FIRST TERM MODEL QUESTION PAPER 2024 WITH ANSWER KEY SET 1

MATHEMATICS - Standard IX

Time: 2.5 hours

Max. Marks: 80

(Prepared by www.educationobserver.com)

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1. 15 minutes is given as cool-off time.
2. This time is to be used for reading the question paper.
3. You are not supposed to write anything during the cool-off time.
4. Attempt the questions according to the instructions.

Section A: Multiple Choice Questions (MCQs) [1 mark each]

1. The value of $\sqrt{144}$ is:
   a) 10
   b) 11
   c) 12
   d) 13

2. Which of the following represents a linear equation?
   a) $x^2 + y^2 = 4$
   b) $x + y = 7$
   c) $y = x^3 + 2$
   d) $y = \frac{1}{x}$

3. The distance between the points $(0, 0)$ and $(3, 4)$ is:
   a) 5 units
   b) 7 units
   c) 3 units
   d) 4 units
4. If the perimeter of a square is 20 cm, the length of each side is:
   a) 4 cm
   b) 5 cm
   c) 10 cm
   d) 8 cm
5. Which of the following is a factor of $x^2 - 9$?
   a) $x + 3$
   b) $x + 9$
   c) $x^2 - 3$
   d) $x - 1$

Section B: Short Answer Questions (Answer any 5 out of 6) [2 marks each]

6. Solve for x if $2x + 5 = 15$.
7. Find the area of a triangle with a base of 8 cm and height of 5 cm.
8. If $a + b = 7$ and $ab = 10$, find the value of $a^2 + b^2$.
9. A rectangle has a length of 10 cm and width of 6 cm. Calculate its perimeter.
10. Express 49 as a power of 7.
11. Solve: $3x + 4 = 2x - 5$.

Section C: Descriptive Questions (Answer any 6 out of 7) [3 marks each]

12. Prove that the sum of the interior angles of a triangle is 180°.
13. Solve the quadratic equation $x^2 - 5x + 6 = 0$ by factorization.
14. Find the length of the diagonal of a square with a side of 7 cm.
15. The sides of a triangle are 9 cm, 12 cm, and 15 cm. Prove that it is a right-angled triangle.
16. If the sum of the first 10 terms of an arithmetic progression (AP) is 55 and the first term is 1, find the common difference.
17. In a right triangle, if one leg is 6 cm and the hypotenuse is 10 cm, find the length of the other leg.
18. Solve the system of linear equations: $x + y = 10$ and $2x - y = 4$.

Section D: (Answer any 6 questions out of 7) [4 marks each]

19. A ladder leans against a wall. The top of the ladder touches the wall at a height of 15 meters. If the ladder is 17 meters long, find the distance between the base of the ladder and the wall.
20. The product of two consecutive even integers is 168. Find the integers.
21. The sum of the digits of a two-digit number is 9, and when the digits are reversed, the number becomes 27 more than the original number. Find the original number.
22. The lengths of the sides of a trapezium are 7 cm, 11 cm, 14 cm, and 20 cm. Calculate its area if the height of the trapezium is 8 cm.

23. A man invests ₹12,000 at a simple interest rate of 6% per annum for 5 years. Calculate the interest earned and the total amount after 5 years.
24. If the sum of the first n terms of an arithmetic progression (AP) is given by $S_n = 3n^2 + 2n$, find the first term and the common difference.
25. A square is drawn on the hypotenuse of a right triangle with legs of 6 cm and 8 cm. Find the area of the square.

Section E: [5 marks each]

(Answer any 5 questions out of 6)

26. A car starts from rest and accelerates uniformly at a rate of 2 m/s². Calculate the distance covered by the car in 10 seconds.
27. The diagonals of a parallelogram bisect each other. Prove that the opposite sides are equal in length.
28. The difference between the squares of two consecutive odd integers is 40. Find the integers.
29. A cylindrical tank has a radius of 7 m and a height of 14 m. Calculate the volume of the tank.
30. If the hypotenuse of a right-angled triangle is 25 cm and one of the legs is 24 cm, find the area of the triangle.
31. A park is in the shape of a trapezium with parallel sides of lengths 20 meters and 30 meters, and the distance between the parallel sides is 15 meters. Calculate the area of the park.

Answer Key

Section A: MCQs

1. c) 12
2. b) $x + y = 7$
3. a) 5 units
4. b) 5 cm
5. a) $x + 3$

Section B: Short Answer Questions

6. $2x + 5 = 15$

$2x = 10$

$x = 5$

7. Area $= \frac{1}{2} \times 8 \times 5 = 20$ cm^2

8. $a^2 + b^2 = (a + b)^2 - 2ab = 49 - 20 = 29$

9. Perimeter $= 2 \times (10 + 6) = 32$ cm

10. $49 = 7^2$

11. $3x + 4 = 2x - 5$, $x = -9$

Section C: Descriptive Questions

12. The sum of the interior angles of a triangle is $180°$. Proof involves drawing a parallel line and showing that the alternate angles add up to $180°$.

13. $x^2 - 5x + 6 = (x - 3)(x - 2) = 0$, so $x = 3$ or $x = 2$

14. Diagonal $= \sqrt{7^2 + 7^2} = \sqrt{49 + 49} = \sqrt{98} \approx 9.9$ cm

15. $9^2 + 12^2 = 15^2$, $81 + 144 = 225$, the triangle is right-angled.

16. $S_{10} = 55$, $a = 1$, find d using $S_n = \frac{n}{2} \times (2a + (n - 1)d)$.

17. $6^2 + b^2 = 10^2$, $36 + b^2 = 100$, $b^2 = 64$, $b = 8$ cm

18. Substitution method gives $x = 7$, $y = 3$.

Section D:

19. Using Pythagoras theorem: $d^2 + 15^2 = 17^2$, $d = 8$ meters

20. Let integers be x and $x + 2$, $x(x + 2) = 168$, $x = 12$, integers are 12 and 14.

21. Let the number be $10x + y$, equations: $x + y = 9$, $10y + x = 10x + y + 27$. Solve to get the number as 36.

22. Area of trapezium $= \frac{1}{2} \times (7 + 14) \times 8 = 84$ cm²

23. Simple interest $= \frac{12000 \times 6 \times 5}{100} = ₹3600$, total amount = ₹15,600

24. First term $a = 5$, common difference $d = 4$.

25. Hypotenuse $= \sqrt{6^2 + 8^2} = 10$ cm, area $= 10^2 = 100$ cm²

Section E:

26. Distance $s = ut + \frac{1}{2}at^2 = 0 + \frac{1}{2} \times 2 \times 10^2 = 100$ m

27. Proof involves showing that the diagonals bisect each other using congruent triangles.

28. Let integers be x and $x + 2$, $(x + 2)^2 - x^2 = 40$, solve to get integers 19 and 21.

29. Volume of cylinder $= \pi r^2 h = \pi \times 7^2 \times 14 = 2156$ m³

30. Area $= \frac{1}{2} \times 24 \times 7 = 84$ cm²

31. Area of trapezium $= \frac{1}{2} \times (20 + 30) \times 15 = 375$ m²