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Some Applications of Trigonometry — CBSE Class 10 Mathematics Chapter Test

FREE CHAPTER TEST · CLASS X · MATHEMATICS (041) · PATTERN OF THE CBSE SAMPLE QUESTION PAPER 2026-27

TIME ALLOWED	MAXIMUM MARKS	QUESTIONS	NAME / ROLL NO.
1½ hours	40	19 (A 10 · B 3 · C 2 · D 2 · E 2)	

GENERAL INSTRUCTIONS

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 19 questions. All questions are compulsory.
2. This question paper is divided into five sections: A, B, C, D and E.
3. In Section A, Questions 1 to 8 are multiple choice questions (MCQs) and Questions 9 and 10 are assertion-reason based questions of 1 mark each.
4. In Section B, Q11–13 are very short answer (VSA) type questions, carrying 2 marks each.
5. In Section C, Q14–15 are short answer (SA) type questions, carrying 3 marks each.
6. In Section D, Q16–17 are long answer (LA) type questions, carrying 5 marks each.
7. In Section E, Q18–19 are case study based questions, carrying 4 marks each, with sub-parts of the values of 1, 1 and 2 marks.
8. There is no overall choice. However, an internal choice has been provided in 1 question of Section B, 1 question of Section C, 1 question of Section D and in the 2-mark sub-part of each question of Section E.
9. Use of calculators is not allowed.
10. This chapter test follows the section structure, question types and marks per question of the CBSE Class X Mathematics (Standard, 041) Sample Question Paper 2026-27, at half the length of the 80-mark board paper: 40 marks in 1½ hours.
11. The answer key and the marking scheme are at the end of this booklet. Attempt the paper in 1½ hours before you look at them.

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Chapter: Some Applications of Trigonometry · **Topics:** Angle of elevation · Angle of depression · One right triangle · Two right triangles · Shadows, kites, towers and ships

SECTION A

This section comprises 10 questions of 1 mark each: 8 multiple choice questions (MCQs) and 2 assertion-reason based questions.

1. The angle of elevation of the top of a tower 30 m high, from a point on the ground 30 m from its foot, is 1

(A) 30° (B) 45°

(C) 60° (D) 90°

2. A ladder 10 m long makes an angle of 60° with the ground. The height it reaches on the wall is 1

(A) 5 m (B) $10\sqrt{3}$ m

(C) $5\sqrt{3}$ m (D) $\frac{10}{\sqrt{3}}$ m

3. The shadow of a tower is $\sqrt{3}$ times its height. The angle of elevation of the sun is 1

(A) 30° (B) 45°

(C) 60° (D) 90°

4. From the top of a cliff 60 m high, the angle of depression of a boat is 30°. The distance of the boat from the foot of the cliff is 1

(A) $20\sqrt{3}$ m (B) 60 m

(C) $30\sqrt{3}$ m (D) $60\sqrt{3}$ m

5. A kite string 100 m long makes an angle of 60° with the level ground. The height of the kite (string taut and straight) is 1

(A) $50\sqrt{3}$ m (B) $100\sqrt{3}$ m

(C) 50 m (D) $\frac{50}{\sqrt{3}}$ m

6. When the shadow of a pole is equal to its height, the sun's altitude is 1

(A) 30° (B) 60°

(C) 45° (D) 90°

7. The angle of elevation of the top of a tower from a point P on the ground is 60°. The angle of depression of P from the top of the tower is 1

(A) 30° (B) 60°

(C) 90° (D) 120°

8. A pole 6 m high casts a shadow $2\sqrt{3}$ m long. The angle of elevation of the sun is 1

(A) 30° (B) 45°

(C) 90° (D) 60°

9. **Assertion (A):** If the length of the shadow of a tower increases, the angle of elevation of the sun decreases. 1

Reason (R): For a tower of fixed height h and shadow s, $\tan\theta = h/s$, which decreases as s increases.

(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.

10. **Assertion (A):** The angle of elevation of the top of a tower 15 m high from a point $15\sqrt{3}$ m from its foot is 60°. 1

Reason (R): $\tan 30° = \frac{1}{\sqrt{3}}$.

(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

This section comprises 3 very short answer (VSA) type questions of 2 marks each.

11. (a) The angle of elevation of the top of a vertical tower from a point on the ground 15 m from its foot is 60°. Find the height of the tower. 2

OR

(b) A kite is flying at a height of 60 m above the ground. Its string, taut and straight, makes an angle of 60° with the ground. Find the length of the string.

12. An observer 1.5 m tall is 28.5 m away from a tower 30 m high. Find the angle of elevation of the top of the tower from his eyes. 2

13. A tree breaks in a storm; the broken part bends so that its top touches the ground 8 m from the foot of the tree, making an angle of 30° with the ground. Find the original height of the tree. 2

SECTION C

This section comprises 2 short answer (SA) type questions of 3 marks each.

14. (a) From the top of a 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°. Find the height of the tower. 3

OR

(b) The angle of elevation of the top of a tower from a point on the ground is 30°. After walking 20 m towards the tower, it becomes 60°. Find the height of the tower.

15. A statue 1.6 m tall stands on a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and that of the top of the pedestal is 45°. Find the height of the pedestal. 3

SECTION D

This section comprises 2 long answer (LA) type questions of 5 marks each.

16. (a) From a point on a bridge across a river, the angles of depression of the banks on opposite sides are 30° and 45°. If the bridge is 3 m above the water, find the width of the river. 5

OR

(b) A 1.2 m tall girl sees a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from her eyes changes from 60° to 30°. Find the distance travelled by the balloon.

17. A man on the deck of a ship is 10 m above the water. He observes that the angle of elevation of the top of a cliff is 60° 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. 5

SECTION E

This section comprises 2 case study based questions of 4 marks each, with sub-parts of 1, 1 and 2 marks.

18. From the top of a lighthouse 75 m high, the angles of depression of two ships on the same side of it, one directly behind the other, are 45° and 30°.

(i) Find the distance of the nearer ship from the foot of the lighthouse. [1]

(ii) Find the distance of the farther ship from the foot of the lighthouse. [1]

(iii) Find the distance between the two ships. [2]

OR

(iii) If the angle of depression of the nearer ship were 60°, how far would it be from the foot of the lighthouse? [2]

19. A student 1.5 m tall flies a kite. The string, 100 m long, is taut and straight, and makes an angle of 30° with the horizontal at her hand, which is at the level of her height.

(i) Find the height of the kite above her hand. [1]

(ii) Find the height of the kite above the ground. [1]

(iii) Find the horizontal distance between the student and the point directly below the kite. [2]

OR

(iii) If the string made an angle of 60° instead, find the height of the kite above the ground. [2]

END OF THE QUESTION PAPER

ANSWER KEY — SECTION A

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
(B)	(C)	(A)	(D)	(A)	(C)	(B)	(D)	(A)	(D)

MARKING SCHEME AND WORKED SOLUTIONS

Marks for each step are shown in brackets, as in the CBSE marking scheme. Any correct alternative method earns full marks.

Q1. Answer (B). $\tan\theta = 30/30 = 1$.

Q2. Answer (C). $h = 10 \sin 60° = 5\sqrt{3}$ m.

Q3. Answer (A). $\tan\theta = h/(\sqrt{3}h) = 1/\sqrt{3}$.

Q4. Answer (D). $\tan 30° = 60/d$, $d = 60\sqrt{3}$ m.

Q5. Answer (A). $100 \sin 60° = 50\sqrt{3}$ m.

Q6. Answer (C). $\tan\theta = 1$.

Q7. Answer (B). They are alternate angles, so they are equal.

Q8. Answer (D). $\tan\theta = 6/(2\sqrt{3}) = \sqrt{3}$.

Q9. Answer (A). R explains A. Answer (A).

Q10. Answer (D). $\tan\theta = 15/(15\sqrt{3}) = 1/\sqrt{3}$, so $\theta = 30°$: A is false, R is true. Answer (D).

Q11. (2 marks) Answer: (a) $15\sqrt{3}$ m; (b) $40\sqrt{3}$ m.
(a) $\tan 60° = h/15$ [1], $h = 15\sqrt{3}$ m. [1]
OR (b) $\sin 60° = 60/l$ [1], $l = 60 \times 2/\sqrt{3} = 40\sqrt{3}$ m. [1]

Q12. (2 marks) Answer: 45°.
Height above eye level = $30 - 1.5 = 28.5$ m. [1] $\tan\theta = 28.5/28.5 = 1$, so $\theta = 45°$. [1]

Q13. (2 marks) Answer: $8\sqrt{3}$ m.
Standing part = $8 \tan 30° = 8/\sqrt{3}$ m; broken part = $8/\cos 30° = 16/\sqrt{3}$ m. [1] Height = $24/\sqrt{3} = 8\sqrt{3}$ m. [1]

Q14. (3 marks) Answer: (a) $7(\sqrt{3} + 1)$ m; (b) $10\sqrt{3}$ m.
(a) Distance between building and tower: $7/\tan 45° = 7$ m. [1] Height of tower above the top of the building = $7 \tan 60° = 7\sqrt{3}$ m. [1] Tower = $7 + 7\sqrt{3} = 7(\sqrt{3} + 1)$ m. [1]
OR (b) $h = x \tan 60° = (x + 20) \tan 30°$. [1] $x\sqrt{3} = (x + 20)/\sqrt{3}$, $3x = x + 20$, $x = 10$ m. [1] $h = 10\sqrt{3}$ m. [1]

Q15. (3 marks) Answer: $0.8(\sqrt{3} + 1)$ m.
Let the pedestal be h m and the point x m from its foot. $\tan 45° = h/x$ gives $x = h$. [1] $\tan 60° = (h + 1.6)/h$, so $\sqrt{3}h = h + 1.6$. [1] $h = 1.6/(\sqrt{3} - 1) = 0.8(\sqrt{3} + 1)$ m. [1]

Q16. (5 marks) Answer: (a) $3(\sqrt{3} + 1)$ m; (b) $58\sqrt{3}$ m.
(a) Let P be the point, 3 m above the water at Q. Bank A (30°): $AQ = 3/\tan 30° = 3\sqrt{3}$ m. [2] Bank B (45°): $QB = 3/\tan 45° = 3$ m. [2] Width = $3\sqrt{3} + 3 = 3(\sqrt{3} + 1)$ m. [1]
OR (b) Height of the balloon above her eyes = $88.2 - 1.2 = 87$ m. [1] Horizontal distances: $87/\tan 60° = 87/\sqrt{3}$ and $87/\tan 30° = 87\sqrt{3}$. [2] Distance travelled = $87\sqrt{3} - 87/\sqrt{3} = 87 \times 2/\sqrt{3} = 58\sqrt{3}$ m. [2]

Q17. (5 marks) Answer: $10\sqrt{3}$ m; 40 m.
Distance: $\tan 30° = 10/d$ [1], $d = 10\sqrt{3}$ m. [1] Height of the cliff above his eye level: $d \tan 60° = 10\sqrt{3} \times \sqrt{3} = 30$ m. [2] Height of the cliff = $30 + 10 = 40$ m. [1]

Q18. (4 marks) Answer: (i) 75 m; (ii) $75\sqrt{3}$ m; (iii) $75(\sqrt{3} - 1)$ m, or $25\sqrt{3}$ m.
(i) $75/\tan 45° = 75$ m. [1]
(ii) $75/\tan 30° = 75\sqrt{3}$ m. [1]
(iii)(a) $75\sqrt{3} - 75$ [1] $= 75(\sqrt{3} - 1)$ m. [1]
OR (iii)(b) $75/\tan 60° = 75/\sqrt{3}$ [1] $= 25\sqrt{3}$ m. [1]

Q19. (4 marks) Answer: (i) 50 m; (ii) 51.5 m; (iii) $50\sqrt{3}$ m, or $(50\sqrt{3} + 1.5)$ m.
(i) $100 \sin 30° = 50$ m. [1]
(ii) $50 + 1.5 = 51.5$ m. [1]
(iii)(a) $100 \cos 30°$ [1] $= 50\sqrt{3}$ m. [1]
OR (iii)(b) $100 \sin 60° = 50\sqrt{3}$ m [1]; height above the ground $= (50\sqrt{3} + 1.5)$ m. [1]

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