

Permutations and Combinations — CBSE Pattern Test 2

Class 11 Maths · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 2 — CBSE Pattern (90 minutes, 40 marks)

Class 11 Maths · Permutations and Combinations · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.
(2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.
(3) For MCQ questions choose the single correct option; for VSA answers write a single line.
(4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

- If a job can be done in m ways or n ways, the total number of ways is
 - $m + n$
 - $m \times n$
 - $m - n$
 - m^n
- The number of permutations of n distinct objects taken r at a time is
 - $nPr = n!/(n-r)!$
 - $nCr = n!/(r!(n-r)!)$
 - $n!$
 - n^r
- The number of ways to arrange 3 objects from 5 distinct objects is
 - 60
 - 10
 - 15
 - 120
- The number of permutations of n objects where p are alike of one kind and q alike of another is
 - $n!/(p! q!)$
 - $n!$
 - $n!/(p q)$
 - nPr
- The number of ways 4 people can be seated around a circular table is
 - 6
 - 24
 - 12
 - 4
- The number of ways to choose 3 from 7 objects is
 - 35
 - 21
 - 7
 - 210
- nCn is equal to
 - 1

- (B) 0
- (C) n
- (D) $n!$

8. The relation between nPr and nCr is

- (A) $nPr = r! \times nCr$
- (B) $nCr = r! \times nPr$
- (C) $nPr = nCr$
- (D) $nPr = nCr / r!$

9. Write the formula for nPr .

10. In how many ways can 5 people sit around a round table?

Section B — Short Answer I ($4 \times 2 = 8$ marks)

- 11. Evaluate $4! - 3!$.
- 12. Find the number of arrangements of the letters of 'LEVEL'.
- 13. When are clockwise and anticlockwise circular arrangements treated as the same?
- 14. Simplify $nC(n-r)$.

Section C — Short Answer II ($4 \times 3 = 12$ marks)

- 15. Evaluate $8C3$.
- 16. In how many ways can the letters of 'INDIA' be arranged?
- 17. In how many ways can a garland be made from 6 different flowers?
- 18. In how many ways can a selection of at least one book be made from 5 distinct books?

Section D — Long Answers ($2 \times 5 = 10$ marks)

- 19. Find the value of n if $nP2 = 30$. Prove that $nPr = n \times (n-1)P(r-1)$.
- 20. In how many ways can 5 boys and 5 girls sit around a round table such that boys and girls alternate? Prove that $nCr = nC(n-r)$.

Answer Key (Marking Scheme)

- Q1 — (A) $m + n$. Q2 — (A) $nPr = n!/(n-r)!$. Q3 — (A) 60. Q4 — (A) $n!/(p! q!)$.
- Q5 — (A) 6. Q6 — (A) 35. Q7 — (A) 1. Q8 — (A) $nPr = r! \times nCr$.
- Q9 — $n!/(n-r)!$.
- Q10 — 24.
- Q11 — 18.
- Q12 — $5!/2! = 60$.
- Q13 — When the arrangement is a necklace or garland.
- Q14 — nCr .
- Q15 — 56.
- Q16 — 60.
- Q17 — $(6-1)!/2 = 60$.
- Q18 — $2^5 - 1 = 31$.

Q19 — $n = 6$; proof as in notes.

Q20 — $2 \times 4! \times 5! = 5760$; proof as in notes.