3

# 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.** After how many places will the decimal expansion of $\frac{189}{125}$ terminate? **1**

(A) 1 place (B) 2 places (C) 3 places (D) 4 places

**2.** The two zeros of the polynomial $p(x) = 4x^2 - 12x + 9$ are: **1**

(A) $\frac{3}{2}, \frac{3}{2}$ (B) $\frac{3}{2}, \frac{1}{4}$ (C) $\frac{1}{4}, \frac{1}{2}$ (D) $\frac{3}{2}, \frac{-3}{2}$

**3.** If $x = a, y = b$ is the solution of the pair of equations $x - y = 2$ and $x + y = 4$, then the value of $a$ and $b$, respectively are: **1**

(A) 1, 3 (B) 2, 3 (C) 3, 1 (D) 2, 5

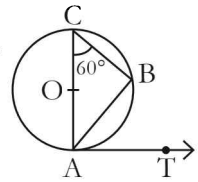
**4.** The discriminant of the quadratic equation $2x^2 + 4x - 7 = 0$ is: **1**

(A) 72 (B) $6\sqrt{2}$ (C) $2\sqrt{10}$ (D) –40

**5.** The area of the $\Delta ABC$, where A (0, 0), B (4, 0) and C (0, 5) is: **1**

(A) 10 sq units (B) 12 sq units (C) 20 sq units (D) 24 sq units

**6.** In the figure, O is the centre of a circle and AT is a tangent at point A. The measure of $\angle BAT$ is: **1**




(A) 30° (B) 60° (C) 75° (D) 105°

**7.** The value of (sin 25° cos 65° + cos 25° sin 65°) is: **1**

(A) 0 (B) 1 (C) 2 (D) 4

**8.** The area of a circle, whose circumference is 22 cm, is: **1**

(A) 54 sq cm (B) 46 sq cm (C) 40.5 sq cm (D) 38.5 sq cm

**9.** The class-mark of the class interval 10-25 is: **1**

(A) 10 (B) 15 (C) 17.5 (D) 25

**10.** One card is drawn from a pack of 52 cards. The probability that the card drawn is either red or a queen, is: **1**

(A) $\frac{1}{3}$ (B) $\frac{1}{13}$ (C) $\frac{7}{13}$ (D) $\frac{2}{13}$

**(Q 11 – 15) Fill in the blanks:**

**11.** Sum of roots of quadratic equation $x^2 - 4x + 2 = 0$ is ..... of product of roots. **1**

**12.** If $S_n = 5n^2 + 3n$, then $n^{th}$ term is ..... **1**

**OR**

if the common difference of an AP is 5, then $a_{18} - a_{13}$ = ..... **1**

**13.** If $\tan\theta + \cot\theta = 2$, then the value of $\tan^2\theta + \cot^2\theta$ is ..... **1**

**14.** Mode of observations 4, 3, 1, 2, 3, 4, 4 is ..... **1**

**15.** Number of face cards in a pack of 52 cards is ..... **1**

**(Q 16 – 20) Answer the following:**

**16.** Find the $16^{th}$ term of the AP: 2, 7, 12, 17, ……. **1**

**OR**

In an A.P., $a = -6$ and $d = 2$. Find the sum of its first 20 terms. **1**

**17.** Write the relationship between the coefficients, if the following pair of equations are inconsistent. **1**

$$ax + by + c = 0; \quad a'x + b'y + c' = 0$$

**18.** If $\tan A = 1$ $(0° < A < 90°)$ and $\cos B = \frac{1}{\sqrt{2}}$ $(0° < B < 90°)$, then find $\cos(A + B)$ **1**

**19.** Determine the upper limit of the modal class of the following frequency distribution: **1**

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

**20.** Write the empirical relationship among the three measures of central tendency mean, mode and median. **1**

## SECTION - B

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

**21.** Prove that: **2**

$$\frac{\cos 20°}{\sin 70°} + \frac{\cos \theta}{\sin(90° - \theta)} = 2$$

**OR**

For A = 30°, verify that $\cos 2A = \cos^2 A - \sin^2 A$. **2**

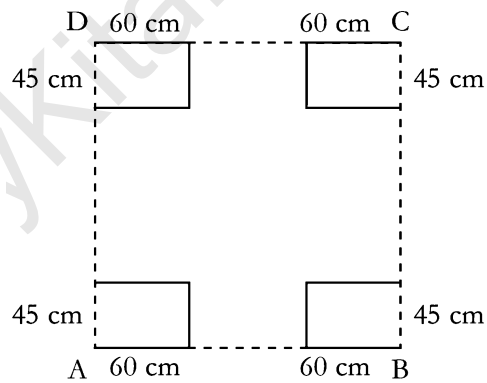
**22.** In an A.P., if $S_n = 3n^2 + 5n$ and $a_k = 164$, find value of $k$. **2**

**OR**

Find the zeros of the polynomial $2x^2 - (1 + 2\sqrt{2})\,x + \sqrt{2}$. **2**

**23.** A line intersects the $y$ – axis and $x$ – axis at the points P and Q respectively. If (2, –5) is the mid-point of PQ, find the coordinates of P and Q. **2**

**24.** Each student in a classroom has a rectangular desk that measures 60 cm by 45 cm. Some of these desks are put together as shown in the diagram to form a large square table for a class activity. **2**




**Square table for a class activity (made out of desks)**

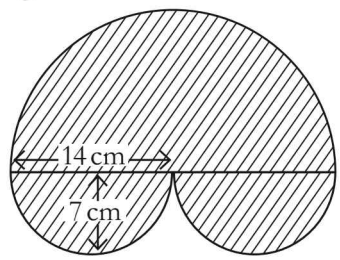
Find:

(i) The least length of a side of the square

(ii) The number of rows and columns of desks used to form a square table.

**25.** Using prime factorisation method, find the HCF and LCM of 210 and 175. **2**

**26.** Find the area of the shaded region: **2**




## SECTION - C

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

**27.** If the areas of two similar triangles are equal, prove that they are congruent. **3**

**OR**

A vertical pole of length 6 m casts a shadow 4 m long on the ground and at the same time a tower casts a shadow 28 m long. Find the height of the tower. **3**

**28.** Find the third vertex of a triangle, if two of its vertices are at (–3, 1) and (0, –2) and the centroid is at the origin. **3**

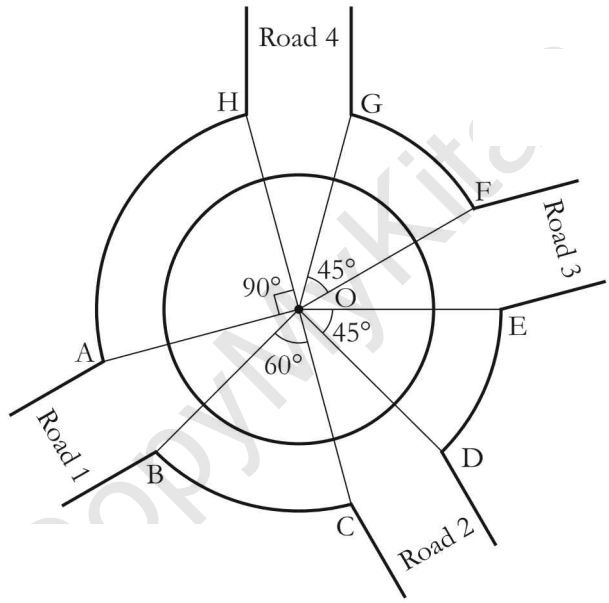
**OR**

In what ratio does the $x$-axis is divide the line segment showing the points (–4, –6) and (–1, 7)? Find the coordinates of the point of division. **3**

**29.** The diagram shows a roundabout at the junction of four Roads (of equal width).

The central park is in the form of a circle with centre O and radius 14 m. **3**

The curbs BC, DE, FG and HA are in the form of arcs that lie on a circle with centre O and radius 21 m. The angles subtended by these curbs at O are 60°, 45°, 45°, 90°.

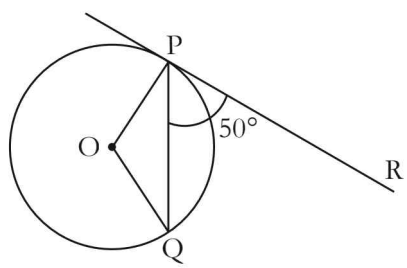



(i) Find the total lengths of the curbs;

(ii) Find the area of he circular road surrounded the central park;

(iii) Cite reasons why traffic roundabout are built.

**30.** In the figure, if O is the centre of a circle, PQ is a chord and the tangent PR at P makes an angle of 50° with the chord PQ, then determine ∠POQ. **3**



**31.** Solve for $x$ and $y$: **3**

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

**OR**

The sum of reciprocals of a child's age (in years) 3 years ago and 5 years from now is $\frac{1}{3}$. Find his present age. **3**

**32.** Prove that: **3**

$$(\sin \theta + \cos \theta)(\tan \theta + \cot \theta) = \sec \theta + \operatorname{cosec} \theta$$

**33.** Using Euclid's division algorithm, find whether the pair of numbers 216 and 297 are co-prime or not. **3**

**34.** The following table shows the cumulative frequency distribution of marks of 34 students in a test: **3**

| Marks (out of 90) | Number of students |
|---|---|
| More that or equal to 80 | 4 |
| More that or equal to 70 | 6 |
| More that or equal to 60 | 11 |
| More that or equal to 50 | 17 |
| More that or equal to 40 | 23 |
| More that or equal to 30 | 27 |
| More that or equal to 20 | 30 |
| More that or equal to 10 | 32 |
| More that or equal to 0 | 34 |

Construct a frequency distribution table for the data above.

Also, find the mean of the data.

## SECTION - D

**35.** Draw two concentric circles of radii 3 cm and 5 cm. Taking a point on outer circle, construct the pair of tangents to the inner circle. Measure the length of a tangent and verify it by actual calculation. **4**

**36.** How many silver coins, 1.75 cm in diameter and of thickness 2 mm, must be melted to form a cuboid of dimensions 5.5 cm × 10 cm × 3.5 cm? **4**

**37.** Vijay had some bananas, and he divided them into two lots A and B. He sold the first lot A at the rate of ₹2 for 3 bananas and the second lot B at the rate of ₹1 per banana, and got a total collection of ₹400. If he had sold the first lot A at the rate of ₹1 per banana, and the second lot B at the rate of ₹4 for 5 bananas, his total collection would have been ₹460. Determine the total number of bananas he had. **4**

**38.** The angles of depression of the top and bottom of building 50 metres high as observed from the top of a tower are 30° and 60°, respectively. Find the height of the tower and also the horizontal distances between the building and the tower. **4**

**OR**

Prove the following identity:

$$\frac{\cos A}{1+\sin A}+\frac{1+\sin A}{\cos A} = 2 \sec A$$ **4**

**39.** A natural number, when increased by 12, equals 160 times its reciprocal. Find the number. **4**

**OR**

Divide $p(x) = 8x^4 + 14x^3 - 2x^2 + 7x - 8$ by $q(x) = 4x^4 + 3x - 2$ and determine the quotient and the remainder. **4**

**40.** Prove that, the ratio of areas of two similar triangles is equal to the ratio of the squares of their corresponding sides. **4**

**OR**

D and E are points on the sides CA and CB respectively of a ΔABC, right-angled at C. **4**
Prove that:

$$AE^2 + BD^2 = AB^2 + DE^2$$