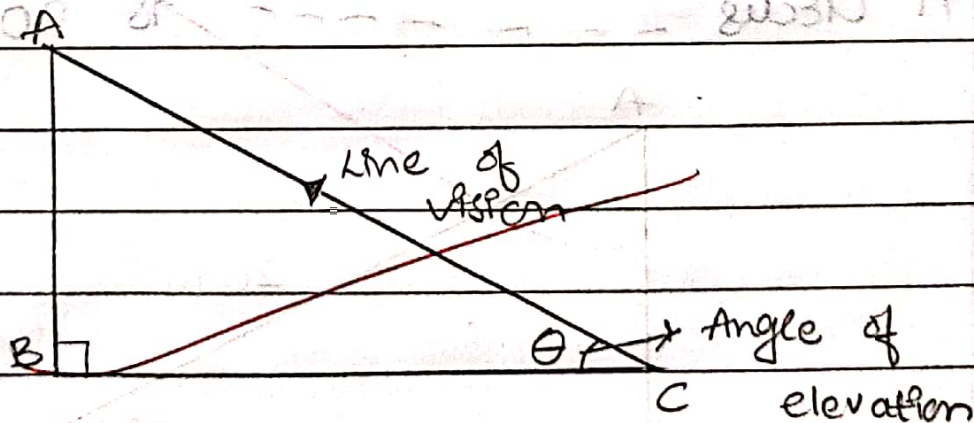
TRIGONOMETRY

Trigonometry is used to find the distances and heights.

Following are the terminology used to determine height and distance:-

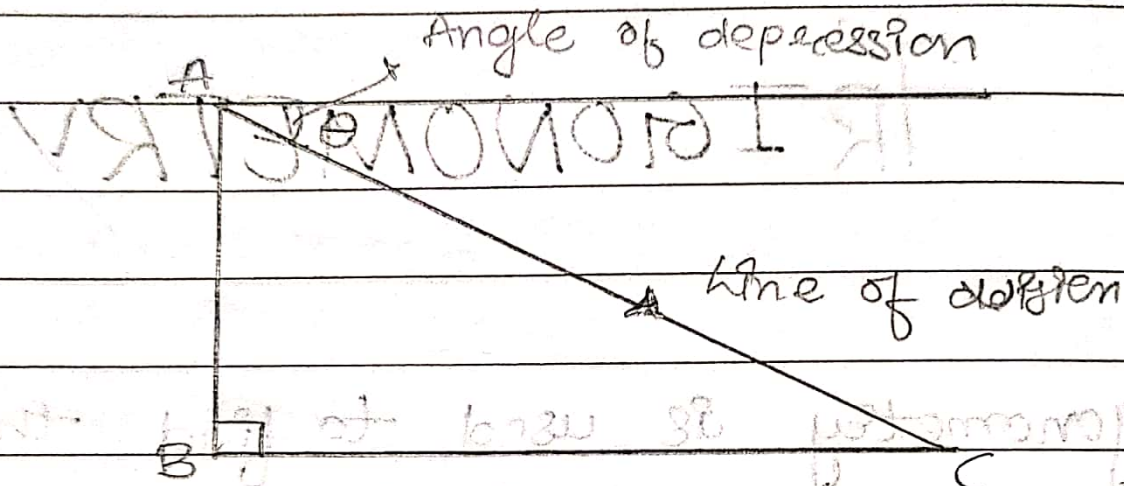
(1) Line of vision :- It is a line through which object can be observed.

(2) Angle of Elevation :-



Angle of elevation is the angle between line of vision and horizontal line when observed from bottom to top.

Angle of Depression:-



Angle of depression is the angle between line of vision and horizontal line when observed from top to bottom.

Ratio for $30^\circ, 60^\circ, 90^\circ \Delta$

$$30^\circ : 60^\circ : 90^\circ$$

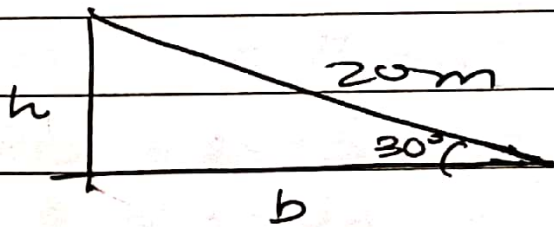
$$1 : \sqrt{3} : 2$$

Ratio for $45^\circ, 45^\circ, 90^\circ \Delta$

$$45^\circ : 45^\circ : 90^\circ$$

$$1 : 1 : \sqrt{2}$$

2] A circus artist is climbing a rope 20m in l. The rope is tied to a pole at an inclination of 30° from the ground. Find the height of the pole.



$$\sin \theta = \frac{\text{Opp}}{\text{Hypo}}$$

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

$$\frac{1}{2} = \frac{h}{20}$$

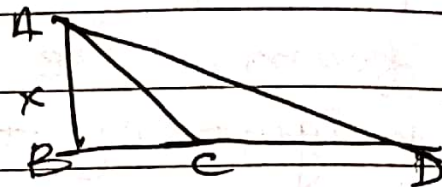
$$h = 10\text{m}$$

2] There is a tower on one side of the canal. If you look at the top of the tower from the other side of the canal, the angle of inclination is 60° . If you move 20m further away, the angle of inclination becomes 30° . Find the height of the tower and the width of the canal.

→

Given,

$$CD = 20\text{m}$$



To find,

AB, CB

Solution

$$DB - CB = 20\text{m} \quad \text{--- (1)}$$

$$\tan \theta = \frac{\text{Opp}}{\text{Ad}}$$

$$\tan 60^\circ = \frac{x}{CB}$$

$$\sqrt{3} = x / CB$$

$$CB = x / \sqrt{3}$$

$$\tan 30^\circ = x / DB$$

$$\frac{1}{\sqrt{3}} = x / DB$$

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

By putting values in eqn (1)

$$x \sqrt{3} - x / \sqrt{3} = 20$$

$$3x - x = 20$$

$$\frac{2x}{\sqrt{3}}$$

$$2x = 20$$

$$\frac{2x}{\sqrt{3}}$$

$$x = 10\sqrt{3} \text{ m}$$

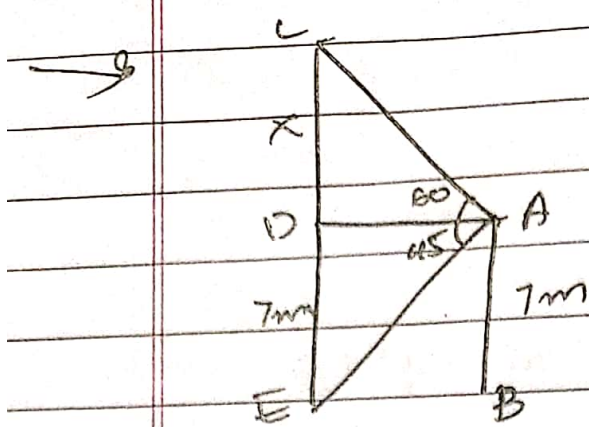
$$AB = 10\sqrt{3}$$

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

$$\frac{10\sqrt{3}}{\sqrt{3}}$$

$$= 10 \text{ m}$$

3) There is a building of $h = 7 \text{ m}$ next to a cable tower of unknown h . From the top of building, the angle of inclination of the top of the tower is 45° . Find the h of the cable tower.



$$CE = CD + DE \quad \text{--- (1)}$$

In $\triangle ADE$

$$\angle DAE = 45^\circ$$

$$DE = 7m$$

$$\tan 45 = 7/AD$$

$$1 = 7/AD$$

$$AD = 7m$$

In $\triangle ACD$,

$$\angle CAD = 60^\circ$$

$$AD = 7m$$

$$\tan 60^\circ = CD/AD$$

$$\sqrt{3} = x/7$$

$$x = 7\sqrt{3}$$

From eqn (1)

$$CE = CD + DE$$

$$CE = 7 + 7\sqrt{3}$$

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