ICSE Board
Class X Mathematics

(Two and a half hours)

Answers to this Paper must be written on the paper provided separately.

You will not be allowed to write during the first 15 minutes.

This time is to be spent in reading the Question Paper.

The time given at the head of this Paper is the time allowed for writing the answers.

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*Attempt **all** questions from **Section A** and **any four** questions from **Section B**.*

All working, including rough work, must be clearly shown and must be done on the same sheet as the rest of the answer.

Omission of essential working will result in loss of marks.

The intended marks for questions or parts of questions are given in brackets [ ].

Mathematical tables are provided.

SECTION A (40 Marks)

*Attempt **all** questions from this Section.*

Question 1

(a) If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, find $A^2 - 5A + 7I$. [3]

(b) Mr Ashok gets Rs 6455 at the end of 1 year at the rate of 14% in recurring deposit amount . Find the monthly installment. [3]

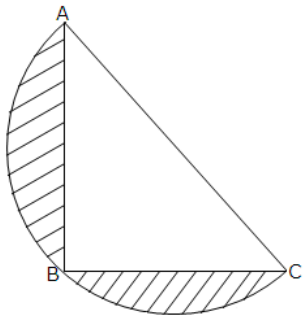
(c) Using the Remainder Theorem factorise completely the following polynomial.
$3x^3 + 2x^2 - 19x + 6$ [4]

Question 2

(a) Solve the following equation . Give your answer up to one decimal place.

$$2x - \frac{1}{x} = 7$$ [3]

(b) ABC is an isosceles right angled triangle with $\angle ABC = 90^o$. A semi-circle is drawn with AC as the diameter. If AB = BC = 7 cm, find the area of the shaded region. $\left(\text{Take } \pi = \frac{22}{7}\right)$ [3]



(c) Given a line segment AB joining the points A(−4, 6) and B(8, −3). Find

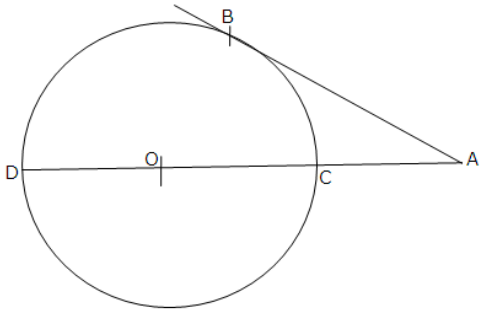
(i) The ratio in which AB is divided by y-axis.

(ii) Find the coordinates of the point of intersection.

(iii) The length of AB. [4]

Question 3

(a) In the given figure O is the centre of the circle and AB is a tangent at B. If AB = 15 cm and AC = 7.5 cm. Calculate the radius of circle. [3]



(b) Evaluate without using trigonometric tables:

$$\cos^2 26^o + \cos 64^o \sin 26^o + \frac{\tan 36^o}{\cot 54^o}$$ [3]

(c) Marks obtained by 40 students in a short assessment is given below, where a and b are two missing data.

Marks	5	6	7	8	9
Number of Students	6	a	16	13	b

If the mean of the distribution is 7.2, find a and b. [4]

Question 4

(a) Kiran deposited Rs. 200 per month for 36 months in a bank's recurring deposit account. If the bank pays interest at the rate of 11% per annum, find the amount she gets on maturity. [3]

(b) A pair of dice is rolled . Find probability of getting

i. doublet ii. sum is atleast 10 iii. sum is almost 5 iv sum is multiple of 5 [3]

(c) Using graph paper and taking 1 cm = 1 unit along both x-axis and y-axis.

(i) Plot the points A(−4, 4) and B(2, 2).

(ii) Reflect A and B in the origin to get the images A' and B' respectively.

(iii) Write down the co-ordinates of A' and B'.

(iv) Give the geometrical name for the figure ABA'B'.

(v) Draw and name its lines of symmetry. [4]

SECTION B (40 Marks)

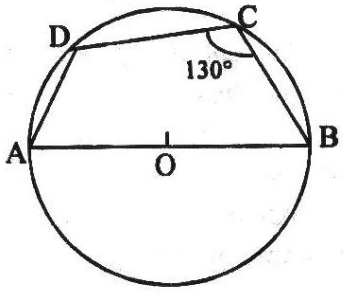
*Attempt any **four** questions from this Section*

Question 5

(a) In the given figure, AB is the diameter of a circle with centre O. ∠BCD = 130°. Find:

(i) ∠ DAB

(ii) ∠ DBA [3]



(b) Given $\begin{bmatrix} 2 & 1 \\ -3 & 4 \end{bmatrix} X = \begin{bmatrix} 7 \\ 6 \end{bmatrix}$. Write:

(i) The order of the matrix X

(ii) The matrix X. [3]

(c) Find three numbers in G.P whose product is 216 and the sum of their products in pairs is 156.

[4]

Question 6

(a) Use properties of proportion and solve for x

$$\frac{2x+\sqrt{4x^2-1}}{2x-\sqrt{4x^2-1}} = 4$$

[3]

(b) Solve the following inequation and represent the solution set on the number line:

$$4x - 19 < \frac{3x}{5} - 2 \leq \frac{-2}{5} + x,\ x \in R$$

[3]

(c) Without solving the following quadratic equation, find the value of 'm' for which the given equation has equation has real and equal roots.

$$x^2 + 2(m-1)x + (m+5) = 0.$$

[4]

Question 7

(a) A hollow sphere of internal and external radii 6 cm and 8 cm respectively is melted and recast into small cones of base radius 2 cm and height 8 cm. Find the number of cones. [3]

(b) Solve the following equation and give your answer correct to 3 significant figure:

$5x^2 - 3x - 4 = 0$ [3]

(c) As observed from the top of a 80 m tall lighthouse, the angles of depression of two ships on the same side of the light house of horizontal line with its base are 30^o and 60^o respectively. Find the distance between the two ships. Give your answer correct to the nearest meter. [4]

Question 8

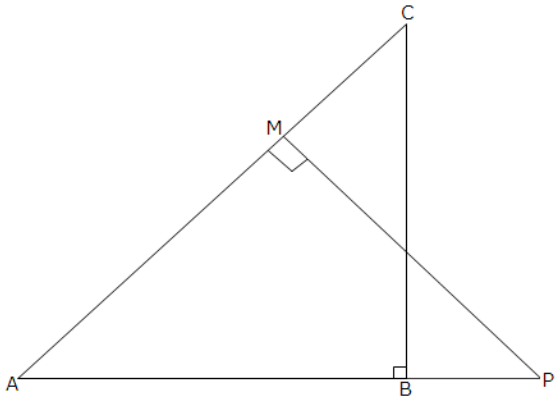
(a) A man invests Rs. 9600 on Rs. 100 shares at Rs. 80. If the company pays him 18% dividend find:

(i) The number of shares he buys.

(ii) His total dividend.

(iii) His percentage return on the shares. [3]

(b) In the given figure ΔABC and ΔAMP are right angled at B and M respectively. Given AC = 10 cm, AP = 15 cm and PM = 12 cm.



(i) Prove $\triangle ABC \sim \triangle AMP$

(ii) Find AB and BC. [3]

(c) If $x = \dfrac{\sqrt{a+1}+\sqrt{a-1}}{\sqrt{a+1}-\sqrt{a-1}}$, using properties of proportion show that $x^2 - 2ax + 1 = 0$.

[4]

Question 9

(a) The line through A(–2, 3) and B(4, b) is perpendicular to the line 2x – 4y = 5. Find the value of b. [3]

(b) Prove that $\frac{\tan^2 \theta}{(\sec \theta - 1)^2} = \frac{1 + \cos \theta}{1 - \cos \theta}$ [3]

(c) A car covers a distance of 400 km at a certain speed. Had the speed been 12 km/h more, the time taken for the journey would have been 1 hour 40 minutes less. Find the orginal speed of the car. [4]

Question 10

(a) Construct a triangle ABC in which base BC = 6 cm, AB = 5.5 cm and $\angle$ ABC = 120°.

(i) Construct a circle circumscribing the triangle ABC. [4]

(ii) Draw a cyclic quadrilateral ABCD so that D is equidistant from B and C.

(b) The following distribution represents the height of 160 students of school.

Height (in cm)	No. of Students
140 – 145	12
145 – 150	20
150 – 155	30
155 – 160	38
160 – 165	24
165 – 170	16
170 – 175	12
175 – 180	8

Draw an ogive for the given distribution taking 2 cm = 5 cm of height on one axis and 2 cm = 20 students on the other axis. Using the graph, determine:

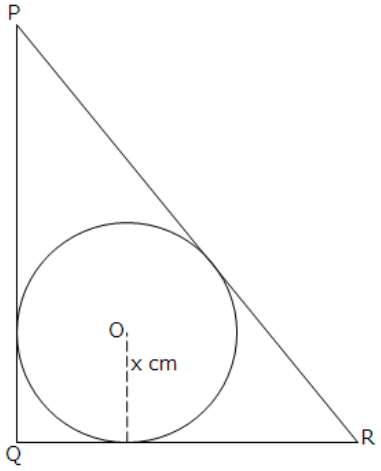
(i) The median height.

(ii) The interquartile range.

(iii) The number of students whose height is above 172 cm. [6]

Question 11

(a) In triangle PQR, PQ = 24 cm, QR = –7 cm and $\angle$PQR = 90°. Find the radius of the inscribed circle. [3]



(b) Find the mode and median of the following frequency distribution: [3]

x	10	11	12	13	14	15
f	1	4	7	5	9	3

(c) The line through P(5, 3) intersects y-axis at Q.

(i) Write the slope of the line.

(ii) Write the equation of the line.

(iii) Find the co-ordinates of Q. [4]