

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.

*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) Find the value of a if division of $ax^3 + 9x^2 + 4x - 10$ by $x - 3$ leaves remainder 5. [3]

(b) Find the values of x , which satisfy the inequation

$-2\frac{5}{6} < \frac{1}{2} - \frac{2x}{3} \leq 2, x \in \mathbb{W}$. Graph the solution set on the number line. [3]

(c) In a single throw of two dice, find the probability of :

(i) a doublet

(ii) a number less than 3 on each dice.

(iii) an odd number as a sum.

(iv) a total of at most 10.

(v) an odd number on one dice and a number less than or equal to 4 on the other dice.

[4]

Question 2

(a) Find x, y if $\begin{bmatrix} -2 & 0 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} -1 \\ -2x \end{bmatrix} + 3 \begin{bmatrix} -2 \\ 1 \end{bmatrix} = 2 \begin{bmatrix} y \\ 3 \end{bmatrix}$. [3]

- (b) Mr. Bajaj needs ₹ 30,000 after 2 years. What least money (in multiple of ₹ 5) must he deposit every month in a recurring deposit account to get required money at the end of 2 years, the rate of interest being 8% p.a. ? [3]

- (c) Calculate the ratio in which the line joining $A(-4, 2)$ and $B(3, 6)$ is divided by a point $P(x, 3)$. Also find (i) x (ii) Length of AP . [4]

Question 3

- (a) Without using trigonometric tables, evaluate

$$\sin^2 34^\circ + \sin^2 56^\circ + 2 \tan 18^\circ \tan 72^\circ - \cot^2 30^\circ$$
 [3]

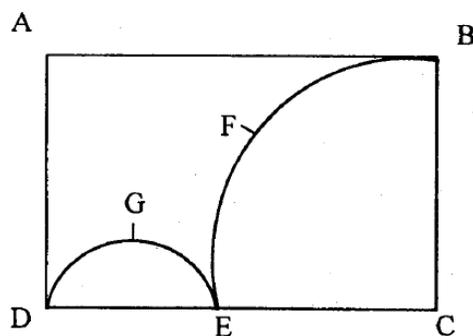
- (b) Using the Remainder and Factor Theorem, factorise the following polynomial:

$$x^3 + 10x^2 - 37x + 26$$
 [3]

- (c) In the figure given below, $ABCD$ is a rectangle. $AB = 14$ cm, $BC = 7$ cm.

From the rectangle, a quarter circle $BFEC$ and a semicircle DGE are removed.

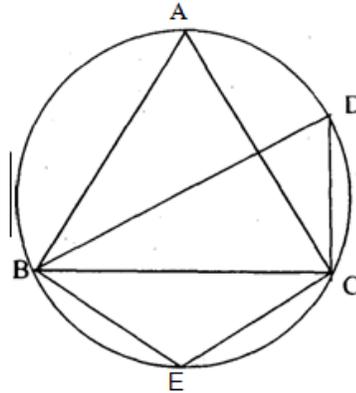
Calculate the area of the remaining piece of the rectangle. (Take $\pi = 22/7$) [4]



Question 4

- (a) The numbers 6, 8, 10, 12, 13 and x are arranged in an ascending order.
If the mean of the observations is equal to the median, find the value of x . [3]

- (b) In the figure, $m\angle DBC = 58^\circ$. BD is the diameter of the circle. Calculate: [3]
- (i) $m\angle BDC$
 - (ii) $m\angle BEC$
 - (iii) $m\angle BAC$



- (c) Use graph paper to answer the following questions. (Take 2 cm = 1 unit on both axes)
- (i) Plot the points $A(-4, 2)$ and $B(2, 4)$
 - (ii) A' is the image of A when reflected at the y -axis. Plot it on the graph paper and write the co-ordinates of A' .
 - (iii) B' is the image of B when reflected on the line AA' . Write the co-ordinates of B' .
 - (iv) Write the geometric name of the figure $ABA'B'$.
 - (v) Name a line of symmetry of the figure formed. [4]

SECTION B (40 Marks)

Attempt any **four** questions from this Section

Question 5

- (a) The sum of first 14 terms is 1050 and its 14th term is 140 .
Find the 20th term.

- (b) If $\frac{x^2+y^2}{x^2-y^2} = \frac{17}{8}$ then find the value of :

(i) $x : y$

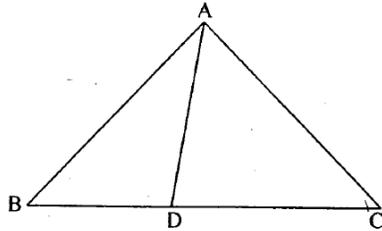
(ii) $\frac{x^3+y^3}{x^3-y^3}$ [3]

- (c) In $\triangle ABC$, $\angle ABC = \angle DAC$. $AB = 8$ cm, $AC = 4$ cm, $AD = 5$ cm.

(i) Prove that $\triangle ACD$ is similar to $\triangle BCA$.

(ii) Find BC and CD

(iii) Find- area of $\triangle ACD$: area of $\triangle BCA$ [4]



Question 6

- (a) The value of 'a' for which of the following points $A(a, 3)$, $B(2, 1)$ and $C(5, a)$ are collinear. Hence find the equation of the line. [3]

- (b) Salman invests a sum of money in Rs. 50 shares, paying 15% dividend quoted at 20% premium. If his annual dividend is Rs. 600, calculate:

(i) the number of shares he bought.

(ii) his total investment.

(iii) the rate of return on his investment. [3]

(c) The surface area of a solid metallic sphere is 2464 cm^2 . It is melted and recast into solid right circular cones of radius 3.5 cm and height 7 cm . Calculate:

(i) the radius of the sphere.

(ii) the number of cones recast. (Take $\pi = 22/17$) [4]

Question 7

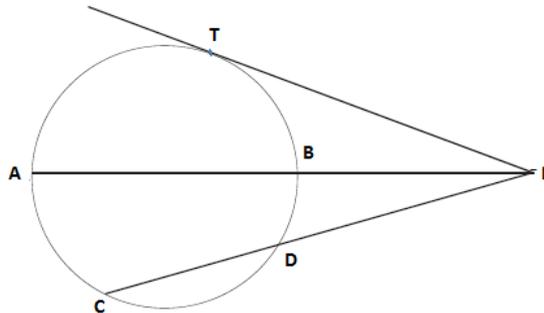
(a) Calculate the mean of the distribution given below using the short cut method. [3]

Marks	11-20	21-30	31-40	41-50	51-60	61-70	71-80
No. of students	2	6	10	12	9	7	4

(b) In the figure given below, diameter AB and chord CD of a circle meet at P. PT is a tangent to the circle at T. $CD = 7.8 \text{ cm}$, $PD = 5 \text{ cm}$, $PB = 4 \text{ cm}$. Find: [3]

(i) AB.

(ii) the length of tangent PT.



(c) Let $A = \begin{bmatrix} 2 & 1 \\ 0 & -2 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 1 \\ -3 & -2 \end{bmatrix}$ and $C = \begin{bmatrix} -3 & 2 \\ -1 & 4 \end{bmatrix}$.

Find $A^2 + AC - 5B$ [4]

Question 8

(a) Rs. 6,500 were divided equally among a certain number of persons. Had there been 15 persons more, each would have got Rs. 30 less. Find the original number of persons. [3]

(b) Construct a ΔABC with $BC = 6.5 \text{ cm}$, $AB = 5.5 \text{ cm}$, $AC = 5 \text{ cm}$. Construct the incircle of the triangle. Measure and record the radius of the incircle. [3]

(c)

The sum of three numbers in G.P. is 21 and the sum of their squares is 189. Find the numbers.

[4]

Question 9

(a) If $(x - 9) : (3x + 6)$ is the duplicate ratio of 4 : 9, find the value of x. [3]

(b) Solve for x using the quadratic formula. Write your answer corrected to two significant figures. $(x - 1)^2 - 3x + 4 = 0$ [3]

(c)

Using step deviation method, find the mean of the following distribution.

Class interval	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	10	6	8	12	5	9

[4]

Question 10

(a) A two digit positive number is such that the product of its digits is 6. If 9 is added to the number, the digits interchange their places. Find the number. [4]

(b) The marks obtained by 100 students in a Mathematics test are given below:

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of students	3	7	12	17	23	14	9	6	5	4

Draw an ogive for the given distribution on a graph sheet.

Use a scale of 2 cm = 10 units on both axes.

Use the ogive to estimate the:

(i) Median.

(ii) Lower quartile.

(iii) Number of students who obtained more than 85% marks in the test.

(iv) Number of students who did not pass in the test if the pass percentage was 35. [6]

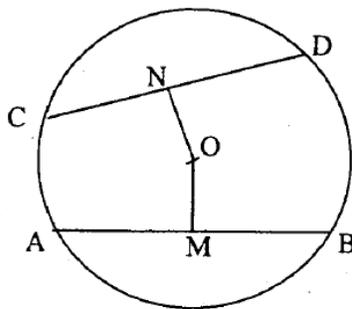
Question 11

(a) In the figure given below, O is the centre of the circle. AB and CD are two chords of the circle. OM is perpendicular to AB and ON is perpendicular to CD.

AB = 24 cm, OM = 5 cm, ON = 12 cm. Find the:

(i) radius of the circle.

(ii) length of chord CD. [3]



Find A if $0 < A < 90$

(b) $\cos^2 A + \cos A - 1 = 0$ [3]

(c) An aeroplane at an altitude of 250 m observes the angle of depression of two boats on the opposite banks of a river to be 45° and 60° respectively. Find the width of the river. Write the answer corrected to the nearest whole number. [4]