

CLASS 10 — MATHEMATICS

Chapter: Some Applications of Trigonometry

Practice Worksheet | CBSE Pattern

Maximum Marks: 40

Time Allowed: 1 hour 30 minutes

Name: _____

Class/Section: _____ Date: _____

General Instructions:

1. All questions are compulsory.
2. Read each question carefully before answering.
3. Show complete working for questions requiring calculations or proofs.
4. Select only one option for each MCQ.
5. Marks for each question are indicated alongside the question.
6. Write mathematical steps clearly and use appropriate notation.

This paper has 21 questions in five sections: A (Q1–Q10, 1 mark each), B (Q11–Q15, 2 marks each), C (Q16–Q19, 3 marks each), D (Q20, 4 marks) and E (Q21, case study, 4 marks). Draw a neat figure for each question in Sections B to D. Figures are not drawn to scale.

SECTION A

Multiple Choice Questions — Q1 to Q10 carry 1 mark each.

- Q1.** The angle of elevation of the sun, when the shadow of a vertical pole is equal to the height of the pole, is **[1 mark]**
(A) 30° (B) 45°
(C) 60° (D) 90°
- Q2.** A ladder 10 m long leans against a vertical wall and makes an angle of 60° with the ground. The height at which the ladder touches the wall is **[1 mark]**
(A) $5\sqrt{3}$ m (B) 5 m
(C) $10\sqrt{3}$ m (D) $\frac{10}{\sqrt{3}}$ m
- Q3.** The angle of elevation of the top of a 50 m high tower from a point on the ground is 60° . The distance of the point from the foot of the tower is **[1 mark]**
(A) $50\sqrt{3}$ m (B) 25 m
(C) $\frac{50}{\sqrt{3}}$ m (D) 100 m
- Q4.** The angle of elevation of the top of a tower from a point $30\sqrt{3}$ m away from its foot is 30° . The height of the tower is **[1 mark]**
(A) $10\sqrt{3}$ m (B) 90 m
(C) $30\sqrt{3}$ m (D) 30 m

- Q5.** From the top of a cliff, the angle of depression of a boat on the sea is 30° . The angle of elevation of the top of the cliff from the boat is **[1 mark]**
 (A) 60° (B) 30°
 (C) 90° (D) 45°
- Q6.** The length of the shadow of a vertical pole is $\sqrt{3}$ times its height. The angle of elevation of the sun is **[1 mark]**
 (A) 30° (B) 45°
 (C) 60° (D) 90°
- Q7.** A kite is attached to a straight string 100 m long. The string makes an angle of 30° with the ground. The height of the kite above the ground is **[1 mark]**
 (A) $50\sqrt{3}$ m (B) $100\sqrt{3}$ m
 (C) 50 m (D) 25 m
- Q8.** The angle of elevation of the top of a tower changes from 30° to 60° as an observer walks 40 m towards it along level ground. The height of the tower is **[1 mark]**
 (A) $40\sqrt{3}$ m (B) 20 m
 (C) $\frac{40}{\sqrt{3}}$ m (D) $20\sqrt{3}$ m

In Q9 and Q10, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

- Q9. Assertion (A):** As an observer walks towards a vertical tower on level ground, the angle of elevation of its top increases. **[1 mark]**
Reason (R): $\tan \theta = \text{height} \div \text{horizontal distance}$. As the distance decreases, $\tan \theta$ increases, and for acute angles a larger value of $\tan \theta$ means a larger angle θ .
 (A) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
 (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
 (C) Assertion (A) is true, but Reason (R) is false.
 (D) Assertion (A) is false, but Reason (R) is true.
- Q10. Assertion (A):** The angle of elevation of the top of a 10 m high pole from a point on the ground 10 m away from its foot is 60° . **[1 mark]**
Reason (R): $\tan 45^\circ = 1$.
 (A) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
 (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
 (C) Assertion (A) is true, but Reason (R) is false.
 (D) Assertion (A) is false, but Reason (R) is true.

SECTION B

Very Short Answer Questions — Q11 to Q15 carry 2 marks each.

Q11. A vertical pole casts a shadow $6\sqrt{3}$ m long when the angle of elevation of the sun is 30° . Find the height of the pole. **[2 marks]**

Q12. An observer whose eyes are 1.6 m above the ground stands $20\sqrt{3}$ m away from a tower. The angle of elevation of the top of the tower from his eyes is 30° . Find the height of the tower. **[2 marks]**

Q13. From the top of a cliff 60 m high, the angle of depression of a boat is 45° . Find the distance of the boat from the foot of the cliff. **[2 marks]**

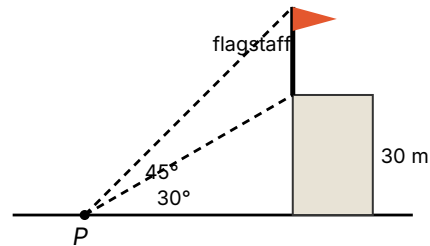
Q14. A wire is stretched from the top of a 12 m high vertical pole to a point on the ground, making an angle of 60° with the ground. Find the length of the wire. (Take $\sqrt{3} = 1.73$) **[2 marks]**

Q15. Find the angle of elevation of the sun when the shadow of a 15 m high tower is $5\sqrt{3}$ m long. **[2 marks]**

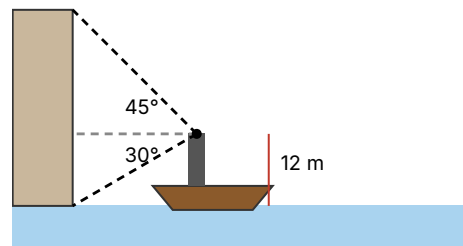
SECTION C

Short Answer Questions — Q16 to Q19 carry 3 marks each.

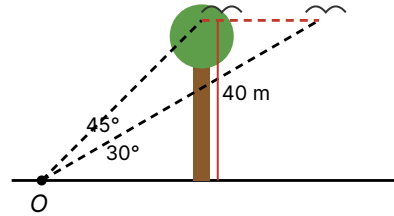
- Q16.** A flagstaff stands on top of a building 30 m high. From a point P on the ground, the angles of elevation of the bottom and the top of the flagstaff are 30° and 45° respectively. Find the length of the flagstaff. (Take $\sqrt{3} = 1.732$) **[3 marks]**



- Q17.** A man on the deck of a ship, 12 m above the water level, observes that the angle of elevation of the top of a cliff is 45° and the angle of depression of its base is 30° . Find the distance of the cliff from the ship and the height of the cliff. **[3 marks]**



- Q18.** A bird is sitting on top of a 40 m high tree. From a point O on the ground, the angle of elevation of the bird is 45° . The bird flies away horizontally, keeping the same height. After 4 seconds, the angle of elevation of the bird from O is 30° . Find the speed of the bird. (Take $\sqrt{3} = 1.732$) **[3 marks]**



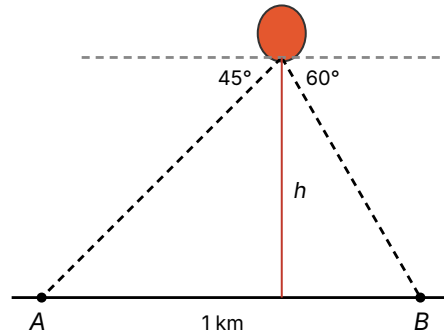
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- Q19.** Two buildings stand on opposite sides of a road 60 m wide. From the top of the shorter building, which is 20 m high, the angle of elevation of the top of the taller building is 30° . Find the height of the taller building. **[3 marks]**
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SECTION D

Long Answer Question — Q20 carries 4 marks.

- Q20.** A balloon is vertically above a straight road. The angles of depression of two consecutive kilometre stones A and B, on opposite sides of the balloon, are 45° and 60° , as shown. Find the height of the balloon above the road, in metres. (Take $\sqrt{3} = 1.732$)

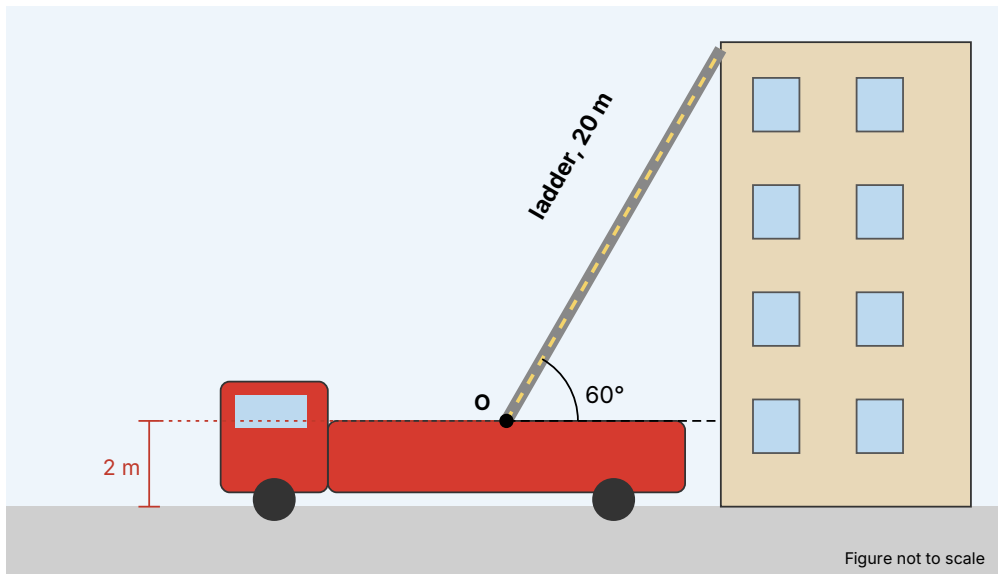
[4 marks]



SECTION E

Case Study Based Question — Q21 carries 4 marks.

- Q21.** A fire engine has an extendable ladder, pivoted at a point O which is **[4 marks]** 2 m above the ground. When fully extended, the ladder is 20 m long. The fire engine is parked so that the ladder, raised at 60° to the horizontal, just touches the wall of a building.



Based on the above information, answer the following questions:

- (i) Find the height above the ground reached by the top of the fully extended ladder at 60° . (Take $\sqrt{3} = 1.732$) **[1 mark]**
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- (ii) Find the horizontal distance between the pivot O and the wall. **[1 mark]**
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- (iii) Without moving the fire engine, the ladder must reach a window 12 m above the ground. At what angle to the horizontal must the ladder be raised, and how long must it be extended? **[2 marks]**
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