

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) Given $A = \begin{bmatrix} 2 & -6 \\ 2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} -3 & 2 \\ 4 & 0 \end{bmatrix}$, $C = \begin{bmatrix} 4 & 0 \\ 0 & 2 \end{bmatrix}$

Find the matrix X such that $A + 2X = 2B + C$. [3]

(b) Two dices are thrown simultaneously . What is the probability that

i. 4 will not come either time.

ii. 4 will come at least once

[3]

(c) The median of the following observations

11, 12, 14, $(x - 2)$, $(x + 4)$, $(x + 9)$, 32, 38, 47 arranged in ascending order is 24.

Find the value of x and hence find the mean.

[4]

Question 2

- (a) What number must be added to each of the numbers 6, 15, 20 and 43 to make them proportional? [3]
- (b) If $(x - 2)$ is a factor of the expression $2x^3 + ax^2 + bx - 14$ and when the expression is divided by $(x - 3)$, it leaves a remainder 52, find the values of a and b. [3]
- (c) Draw a histogram from the following frequency distribution and find the mode from the graph: [4]

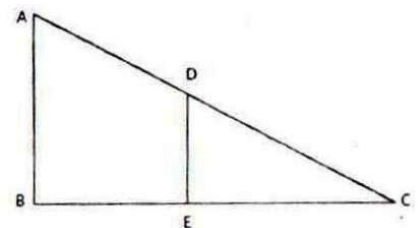
Class		0-5	5-10	10-15	15-20	20-25	25-30
Frequency		2	5	18	14	8	5

Question 3

- (a) Without using tables evaluate:
 $3\cos 80^\circ \cdot \operatorname{cosec} 10^\circ + 2\sin 59^\circ \sec 31^\circ$ [3]
- (b) In the given figure, $\angle BAD = 65^\circ$, $\angle ABD = 70^\circ$, $\angle BDC = 45^\circ$ [3]
(i) Prove that AC is a diameter of the circle.
(ii) Find $\angle ACB$
- (c) AB is a diameter of a circle with centre C = $(-2, 5)$. If A = $(3, -7)$. Find [4]
(i) the length of radius AC
(ii) the coordinates of B.

Question 4

- (a) Solve the following equation and calculate the answer correct to two decimal places:
 $x^2 - 5x - 10 = 0$. [3]
- (b) In the given figure, AB and DE are perpendicular to BC. [3]
(i) Prove that $\triangle ABC \sim \triangle DEC$
(ii) If AB = 6 cm; DE = 4 cm and AC = 15 cm. Calculate CD.
(iii) Find the ratio of area of $\triangle ABC$: area of $\triangle DEC$.



- (c) Using a graph paper, plot the points A(6,4) and B(0,4). [4]
- (i) Reflect A and B in the origin to get the images A' and B'.
- (ii) Write the co-ordinates of A' and B'.
- (iii) State the geometrical name for the figure ABA' B'.
- (iv) Find its perimeter.

SECTION B (40 Marks)

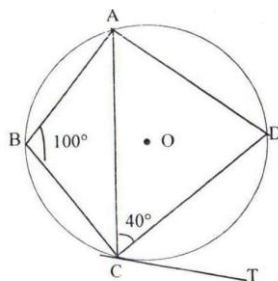
Attempt any **four** questions from this Section

Question 5

- (a) Solve the following inequation, write the solution set and represent it on the number line: $-\frac{x}{3} \leq \frac{x}{2} - 1 < \frac{1}{3}, x \in \mathbb{R}$ [3]
- (b) Mr. Britto deposits a certain sum of money each month in a Recurring Deposit Account of a bank. If the rate of interest is of 8% per annum and Mr. Britto gets Rs. 8088 from the bank after 3 years, find the value of his monthly instalment. [3]
- (c) Salman buys 50 shares of face value Rs. 100 available at Rs. 132. [4]
- (i) What is his investment?
- (ii) If the dividend is 7.5%, what will be his annual income?
- (iii) If he wants to increase his annual income by Rs. 150, how many extra shares should he buy?

Question 6

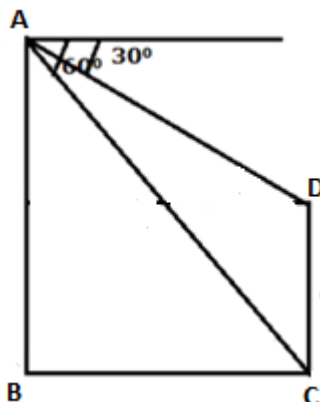
- (a) Show that $\sqrt{\frac{1 - \cos A}{1 + \cos A}} = \frac{\sin A}{1 + \cos A}$. [3]
- (b) In the given circle with centre O, $\angle ABC = 100^\circ$, $\angle ACD = 40^\circ$ and CT is a tangent to the circle at C. Find $\angle ADC$ and $\angle DCT$. [3]



- (c) A and B are the two points on x and y axis respectively. P (2, -3) is the mid point of AB. [4]
 Find the
 i. coordinates of A and B .
 ii. Slope of line AB.
 iii. Equation of line AB

Question 7

- (a) In $\triangle ABC$, A(3, 5), B(7, 8) and C(1, -10). Find the equation of the median through A. [3]
- (b) A right circular cylinder having diameter 12cm and height 15cm is full of ice- cream . The ice - cream is to be filled in identical cones of height 12 cm and diameter 6cm having hemispherical shape on the top. [3]
 Find the number of cones required.
- (c) In the figure given, from the top of a building AB = 60 m high, the angles of depression of the top and bottom of a vertical lamp post CD are observed to 30° and 60° respectively. Find: [4]



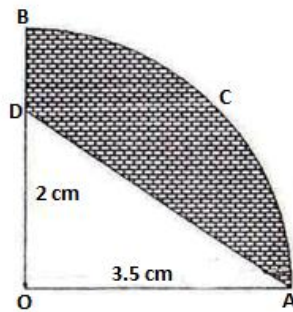
- (i) The horizontal distance between AB and CD.
 (ii) The height of the lamp post.

Question 8

- (a) Find x and y if $\begin{bmatrix} x & 3x \\ y & 4y \end{bmatrix} \begin{bmatrix} 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 5 \\ 12 \end{bmatrix}$. [3]
- (b) A solid sphere of radius 15 cm is melted and recast into solid right circular cones of radius 2.5 cm and height 8 cm. Calculate the number of cones recast. [3]
- (c) Without solving the following quadratic equation, find the value of 'p' for which the given equation has real and equal roots: [4]
- $$x^2 + (p - 3)x + p = 0.$$

Question 9

- (a) In the figure alongside, OAB is a quadrant of a circle. The radius OA = 3.5 cm and OD = 2 cm. Calculate the area of the shaded portion. (Take $\pi = \frac{22}{7}$). [3]



- (b) A box contains some black balls and 30 white balls. If the probability of drawing a black ball is two-fifths of a white ball, find the number of black balls in the box. [3]
- (c) Find the mean of the following distribution by step deviation method: [4]

Class Interval	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	10	6	8	12	5	9

Question 10

- (a) Draw a circle of radius 5 cm. Draw two tangents to this circle so that the angle between the tangents is 45° . [4]

- (b) The marks obtained by 120 students in a test are given below: [6]

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of students	5	9	16	22	26	18	11	6	4	3

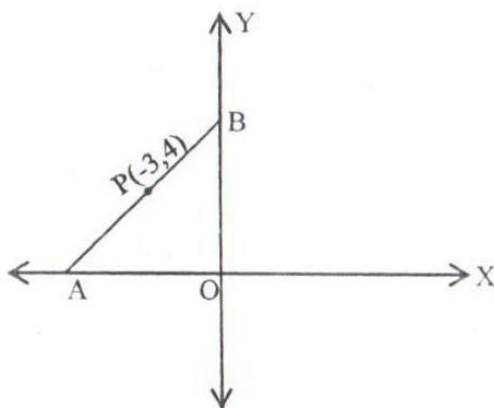
Draw an ogive for the given distribution on a graph sheet.

Use suitable scale for ogive to estimate the following:

- The median.
- The number of students who obtained more than 75% marks in the test.
- The number of students who did not pass the test if minimum marks required to pass is 40.

Question 11

- (a) In the figure given below, the line segment AB meets X-axis at A and Y-axis at B. The point P(-3, 4) on AB divides it in the ratio 2:3. Find the coordinates of A and B. [3]



- (b) Using the properties of proportion, solve for x, given [3]

$$\frac{x^4 + 1}{2x^2} = \frac{17}{8}$$

- (c) A vertical tower stands on horizontal plane and is surmounted by a vertical flagstaff of height h metre. At a point on the plane, the angle of elevation of the bottom of the flagstaff is α and that of the top of flagstaff is β . Prove that the height of the tower is :

$$\frac{h \tan \alpha}{\tan \beta - \tan \alpha}$$