PRACTICE PAPER

ICSE CLASS 10 – MATHEMATICS

Chapter 22 : Heights and Distances

(Trigonometry : Angles of Elevation and Depression)

Maximum Marks: 40 Time allowed: One and a half hours

1. *Answers to this Paper must be written on the paper provided separately.*
2. *You will not be allowed to write during the first 10 minutes. This time is to be spent in reading the question paper.*
3. ***The time given at the head of this Paper is the time allowed for writing the answers.***
4. *Attempt **all** questions from **Section A** and **any two** questions from **Section B**.*
5. ***All working, including rough work, must be clearly shown, and must be done on the same sheet as the rest of the answer.***
6. ***Omission of essential working will result in loss of marks.***
7. *The intended marks for questions or parts of questions are given in brackets [ ].*
8. *Figures given in the questions are rough sketches and are not drawn to scale. Mathematical tables are not required; take √3 = 1.732 wherever needed.*

Question 1

Choose the correct answers to the questions from the given options. [8]

(Do not copy the question, write the correct answers only.)

(i) The angle of elevation of the top of a tower from a point on the ground, 20 m away from its foot, is 45°. The height of the tower is:

(a) 10 m
(b) 20 m
(c) 40 m
(d) 20√2 m

(ii) The length of the shadow of a pole is √3 times its height. The angle of elevation of the sun is:

(a) 30°
(b) 45°
(c) 60°
(d) 90°

(iii) From the top of a cliff, the angle of depression of a boat is 30°. The angle of elevation of the top of the cliff from the boat is:

(a) 60°
(b) 30°
(c) 90°
(d) 0°

(iv) A ladder 10 m long leans against a vertical wall and makes an angle of 60° with the ground. The height of the point where the ladder touches the wall is:

(a) 5 m
(b) 10 m
(c) $5\sqrt{3}$ m
(d) $10\sqrt{3}$ m

(v) A tower 30 m high is observed at an angle of elevation of 60° from a point on level ground. The distance of the point from the foot of the tower is:

(a) $30\sqrt{3}$ m
(b) $10\sqrt{3}$ m
(c) 30 m
(d) 15 m

(vi) As an observer walks towards the foot of a tower, the angle of elevation of the top of the tower:

(a) increases
(b) decreases
(c) remains the same
(d) becomes 90°

(vii) **Assertion (A):** If the angle of elevation of the top of a tower from a point P on the ground is 45°, the height of the tower equals the distance of P from its foot.

Reason (R): $\tan 45° = 1$.

(a) (A) is true and (R) is false.
(b) (A) is false and (R) is true.
(c) Both (A) and (R) are true, and (R) is the correct explanation for (A).
(d) Both (A) and (R) are true, but (R) is not the correct explanation for (A).

(viii) **Assertion (A):** The angle of elevation of the top of a tower increases as the observer walks away from the tower.

Reason (R): For a tower of fixed height, $\tan\theta$ = height ÷ distance decreases as the distance increases.

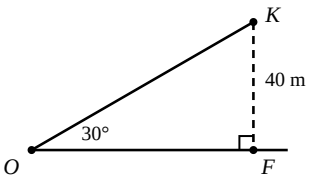
(a) (A) is true and (R) is false.
(b) (A) is false and (R) is true.
(c) Both (A) and (R) are true, and (R) is the correct explanation for (A).
(d) Both (A) and (R) are true, but (R) is not the correct explanation for (A).

Question 2

(i) The angle of elevation of the top of a tower from a point on level ground, 60 m away from its foot, is 30°. Find the height of the tower, correct to two decimal places. [4]

(ii) A ladder 12 m long rests against a vertical wall and makes an angle of 60° with the ground. Find (a) the height reached by the ladder on the wall, correct to two decimal places, and (b) the distance of the foot of the ladder from the wall. [4]

(iii) A kite is flying at a height of 40 m above the ground. The string attached to it is stretched straight and makes an angle of 30° with the horizontal ground (see figure). Find (a) the length of the string (b) the horizontal distance of the boy from the point on the ground vertically below the kite, correct to two decimal places. [4]

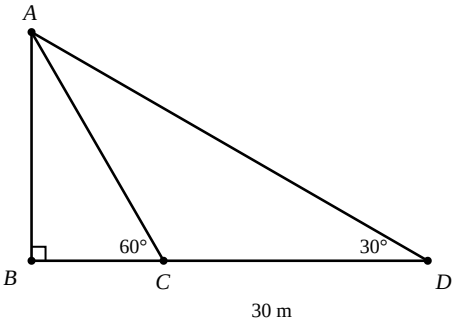


SECTION B (20 Marks)

*(Attempt **any two** questions from this Section.)*

Question 3

In the figure, AB is a vertical tower. C and D are two points on the level ground on the same side of the tower, in a straight line with its foot B. The angles of elevation of the top A from C and D are 60° and 30° respectively, and CD = 30 m.



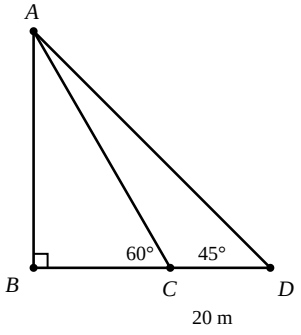
(i) Taking AB = h metres, express BC and BD in terms of h. [3]

(ii) Form an equation in h and hence find the height of the tower, correct to two decimal places. [3]

(iii) Find the distances of C and D from the foot of the tower. [4]

Question 4

The length of the shadow of a vertical tower AB on level ground increases by 20 m when the angle of elevation of the sun changes from 60° to 45° (see figure).



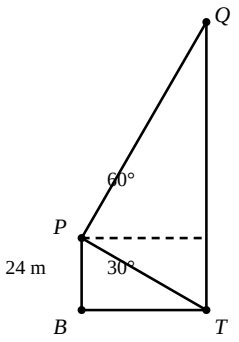
(i) Taking AB = h metres, express the lengths of the shadow in the two cases in terms of h. [3]

(ii) Form an equation and find the height of the tower, correct to two decimal places. [3]

(iii) Find the length of the shadow in each case. [4]

Question 5

From the top P of a building 24 m high, the angle of elevation of the top Q of a tower is 60° and the angle of depression of the foot T of the tower is 30°. The building and the tower stand on the same level ground (see figure).



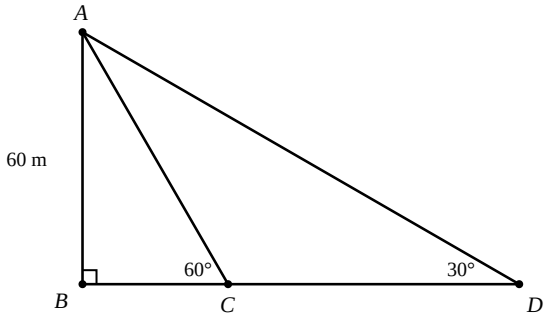
(i) Find the horizontal distance between the building and the tower, correct to two decimal places. [3]

(ii) Find the height of the top of the tower above the point P. [3]

(iii) Find the total height of the tower and the distance PQ, correct to two decimal places. [4]

Question 6

A lighthouse AB is 60 m high. From its top A, the angles of depression of two ships C and D on the same side of the lighthouse are 60° and 30° respectively (see figure).



(i) Find the distance BC, correct to two decimal places. [3]

(ii) Find the distance BD, correct to two decimal places. [3]

(iii) Find the distance between the ships (a) as shown in the figure (b) if the ships were on opposite sides of the lighthouse. [4]

— End of Question Paper —