

BOARD-PATTERN PRACTICE PAPER · CBSE CLASS 12

Inverse Trigonometric Functions

Mathematics · Chapter 2 · Matches current CBSE blueprint · Each question PYQ-sourced where indicated

DATE _____	TOTAL MARKS 30	DURATION 60 min	MARKING As per board	TARGET ≥ 24/30
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GENERAL INSTRUCTIONS

- All questions are compulsory.
- Section A: 1-mark MCQs. Section B: 2-mark short answers. Section C: 3-mark long answers. Section D: 5-mark case-based question.
- Use of calculator is NOT permitted.
- All answers must be in radians, in exact form (no decimal approximations).
- Show working for full marks; correct final answers without working may attract partial credit only.

Section A — MCQ (1 mark each)

4 MARKS · 6 MIN

- Q1.** The principal value of $\sin^{-1}(-1/2)$ is: (a) $\pi/6$ (b) $-\pi/6$ (c) $5\pi/6$ (d) $-5\pi/6$ [PYQ 2023 Delhi] **[1 mark]**
- Q2.** Range of $\sec^{-1} x$ is: (a) $[0, \pi]$ (b) $[0, \pi] - \{\pi/2\}$ (c) $(-\pi/2, \pi/2)$ (d) $[-\pi/2, \pi/2] - \{0\}$ [PYQ 2022 Delhi]
- Q3.** $\sin^{-1} x + \cos^{-1} x$ equals ($x \in [-1, 1]$): (a) 0 (b) $\pi/4$ (c) $\pi/2$ (d) π [PYQ 2018 All India] **[1 mark]**
- Q4.** $\tan^{-1}(-1)$ equals: (a) $\pi/4$ (b) $3\pi/4$ (c) $-\pi/4$ (d) $-3\pi/4$ [PYQ 2019 Delhi] **[1 mark]**

Section B — Short Answer (2 marks each)

8 MARKS · 16 MIN

- Q5.** Find the principal value of $\cos^{-1}(-\sqrt{3}/2)$. [PYQ 2020 All India] **[2 marks]**
- Q6.** Evaluate $\sin^{-1}(\sin(7\pi/6))$. [PYQ 2019 Delhi] **[2 marks]**
- Q7.** Find the principal value of $\tan^{-1}(\sqrt{3}) - \sec^{-1}(-2)$. [PYQ 2018 Delhi] **[2 marks]**
- Q8.** If $\sin^{-1} x = \pi/5$ for some $x \in [-1, 1]$, find $\cos^{-1} x$. [PYQ 2022 All India] **[2 marks]**

Section C — Long Answer (3 marks each)

12 MARKS · 24 MIN

- Q9.** Prove that $\sin^{-1}(1/\sqrt{5}) + \sin^{-1}(2/\sqrt{5}) = \pi/2$. [PYQ 2020 Delhi] **[3 marks]**
- Q10.** Show that $\tan^{-1}(1) + \tan^{-1}(2) + \tan^{-1}(3) = \pi$. [PYQ 2024 All India] **[3 marks]**
- Q11.** Express $2 \tan^{-1}(1/3)$ in the form $\tan^{-1}(p/q)$ with p, q positive integers. [PYQ 2020 All India] **[3 marks]**
- Q12.** Prove that $\sin^{-1} x + \cos^{-1} x = \pi/2$ for all $x \in [-1, 1]$. [PYQ 2018 Delhi] **[3 marks]**

Section D — Case-Based (5 marks total)

6 MARKS · 14 MIN

- Q13.** A surveyor uses a clinometer to measure the angle of elevation to the top of a tower. The clinometer's display shows the value of $\tan^{-1}(\text{opposite/adjacent})$. For a particular reading, opposite/adjacent = $1/2$.
(i) Find the principal value of $\tan^{-1}(1/2) + \tan^{-1}(1/3)$. [2 marks] (ii) The surveyor moves and now records two readings; the sum of their angle-elevation values is observed to be $\pi/4$. If the first reading gives $\tan^{-1}(1/4)$, find the second $\tan^{-1}$ value. [2 marks] [PYQ 2023 All India] **[4 marks]**
- Q14.** Find the principal value of $\sin^{-1}(\sin(13\pi/7))$. [PYQ 2024 Delhi] **[2 marks]**

Marking scheme & model answers — see companion Answer Key PDF · all PYQs traceable to actual CBSE papers · readyforboards.com · +91 70330 05444