9

SAMPLE PAPER

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. For a given grouped data with 40 observations, the 'less than ogive' and the 'more than ogive' intersect at (20.5, 15). The median of the data is: **1**

(A) 4.5 (B) 20 (C) 50 (D) 15.5

2. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is: **1**

(A) 60π sq cm (B) 68π sq cm (C) 120π sq cm (D) 136π sq cm

3. The outer and inner diameters of a circular ring are 34 cm and 32 cm respectively. The area of the ring is: **1**

(A) 66π sq cm (B) 60π sq cm (C) 33π sq cm (D) 29π sq cm

4. If $2 \sin 2\theta = \sqrt{3}$, then the value of θ is: **1**

(A) 90° (B) 30° (C) 60° (D) 45°

5. The value of $[\sin^2 20° + \sin^2 70° - \tan^2 45°]$ is: **1**

(A) 0 (B) 1 (C) 2 (D) –1

6. The perimeter of a triangle ABC with vertices A (0, 4), B (0, 0) and C (3, 0) is: **1**

(A) 5 units (B) 11 units (C) 12 units (D) $(7 + \sqrt{5})$ units

7. If $r = 3$ is a root of quadratic equation $kr^2 - kr - 3 = 0$ then the value of k is: **1**

(A) $\frac{1}{2}$ (B) 2 (C) –2 (D) $-\frac{1}{2}$

8. The degree of the polynomial $(x + 1)(x^2 - x + x^4 - 1)$ is: **1**

(A) 2 (B) 3 (C) 4 (D) 5

9. The decimal expansion of $\frac{1268}{2^2 \times 5}$ will terminate after: **1**

(A) one decimal places (B) two decimal places

(C) three decimal places (D) four decimal places

10. Which of the following is **not** an irrational number? **1**

(A) $\sqrt{2}$ (B) $\sqrt{3}$ (C) $\sqrt{4}$ (D) $\sqrt{5}$

(Q 11 – 15) Fill in the blanks:

11. A monomial has ..... term/terms. **1**

12. Diagonals of a parallelogram separate it into two triangles of **1**

OR

If $\Delta FED \sim \Delta STU$, then $\frac{EF}{ST}$ = …… **1**

13. If S is a point on side PQ of a ΔPQR such that PS = QS = RS, then $PR^2 + QR^2$ = ... **1**

14. Total number of outcomes in a single throw of three coins is **1**

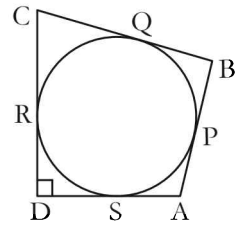
15. If the length of each diagonal of a cube is doubled, then its volume become ..... times. **1**

(Q 16 – 20) Answer the following:

16. A bag contains 5 red, 8 green and 7 white balls. One ball is drawn at random from the bag. Find the probability of getting neither a green ball nor a red ball. **1**

17. Determine the volume of the largest possible cone that can be carved out from a hemi-shpere of radius 'r' cm. **1**

18. In the figure, $\angle ADC = 90°$,
BC = 38 cm, CD = 28 cm and
BP = 25 m. Find the radius of the circle. **1**



19. Find the value of k for which the equation $kx(x-2)+6=0$ has equal roots. **1**

OR

Solve the quadratic equation for x: $(2x-3)^2 = 25$ **1**

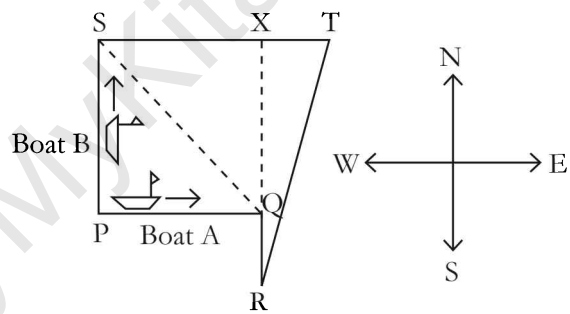
20. For a rhombus ABCD, prove the following: **1**

$$4AB^2 = AC^2 + BD^2$$

SECTION - B

21. The x-coordinate of a point P is twice its y-coordinate. If P is equidistant form Q (2, –5) and R (–3, 6), find the coordinates of P. **2**

22. Boat A travels due East from Port P for 3 hours to reach Port Q and then travels due South for another 2 hours to reach Port R. Boat B travels due North from Port P for 2 hours to reach Port S and then travels due East for another 3 hours to reach Port T. The average speed of Boat A and Boat B are 12km/h and 18 km/h respectively. **2**



Calculate the shortest distance between:

(i) Port Q and Port S

(ii) Port R and Port T.

23. α, β are the zeros of the quadratic polynomial $p(x) = x^2 - (k+6)x + 2(2k-1)$. Find the value of k, if $\alpha + \beta = \frac{1}{3}\alpha\beta$. **2**

24. Prove that the number 4^n, n being a natural number, can never end with the digit 0. **2**

OR

Draw a factor tree for the number 546. **2**

25. Draw two concentric circles of radius 3 cm and 5 cm. Construct a tangent to the smaller circle from a point on the bigger circle. **2**

26. If the HCF (210, 55) is expressible in the form $210 \times 5 - 55y$, then find y. **2**

OR

Find the greatest number of 6-digits exactly divisible by 24, 15 and 36. **2**

SECTION - C

27. Prove that the points (2, –2), (–2, 1) and (5, 2) are the vertices of a right-angled triangle. Also, find the area of the triangle. **3**

28. An AP : 5, 12, 19, ... has 50 terms. Find the last term. Hence, find the sum of its last 15 terms. **3**

29. If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$ **3**

OR

Evaluate: **3**

$$\frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\sin^2 30° + \cos^2 30°}$$

30. Let s denote the semi-perimeter of a triangle ABC in which BC = a, CA = b, AB = c. If a circle touches the side BC, CA, AB at D, E, F respectively, prove that BD = $s - b$. **3**

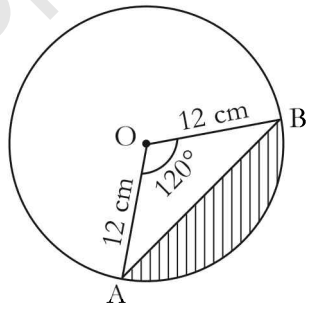
OR

ABC is an equilateral triangle of side $2p$. Find the length of its each altitude. **3**

31. Prove that: **3**

$$\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$$

32. A chord of a circle of radius 12 cm subtends an angle of 120° at the centre. Find the area of the corresponding segment of the circle. (Use $\pi = 3.14$ and $\sqrt{3} = 1.73$) **3**



33. Using Elimination method, solve for x and y the following pair of equations: **3**

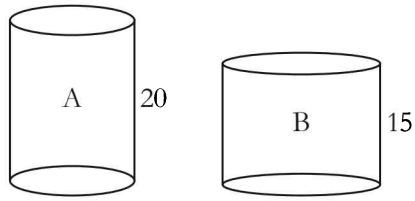
$$7x - 4y = 49; \quad 5x - 6y = 57$$

OR

Find the nature of the roots of the following quadratic equation. If the real roots exist, find them. **3**

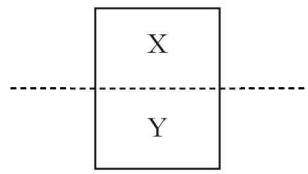
$$3x^2 - 4\sqrt{3}x + 4 = 0$$

34. A sheet of rectangular paper measures 20 cm by 15 cm. It can be rolled up along either side to form two cylinders, A and B as shown. **3**



(i) Which cylinder has a greater volume? How much more than the other?

(ii) Suppose the sheet is divided into two equal parts, X and Y, as shown and then rolled up to form two cylinders of height 15 cm each. Would the sum of the volumes of these two small cylinders be greater than the volume of cylinder B? Explain how you arrived at your conclusion.



SECTION - D

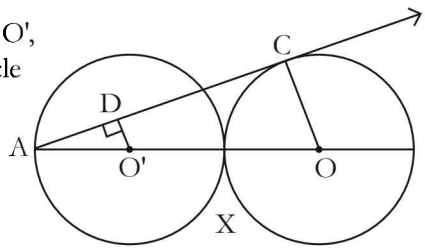
35. A takes 10 days less than the time taken by B to finish a piece of work. If both A and B together can finish the work in 12 days, find the time taken by B alone to finish the work. **4**

36. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding medians. **4**

OR

In the figure, two equal circles, with centres O and O', touch each other at X. OO' produced meets the circle with centre O' at A. **4**

AC is a tangents to the circle with centre O, at the point C. O'D⊥AC. Find the value of $\frac{DO'}{CO}$.



37. The weight of coffee in 70 packets are shown in the following table: **4**

Weight (in g)	200–201	201–202	202–203	203–204	204–205	205–206
Number of packets	12	26	20	9	2	1

Determine the **mean** and the **modal** weights.

38. The lower window of a house is at a height of 2 m above the ground and its upper window is 4 m above the lower window. At certain instant, the angles of elevation of a balloon from these windows are observed to be 60° and 30°, respectively. Find the height of the balloon from the ground. **4**

39. The first term of an AP is 5, the last term is 45 and the sum is 400. Find the number of terms and the common difference. **4**

OR

If Zeba was younger by 5 years than what she really is, then the square of her are (in years) would have been 11 more than five times her actual age. What is her age now? **4**

40. All the black face cards are removed from a pack of 52 playing cards. The reaming cards are well shuffled and then a card is drawn at random. Find the probability of getting a: (i) face card (ii) red card (iii) black card (iv) king. **4**

OR

The distribution below gives the marks of 100 students of a class: **4**

Marks	0–5	5–10	10–15	15–20	20–25	25–30	30–35	35–40
Number of students	4	6	10	10	25	22	18	5

Draw a *less than type* ogive form the given data and hence, obtain the median from the ogive. **4**