Test Paper - Heights and Distance - ICSE 10 th [Revision]

Multiple Choice Questions

A. Multiple Choice Questions [1 Mark]
Choose the correct option:

1. If the length of the shadow of a pole is equal to its height, then the angle of elevation of Sun is:
   (a) 30° (b) 45° (c) 60° (d) 90°
2. If the length of the shadow of a tower is increasing, then the angle of elevation of the Sun is:
   (a) increasing (b) first increasing, then decreasing (c) decreasing (d) not changed
3. 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:
   (a) gets doubled (b) remains unchanged (c) gets tripled (d) becomes half
4. If the angle of elevation of the sun is 60° and the length of the shadow of a tower is 30 m, then the height of the tower is:
   (a)] $3\sqrt{3}$ [(b)] $\sqrt{3}$ [(c)] $30\sqrt{3}$ [(d)] $2\sqrt{3}$
5. The angles of depression of two objects from the top of a 100 m hill lying to its east are found to be 45° and 30°. The distance between the two objects is ($\sqrt{3} = 1.73$):
   [(a)] 73.2 m (b)] 107.5 m [(c)] 150 m [(d)] 200 m
6. **6.** A kite is attached to a string. The length of the string, when the height of the kite is 60 m and the string makes an angle of 30° with the ground, is:
   (a) 120 m (b) 30 m (c) 60 m (d) 50 m
7. **7.** The angle of elevation a plane $2x$ metres above the ground from a point x metres above the ground is 0. At this moment, the angle of depression of a point just below the plane will be:
   (a) $\sin(45° - \theta)$ (b) $\cot(45° - \theta)$ (c) 2θ (d) 0
8. **8.** If the angles of elevation of the top of a vertical tower from two points A and B on the ground are respectively 30° and 60°, then the ratio of the distances of A and B from the upper end of the tower is:
   (a) $\sqrt{3} : 1$ (b) $1 : \sqrt{3}$ (c) $\sqrt{3} + 1 : 1$ (d) $1 : \sqrt{3} - 1$
9. **9.** A ladder 15 m long just reaches the top of a vertical wall. If the ladder makes an angle of 60° with the wall, then the height of the wall is:
   (a) 6.5 m (b) 7.5 m (c) 8.5 m (d) $\frac{15}{\sqrt{3}}$ m
10. **10.** 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°, then the height of the tower is:
    (a) $6\sqrt{3}$ m (b) $15\sqrt{3}$ m (c) 18 m (d) $\frac{25}{\sqrt{3}}$ m
11. **11.** A bridge, in the shape of a straight path, across a river, makes an angle of 60° with the width of the river. If the length of the bridge is 100 metres, then the width of the river is:
    (a) 50 m (b) 175.5 m (c) 92 m (d) 100 m
12. **12.** An observer 1.5 metres tall is 18.5 metres away from the tower. If the angle of elevation of the top of the tower from his eye is 45°, the height of the tower is:
    (a) 15 m (b) 20 m (c) 8.5 m (d) 25.6 m
13. **13.** The shadow of a tower, standing on a level ground, is found to be 40 m longer when Sun's altitude is 30° than when it was 60°. Then the height of the tower is:
    (a) 20 m (b) $10\sqrt{3}$ m (c) 10 m (d) $20\sqrt{3}$ m

14. **14.** 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 the height of 30 m from the bank, then the width of the river is:

    (a) 90 m (b) $30\sqrt{3}$ m (c) $30\sqrt{3}+1$ m (d) $25\sqrt{3}-1$ m

15. **15.** The angles of depression of two ships from the top of a lighthouse are 45° and 30° towards east. If the ships are 10 m apart, the height of the lighthouse is:

    (a) $\frac{20}{\sqrt{3}+1}$ m (b) $\frac{20}{\sqrt{3}-1}$ m (c) $50(\sqrt{3}-1)$ m (d) $50(\sqrt{3}+1)$ m

B. Short Answer Type Questions [3 Marks]

1. A circus artist is climbing a 30 m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground. Find the distance of the pole to the peg in the ground, if the angle made by the rope with the ground level is 30°.
2. A tree is broken by the wind. Find the total height of the tree if the top struck the ground at an angle of 30° and at a distance of 18 m from the foot of the pole.
3. A man standing on the top of a vertical tower observes a car moving towards the tower at a uniform speed. If it takes 10 minutes for the angle of depression to change from 30° to 45°, how soon after this will the car reach the tower?
4. The angles of elevation of the top of a vertical tower from two points, at a distance a and b $(a > b)$ from the base and in the same straight line with it are complementary. Find the height of the tower.
5. If the angle of depression of the top and the bottom of a tower as observed from the top of a h metre high cliff are 30° and 60° respectively, prove that the height of the tower is $\frac{2h}{3}$.
6. The angle of elevation of the top of a vertical tower PQ from a point X on the ground is 60°. From a point Y, 40 m vertically above X, the angle of elevation of the top Q of the tower is 45°. Find the height of the tower PQ and distance PX. (Use $\sqrt{3} = 1.73$).
7. A man observes the angle of elevation of the top of a building to be 30°. He walks towards it in a horizontal line through its base. On covering 60 m, the angle of elevation changed to 60°. Find the height of the building.

C. Long Answer Type Questions [4 Marks]

1. An observer measures angles of elevation of two towers of equal height from a point between the towers. The angles of elevation of the tops of the two towers from this point are 60° and 30°. If this point is at a distance of 120 m from the first tower, find the distance between the towers.
2. Two towers AB and CD are standing at some distance apart. From the top of tower AB, the angle of depression of the foot of tower CD is 30°. From the top of tower CD, the angle of depression of the foot of tower AB is 60°. If the height of tower CD is h m, then prove that the height of tower AB is $\frac{h}{3}$ m.
3. Two poles of equal heights are standing opposite to each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of poles are 60° and 30° respectively. Find the height of poles and the distances of the point from the poles.
4. An aeroplane is flying at a height of 300 m above the ground. Flying at this height, the angles of depression from the plane to two points on both banks of a river in opposite directions are 45° and 60° respectively. Find the width of the river. (Use $\sqrt{3} = 1.73$).
5. There is a building of height 7 m next to a cable tower of unknown height. From the top of the building, the angle of elevation of the top of the tower is 60° and the angle of depression to the foot of the tower is 45°. Find the height of the cable tower.

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