Short Answer Type Questions – I

[2 marks]

Write true or false in each of the following and justify your answer (Q. 1 to 4).

Que 1. The angle of elevation of the top of a tower is 30°. If the height of the tower is doubled, then the angle of elevation of its top will also be doubled.

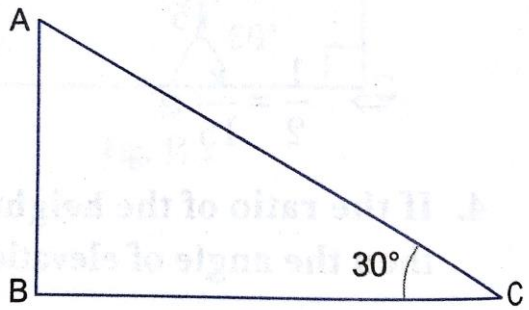

Fig. 11.12

Sol. False, let AB be the tower of height h **(Fig. 11.12)**

Then, $\tan 30° = \frac{h}{BC}$

$\Rightarrow \quad \frac{1}{\sqrt{3}} = \frac{h}{BC}$ …(i)

When AB = 2h, $\tan\theta = \frac{2h}{BC} = 2 \times \frac{1}{\sqrt{3}}$ $[Using\ (i)]$

$\Rightarrow \quad \theta \neq 60°$

Que 2. If the height of a tower and the distance of the point of observation from its foot, both are increased by 10%, then the angle of elevation of its top remains unchanged.

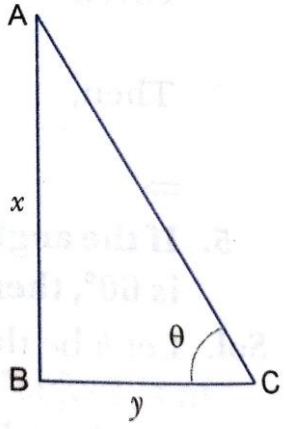

Fig. 11.13

Sol. True,

Let AB = x, BC = y **(Fig. 11.13)** (AB be the tower)

Then, $\tan\theta = \frac{x}{y}$

When, $AB = x + 10\%\ of\ x = x + \frac{1}{10}x = \frac{11}{10}x$

$BC = y + 10\%\ of\ y = y + \frac{1}{10}y = \frac{11}{10}y$

Then, $\frac{AB}{BC} = \frac{\frac{11}{10}x}{\frac{11}{10}y} = \frac{x}{y} = \tan\theta$

Que 3. If a man standing on a platform, 3 metres above the surface of a lake observes a cloud and its reflection in the lake, then the angle of elevation of the cloud is equal to the angle of depression of its reflection.

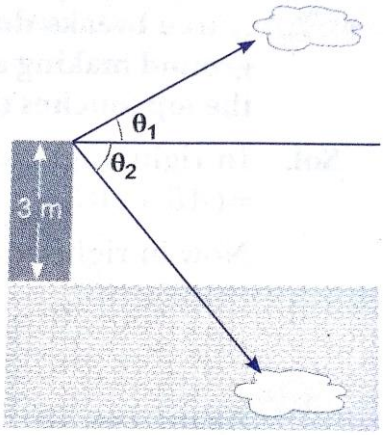

Fig. 11.14

Sol. False, $\theta_1 = \theta_2$ **(Fig. 11.14)**

Que 4. Find the angle of elevation of the sun when the shadow of a pole h m high is $\sqrt{3}$ h m long.

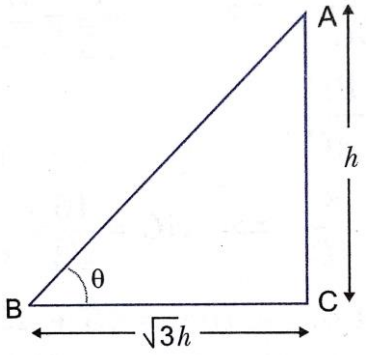

Fig. 11.15

Sol. In ΔABC

$$\tan\theta = \frac{AB}{BC} = \frac{h}{\sqrt{3}\,h}$$

$$\Rightarrow \quad \tan\theta = \frac{1}{\sqrt{3}} = \tan 30°$$

$$\therefore \quad \theta = 30°$$

Que 5. The height of a tower is 12 m. What is the length of its shadow when sun's altitude is 45°?

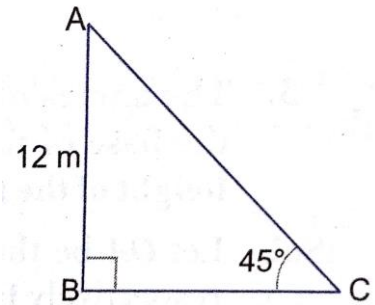

Fig. 11.16

Sol. Let AB be the tower **[Fig. 11.16].**

Then, $\angle C = 45°,\ AB = 12\ m$

$$\tan 45° = \frac{AB}{BC} = \frac{12}{BC} \quad \Rightarrow \quad 1 = \frac{12}{BC} \quad \Rightarrow \quad BC = m$$

$\therefore$ The length of the shadow is 12 m.

Que 6. A circus artist is climbing a 20 m long pore, which is tight 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 ° [Fig. 11.17].

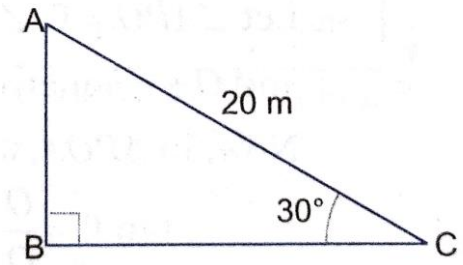

Fig. 11.17

Sol. Let AB be the vertical pole and AC be the long rope tied to point C.

In rightΔABC. We have

$$\sin 30° = \frac{AB}{AC} \quad \Rightarrow \quad \frac{1}{2} = \frac{AB}{20} \quad \Rightarrow \quad \frac{20}{2} = AB \quad \Rightarrow \quad AB = 10\ m$$

Therefore, height of the pole is 10 m.