SAMPLE PAPER 4

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. If HCF $(a, b) = 45$ and $a \times b = 30375$, then LCM (a, b) is: **1**

(A) 1875 (B) 1350 (C) 625 (D) 675

2. If the sum of the zeros of the polynomial $2x^3 - 3kx^2 + 4x - 5$ is 6, then the value of k is: **1**

(A) 2 (B) 4 (C) –2 (D) –4

3. A pair of linear equations is said to be **inconsistent** if it has: **1**

(A) at least one solution (B) no solution

(C) infinitely many solutions (D) unique solution

4. The roots of the quadratic equation $(3x - 5)(x + 3) = 0$ are: **1**

(A) $-\frac{3}{5}, -3$ (B) –5, 3 (C) $\frac{5}{3}, -3$ (D) 5, –3

5. If A(6, 2), B(4, 2) and C(6, 4) are the vertices of ΔABC, then length of the median CZ is: **1**

(A) $\sqrt{5}$ units (B) $\sqrt{2}$ units (C) $\sqrt{7}$ units (D) 3 units

6. In ΔABC, if DE || BC, $\frac{AD}{DB} = \frac{3}{4}$ and AC = 15 cm, then AE is equal to: **1**

(A) $\frac{25}{7}$ cm (B) $\frac{45}{7}$ cm (C) 20 cm (D) 24 cm

7. If sec 4A = cosec (A – 20°), where 4A is an acute angle, then the value of A is: **1**

(A) 15° (B) 22° (C) 36° (D) 60°

8. The area of a sector of angle θ (in degrees) of a circle with radius '*r*' is: **1**

(A) $\frac{\theta}{180°} \times 2\pi r$ (B) $\frac{\theta}{180°} \times \pi r^2$ (C) $\frac{\theta}{360°} \times 2\pi r$ (D) $\frac{\theta}{720°} \times 2\pi r^2$

9. The modal class for the frequency distribution given below is: **1**

Class interval	0-20	20-40	40-60	60-80	80-100
Number of workers	15	18	21	29	17

(A) 40-60 (B) 60-80 (C) 80-100 (D) 20-40

10. If P(E) = 0.005, then the probability of "not E" is: **1**

(A) 0.05 (B) 0.5 (C) 0.995 (D) 0.95

(Q 11 – 15) Fill in the blanks:

11. The sum of natural numbers from 51 to 100 is **1**

OR

Write the 8th term from the end of the AP: − 12, − 7, −2, …….68. **1**

12. The number of terms of AP: 18, 16, 14, ... that make the sum zero, is **1**

13. The value of θ for which sin 3θ = cos (θ – 6°) is **1**

14. When a digit is choosen at random from the digits, 1 to 9, then the probability of this chosen digit to be a prime number is **1**

15. The upper limit of the median class of the following frequency distribution is **1**

Class	0-5	6-11	12-17	18-23	24-29
Frequency	13	10	15	8	11

(Q 16 – 20) Answer the following:

16. Write the quadratic formula for determining the roots of the quadratic equation **1**

$$ax^2 + bx + c = 0 \ (a \neq 0)$$

17. Find the value of $\frac{\sec 70^\circ}{\operatorname{cosec} 20^\circ} + \frac{\sin 59^\circ}{\cos 31^\circ}$. **1**

OR

Simplify: $\frac{\sin^4 \theta - \cos^4 \theta}{\sin^2 \theta - \cos^2 \theta}$ **1**

18. If the product of two zeros of the polynomial $p(x) = 2x^3 + 6x^2 - 4x + 9$ is 3, find the third zero of the polynomial. **1**

19. An unbiased die is rolled once. Find the probability of getting an even prime number.. **1**

20. Name the graphical representation from which the median of a frequency distribution can be obtained. **1**

SECTION - B

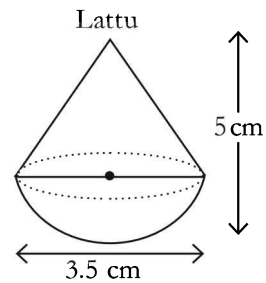
Read the following question carefully and answer the questions that follow.

21. Find the value of x, so that the point $(3, x)$ lies on the line represented by $2x - 3y + 5 = 0$. **2**

22. Raju got a playing *lattu* as his birthday present but it has surprisingly no colour on it. He wants to colour it with his crayons in a smart way.. **2**

It is shaped like a cone surmounted by a hemi-sphere as shown.

The entire lattu is 5 cm in height and the diameter of hemi-sphere base is 3.5 cm.



Find:

(i) The surface area of the hemi-sphere;

(ii) The area that he has to colour.

23. Using Euclid's division algorithm, find the HCF of 150 and 420. **2**

OR

Show that $3+\sqrt{5}$ is an irrational number, assume that $\sqrt{5}$ is an irrational number. **2**

24. If $\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \frac{1-\sqrt{3}}{1+\sqrt{3}}$, then find the value of θ. **2**

25. Find the roots of the quadratic equation: $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$ **2**

OR

What number should be added to the polynomial, $x^2 + 7x - 35$ so, that 3 is the zero of the polynomial. **2**

26. In a single throw of a die, determine the probability of getting: **2**

(i) neither a prime nor a composite number;

(ii) getting 7 or greater.

SECTION - C

Read the following question carefully and answer the questions that follow.

27. Prove that: **3**

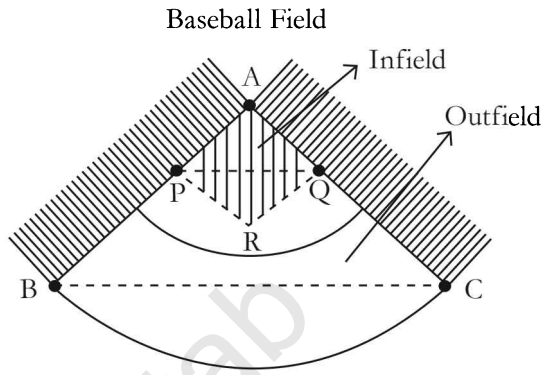
$$2\sec^2\theta - \sec^4\theta - 2\operatorname{cosec}^2\theta + \operatorname{cosec}^4\theta = \cot^4\theta - \tan^4\theta$$

OR

Evaluate: **3**

$$\operatorname{cosec}(65° + \theta) - \sec(25° - \theta) - \tan(55° - \theta) + \cot(35° + \theta)$$

28. A baseball groundsman is preparing the field for the big game at the weekend. The baseball field has side foul lines (fences) AB and AC, which makes the outfield. The ground as shown is in a shape of triangle plus semi-circle. The pitcher area is shown in APRQ where P and Q are two infield areas points corner on the lines AB and AC. The dimensions need to be accurate for the big game and hence $\frac{AP}{AB} = \frac{PQ}{BC}$.



We have AP = $6x$ cm, AB = $(3x + 5)$ cm, PQ = x cm and BC = 1 cm. **3**

(i) To assist the groundsman, first transform the relation $\frac{AP}{AB} = \frac{PQ}{BC}$ into a quadratic equation in x;

(ii) Now, solve the equation, obtained in (i), for x;

(iii) Finally calculate the length of PB.

29. The sum of the squares of two consecutive multiples of 7 is 637. Find the two multiples. **3**

OR

In an AP, the last term is 28 and the sum of all the nine terms of the AP is 144. Find the first term. **3**

30. Find the ratio in which the line segment joining the points (–3, 10) and (6, –8) is divided by (–1, 6). **3**

31. The diagonals of a trapezium ABCD in which AB || DC, intersect at O. If AB = 2 CD, then find the ratio of the areas of triangles AOB and COD. **3**

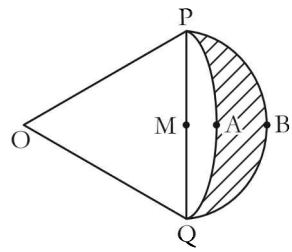
32. The following distribution gives the daily income of 50 workers of a factory: **3**

Daily income (in ₹)	100-120	120-140	140-160	160-180	180-200
Number of workers	12	14	8	6	10

Convert the distribution above to a "less than type" cumulative frequency distribution, and draw its ogive.

33. In the figure, are shown two arcs PAQ and PBQ. Arc PAQ is a part of circle with centre O and radius OP while arc PBQ is a semi-circle drawn on PQ as diameter with centre M.

If OP = PQ = 10 cm, show that the area of the shaded region is $25\left(\sqrt{3}-\frac{\pi}{6}\right)$ sq cm. **3**



34. Prove that the length of two tangents drawn from an external point to a circle are equal. **3**

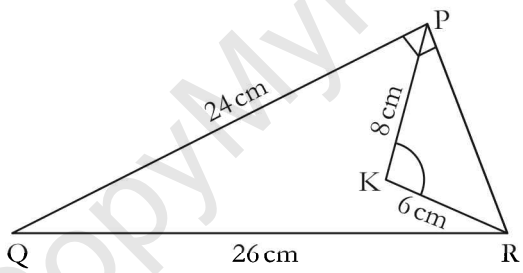
OR

Draw an line segment AB of length 6.4 cm. Divide AB in the ratio 3 : 5. Measure the two parts. **3**

SECTION - D

35. In a triangle, if the square of one side is equal to the sum of the squares of the other two sides, prove that the angle opposite to the first side is a right angle. **4**

Use the above result, to find the measure of ∠PKR in the given figure.



36. Find the sum given below: **4**

$$7 + 10\frac{1}{2} + 14 + \ldots\ldots\ldots\ldots + 84$$

OR

The sum of two numbers is 15 and the sum of their reciprocals is $\frac{3}{10}$. Find the two numbers. **4**

37. Solve for x and y graphically: **4**

$$x - y = 0; \quad 3x + 2y - 12 = 0$$

OR

What must be subtracted from $x^3 - 6x^2 + 13x - 6$ so that the resulting polynomial is exactly divisible by $x^2 + x + 1$? **4**

38. Construct a triangle PQR, where QR = 6 cm, ∠PQR = 60° and PQ = 4 cm. Construct another triangle whose sides are $\frac{4}{5}$ of the corresponding sides of ΔPQR. **4**

OR

Prove that the parallelogram circumscribing a circle is a rhombus. **4**

39. From an aeroplane vertically above a horizontal plane, the angles of depression of two consecutive kilometre stones on the opposite sides of the aeroplane are found to be α and β. Show that the height of the aeroplane is $\frac{\tan\alpha \cdot \tan\beta}{\tan\alpha + \tan\beta}$. **4**

40. A hollow cone is cut by a plane parallel to the base and upper portion is removed. If the curved surface area of the remainder is $\frac{8}{9}$ of the curved surface area of the whole cone, find the ratio of the line segments into which the cone's altitude is divided by the plane. **4**