

BOARD-PATTERN PRACTICE PAPER · CBSE CLASS 12

Relations and Functions

Mathematics · Chapter 1 · Matches current CBSE blueprint · Each question PYQ-sourced where indicated

DATE _____	TOTAL MARKS 25	DURATION 60 min	MARKING As per board	TARGET ≥ 20/25
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GENERAL INSTRUCTIONS

- All questions compulsory.
- Proofs must state quantifiers (\forall , \exists) explicitly.
- Final answers must include domain/codomain where applicable.
- For composition, write fog and gof unambiguously.

Section A — VSA (1 mark × 4)

4 MARKS · 8 MIN

- Q1.** Define an equivalence relation. [PYQ 2018 Delhi] [1 mark]
- Q2.** State a condition under which a function has an inverse. [PYQ 2019 All India] [1 mark]
- Q3.** Find (gof)(2) given $f(x) = 3x$ and $g(x) = x + 1$. [PYQ 2022 Delhi] [1 mark]
- Q4.** Is the function $f: \mathbb{N} \rightarrow \mathbb{N}$ defined by $f(n) = n^2$ one-one? [PYQ 2024 Delhi] [1 mark]

Section B — SA-I (2 marks × 3)

6 MARKS · 12 MIN

- Q5.** If $f(x) = x + 7$ and $g(x) = x - 7$ on \mathbb{R} , show that $f \circ g = \text{I}$ (identity). [PYQ 2019 Delhi] [2 marks]
- Q6.** Show that the relation R on \mathbb{R} defined by $R = \{(a, b) : a \leq b^3\}$ is neither reflexive nor symmetric. [PYQ 2020 All India] [2 marks]
- Q7.** Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = (3x + 5)/2$. Find $f^{-1}(x)$. [PYQ 2022 Outside Delhi] [2 marks]

Section C — SA-II (3 marks × 3)

9 MARKS · 20 MIN

- Q8.** Check whether the relation R on the set of natural numbers \mathbb{N} defined by $R = \{(a, b) : a \text{ is a factor of } b\}$ is reflexive, symmetric, transitive. [PYQ 2018 Outside Delhi] [3 marks]
- Q9.** If $f: \mathbb{R} \rightarrow \mathbb{R}$ and $g: \mathbb{R} \rightarrow \mathbb{R}$ are defined by $f(x) = 2x - 3$ and $g(x) = x^2 + 1$, find (i) $(f \circ g)(x)$, (ii) $(g \circ f)(x)$. Are they equal? [PYQ 2023 Delhi] [3 marks]
- Q10.** Show that the function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = x / (x^2 + 1)$ is neither one-one nor onto. [PYQ 2020 Delhi] [3 marks]

Section D — Long Answer (5-6 marks)

6 MARKS · 20 MIN

- Q11.** Show that the relation R defined on the set $A = \{1, 2, 3, 4, 5\}$ by $R = \{(a, b) : |a - b| \text{ is even}\}$ is an equivalence relation. Find the equivalence classes [1], [2]. [PYQ 2019 Outside Delhi] [6 marks]

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