# SAMPLE PAPER
## (SELF ASSESSMENT)

11

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.** $(2+\sqrt{2})$ is: **1**

(A) a composite number (B) a rational number

(C) an irrational number (D) a number which is neither prime nor composite

**2.** If the zeros of the quadratic polynomial $x^2 + (a + 1)x + b = -1$ are 2 and $-3$, then: **1**

(A) $a = -7, b = -1$ (B) $a = 5, b = -1$

(C) $a = 2, b = -6$ (D) $a = 0, b = -6$

**3.** If $x^2 + 5px + 16 = 0$ has no real roots, then: **1**

(A) $p > \frac{8}{5}$ (B) $p < \frac{-8}{5}$ (C) $\frac{-8}{5} < p < \frac{8}{5}$ (D) $p = \frac{8}{5}$

**4.** In an AP, $a_{m+n} + a_{m-n}$ is equal to: **1**

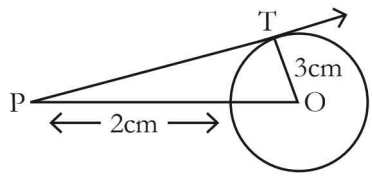
(A) 0 (B) 1 (C) $a_n$ (D) $a_m$

**5.** The centroid of ΔABC, A (7, 5), B(5, 7), and C (–3, 3 ), is: **1**

(A) (3,–5) (B) (–3,5) (C) (–3,–5) (D) (3, 5)

**6.** In the adjoining figure, the length of PT is: **1**

(A) 3 cm (B) 4 cm (C) 5 cm (D) 6 cm




**7.** If cos A = $\frac{3}{4}$, then tan A is equal to: **1**

(A) $\frac{3}{4}$ (B) $\frac{4}{5}$ (C) $\frac{\sqrt{7}}{4}$ (D) $\frac{\sqrt{7}}{3}$.

**8.** If the perimeter of a circle is 44 cm, then its area is: **1**

(A) 112 sq cm (B) 38.5 sq cm (C) 77 sq cm (D) 154 sq cm

**9.** The radius of a sphere is '*r*' cm. It is divided into two equal parts. The total surface area of the two parts is: **1**

(A) $8\pi r^2$ cm$^2$ (B) $6\pi r^2$ cm$^2$ (C) $4\pi r^2$ cm$^2$ (D) $10\pi r^2$ cm$^2$

**10.** The mean of the following data is 12, then the value of *p* is: **1**

| $x$ | 4 | 8 | $p$ | 16 | 20 |
|---|---|---|---|---|---|
| $f$ | 5 | 3 | 12 | 5 | 4 |

(A) 11 (B) 12 (C) 13 (D) 14

**(Q 11 – 15) Fill in the blanks:**

**11.** If in an AP, $a_2 = 10$, $a_3 = 15$, then $a_5$ is equal to ..... . **1**

**12.** The discriminant of $4x^2 - 20x + 25$ is ..... . **1**

**OR**

The quadratic equation $px^2 + qx + r = 0$ has real and distinct roots, if …….. **1**

**13.** If ΔABC is an isosceles triangle, right-angled at C, then $AB^2$ = ..... . **1**

**14.** If the surface area of a sphere is 616 sq. cm, then radius of the sphere is ..... cm. **1**

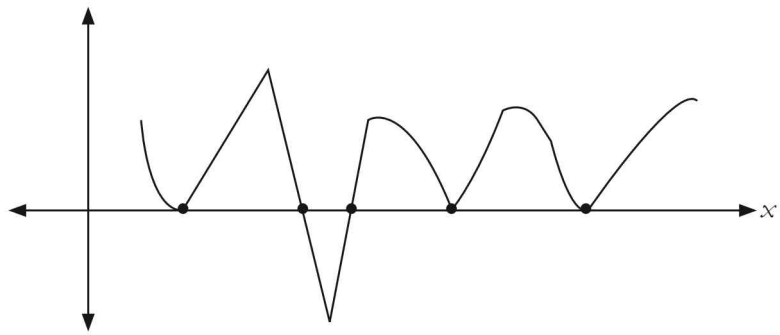
**15.** The mean of first 50 natural numbers is ..... . **1**

**(Q 16 – 20) Answer the following:**

**16.** Discuss the nature of roots of the quadratic equation: $x^2 + 10x + 39 = 0$ **1**

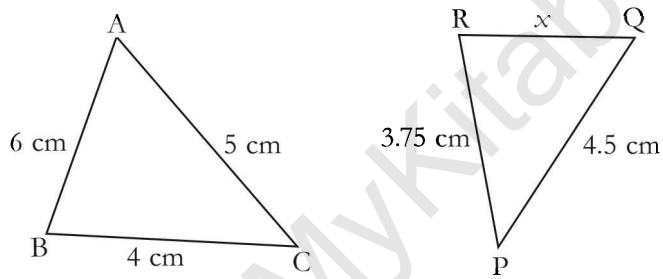
**OR**

The graph of a polynomial $p(x)$ shown below cuts the $x$-axis at two places and touches the $x$-axis at three places. **1**




What is the number of zeros of the polynomial $p(x)$.

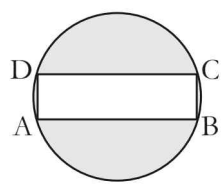
**17.** In the given figure $\Delta ABC \sim \Delta PQR$. Find the value of $x$. **1**




**18.** Find the mode of the data: 4, 7, 3, 2, 5, 5, 2, 8, 2, 5, 3, 5 **1**

**19.** Using the concept of A.P., find the sum of first six multiples of 4. **1**

**20.** Determine the area of the shaded region of the given figure, if AB = 8 cm and BC = 6 cm (Take $\pi$=3.14) **1**




## SECTION - B

**21.** If $x = 2^3 \times 3 \times 5^2$ and $y = 2^3 \times 3^3$, then find HCF($x$, $y$) and LCM($x$, $y$). **2**

**22.** Find the zeros of the polynomial $p(x) = x^3 + 4x^2 + x - 6$, if it is given that the product of the two of its zeros is 6. **2**

**23.** Construct a triangle similar to a given $\Delta ABC$ with sides equal to $\frac{4}{7}$ of the corresponding sides of $\Delta ABC$. **2**

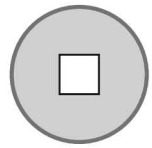
**24.** If $5\cos\theta = 7\sin\theta$, find the value of: $\frac{7\sin\theta + 5\cos\theta}{5\sin\theta + 7\cos\theta}$ **2**

**OR**

Simplify: $\sqrt{(1-\cos^2\theta)\sec^2\theta}$ **2**

**25.** PQR is a triangle, XY is drawn parallel to QR meeting PQ at X and PR at Y. If $\frac{PX}{XQ} = \frac{3}{5}$ and PR = 6 cm, find PY. **2**

**26.** The figure shows an ancient coin. The coin is in the shape of a circle of radius 3 cm with a square of sides $x$ cm removed from its centre. The area of each face of the coin is $7\pi$ sq cm. **2**



i. Form an equation in $x$ and solve it for $x$.

ii. Find the perimeter of the square. (Take $\pi = 3.14$)

**OR**

Find the distance between A$(x + y, x - y)$ and B$(x - y, x - y)$.

## SECTION - C

**27.** Prove that $\sqrt{3}$ is an irrational number. **3**

**OR**

Calculate whether the following rational numbers will have terminating or a non-terminating decimal expression.

(i) $\frac{13}{2125}$ (ii) $\frac{23}{2^3 \times 5^2}$ (iii) $\frac{129}{2^3 \times 5 \times 1^3}$

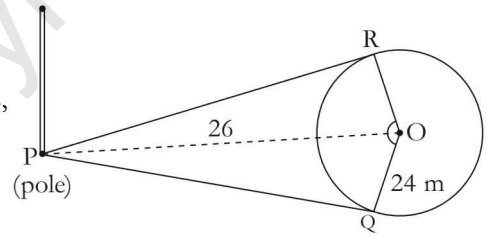
**28.** In an AP of 50 terms, the sum of first 10 terms is 210 and the sum of its last 15 terms is 2565. Find the AP **3**

**29.** Using Euclid's division algorithm, find the HCF of 12560 and 215. **3**

**30.** 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. **3**

(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.




**31.** Prove that: $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \text{cosec}\,\theta + \cot\theta$ **3**

**OR**

Prove that: $2\sec^2\theta - \sec^4\theta - 2\text{cosec}^2\theta + \text{cosec}^2\theta = \cot^4\theta - \tan^4\theta$ **3**

**32.** For $\theta = 30°$, verify the following: **3**

(1) $\sqrt{\frac{1-\cos 2\theta}{2}} = \sin\theta$ (2) $\tan 2\theta = \frac{2\tan\theta}{1-\tan^2\theta}$

**OR**

If $\tan A = 2$, evaluate: $\sec A \sin A + \tan^2 A - \text{cosec}\, A$ **3**

**33.** Two men are on opposite sides of a tower. They observe the angles of elevation of the top of the tower as 30° and 45° respectively. If the height of the tower is 50 m, find the distance between the two men. **3**

**34.** A park is in the form of a rectangle 120 m long and 100 m wide. At the centre of the park, there is a circular lawn. The area of the park excluding the lawn is 8700 sq m. Find the radius of the circular lawn. **3**

## SECTION - D

**35.** A die has six faces, marked 0, 1, 1, 1, 6, 6. Two such dice are thrown together and the total score is recorded. Find the probability of getting a total of 7. **4**

**36.** A train covers a distance of 300 km between two stations at a speed of $x$ km/h. Another train covers the same distance at a speed of $(x - 5)$ km/h. **4**

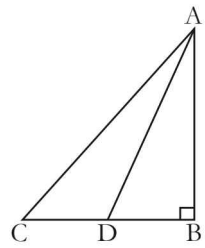
(i) If the first train takes 3 hours less than the second train, find the speed of each train.

(ii) Find the time which each train takes to cover the distance between the stations.

**37.** Prove that in a triangle, if the square of one side is equal to the sum of the squares of the other two sides, then the angle opposite to the first side is a right angle. **4**

**OR**

In the figure, $\Delta ABC$ is a right-angled at B and D is the mid-point of BC. **4**



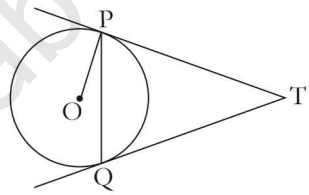

Prove that:

$$AC^2 = 4AD^2 - 3AB^2$$

**38.** PQ is a chord of length 8 cm of a circle of radius 5 cm.

The tangents at P and Q intersect at a point T.

Find the length of TP. **4**




**39.** 50 students enter for a school Javelin throw competition. The distance (in metres) thrown are recorded below: **4**

| **Distance (in m)** | 0–20 | 20–40 | 40–60 | 60–80 | 80–100 |
|---|---|---|---|---|---|
| **Number of students** | 6 | 11 | 17 | 12 | 4 |

(1) Construct a cumulative frequency table.

(2) Draw a cumulative frequency curve (*less than type*) and determine the **median** distance thrown by using this curve.

**OR**

60 accidents reported were randomly picked up from local evening newspaper involving the age of drivers. **4**

| **Age group** | 0–20 | 20–40 | 40–60 | 60–80 | 80–100 |
|---|---|---|---|---|---|
| **Number of accidents** | 17 | 12 | 24 | 12 | 5 |

Find the **mean** and **mode** of the data.

**40.** Ankush cycles for $x$ hours at 20 km/h and then $y$ hours at 16 km/h. If he cycles 68 km altogether in 4 hours, find the values of $x$ and $y$. **4**

**OR**

The sum of the third and the seventh terms of an AP is 6 and their product is 8. Find the sum of first sixteen terms of the AP. **4**