

GRADE X

Question Bank (MATHEMATICS)

Chapter-9 APPLICATIONS OF TRIGONOMETRY

1 marks:

1. From a point on the ground, which is 30 m away from the foot of the vertical tower, the angle of elevation of the top of the tower is found to be 60° . The height (in metres) of the tower is: **[BOARD 2024]**

a) $10\sqrt{3}$ b) $30\sqrt{3}$ c) 60 d) 30

2. At some time of the day, the length of the shadow of a tower is equal to its height. Then, the Sun's altitude at the time is **[BOARD 2024]**

a) 30° b) 45° c) 60° d) 90°

3. If a vertical pole of length 7.5 m casts a shadow 5m long on the ground and at the same time, a tower casts a shadow 24m long, then the height of the tower is:

[BOARD 2024]

a) 20m b) 40m c) 60m d) 80m

4. The ratio of the length of the pole and its shadow on the ground is $1:\sqrt{3}$. The angle of elevation of the Sun is: **[BOARD 2024]**

a) 90° b) 60° c) 45° d) 30°

5. The length of the shadow of a tower on the plane ground is $\sqrt{3}$ times the height of the tower. The angle of elevation of the Sun is: **[BOARD 2024]**

a) 30° b) 45° c) 60° d) 90°

6. If a pole 6m high casts a shadow $2\sqrt{3}m$ long on the ground, then Sun's elevation is

[BOARD 2023]

a) 30° b) 45° c) 60° d) 90°

7. If the angle of depression of an object from a 75m high tower is 30° then the distance of the object from the tower is

a) $25\sqrt{3}m$ b) $50\sqrt{3}m$ c) $75\sqrt{3}m$ d) 150 m

8. A tree casts a shadow 15m long on the level of ground, when the angle of elevation of the Sun is 45° . The height of a tree is

a) 10 m b) 14 m c) 8 m d) 15 m

9. 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, then the height of the pole, if the angle made by the rope with the ground level is 30° , is
- a) 5 m b) 10 m c) 15 m d) 20 m
10. An observer, 1.5 m tall is 20.5 m away from a tower 22 m high, then the angle of elevation of the top of the tower from the eye of the observer is
- a) 10 m b) 14 m c) 8 m d) 15 m
11. From the top of 7 m high building the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 45° , then the height of the tower is
- a) 14.124 m b) 17.124 m c) 19.124 m d) 15.124 m
12. A tree is broken by the wind. The top stuck the ground at an angle of 30° and at a distance of 10 m from its foot. The whole height of the tree is
- a) $10\sqrt{3}$ m b) $3\sqrt{10}$ m c) $20\sqrt{3}$ m d) $3\sqrt{20}$ m

2 marks:

1. The length of the shadow of a tower on the plane ground is $\sqrt{3}$ times the height of the tower. Find the angle of elevation of the Sun. **[BOARD 2023]**
2. The angle of elevation of the top of a tower from a point on the ground is 30m away from the foot of the tower, is 30° . Find the height of the tower. **[BOARD 2023]**
3. Find the length of the shadow on the ground of a pole of height 18m when angle of elevation θ of the Sun is such that $\tan \theta = \frac{6}{7}$. **[BOARD 2023]**

3 marks:

1. 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 a tower from the foot of the building is 60° . If the tower is 50 m high, then find the height of the building.
2. The top of two poles of height 16 m and 10 m are connected by a length 'l' meter. If the wire makes an angle of 30° with the horizontal, then find 'l'.
3. An electric pole is 10 m high. A steel wire tied to top of the pole is affixed at a point on the ground to keep the pole up right. If the wire makes an angle of 45° with the horizontal through the foot of the pole, find the length of the wire. (Use $\sqrt{2} = 1.414$)
4. A boy, flying a kite with a string of 85 m long, which is making an angle θ with the ground. Find the height of the kite. (Given $\tan \theta = \frac{15}{8}$)

5 marks:

1. A pole of 6m high is fixed on the top of the tower. The angle of elevation of the top of the pole observed from a point P on the ground is 60° and the angle of depression of the point P from the top of the tower is 45° . Find the height of the tower and the distance of the point P from the foot of the tower. (Use $\sqrt{3} = 1.73$)

[BOARD 2024]

2. From the top of a building 60m high, the angles of depression of the top and bottom of the vertical lamp post are observed to be 30° and 60° respectively.

- (i) Find the horizontal distance between the building and the lamp post.
(ii) Find the distance between the tops of the building and the lamp post.

[BOARD 2024]

3. From the top of a 15m high building, the angle of elevation of the top of a tower is found to be 30° . From the bottom of the same building, the angle of elevation of the top of the tower is found to be 60° . Find the height of the tower and the distance between tower and the building.

[BOARD 2024]

4. As observed from the top of a 75m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 60° . If one ship is exactly behind the other on the same side of the lighthouse, find the distance between two ships.

(Use $\sqrt{3} = 1.73$)

[BOARD 2023]

5. From the top of 45m high light house, the angles of depression of two ships, on the opposite side of it, are observed to be 30° and 60° . If the line joining the ships passes through the foot of the light house, find the distance between the ships.

(Use $\sqrt{3} = 1.73$)

[BOARD 2024]

6. The angle of elevation of an aircraft from a point A on the ground is 60° . After a flight of 30 seconds, the angle of elevation changes to 30° . The aircraft is flying at a constant height of $3500\sqrt{3}m$ at a uniform speed. Find the speed of the aircraft.

[BOARD 2024]

7. A person standing on the bank of a river observes that the angle of elevation of the top of a tower on the opposite bank is 60° . When he moves 30m away from the bank, he finds the angle of elevation to be 30° . Find the height of the tower and width of the river. (Use $\sqrt{3} = 1.732$)

[BOARD 2024]

8. 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 20m high building are 45° and 60° respectively. Find the height of the tower. **[BOARD 2024]**
9. Two pillars of equal lengths stand on either side of a road which is 100m wide, exactly opposite to each other. At a point on the road between the pillars, the angles of elevation of the tops of the pillars are 60° and 30° . Find the length of each pillar and distance of the point on the road from the pillars. (Use $\sqrt{3} = 1.732$) **[BOARD 2024]**
10. The angles of depression of the top and the bottom of a 50 m high building from the top of a tower are 45° and 60° , respectively. Find the height of the tower. (Use $\sqrt{3} = 1.73$) **[BOARD 2024]**
11. From a top of 7m high building, the angle of elevation of the top a cable tower is 60° and the angle of depression of its foot is 30° . Find the height of the tower. **[BOARD 2023]**
12. The angles of depression of the top and the bottom of a 8m tall building from the top of a multi-storied building are 30° and 45° respectively. Find the height of the multi-storied building and the distance between the two buildings. **[BOARD 2024]**
13. From a point on a bridge across the river, the angles of depressions of the banks on opposite sides of the river are 30° and 60° respectively. If the bridge is at a height of 4m from the banks, find the width of the river. **[BOARD 2024]**
14. From a window 15 m high above the ground in a street, the angles of elevation and depression of top and the foot of another house on the opposite side of the street are 30° and 45° respectively. Find the height of the opposite house. (Use $\sqrt{3} = 1.732$) **[BOARD 2024]**
15. The angle of elevation of the top of a tower 24m high from the foot of another tower in the same plane is 60° . The angle of elevation of the top of second tower from the foot of the first tower is 30° . Find the distance between two towers and the height of the other tower. Also, find the length of wire attached to the tops of both the towers. **[BOARD 2023]**
16. A spherical balloon of radius 'r' subtends an angle of 60° at the eye of an observer. If the angle of elevation of its centre is 45° from the same point, then prove that height of the centre of the balloon is $\sqrt{2}$ times its radius. **[BOARD 2023]**