

**ICSE Board**  
**Class X Mathematics**

**Time: 2½ hrs**

**Total Marks: 80**

---

**General Instructions:**

1. Answers to this paper must be written on the paper provided separately.
  2. You will **NOT** be allowed to write during the first 15 minutes. This time is to be spent in reading the question paper.
  3. The time given at the head of this paper is the time allowed for writing the answers.
  4. This question paper is divided into two Sections. Attempt **all** questions from **Section A** and any **four** questions from **Section B**.
  5. Intended marks for questions or parts of questions are given in brackets along the questions.
  6. All working, including rough work, must be clearly shown and should be done on the same sheet as the rest of the answer. Omission of essential working will result in loss of marks.
  7. Mathematical tables are provided.
- 

**SECTION – A (40 Marks)**

*(Answer all questions from this Section)*

**Q. 1**

a) Given matrix  $A = \begin{bmatrix} 4\sin 30^\circ & \cos 0^\circ \\ \cos 0^\circ & 4\sin 30^\circ \end{bmatrix}$  and  $B = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$ . If  $AX = B$ . [3]

- (i) Write the order of matrix X
- (ii) Find the matrix 'X'

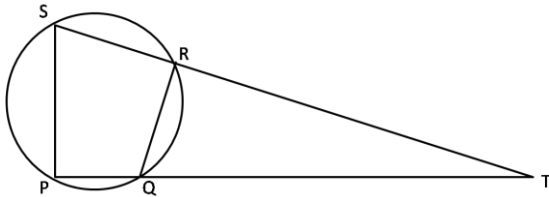
b) Mr Menon deposits Rs. 1,200 per month in a cumulative deposit account for a period of 5 years. After the end of the period, he will receive Rs. 88,470. [3]

- (i) Find the rate of interest per annum
- (ii) Find the total interest that Mr Menon will earn

- c) In a bag there are 44 identical cards with the figure of a circle or square on them. There are 24 circles, of which 9 are blue and the rest are green and 20 squares of which 11 are blue and the rest are green. One card is drawn from the bag at random. Find the probability that it has the figure [4]
- (i) square
  - (ii) green colour
  - (iii) blue circle
  - (iv) green square

### Q. 2

- a) The sum of the inner and outer curved surfaces of a hollow metallic cylinder is  $1056 \text{ cm}^2$  and the volume of material in it is  $1056 \text{ cm}^3$ . Find its internal and external radii. Given that the height of the cylinder is 21 cm. [3]
- b) The sum of the 4<sup>th</sup> and 8<sup>th</sup> terms of an AP is 24, and the sum of the 6<sup>th</sup> and 10<sup>th</sup> terms is 44. Find the first three terms of the AP. [3]
- c) In the given figure, PQRS is a cyclic quadrilateral. PQ and SR produced meet at T.



- (i) Prove  $\Delta TPS \sim \Delta TRQ$
- (ii) Find SP, if  $TP = 18 \text{ cm}$ ,  $RQ = 4 \text{ cm}$  and  $TR = 6 \text{ cm}$  [4]
- (iii) Find the area of quadrilateral PQRS if the area of  $\Delta PTS = 27 \text{ cm}^2$

### Q. 3

- a) Find the values of p and q in the polynomial  $f(x) = x^3 - px^2 + 14x - q$  if it is exactly divisible by  $(x - 1)$  and  $(x - 2)$ . [3]
- b) If  $\operatorname{cosec} \theta + \cot \theta = p$ , prove that  $\cos \theta = \frac{(p^2 - 1)}{(p^2 + 1)}$ . [3]

- c) Use a graph paper for this question. [4]

The table given below shows the monthly wages of some factory workers.

(i) Using the table, calculate the cumulative frequencies of workers

(ii) Draw a cumulative frequency curve

Use 2 cm = Rs 500, starting the origin at Rs 6500 on the x-axis and 2 cm = 10 workers on the y-axis.

Wages (in Rs)	6500- 7000	7000- 7500	7500- 8000	8000- 8500	8500- 9000	9000-9500	9500- 10000
No. of workers	10	18	22	25	17	10	8

#### Q. 4

- a) Find the range of values of x which satisfy [3]

$$-\frac{1}{3} \leq \frac{x}{2} + 1\frac{2}{3} < 5\frac{1}{6}$$

Graph, in each of the following cases, the values of x on the different real number lines:

- (i)  $x \in W$                       (ii)  $x \in Z$                       (iii)  $x \in R$  [3]

- b) PQRS is a rhombus. The coordinates of Q and S are (-3, 4) and (5, -6), respectively. Find the equation of PR.

- c)  $\frac{3}{x+1} + \frac{4}{x-1} = \frac{29}{4x-1}; x \neq 1, -1, \frac{1}{4}$  [4]

**SECTION - B (40 Marks)**

(Answer *any four questions* from this Section)

**Q. 5**

- a) Solve  $2x^2 + 2x - 3 = 0$ ,  
giving your answer correct upto one decimal place. [3]
- b) Payal had Rs. 125 shares of 'Asian Chemicals' paying a 12% dividend. She sold them at Rs. 150 and invested the proceeds in Rs. 50 shares of 'Saras Chemicals' at Rs. 40 and paying a 10% dividend. She thus increased her income by Rs 825. Find the number of shares of 'Asian Chemicals' that Payal sold. [3]
- c) Points (3, 0) and (-1, 0) are invariant points under reflection in line  $L_1$ ; points (0, -3) and (0, 1) are invariant points under reflection in line  $L_2$ .
- (i) Name or write equations for the lines  $L_1$  and  $L_2$ .
- (ii) Write down the images of the points P (3, 4) and Q (-5, -2) under reflection in line  $L_1$ . Name the images as P' and Q', respectively.
- (iii) Write down the images of P and Q under reflection in  $L_2$ . Name the images as P'' and Q'', respectively.
- (iv) State or describe a single transformation that maps P' onto P''. [4]

**Q. 6**

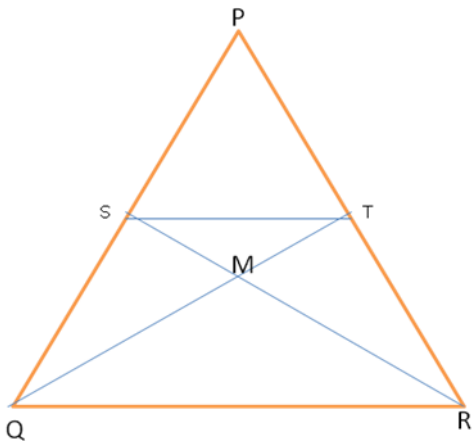
- a) Find the mean proportional between [3]
- (i) 17.5 and 0.007
- (ii)  $6 + 3\sqrt{3}$  and  $8 - 4\sqrt{3}$
- (iii)  $a - b$  and  $a^3 - a^2b$
- b) If  $P = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ ,  $Q = \begin{bmatrix} 5 & 1 \\ 7 & 4 \end{bmatrix}$  and  $R = \begin{bmatrix} 2 & 1 \\ 4 & 2 \end{bmatrix}$ , find the value of (i)  $P(Q + R)$  (ii)  $(R + Q)P$ . [3]
- c) Prove:  $(1 + \cot A - \operatorname{cosec} A) (1 + \tan A + \sec A) = 2$  [4]

**Q.7**

a) Find two consecutive odd positive integers, the sum of whose squares is 970. [3]

b) Figure shows  $\Delta PQR$  in which  $ST \parallel QR$  and  $SR$  and  $QT$  intersect each other at  $M$ . If

$$\frac{PT}{TR} = \frac{5}{3}, \text{ find } \frac{\text{Ar.}(\Delta MTS)}{\text{Ar.}(\Delta MQR)}. \quad [3]$$



c) Show that the line segment joining the points  $(-3, 10)$  and  $(6, -5)$  is trisected by the coordinate axis. [4]

**Q.8**

a) To fill a swimming pool, two pipes are used. If the pipe of a larger diameter is used for 4 hours and the pipe of a smaller diameter is used for 9 hours, only half of the pool can be filled. Find how long it would take for each pipe to fill the pool separately if the pipe of the smaller diameter takes 10 hours more than the pipe of the larger diameter to fill the pool? [3]

b) Find the mean of the following frequency distribution by the step deviation method: [3]

Class	100–110	110–120	120–130	130–140	140–150
Frequency	15	18	32	25	10

c) Draw a circle of radius 3 cm. From a point  $P$ , 7 cm away from the centre of the circle, draw two tangents to the circle. Also, measure the lengths of the tangents. [4]

**Q. 9**

- a) Peter has a recurring deposit account in a bank for 4 years earning interest at 10% p.a. He will get Rs. 6,370 as interest on maturity. Find
- (i) monthly instalment
  - (ii) the maturity value of the account [3]
- b) On a map drawn to a scale of 1:25000, a triangular plot of a land is marked as ABC with  $AB = 6$  cm,  $BC = 8$  cm and  $\angle ABC = 90^\circ$ . Calculate the actual length of AB in km and the actual area of the plot in  $\text{cm}^2$ . [3]
- c) A bucket, made of a metal sheet, is in the form of a cone whose height is 35 cm and radii of circular ends are 30 cm and 12 cm. How many litres of milk would it contain if it is filled to the brim? If the milk is sold at 40 per litre, find the amount received by the person. [4]

**Q. 10**

- a) Using the remainder theorem, factorise the following expression completely:  
 $3x^3 + 2x^2 - 19x + 6$  [3]
- b) PQ is a chord of length 4.8 cm of a circle of radius 3 cm. The tangents at P and Q intersect at a point T. Find the length of TP. [3]
- c) From the top of a 120-m high tower, a man observes two cars on the opposite sides of the tower and in a straight line with the base of the tower with angles of depression as  $60^\circ$  and  $45^\circ$ . Find the distance between the cars. (Take  $\sqrt{3} = 1.732$ ) [4]

**Q. 11**

- a) If the sum of the first  $n$  terms of an AP is  $\frac{1}{2}(3n^2 + 7n)$ , then find its  $n^{\text{th}}$  term. Hence, write its 20<sup>th</sup> term. [4]
- b) Find the lower quartile, upper quartile and interquartile range for the following frequency distribution: [6]

Marks (less than)	10	20	30	40	50	60	70	80
No. of students	5	15	30	54	72	86	94	100