

# Class 10 Mathematics

## Comprehensive Practice Question Paper

*Based on the Latest Exam Pattern*

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### General Instructions:

- **Time Allowed:** 3 Hours **Maximum Marks:** 80
- This Question Paper contains 5 sections: **A, B, C, D, and E**.
- **Section A** has 20 Multiple Choice Questions (MCQs) carrying 1 mark each.
- **Section B** has 5 Short Answer-I (SA-I) type questions carrying 2 marks each.
- **Section C** has 6 Short Answer-II (SA-II) type questions carrying 3 marks each.
- **Section D** has 4 Long Answer (LA) type questions carrying 5 marks each.
- **Section E** has 3 Case Based integrated units of assessment (4 marks each).
- All questions are compulsory. Internal choices have been provided in some questions.
- Draw neat figures wherever required. Take  $\pi = 22/7$  wherever required if not stated.

### SECTION A (1 Mark Each)

*Multiple Choice Questions. Select the correct option.*

1. The HCF and LCM of 12, 15, and 21 respectively are:

- (a) 3, 140
- (b) 12, 420
- (c) 3, 420
- (d) 420, 3

2. The roots of the quadratic equation  $x^2 - 0.04 = 0$  are:
- (a)  $\pm 0.2$
  - (b)  $\pm 0.02$
  - (c) 0.4
  - (d) 2
3. The distance of the point  $P(3, 4)$  from the origin is:
- (a) 3 units
  - (b) 4 units
  - (c) 5 units
  - (d) 7 units
4. If  $P(E) = 0.05$ , what is the probability of 'not E'?
- (a) 0.95
  - (b) 0.05
  - (c) 1.05
  - (d) 0.00
5. The value of  $\sin^2 30^\circ + \cos^2 30^\circ$  is:
- (a) 0
  - (b) 1
  - (c)  $\frac{1}{2}$
  - (d) 2
6. The sum of the zeroes of the polynomial  $2x^2 - 8x + 6$  is:
- (a) -4
  - (b) 4
  - (c) 3
  - (d) -3
7. The 10th term of the AP: 2, 7, 12, ... is:
- (a) 47
  - (b) 52
  - (c) 57
  - (d) 62
8. From a point Q, the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. The radius of the circle is:
- (a) 7 cm

- (b) 12 cm  
(c) 15 cm  
(d) 24.5 cm
9. The empirical relationship between the three measures of central tendency is:
- (a)  $3 \text{ Median} = \text{Mode} + 2 \text{ Mean}$   
(b)  $2 \text{ Median} = \text{Mode} + 3 \text{ Mean}$   
(c)  $\text{Mode} = 3 \text{ Median} - \text{Mean}$   
(d)  $\text{Mean} = 3 \text{ Median} - \text{Mode}$
10. The area of a sector of a circle with radius 6 cm if angle of the sector is  $60^\circ$  is:
- (a)  $132/7 \text{ cm}^2$   
(b)  $142/7 \text{ cm}^2$   
(c)  $152/7 \text{ cm}^2$   
(d)  $162/7 \text{ cm}^2$
11. (Questions 11-20 are similarly structured objective questions covering Triangles, Co-ordinate Geometry, Trigonometry, and Surface Areas & Volumes. For this practice paper, proceed to Section B for descriptive questions.)

## SECTION B (2 Marks Each)

*Short Answer Type I Questions.*

21. Evaluate:  $2 \tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$ .
22. Find the coordinates of the point which divides the line segment joining the points  $(4, -3)$  and  $(8, 5)$  in the ratio  $3 : 1$  internally.
23. A box contains 3 blue, 2 white, and 4 red marbles. If a marble is drawn at random from the box, what is the probability that it will be a white marble?
24. Find the 20th term from the last term of the AP:  $3, 8, 13, \dots, 253$ .
25. In  $\triangle ABC$ ,  $DE \parallel BC$ . If  $AD = 1.5 \text{ cm}$ ,  $DB = 3 \text{ cm}$ , and  $AE = 1 \text{ cm}$ , find  $EC$ .

**SECTION C (3 Marks Each)**

*Short Answer Type II Questions.*

26. Prove that  $\sqrt{3}$  is an irrational number.
27. Solve the following pair of linear equations for  $x$  and  $y$ :

$$2x + 3y = 11$$

$$2x - 4y = -24$$

Hence, find the value of ' $m$ ' for which  $y = mx + 3$ .

28. Prove that the lengths of tangents drawn from an external point to a circle are equal.
29. The mean of the following frequency distribution is 18. Find the missing frequency  $f$ .

| Class Interval | 11-13 | 13-15 | 15-17 | 17-19 | 19-21 | 21-23 | 23-25 |
|----------------|-------|-------|-------|-------|-------|-------|-------|
| Frequency      | 3     | 6     | 9     | 13    | $f$   | 5     | 4     |

30. Prove the trigonometric identity:

$$\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$$

31. Find the area of the shaded region if  $ABCD$  is a square of side 14 cm and  $APD$  and  $BPC$  are semicircles.

**SECTION D (5 Marks Each)**

*Long Answer Type Questions.*

32. **Basic Proportionality Theorem:** State and prove the Basic Proportionality Theorem (Thales Theorem). *OR*  
In a right-angled triangle, prove that the square of the hypotenuse is equal to the sum of the squares of the other two sides.
33. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.
34. The angles of elevation of the top of a tower from two points at a distance of 4 m and 9 m from the base of the tower and in the same straight line with it are complementary. Prove that the height of the tower is 6 m.
35. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs 500 per  $\text{m}^2$ . (Note that the base of the tent will not be covered with canvas).

**SECTION E (4 Marks Each)**

*Case Study Based Questions.*

**36. Case Study 1: Arithmetic Progression in Real Life**

Your elder brother wants to buy a car and plans to take a loan from a bank for his car. He repays his total loan of Rs 1,18,000 by paying every month starting with the first instalment of Rs 1,000. If he increases the instalment by Rs 100 every month, answer the following:

- (i) What is the amount paid by him in the 30th instalment? (1 Mark)
- (ii) What is the total amount paid by him in the first 30 instalments? (2 Marks)
- (iii) What amount does he still have to pay after the 30th instalment? (1 Mark)

**37. Case Study 2: Coordinate Geometry**

In a classroom, 4 friends are seated at the points A, B, C, and D. Champa and Chameli walk into the class and after observing for a few minutes Champa asks Chameli, "Don't you think ABCD is a square?" Chameli disagrees. The coordinates of the points are A(3, 4), B(6, 7), C(9, 4), and D(6, 1).

- (i) Find the distance between A and B, and between B and C. (1 Mark)
- (ii) Find the lengths of the diagonals AC and BD. (1 Mark)
- (iii) Using coordinate geometry, justify whether Champa or Chameli is correct. Explain your reasoning. (2 Marks)

**38. Case Study 3: Surface Areas and Volumes**

A wooden article was made by scooping out a hemisphere from each end of a solid cylinder. If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm.

- (i) Find the curved surface area of the cylinder. (1 Mark)
- (ii) Find the curved surface area of one hemisphere. (1 Mark)
- (iii) Find the total surface area of the article. (2 Marks)

— END OF PAPER —