Nishant eAcademy
CBSE Sample Paper Class 11 Mathematics 2023-24

Subject: Mathematics Class: 11 Maximum Marks: 100 Duration: 3 hours

Section A: Multiple Choice Questions (20 marks) Answer all the questions. Each question carries 1 mark.

1. If A and B are two events such that P(A) = 0.3 and P(B) = 0.6, then $P(A \cap B)$ is: a) 0.18 b) 0.09 c) 0.48 d) 0.36

2. The sum of the roots of the equation $x^2 - 7x + 12 = 0$ is: a) 7 b) 12 c) -7 d) -12

3. If $\tan\theta = 4/3$ and θ is an acute angle, then $\cos\theta$ is: a) 3/5 b) 4/5 c) 5/3 d) 5/4

4. The value of $\int(2x + 3)\, dx$ from $x = 1$ to $x = 4$ is: a) 16 b) 20 c) 12 d) 24

Section B: Short Answer Type Questions (40 marks) Answer any five questions. Each question carries 4 marks.

5. Find the value of k for which the system of equations $3x + ky = 8$ and $2x - y = 1$ has no solution.

6. Find the value of a for which the quadratic equation $(a - 1)x^2 - 2ax + a - 2 = 0$ has equal roots.

7. Find the sum of the first 20 terms of the arithmetic sequence if the first term is 2 and the common difference is 3.

8. Prove that $\sqrt{2}$ is an irrational number.

9. If A and B are two matrices of order 3x3, prove that $(A - B)(A + B) = A^2 - B^2$.

10. Find the distance between the points (2, -3) and (-4, 5).

Section C: Long Answer Type Questions (40 marks) Answer any four questions. Each question carries 10 marks.

11. Find the value of k for which the system of equations $x + 2y - z = 3$, $2x - 3y + kz = -1$, and $3x + 2y + 4z = 5$ has infinite solutions.

12. Prove that $\sin(A - B) = \sin A \cos B - \cos A \sin B$.

13. Solve the inequality $3x - 5 > 2x + 1$ and represent the solution on a number line.

14. A manufacturing company produces two types of toys, A and B. The company can produce a maximum of 800 toys per day. Toy A requires 2 hours of machine time and 3 hours of labor time, while Toy B requires 4 hours of machine time and 2 hours of labor time. The profit per toy for Toy A is ₹10 and for Toy B is ₹15. Formulate the problem as a linear programming problem to maximize the profit.

15. Find the equation of the circle passing through the points (1, 2), (2, -1), and (-1, 3).