# SAMPLE PAPER

**7**

## 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. $6^n$ cannot end with digit:     **1**
   (A) 0      (B) 1      (C) 2      (D) 3

2. The value of the remainder, when $x^2 + (a + b) x + ab$ is divided by $(x + a)$, is:     **1**
   (A) 0      (B) $x + b$      (C) $ab$      (D) $-b$

3. If the sum of a positive number and its square is 240, then the number is:     **1**
   (A) 4      (B) 5      (C) 6      (D) 15

4. If $x$, $x - 2$ and $3x$ are in AP, then the value of $x$ is:     **1**
   (A) –3      (B) –2      (C) 3      (D) 2

5. $x$ – axis divides the join of A(2, –3) and B(5, 6) in the ratio:     **1**
   (A) 1 : 2      (B) 2 : 1      (C) 3 : 2      (D) 2 : 3

6. If a square ABCD is inscribed in a circle of radius '$r$' and AB = 4 cm, then the value of $r$ is:     **1**
   (A) 2 cm      (B) $2\sqrt{2}$ cm      (C) 4 cm      (D) $4\sqrt{2}$ cm

**7.** (sin 72° + cos 18°)(sin 72° − cos 18°) is equal to:      **1**

(A) $\dfrac{1}{\sqrt{3}}$      (B) 1      (C) 2      (D) 0

**8.** If the area of a circle is 154 sq cm, then its circumference is:      **1**

(A) 11 cm      (B) 22 cm      (C) 44 cm      (D) 55 cm

**9.** Volume of frustum of a cone is given by:      **1**

(A) $\dfrac{4}{3}\pi(R^3 - r^3)$      (B) $\pi(R + r)\ell$

(C) $\dfrac{1}{3}\pi h(R^2 + r^2 + Rr)$      (D) $\pi h(R^2 + r^2 + Rr)$

**10.** The mode of the following data:      **1**

| $x$ | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
|-----|------|-------|-------|-------|-------|-------|
| $f$ | 6 | 11 | 21 | 23 | 14 | 5 |

is nearly equal to:

(A) 31.82      (B) 40      (C) 28      (D) 25

## (Q 11 – 15) Fill in the blanks:

**11.** $12^{th}$ term of the AP: 5, 8, 11, 14, ............... is ..................      **1**

**12.** The sum of the roots of the quadratic equation $2x^2 + 14x + 24 = 0$ is ....................      **1**

**13.** If areas of two similar triangles are equal, then these triangles are ...................      **1**

**OR**

Figure shows a ΔDEF, formed by joining mid-points of the sides of ΔABC.      **1**
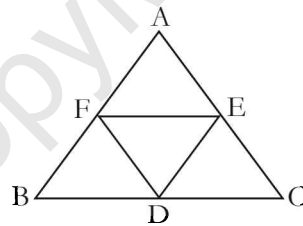


Ratio of area of ΔDEF to area of ΔABC is ………….

**14.** If the radius of the base of a right circular cylinder is halved, keeping the height same, then the ratio of the volume of the reduced cylinder to that of the original cylinder is ........ ...........................   **1**

**15.** An unbiased die is rolled once. The probability of getting an even prime number is .................      **1**

## (Q 16 – 20) Answer the following:

**16.** If one of the zeros of polynomial $p(x) = (k - 1)x^2 - kx + 1$ is −3, find the value of $k$.      **1**

**17.** Check if the three sides of lengths 3 cm, 8 cm and 6 cm can form a right triangle.      **1**

**18.** Determine the median class for the following distribution:      **1**

| Class | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
|-------|------|-------|-------|-------|-------|-------|
| Frequency | 5 | 3 | 4 | 3 | 6 | 12 |

**19.** Determine the dimensions of a rectangular park whose perimeter is 80 m and area 400 sq m **1**

**20.** Find the area of square inscribed in a circle of radius 8 cm. **1**

**OR**

The diameter of a cycle wheel is 21 cm. How many revolutions will it make in moving 66 m? **1**

# SECTION - B

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

**21.** Find the greatest positive integer that will divided 434 and 539 leaving remainders 9 and 12 respectively. **2**

**OR**

For every positive real number $x$, prove that there exists an irrational number $y$ satisfying $0 < y < x$. **2**

**22.** Draw a circle of radius 3 cm. From a point 5 cm away from the centre of the circle, draw two tangents to the circle. **2**

**23.** If the zeros of the polynomial $x^3 - 2x^2 + x + 1$ are $a - b$, $a$ and $a + b$, then find the values of $a$ and $b$. **2**

**24.** The diagram shows the positions of three electric poles A, B and C in a colony's park. Despite these three poles, some parts of the park are still in dark. So, RWA decides to have one more electric pole D in the park. **2**
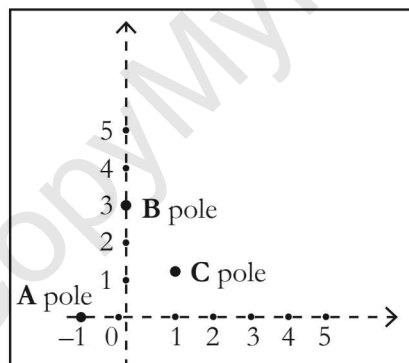


(i) Does the three poles A,B and C form a right- angled triangle? Justify your answer

(ii) Determine the position of the fourth pole D so that four points A,B,C and D form a parallelogram.

**25.** Prove that a line drawn through the mid-point of one side of a triangle parallel to another side bisects the third side. **2**

**26.** If $x = r \sin A \cos C$, $y = r \sin A \sin C$, $z = r \cos A$; then **2**

prove that: $r^2 = x^2 + y^2 + z^2$

**OR**

Prove that: $\sec^2 \theta + \cot^2 (90° - \theta) = 2 \csc^2 (90° - \theta) - 1$ **2**

## SECTION - C

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

**27.** Evaluate:     **3**

$$\sec^2 10° - \cot^2 80° + \frac{\sin 15° \cos 75° + \cos 15° \sin 75°}{\cos\theta \, \sin(90° - \theta) + \sin\theta \, \cos(90° - \theta)}$$

**OR**

Prove that:     **3**

$$\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A} = 1 + \tan A + \cot A$$

**28.** Show that the sum of AP, whose first term is *a* the second term *b* and the last term *c*, is

equal to $\dfrac{(a + c) + (b + c - 2a)}{2(b - a)}$.     **3**

**29.** Sixteen glass spheres each of radius 2 cm are packed into a cuboidal box of internal dimensions 20 cm × 10 cm × 10 cm and then the box is filled with water. Find the volume of water filled in the box.     **3**

**OR**

The base radius and height of a right circular solid cone are 2 cm and 8 cm respectively. It is melted and recast into spheres of diameter 2 cm each.

Find the number of sphere so formed.     **3**

**30.** Show that the square of any positive odd integer is of the form 8*m* + 1, for some integer *m*.     **3**

**31.** The vertices of a triangle are (–4, 2), (*a*, 7) and (2, *b*) and its centroid is (–1, 3). Find the values of *a* and *b*.     **3**

**OR**

Show that the points A(1, 0), B(5, 3), C(2, 7) and D(–2, 4) are the vertices of a parallelogram.     **3**

**32.** If θ is an acute angle and tan θ + cot θ = 2; then find the value of (tan⁵ θ + cot⁵ θ).     **3**

**33.** The diagram shows two different positions, P and Q of a helicopter flying horizontally at a uniform speed of 72 km/h. It is found that it takes the helicopter 10 minutes to fly from P to Q. The angles of elevation of P and Q from a point A on the ground are 45° and 60° respectively.
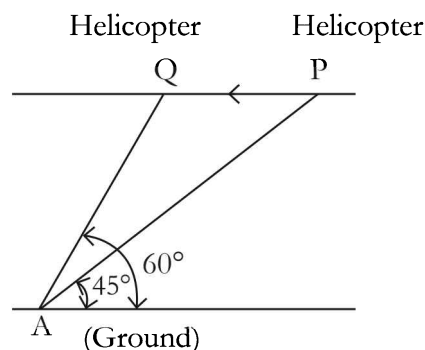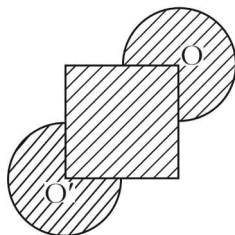


Find:

(i) The distance PQ;

(ii) The distance AQ;

(iii) The height of the helicopter above the ground.

**34.** In the figure, the side of the square is 28 cm and radius of each circle is half of the length of the side of the square, where O and O′ are centres of the circles.　**3**

Find the area of the shaded region.



# SECTION - D

**35.** If the sum of first 7 terms of an AP is 49 and that of first 17 terms is 289, find the sum of first $n$ terms.　**4**

**36.** Draw the graphs of the equations:　**4**

$$4x - y = 4 \quad \text{and} \quad 4x + y = 12$$

Determine the vertices of the triangle formed by the lines representing these equations and the $x$ – axis. Shaded the triangular region so formed.

**OR**

A person on tour has ₹4200 for his expenses. If he extends his tour for 3 days, he has to cut down his daily expenses by ₹70. Find the original duration of the tour.　**4**

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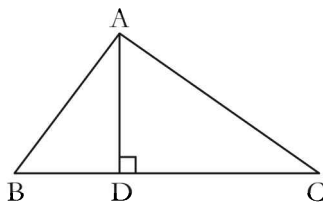
**OR**

In ΔABC, AD ⊥ BC such that $AD^2 = BD \times DC$.　**4**

Prove that ΔABC is right triangle, right-angled at A.



**38.** If the mean of the following data is 14.7, find the values of $p$ and $q$.　**4**

| Class | 0-6 | 6-12 | 12-18 | 18-24 | 24-30 | 30-36 | 36-42 | Total |
|-------|-----|------|-------|-------|-------|-------|-------|-------|
| Frequency | 10 | $p$ | 4 | 7 | $q$ | 4 | 1 | 40 |

Hence, also determine the mode of the data.

**OR**

The annual rainfall record of a city for 66 days is given below in the table: **4**

| Rainfall (in cm) | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
|---|---|---|---|---|---|---|
| Number of days | 22 | 10 | 8 | 15 | 5 | 6 |

Calculate the median rainfall, using the formula.

**39.** Prove that the lengths of tangents drawn from an external point to a circle are equal. **4**

Using the above result, prove the following:

"If a circle touches all the four sides of a quadrilateral ABCD, prove that:

AB + CD = BC + DA".

**40.** There are 100 cards in a bag on which numbers from 1 to 100 are written. A card is taken out from the bag at random. Find the probability that the number on the selected card (i) is divisible by 9 and is a perfect square (ii) is a prime number greater than 80. **4**