



**MATHEMATICS | SAMPLE PAPER**

**ICSE  
CLASS – 10**

**Maximum Marks: 80**

**Duration: 2.5 Hrs.**

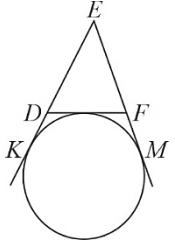
**General Instructions:**

1. Answers to this paper must be written on the paper provided separately.
2. You will not be allowed to write during first 15 minutes.
3. This time is to be spent in reading the question paper.
4. The time given at the head of this Paper is the time allowed for writing the answers.
5. Attempt All Questions from **Section A** and attempt any four questions from **Section B**.
6. All work, including rough work, must be clearly shown and must be done on the same sheet as the rest of the solution.
7. Omission of essential working will result in loss of marks.
8. The intended marks for questions or parts of questions are given in brackets [ ].
9. Mathematical tables and graph papers are to be provided.

**Section – A (40 Marks) (Attempt All Questions from this Section)**

**Question 1.** Choose the correct solutions to the questions from the given options. (Do not copy the questions. Write the correct solutions only) **[15 Marks]**

- 1.1 A retailer purchases a fan for ₹1500 from a wholesaler and sell it to a consumer at 10% profit. If the sales are intra-state and the rate of GST is 12%, the cost of the fan to the consumer inclusive of tax is:  
(a) ₹1800 (b) ₹1848 (c) ₹1650 (d) ₹1830
- 1.2 The value of  $x$  satisfying  $p^2x^2 + (p^2 - q^2)x - q^2 = 0$  are:  
(a)  $\frac{q^2}{p^2}, -1$  (b)  $\frac{p^2}{q^2}, 1$  (c)  $1, \frac{-p}{q}$  (d)  $\frac{q^2}{p^2}, 1$
- 1.3 If  $(x + 2)$  is a common factor of  $x^2 + ax + b$  and  $x^2 + bx + a$ , then the ratio  $a : b$  is equal to:  
(a) 4 (b) 1 (c) 3 (d) 2
- 1.4 For an  $m \times n$  matrix  $A$ , which statement is always true:  
(a) It has  $m + n$  entries (b) It has  $m \times n$  entries  
(c) It has  $m$  columns and  $n$  rows (d) None of these

- 1.5 The sum of series  $1 + (1+2) + (1+2+3) + (1+2+3+4) + \dots + (1+2+3+\dots+20)$  is:  
 (a) 1470 (b) 1540 (c) 1610 (d) 1370
- 1.6 The point  $P(h, k)$  is reflected in the  $X$ -axis, then it is reflected in the origin to  $P'$ . If  $P'$  has coordinates  $(-8, 5)$ , then the point  $(h, k)$  is:  
 (a)  $(8, 5)$  (b)  $(-8, -5)$  (c)  $(-5, -8)$  (d)  $(5, 8)$
- 1.7 Diagonal  $AC$  of a rectangle  $ABCD$  is produced to the point  $E$  such that  $AE : CE = 2 : 1$ ,  $AB = 8$  cm and  $BC = 6$  cm. The length of  $DE$  is:  
 (a)  $3\sqrt{17}$  cm (b)  $2\sqrt{19}$  cm (c) 13 cm (d) 15 cm
- 1.8 A sphere of radius  $a$  units is immersed completely in water contained in a right circular cone of semi-vertical angle  $30^\circ$  and water is drained off from the cone till its surface touches the sphere. Then the volume of water remaining in the cone will be:  
 (a)  $\frac{5\pi}{3}a^3$  (b)  $\frac{5}{3}\pi a^2$  (c)  $\frac{\pi a^3}{3}$  (d)  $5\pi a^3$
- 1.9 Solve the inequation  $\left| \frac{2}{x-4} \right| > 1, x \neq 4$ :  
 (a)  $\{x : x \in [2, 4) \cup (4, 6), x \in R\}$  (b)  $\{x : x \in (2, 4) \cup (4, 6), x \in R\}$   
 (c)  $\{x : x \in (-2, 4) \cup (-4, 6), x \in R\}$  (d)  $\{x : x \in [-2, 4) \cup (-4, 6], x \in R\}$
- 1.10 Three different coins are tossed simultaneously. Find the probability of getting exactly one head.  
 (a)  $\frac{1}{8}$  (b)  $\frac{5}{8}$  (c)  $\frac{7}{8}$  (d)  $\frac{3}{8}$
- 1.11 If  $X = \begin{bmatrix} 1 & -2 \\ 0 & 3 \end{bmatrix}$  and  $I$  is a  $2 \times 2$  matrix, then  $X^2 - 2X + 3I$  is equal to:  
 (a)  $4X$  (b)  $2X$  (c)  $-I$  (d)  $-2X$
- 1.12 If  $(-4, 3)$  and  $(4, 3)$  are two vertices of an equilateral triangle and the origin lies in the interior of the triangle, then the coordinates of the third vertex will be:  
 (a)  $(1, 0)$  (b)  $(0, 1)$   
 (c)  $(0, 3 - 4\sqrt{3})$  (d)  $(1, 3 - 4\sqrt{3})$
- 1.13 In the given figure a circle touches the side  $DF$  of  $\triangle EDF$  at  $H$  and touches  $ED$  and  $EF$  produced at  $K$  and  $M$  respectively. If  $EK = 9$  cm, then the perimeter of  $\triangle EDF$  (in cm) is:  
  
 (a) 13.5 (b) 18 (c) 9 (d) 12
- 1.14. If  $x < y < 2x$ , then the median and mean of  $x, y$  and  $2x$  are 27 and 33, respectively. The mean of  $x$  and  $y$  is:  
 (a) 25.1 (b) 25 (c) 25.2 (d) 25.5

**1.15. Assertion (A):** Let the positive numbers  $a, b, c$  be in A.P., then  $\frac{1}{bc}, \frac{1}{ac}, \frac{1}{ab}$  are also in AP.

**Reason (R):** If each term of an A.P. is divided by  $abc$ , then the resulting sequence is also in A.P.

- (a) Both A and R are true and R is the correct explanation of A
- (b) Both A and R are true but R is not the correct explanation of A
- (c) A is true but R is false
- (d) A is false but R is true.

**Question 2**

**[12 Marks]**

- 2.1** Vaishnavi has a cumulative deposit account of Rs 200 per month at 10% per annum. If she gets Rs 6775 at the time of maturity, find the total time for which the account was held.
- 2.2** If  $y = \frac{10ab}{a+b}$ , then find the value of  $\frac{y+5a}{y-5a} + \frac{y+5b}{y-5b}$ .
- 2.3.** Prove that :  $\sec^2 A - \left( \frac{\sin^2 A - 2\sin^4 A}{2\cos^4 A - \cos^2 A} \right) = 1$

**Question 3**

**[13 Marks]**

- 3.1** A solid cylinder of radius 7 cm and height 14 cm is melted and recast into solid spheres each of radius 3.5 cm. Find the number of spheres formed.
- 3.2.** Points  $A(9, 2)$ ,  $B(1, 10)$  and  $C(-7, -6)$  are the vertices of a  $\triangle ABC$ . find the equation of:
- (i) The median of the triangle through  $A$ .
  - (ii) The altitude of the triangle through  $A$ .
- 3.3.** Use graph paper to answer the questions:
- (i) The point  $P(2, -4)$  is reflected about the line  $x = 0$  to get the image of  $Q$ . Find the coordinates of  $Q$ .
  - (ii) Point  $Q$  is reflected about the line  $y = 0$  to get the image  $R$ . Find the coordinates of  $R$ .
  - (iii) Name the figure  $PQR$
  - (iv) Find the area of figure  $PQR$

**Section-B (40 Marks) (Attempt Any Four questions from this Section)**

**Question 4**

**[10 Marks]**

- 4.1.** Let Vinod, Govind and Ankit be three dealers belonging to different states. Dealer Vinod sells some products/services to dealer Govind for ₹1000 and dealer Govind sells the same products/services to dealer Ankit at a profit of ₹300. Calculate the tax liability of Govind, if the rate of GST is 12%. **[3]**
- 4.2.** Find the discriminant in the following quadratic equations and state the nature of the roots. **[3]**

1.  $3x^2 - 5x + 2 = 0$

2.  $x^2 - \frac{x}{3} + \frac{3}{2} = 0$

- 4.3. Use a graph paper for this question, the daily pocket expenses of 200 students in a school are given below: [4]

| Pocket Expenses<br>(in Rs) | Number of students<br>(Frequency) |
|----------------------------|-----------------------------------|
| 0-5                        | 10                                |
| 5-10                       | 14                                |
| 10-15                      | 28                                |
| 15-20                      | 42                                |
| 20-25                      | 50                                |
| 25-30                      | 30                                |
| 30-35                      | 14                                |
| 35-40                      | 12                                |

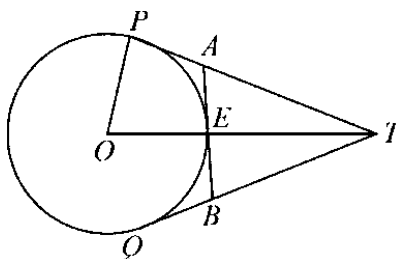
Draw a histogram representing the above distribution and estimate the mode from the graph.

**Question 5**

[10 Marks]

- 5.1 If  $A = \begin{bmatrix} 2 & 1 \\ 0 & -2 \end{bmatrix}$ ,  $B = \begin{bmatrix} 4 & 1 \\ -3 & -2 \end{bmatrix}$  and  $C = \begin{bmatrix} -3 & 2 \\ -1 & 4 \end{bmatrix}$ , then find  $A^2 + AC - 5B$ . [3]

- 5.2 In the given figure,  $O$  is the centre of a circle of radius  $5\text{ cm}$ ,  $T$  is a point such that  $OT = 13\text{ cm}$  and  $OT$  intersect the circle at  $E$ . If  $AB$  is the tangent to the circle at  $E$ , then find the length of  $AB$ . [3]



- 5.3. Without actual division, find the remainder, if  $P(x) = 9x^2 - 6x + 2$  is divided by  $(3x - 2)$ . [4]

**Question 6**

[10 Marks]

- 6.1. The centroid of a triangle is the point  $(6, -1)$ . If two vertices are  $(3, 4)$  and  $(-2, 5)$ , then find third vertex. [3]
- 6.2. State for any acute angle  $\theta$ . [3]
- (i) whether  $\sin \theta$  increases or decreases as  $\theta$  increases;
- (ii) whether  $\cos \theta$  increases or decreases as  $\theta$  decreases.
- 6.3. Sum of the first  $n$  terms of an AP is  $5n^2 - 3n$ . Find the  $AP$  and also its  $16^{\text{th}}$  term. [4]

**Question 7**

[10 Marks]

- 7.1. Solve the equation by reducing them to quadratic equation:  $3^{4x+1} - 2 \times 3^{2x+2} - 81 = 0$ . [5]

- 7.2. The weight of 50 apples was recorded as given below. Calculate the mean weight to the nearest gram, by the step deviation method. [5]

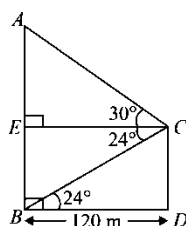
| Weight in (grams) | 80 – 85 | 85 – 90 | 90 – 95 | 95 – 100 | 100 – 105 | 105 – 110 | 110 – 115 |
|-------------------|---------|---------|---------|----------|-----------|-----------|-----------|
| No. Villages      | 5       | 8       | 10      | 12       | 8         | 4         | 3         |

**Question 8 [10 Marks]**

- 8.1. In a box that contains 40 electric rods in which 30 are goods, 4 have minor defect and 6 have major defect. Sunita will buy an electric rod, if it has no major defect, and trader will accept with only major defect. If one electric rod is selected at random from the lot, then what is the probability that it is: [3]  
 (i) acceptable to Sunita? (ii) acceptable to the trader?
- 8.2. A certain number of metallic cones, each of radius 2 cm and height 3 cm are melted and recast into a solid sphere of radius 6 cm. Find the number of cones. [3]
- 8.3. Inscribe a circle in a regular hexagon of side 3.2 cm. [4]

**Question 9 [10 Marks]**

- 9.1. Compare the following ratios and write them in ascending order  $\frac{4}{5}, \frac{3}{2}, \frac{1}{10}$ . [3]
- 9.2. Construct a  $\triangle PQR$ , in which  $PQ = 6$  cm,  $PR = 5.5$  cm and  $\angle Q = 60^\circ$ . Draw the circumcircle of  $\triangle PQR$ . Also, write the steps of construction. [3]
- 9.3. The horizontal distance between two towers is 120 m. The angle of elevation of the top and angle of depression of the bottom of the first tower as observed from the second tower is  $30^\circ$  and  $24^\circ$  respectively. [4]



Find the height of the two towers. Give your answer correct to 3 significant figures.

**Question 10 [10 Marks]**

- 10.1. Solve the following inequation and represent the solution set on a number line  $-8\frac{1}{2} < -\frac{1}{2} - 4x \leq 7\frac{1}{2}, x \in I$  [3]
- 10.2. The marks obtained by 12 students in a monthly test are 11, 19, 7, 13, 18, 21, 9, 5, 20, 17, 16, 21. [3]  
 Find:  
 (i) the mean of their marks.  
 (ii) the mean of their marks, when the marks of each student are increased by 3.
- 10.3. The shadow of a vertical tower on a level ground increase by 10 m, when the altitude of the sun changes from  $45^\circ$  to  $30^\circ$ . Find the height of the tower correct to two decimal places. [4]