5

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. The cube of any positive integer is **not** of the form: **1**

(A) $9q$ (B) $9q + 1$ (C) $9q + 3$ (D) $9q + 8$

2. If α and β be the zeros of $x^2 + x + 1$, then $\frac{1}{\alpha}+\frac{1}{\beta}$ is equal to: **1**

(A) 1 (B) –1 (C) 0 (D) –3

3. In a right-angled triangle ABC, AB = $\frac{x}{2}$, BC = $x + 2$ and AC = $x + 3$. The value of x is: **1**

(A) 5 (B) 10 (C) 12 (D) 14

4. If k, $2k - 1$ and $2k + 1$ are three consecutive terms of an AP, then the value of k is: **1**

(A) 2 (B) 3 (C) –3 (D) 5

5. The coordinates of the point which divides the line segment joining A(–2, 2) and B(2, 8) in the ratio 3 : 1 are: **1**

(A) $\left(-1, \frac{7}{2}\right)$ (B) (0, 5) (C) $\left(1, \frac{13}{2}\right)$ (D) $\left(\frac{3}{2}, 5\right)$

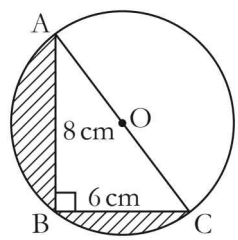
6. If D, E and F are the mid-points of sides BC, CA and AB respectively of ΔABC, then the ratio of the areas of ΔDEF to the area of ΔABC is: **1**

(A) 1 : 4 (B) 1 : 2 (C) 1 : 3 (D) 2 : 3

7. If $x \sin(90° - \theta) \cot(90° - \theta) = \cos(90° - \theta)$, then x is: **1**

(A) 0 (B) 1 (C) –1 (D) 2

8. In the figure, the area of the shaded portion is: **1**



(A) 15.25 sq cm (B) 12.75 sq cm

(C) 18.05 sq cm (D) 20.60 sq cm

[Use $\pi = 3.14$]

9. A metallic sphere of diameter 20 cm is recast into a right circular cone of base radius 10 cm. What is the height of the cone? **1**

(A) 4 cm (B) 40 cm (C) 60 cm (D) 120 cm

10. In a frequency distribution, an ogive helps in determining the: **1**

(A) mean (B) median (C) mode (D) cumulative frequency

(Q 11 – 15) Fill in the blanks:

11. The quadratic equation $2x^2 + x + 4$ has ..... real roots. **1**

OR

The discriminant of the equation $3x^2 + 2x = 0$ is …….. **1**

12. In between 10 and 250, there are ..... multiples of 4. **1**

13. The length of an altitude in an equilateral triangle of side 'a' cm is **1**

14. If the area of a semi-circlular region is 308 sq cm, then its perimeter is **1**

15. If a number x is chosen at random from the numbers –2, –1, 0, 1, 2, then the probability that $x^2 < 2$ is **1**

(Q 16 – 20) Answer the following:

16. If α and β are the zeros of the polynomial $p(x) = 4x^2 - 2x - 3$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$. **1**

17. State the SAS criterion of similarity of triangles. **1**

OR

If in two triangles ABC and PQR, $\frac{AB}{PQ} - \frac{BC}{RP}$, then write the equality of angles of the two triangles such that two triangles are similar.

18. Write a pair of linear equations having no solution. **1**

19. Show that if the circumferences of two circles are equal, then their areas are also equal. **1**

20. In a pack of 52 playing cards, what is the probability of a face card appearing if you pick a card ?. [Aces 'A' are not considered face cards.] **1**

SECTION - B

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

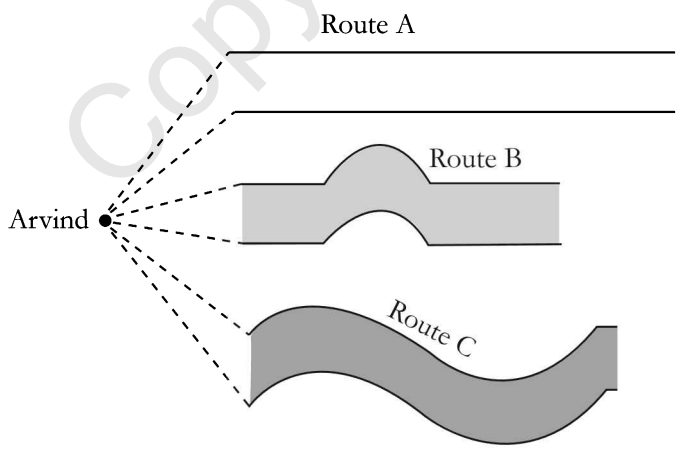
21. Divide a line segment AB of length 7 cm in the ratio 2 : 3. Also, measure the two parts. **2**

22. Find the roots of the quadratic equation: **2**

$$\frac{x-2}{x-3} + \frac{x-4}{x-5} = \frac{10}{3} \qquad (x \neq 3, 5)$$

23. Arvind is planning an expedition. He investigates three possible routes. **2**

- If he travels on route A, which is 800 km long, he expects to cover x km per day.
- Route B, which is the same distance as route A, has more difficult conditions and he would only expect to cover $(x - 5)$ km per day.
- Rote C, which is 100 km longer than route A, has easier conditions and he would expect to cover $(x + 5)$ km per day.

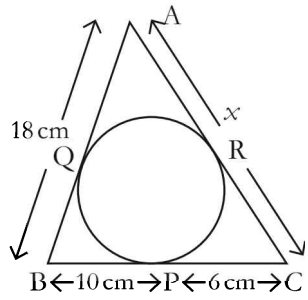


(i) If route C takes 20 days less than route B, form an equation in x and reduce it to the standard form.

(ii) Find the number of days that he expects to take on route A.

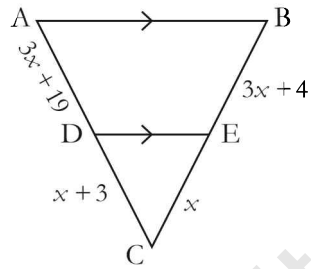
24. Show that the point (a, a), $(-a, -a)$ and $(-a\sqrt{3}, a\sqrt{3})$ are the vertices of an equilateral triangle **2**

25. In the figure, all three sides of a triangle touch the circle. Find the value of x. **2**



OR

Find the value of x for which DE || AB in the figure given below: **2**



26. Taking A = 30°, verify the following: **2**

$$\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

OR

Evaluate: $\frac{\tan 50° + \sec 50°}{\cot 40° + \operatorname{cosec} 40°} + \cos 40° \operatorname{cosec} 50°$ **2**

SECTION - C

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

27. Using prime factorisation, find HCF and LCM of 18, 45 and 60. Check if HCF × LCM = product of the numbers **3**

28. Prove that: **3**

$$\sec^2 \theta + \operatorname{cosec}^2 \theta = \sec^2 \theta \operatorname{cosec}^2 \theta$$

OR

Prove that: $\sin^2 A + \sin^2 A \tan^2 A = \tan^2 A$ **3**

29. Find the solution of the pair of equations: **3**

$$x - y + 1 = 0, \quad 3x + 2y - 12 = 0 \text{ graphically.}$$

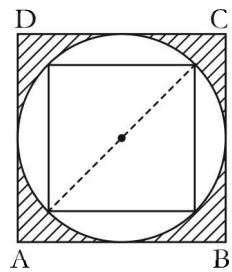
OR

Find the zeros of the polynomial $9x^2 - 5$ and verify the relation between the zeros and its coefficients. **3**

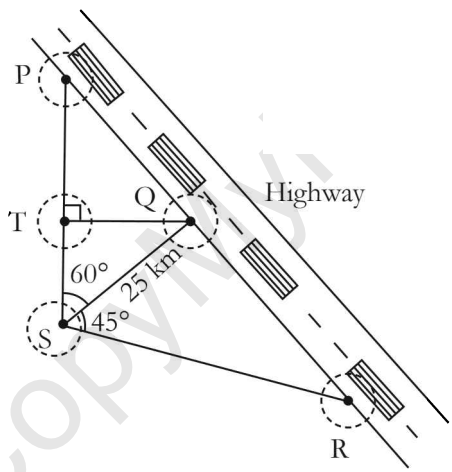
30. If the points A(1, –2), B(2, 3), C(a, 2) and D(–4, –3) from a parallelogram, find the value of a. **3**

31. A vertical tower stands on a horizontal plane is surmounted by a vertical flagstaff of height h. At a point on the ground, the angles of elevation of the bottom and the tops of the flagstaff are α and β respectively. Prove that the height of the tower is $\frac{h \tan \alpha}{\tan \beta - \tan \alpha}$. **3**

32. A circle is inscribed in a square of side 4 cm. Determine the left out area. What will be the left out area of the circle if a square is inscribed in the circle? (Use $\pi = 3.14$) **3**



33. Five small towns on the outskirts of Nagpur P,Q,R, S and T, three of which are located on the highway, are interconnected as shown in the figure. **3**



Google engineers need to map these areas for people to know travel time on google maps easily. To help them please calculate:

(i) The distance between towns Q and T;

(ii) The distance between towns P and T;

(iii) The distance between towns P and R.

34. If h, C and V respectively represent the height, curved surface area and volume of a cone, prove that: **3**

$$C^2 = \frac{3\pi V h^3 + 9V^2}{h^2}$$

OR

The radii of the circular ends of a frustum of a solid cone are 20 cm and 12 cm and its height is 6 cm, then find the volume and the surface area of the frustum. **3**

SECTION - D

35. An urn contants 9 red, 7 white and 4 black balls. A ball is drawn at random. Find the probability that the ball drawn will be: **4**

(i) white (ii) not red (iii) white or black (iv) green

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

OR

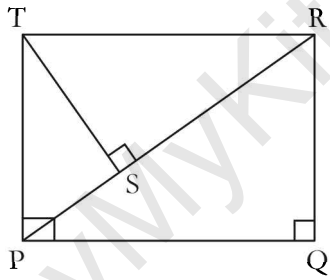
A 2-digit number is such that the product of its digit is 8. When 18 is added to the number, the digits interchange their place. Determine the number. **4**

37. The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Determine their present ages. **4**

38. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. **4**

OR

In the figure, RQ ⊥ PQ, PQ ⊥ PT and ST ⊥ PR. Prove that: ST × QR = PS × PQ **4**



39. The lengths of 40 leaves of a plant are measured correct to nearest millimetre, and the data obtained is represented in the following table: **4**

Length (in mm)	118-126	127-135	136-144	145-153	154-162	162-171	172-180
Number of leaves	3	5	9	12	5	4	2

Find the median length of the leaves.

40. Prove that, the tangent at any point of a circle is perpendicular to the radius through the point of contact. **4**

OR

The perimeter of a sheet of paper (in the shape of a quadrant of a circle) is 75 cm. Find its area. **4**