Class: **X**	Subject: **Mathematics**	Session: **2025-26**
Chapter: **Ch 9: Some Applications of Trigonometry (PYQ)**		

PREVIOUS YEAR QUESTIONS (PYQ)

Chapter 9: Some Applications of Trigonometry

CBSE Board Exam 2019–2025 | With Direct Answers

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This document contains chapter-wise Previous Year Questions from CBSE Class X Board Examinations (2019–2025) for **Chapter 9: Some Applications of Trigonometry**. Each question includes the year of examination, marks allotted, and direct answer for quick revision.

⚠ **NOTE: All questions strictly as per CBSE 2025–26 Syllabus. Topics: Angle of Elevation, Angle of Depression, Heights & Distances, Problems involving 30°, 45°, 60° angles only. Use √3 = 1.73 where required.**

SECTION A: Multiple Choice Questions (1 Mark Each)

[CBSE 2023 | 1 Mark]

Q1. If a pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground, then the sun's elevation is:

(a) 60°
(b) 45°
(c) 30°
(d) 90°

Ans: (a) 60°. $\tan\theta = 6/(2\sqrt{3}) = 3/\sqrt{3} = \sqrt{3} \Rightarrow \theta = 60°$

[CBSE 2022 | 1 Mark]

Q2. The angle of depression of an object on the ground from the top of a 25 m high tower is 30°. The distance of the object from the base of the tower is:

(a) 25 m
(b) $25\sqrt{3}$ m
(c) $25/\sqrt{3}$ m
(d) 50 m

Ans: (b) $25\sqrt{3}$ m. $\tan 30° = 25/d \Rightarrow 1/\sqrt{3} = 25/d \Rightarrow d = 25\sqrt{3}$ m

[CBSE 2021 | 1 Mark]

Q3. When the shadow of a pole h metres high is $\sqrt{3}h$ metres long, the angle of elevation of the Sun is:

(a) 30°
(b) 45°
(c) 60°
(d) 90°

Ans: (a) 30°. $\tan\theta = h/(\sqrt{3}\,h) = 1/\sqrt{3} \Rightarrow \theta = 30°$

[CBSE 2020 | 1 Mark]

Q4. If the height and length of shadow of a tower are equal, then the angle of elevation of the Sun is:

(a) 30°
(b) 45°
(c) 60°
(d) 90°

Ans: (b) 45°. $\tan\theta = h/h = 1 \Rightarrow \theta = 45°$

[CBSE 2024 | 1 Mark]

Q5. A ladder makes an angle of 60° with the ground, when placed along a wall. If the foot of the ladder is 8 m away from the wall, the length of the ladder is:

(a) 8 m
(b) 12 m
(c) 16 m
(d) 8√3 m

Ans: (c) 16 m. $\cos 60° = 8/l \Rightarrow 1/2 = 8/l \Rightarrow l = 16$ m

[CBSE 2020 | 1 Mark]

Q6. The angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of the tower, is 30°. The height of the tower is:

(a) 30 m
(b) 10√3 m
(c) 30√3 m
(d) 30/√3 m

Ans: (b) 10√3 m. $\tan 30° = h/30 \Rightarrow h = 30/\sqrt{3} = 10\sqrt{3}$ m

[CBSE 2021 | 1 Mark]

Q7. A kite is flying at a height of 60 m above the ground. The string attached to the kite makes an angle of 60° with the ground. The length of the string is:

(a) 40√3 m
(b) 60 m
(c) 60√3 m
(d) 120 m

Ans: (a) 40√3 m. $\sin 60° = 60/l \Rightarrow \sqrt{3}/2 = 60/l \Rightarrow l = 120/\sqrt{3} = 40\sqrt{3}$ m

[CBSE 2019 | 1 Mark]

Q8. If a man standing on a platform 3 metres above the surface of a lake observes a cloud and its reflection in the lake, then the angle of elevation of the cloud is always:

(a) equal to the angle of depression of its reflection
(b) less than the angle of depression of its reflection
(c) greater than the angle of depression of its reflection
(d) cannot be determined

Ans: (b) less than the angle of depression of its reflection. The reflection appears farther below, making the depression angle larger.

SECTION B: Assertion-Reason Questions (1 Mark Each)

[CBSE 2024 | 1 Mark]

Q9. Assertion (A): A ladder leaning against a wall stands at a horizontal distance of 6 m from the wall. If the height of the wall up to which the ladder reaches is 8 m, then the length of the ladder is 10 m.
Reason (R): The ladder makes an angle of 60° with the ground.

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

Ans: (c) A is true ($\sqrt{(6^2 + 8^2)} = 10$ m), but R is false ($\tan\theta = 8/6 = 4/3$, $\theta \approx 53°$, not 60°).

[CBSE 2023 | 1 Mark]

Q10. Assertion (A): The angle of elevation of the Sun when the shadow of a vertical pole is equal to its height is 45°.
Reason (R): $\tan 45° = 1$.

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

Ans: (a) Both true and R is the correct explanation. $\tan\theta$ = height/shadow = h/h = 1 = $\tan 45° \Rightarrow \theta = 45°$.

SECTION C: Short Answer Questions (3 Marks Each)

[CBSE 2023 | 3 Marks]

Q11. 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 30°. Determine the height of the tower.

Ans: Let building = AE = 7 m, tower = BD. In ΔABC (depression of foot): $\tan 30° = 7/BC \Rightarrow BC = 7\sqrt{3}$ m. In ΔACD (elevation of top): $\tan 60° = CD/7\sqrt{3} \Rightarrow CD = 7\sqrt{3} \times \sqrt{3} = 21$ m. Height of tower = CD + DB = 21 + 7 = 28 m

[CBSE 2022 | 3 Marks]

Q12. The shadow of a tower standing on a level ground is found to be 40 m longer when the Sun's altitude is 30° than when it is 60°. Find the height of the tower.

Ans: Let height = h. At 60°: shadow = $h/\sqrt{3}$. At 30°: shadow = $h\sqrt{3}$. Difference: $h\sqrt{3} - h/\sqrt{3} = 40 \Rightarrow h(3-1)/\sqrt{3} = 40 \Rightarrow 2h/\sqrt{3} = 40 \Rightarrow h = 20\sqrt{3} = 34.6$ m

[CBSE 2021 | 3 Marks]

Q13. A 1.5 m tall boy is standing at some distance from a 30 m tall building. The angle of elevation from his eyes to the top of the building increases from 30° to 60° as he walks towards the building. Find the distance he walked.

Ans: Effective height = 30 − 1.5 = 28.5 m. At 30°: $\tan 30° = 28.5/d_1 \Rightarrow d_1 = 28.5\sqrt{3}$ m. At 60°: $\tan 60° = 28.5/d_2 \Rightarrow d_2 = 28.5/\sqrt{3} = 9.5\sqrt{3}$ m. Distance walked = $d_1 - d_2 = 28.5\sqrt{3} - 9.5\sqrt{3} = 19\sqrt{3} = 32.87$ m

[CBSE 2019 | 3 Marks]

Q14. An observer 1.5 m tall is 28.5 m away from a chimney. The angle of elevation of the top of the chimney from her eyes is 45°. What is the height of the chimney?

Ans: Let chimney height above eye level = h. tan 45° = h/28.5 ⇒ h = 28.5 m. Total height = 28.5 + 1.5 = 30 m

SECTION D: Long Answer Questions (4–5 Marks Each)

[CBSE 2024 | 5 Marks]

Q15. A man on a cliff observes a boat at an angle of depression of 30° which is approaching the shore. Six minutes later, the angle of depression of the boat is found to be 60°. Find the time taken by the boat to reach the shore.

Ans: Let cliff = AB, initial position P, later Q. Speed = v. PQ = 6v. BQ = vt. In ΔABP: tan 30° = AB/BP ⇒ AB = BP/√3 = (6v + vt)/√3. In ΔABQ: tan 60° = AB/BQ ⇒ AB = √3 × vt. Equating: (6v + vt)/√3 = √3 vt ⇒ 6 + t = 3t ⇒ 2t = 6 ⇒ t = 3 minutes

[CBSE 2023 | 5 Marks]

Q16. A straight highway leads to the foot of a tower. A man standing on top of the 75 m high tower observes two cars at angles of depression of 30° and 60°, approaching the foot of the tower. If one car is exactly behind the other, find the distance between the two cars. (Use √3 = 1.73)

Ans: Let tower AB = 75 m. Car at C (60°): tan 60° = 75/BC ⇒ BC = 75/√3 = 25√3 m. Car at D (30°): tan 30° = 75/BD ⇒ BD = 75√3 m. Distance CD = BD − BC = 75√3 − 25√3 = 50√3 = 50 × 1.73 = 86.5 m

[CBSE 2022 | 5 Marks]

Q17. From the top of a 60 m high building, the angles of depression of the top and bottom of a tower are 45° and 60° respectively. Find the height of the tower. (Use √3 = 1.73)

Ans: Let building = AB = 60 m, tower = CD = h. Let distance = BC = x. From bottom: tan 60° = 60/x ⇒ x = 60/√3 = 20√3 m. From top: tan 45° = (60 − h)/x ⇒ 1 = (60 − h)/(20√3) ⇒ 60 − h = 20√3 ⇒ h = 60 − 20√3 = 60 − 34.6 = 25.4 m

[CBSE 2020 | 5 Marks]

Q18. Two poles of equal heights are standing opposite each other on either side of a road which is 80 m wide. From a point between them on the road, the angles of elevation of the tops of the poles are 60° and 30° respectively. Find the height of the poles and the distances of the point from the poles.

Ans: Let height = h, point at distance x from first pole. tan 60° = h/x ⇒ h = x√3 ... (i). tan 30° = h/(80 − x) ⇒ h = (80 − x)/√3 ... (ii). From (i) & (ii): x√3 = (80 − x)/√3 ⇒ 3x = 80 − x ⇒ 4x = 80 ⇒ x = 20 m. h = 20√3 = 34.6 m. Distances: 20 m and 60 m.

[CBSE 2019 | 5 Marks]

Q19. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream. From the top of a lighthouse 100 m high, the angles of depression of two ships on opposite sides are 30° and 45°. Find the distance between the two ships.

Ans: Let lighthouse = AB = 100 m. Ship at C (45°): tan 45° = 100/BC ⇒ BC = 100 m. Ship at D (30°): tan 30° = 100/BD ⇒ BD = 100√3 = 173 m. Distance = BC + BD = 100 + 100√3 = 100(1 + √3) = 100 × 2.73 = 273 m

[CBSE 2020 | 5 Marks]

Q20. As observed from the top of a 100 m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 45°. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships. (Use √3 = 1.732)

Ans: Ship at A (45°): tan 45° = 100/d_1 ⇒ d_1 = 100 m. Ship at B (30°): tan 30° = 100/d_2 ⇒ d_2 = 100√3 = 173.2 m. Distance = d_2 − d_1 = 173.2 − 100 = 73.2 m

SECTION E: Case Study Based Questions (4 Marks Each)

[CBSE 2025 | 4 Marks]

Q21. Case Study: A group of students went on an excursion to a hill station. From a point on the ground, the angle of elevation of the top of a temple on a hill is 60°. After walking 50 m towards the temple, the angle of elevation becomes 30°.
(i) Draw a labelled figure for the given situation.
(ii) Find the height of the hill.
(iii) Find the distance of the first point from the foot of the hill.
(iv) Find the distance of the second point from the foot of the hill.

Ans: Let height = h, first point distance = d. tan 60° = h/d ⇒ h = d√3. tan 30° = h/(d − 50) ⇒ h = (d − 50)/√3. Equating: d√3 = (d − 50)/√3 ⇒ 3d = d − 50. This gives −2d = −50 ⇒ d = 25 m. h = 25√3 = 43.25 m. Note: Since angle increases on walking towards, swap: tan 30° = h/d ⇒ h = d/√3; tan 60° = h/(d−50) ⇒ h = (d−50)√3. d/√3 = (d−50)√3 ⇒ d = 3d − 150 ⇒ d = 75 m. h = 75/√3 = 25√3 = 43.25 m. Second point = 75 − 50 = 25 m.

[CBSE 2024 | 4 Marks]

Q22. Case Study: A statue 1.6 m tall stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point, the angle of elevation of the top of the pedestal is 45°.
(i) Find the height of the pedestal.
(ii) Find the distance of the point from the base of the pedestal.

Ans: Let pedestal = h, distance = d. tan 45° = h/d ⇒ d = h. tan 60° = (h + 1.6)/d ⇒ √3 = (h + 1.6)/h ⇒ h√3 = h + 1.6 ⇒ h(√3 − 1) = 1.6 ⇒ h = 1.6/(√3 − 1) = 1.6(√3 + 1)/2 = 0.8(√3 + 1) = 0.8 × 2.73 = 2.18 m. Distance = h = 2.18 m.

★ PYQ SUMMARY & ANALYSIS

Topic	Years Asked	Frequency	Marks
Shadow / Sun elevation	2019–2024	Every Year	1
Angle of depression from tower	2019–2024	Every Year	1–5
Two angles of depression (same side)	2019–2023	5 times	4–5
Two angles (opposite sides)	2019–2022	3 times	4–5
Building + Tower (elevation + depression)	2019–2024	Every Year	3–5
Approaching observer problems	2019–2024	4 times	3–5
Ladder / Kite problems	2019–2024	3 times	1–3
Case Study (hill, pedestal)	2024–2025	2 times	4

Key Observations for Students:

- ✔ Height & Distance problems carry 4–5 marks — at least ONE long question every year.
- ✔ Most common pattern: Two angles of depression from top of tower to two objects (same side).
- ✔ Building + Tower combination (elevation to top, depression to foot) — very frequent 3–5 marks.
- ✔ ALWAYS draw the figure first — label all angles, heights, distances carefully.
- ✔ Only 30°, 45°, 60° angles are used. Remember: tan 30° = 1/√3, tan 45° = 1, tan 60° = √3.
- ✔ Use √3 = 1.73 or 1.732 as given in question for final numerical answer.
- ✔ Angle of depression = Angle of elevation (alternate interior angles with horizontal).
- ✔ Expected marks from Ch 8 + Ch 9 combined: 8–12 marks in Board Exam.

"Practice makes perfect. Solve PYQs to master your Board Exam!"

Best Wishes for Your Board Exam!

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