SAMPLE PAPER

10

CBSE - Class 10

MATHEMATICS

(STANDARD)

Time Allowed: 3 Hours *Maximum Marks: 80*

General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 40 questions divided into four sections A, B, C & D.

(iii) Section A contains **20** questions of **1** mark each, Section B comprises of **6** questions of **2** marks each. Section C comprises of **8** questions of **3** marks each. Section D comprises **6** questions of **4** marks each.

(iv) There is no overall choice. However internal choices have been provided in **two** questions of **1** marks each, **two** questions of **2** marks each, **three** questions of **3** marks each and **three** questions of **4** marks each. You have to attempt only one of the alternatives in all such questions.

(v) Use of calculators is **not** permitted.

SECTION - A

Q 1 – 10 are multiple choice questions. Select the most appropriate answer from the given options.

1. Polynomial of degree 3 is called a: **1**

(A) linear polynomial

(B) quadratic polynomial

(C) cubic polynomial

(D) biquadratic polynomial

2. Which of the following is **not** a solution of the equation $x - 3y = 5$? **1**

(A) $x = 5,\ y = 0$ (B) $x = 2,\ y = -1$

(C) $x = -1,\ y = -2$ (D) $x = 1,\ y = 2$

3. The equation $x^2 + 4x + k = 0$ has real roots, when: **1**

(A) $k \geq 4$ (B) $k \leq 4$ (C) $k \leq 0$ (D) $k \geq 0$

4. The mid-point of the line segment joining the points (–2, 4) and (6, 10) is: **1**

(A) (2, 5) (B) (2, 7) (C) (3, 7) (D) (3, 8)

5. The length of the sides of a rhombus, whose diagonals are of lengths 24 cm and 10 cm, is: **1**

(A) 17 cm (B) 13 cm (C) 14 cm (D) 34 cm

6. How many lead shots each 0.3 cm in diameter can be made from a cuboid of dimensions 9 cm × 11 cm × 12 cm? **1**

(A) 7200 (B) 8400 (C) 84,000 (D) 72,000

7. If the radius of a circle is increased by 200%, then its area will be increased by: **1**

(A) 100% (B) 200% (C) 400% (D) 800%

8. A sector of a circle becomes segment also if the degree measure of the sector angle is: **1**

(A) 60° (B) 120° (C) 90° (D) 180°

9. In a right circular cone, the cross-section made by a plane parallel to the base is a: **1**

(A) circle

(B) frustum of a circle

(C) sphere

(D) hemi-sphere

10. If the mean of 6, 4, 7, p and 10 is 8, then the value of p is: **1**

(A) 17 (B) 13 (C) 15 (D) 11

(Q 11 – 15) Fill in the blanks:

11. Any graph which touches x – axis at two distinct points has ..... zeros. **1**

12. For k = ..., the system of equations $kx - y - 2 = 0$ and $6x - 2y - 3 = 0$ has no solution. **1**

OR

The graph of $x = 5$ is a straight line parallel to **1**

13. The value of $3 \operatorname{cosec}^2 A - 3 \cot^2 A$ is **1**

14. An ogive is used to determine **1**

15. Sum of probabilities of occurence and non-occurence of any event is always equal to **1**

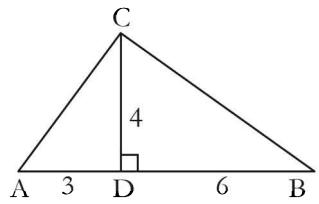
(Q 16 – 20) Answer the following:

16. Determine the zeros of the polynomial $p(x) = x^3 - 4x$. **1**

17. Find the first negative term of the AP:

$20,\ 19\frac{1}{4},\ 18\frac{1}{2},\ 17\frac{3}{4},\ \ldots\ldots$ **1**

18. From the given figure, determine sin A and tan B. **1**



19. Find the median class of the following distribution: **1**

Class	40-45	45-50	50-55	55-60	60-65	65-70	70-75
Frequency	2	3	8	6	6	3	2

20. An integer is chosen at random between 1 and 100. Find the probability that it is divisible by 10. **1**

OR

Two different dice are rolled together. Find the probability of getting a sum of 10, of the numbers on the two dice. **1**

SECTION - B

21. If n is a positive odd integer, then show that $n^2 - 1$ is divisible by 8. **2**

OR

Check whether 15^n can end with digit zero for any natural number n. **2**

22. The decimal expansion of the rational number $\frac{37}{2^2 \cdot 5^4}$, will terminate after how many places of decimals? **2**

23. Find the HCF of 72 and 120, using prime factorisation method. **2**

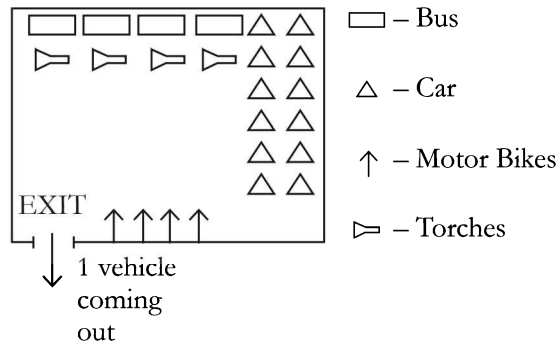
24. If P(5, 7), Q(x, – 2) and R(–3, y) are collinear points such that PQ = $\frac{1}{2}$PR, calculate the values of x and y. **2**

OR

Prove that the diagonals of a rectangle with vertices (0, 0), (a, 0), (a, b) and (0, b) bisect each other and are equal. **2**

25. The sum of circumferences of two circle is 132 cm. It the radius of one circle is 14 cm, find the radius of the other circle. **2**

26. In a car park, there are 125 cars, $3p$ motorbikes, $2q$ lorries and 20 buses. One of the vehicles leaves the car park at random.



(i) Given that the probability that the vehicle is a motorbike is $\frac{3}{40}$ and probability that the vehicle is a bus is $\frac{1}{10}$, form an equation in p and q.

(ii) Find the values of p and q.

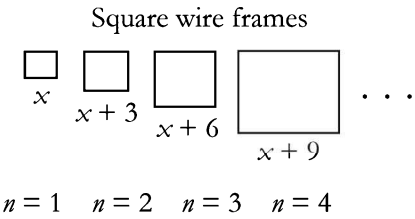
SECTION - C

27. The diagram shows a sequence of square wire frames. The lengths of a side of these frames are x cm, (x + 3) cm, (x + 6) cm……respectively. The sum of the areas of the first three squares is 525 sq cm. **3**

(i) Express the length of a side of the n^{th} frame in terms of x and n;

(ii) Find the value of x;

(iii) A piece of wire is 99 cm long. It is cut and bent into a frame in the sequence. Find the length of a side of the largest frame than can be formed.



28. Let A(4, 2), B(6, 5) and C(1, 4) be the vertices of ΔABC. The median AD from A meets BC in D. Find the coordinates of the point P on AD such that AP : PD = 2 : 1. **3**

29. Samuel planted 23 rose plants in the first row of a flower bed, 21 plants in the second row, 19 in the third row and so on. If there were 5 rose plants in the last row, find the number of rows in the flower bed. **3**

30. Draw a line segment AB of length 7 cm. Locate a point R on AB such that $\frac{AR}{RB} = \frac{5}{7}$ **3**

OR

Construct an isosceles triangle whose base is 8 cm and altitude 4 cm. Then also construct another triangle whose sides are $\frac{3}{5}$th the corresponding sides of the isosceles triangle. **3**

31. Solve for x and y:

$$\frac{3x}{2} - \frac{5y}{3} = -2\,; \quad \frac{x}{3} + \frac{y}{2} = \frac{13}{6}$$ **3**

OR

Show that the roots of the quadratic equation:

$$(b - c)x^2 + (c - a)x + (a - b) = 0$$

are equal if $c + a = 2b$. **3**

32. Prove that: **3**

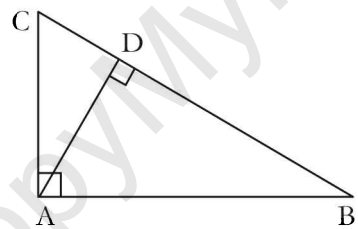
$$\frac{\sin\theta}{\sin(90° - \theta)} + \frac{\cos\theta}{\cos(90° - \theta)} = \sec\theta \operatorname{cosec}\theta$$

33. If $\tan\theta = \frac{12}{13}$, evaluate $\frac{2\sin\theta\cos\theta}{\cos^2\theta - \sin^2\theta}$. **3**

OR

Evaluate: $\left(\frac{\sin 47°}{\cos 43°}\right)^2 + \left(\frac{\cos 43°}{\sin 47°}\right)^2 - 4\cos^2 45°$. **3**

34. In the figure, ABC is a triangle, right-angled at A and AD $\perp$ BC. If AC = 3 cm, AB = 4 cm and BD = 3.2 cm, find AD. **3**



SECTION - D

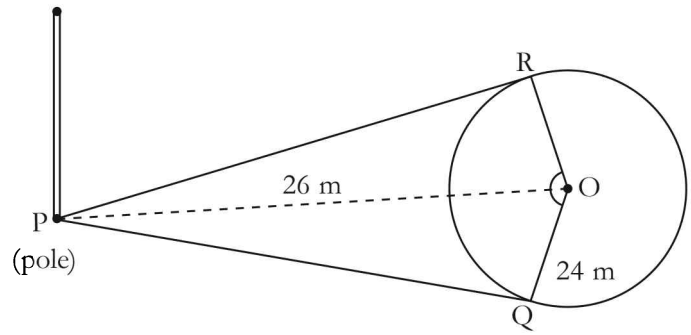
35. Calculate the **mean** and **mode** for the following frequency distribution:

Marks	0-9	10-19	20-29	30-39	40-49	50-59
Frequency	4	6	12	6	7	5

36. Two circles with centres A and B of radii 3 cm and 4 cm respectively intersect at two points C and D such that AC and BC are tangents to the two circles. **4**

Find the length of the common chord CD.

37. There is a circular park of radius 24 m and there is a pole at a distance of 26 m from the centre of the park as shown in the figure. It is planned to enclose the park by planting trees along line segments PQ and PR tangential to the park. **4**



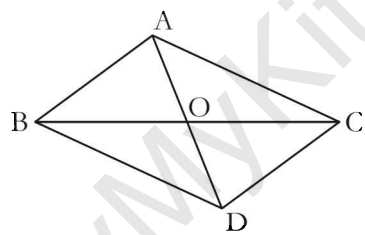
i. Find the length of PQ and PR;

ii. If six trees are to be planted along each tangential line segments at equal distances, find the distance between any two consecutive trees.

OR

From the first floor of Qutab Minar, which is at a height of 25 m from the level ground, a man observes the top of a building at an angle of elevation of 30° and the angle of depression of the base of the building to be 60°. Calculate the height of the building. **4**

38. In the figure, ABC and DBC are two triangles on the same base BC. If AD intersects BC at 0,



show that: $\frac{ar(\Delta ABC)}{ar(\Delta DBC)} = \frac{AO}{DO}$ **4**

OR

Prove that the line segments joining the mid-points of the sides of a triangle form four triangles, each of which is similar to the original triangle. **4**

39. A sphere of diameter 6 cm is dropped in a right circular cylindrical vessel partly filled with water. The diameter of the cylindrical vessel is 12 cm. If the sphere is completely submerged in water, by how much will the level of water rise in the cylindrical vessel? **4**

40. Find the zeros of the polynomial $p(x) = x^3 - 2x^2 - 49x + 98$, if its two zeros are equal in magnitude but opposite in sign. **4**

OR

A piece of cloth costs ₹35. If the piece were 4 m longer and each metre costs ₹1 less, the cost would remain unchanged. How long is the piece? **4**