ICSE Board
Class X Mathematics
Sample Paper – 3

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) Solve and graphically represent the solution set of $2x - 9 < 7$ and $3x + 9 \leq 25$, $x \in R$. [3]

(b) Rahul bought a jacket for Rs. 462 which includes a 20% discount on the listed price and 5% sale tax on the reduced price. Find the list price of the jacket. [3]

(c) Rajinder deposited Rs. 150 per month in a bank for 8 months in a Recurring Deposit account. What will be the maturity value of his deposits, if the rate of interest is 8% p.a. and interest is calculated at the end of every month? [4]

Q. 2.

(a) The compound interest on a certain sum of money at 5% per annum for two years is Rs. 246. Calculate the simple interest on the same sum for three years at 6% per annum. [3]

(b) ABCD is a rhombus. The co-ordinates of A and C are (3, 6) and (−1, 2) respectively. Write down the equation of BD. [3]

(c) If $A = \begin{bmatrix} 2 & -2 \\ -3 & 4 \end{bmatrix}$, the find $-A^2 + 6A$. [4]

Q. 3.

(a) Prove that: $\frac{\cos(90^\circ - A)}{\sin A} + \frac{\tan B}{\cot(90^\circ - B)} = 2$ [3]

(b) Cards numbered from 1 to 18 are put in a box and mixed thoroughly. One card is drawn at a random. Find the probability that the card drawn bears:

i. a prime number
ii. a factor of 18
iii. a number divisible by 2 and 3 [3]

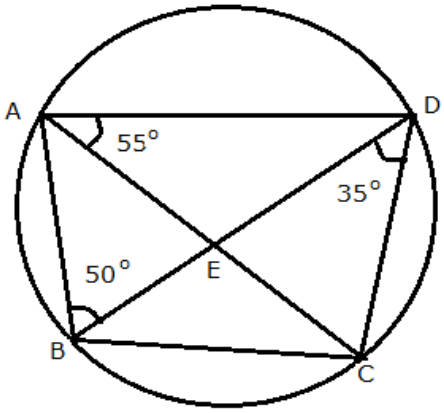
(c) The points A(3, 2), B(0, 4) and C(−4, −3) are the vertices of a triangle.

i. Plot the points on a graph paper
ii. Draw the triangle formed by the reflection of these points at the x-axis
iii. Are the two triangles congruent? [4]

Q. 4.

(a) Determine the value of 'm' if (x – m) is a factor of the polynomial, $(x^3 - (m^2 - 1)x + 2)$. Hence find the value of k if 3m + 6 = k. [3]

(b) In the given fig, find ∠CEB and ∠ADB, where E is the point of intersection of chords AC and BD of circle. [3]



(c) If the mean of the distribution is 62.8 and sum of frequencies is 50, find p and q. [4]

Class	Frequency
0-20	5
20-40	P
40-60	10
60-80	Q
80-100	7
100-120	8

SECTION – B

*(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) Divide Rs. 21,025 into two parts such that the amount for one in 3 years is the same as the amount for the second in 5 years; the rate of C.I. being 5% p.a. [4]

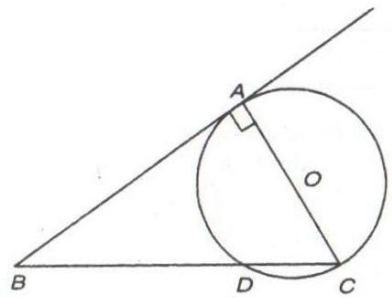
(c) The entries in a passbook of a Saving Bank account are given below:

Date 1999	Particulars	Withdrawals (in Rs.)	Deposits (in Rs.)	Balance (in Rs.)
Feb.2	By cash		100.00	100.00
Feb.4	By salary		2,000.00	2,100.00
Feb.6	To cheque	400.00		1,700.00
Feb.16	By cash		600.00	2,300.00
Feb.25	To Ajay	200.00		2,100.00
Mar. 1	By salary		2,000.00	4,100.00
Mar.8	To cheque	1,000.00		3,100.00
Mar.22	To cheque	1,400.00		1,700.00
Mar.26	To self	800.00		900.00
Apr.1	By salary		2,000.00	2,900.00

The account is closed on 12th April, 1999. Compute the interest if the rate of interest is 5% per annum. [3]

Q. 6.

(a) In the given figure angle A of the triangle ABC is a right angle. The circle on AC as diameter cuts BC at D. If BD = 9 and DC = 7, calculate the length of AB. [3]



(b) The manufacturer sold a TV to a wholesaler for Rs. 7000. The wholesaler sold it to a trader at a profit of Rs. 1000. If the trader sold it to the customer at a profit of Rs.1500, find:

i. The total VAT(value added tax) collected by the state government at the rate of 5%

ii. The amount that the customer pays for the TV [3]

(c) PQRS is a square piece of land of side 56 m. Two semicircle grass covered lawns are made on two of its opposite sides as shown in the figure. Calculate the area of the uncovered portion. [4]

Q. 7.

(a) Construct a ΔABC, in which AC = 5 cm, BC = 7 cm and AB = 6 cm.

i. Mark D, the mid-point of AB.

ii. Construct the circle which touches BC at C, and passes through D. [3]

(b) Find the equation of the line perpendicular to 5x – 2y = 8 and which passes through the midpoint of the line segment joining (2, 3) and (4, 5). [3]

(c) The mean of the following frequency table is 50. But the frequencies f_1 and f_2. in the classes 20-40 and 60-80 are missing. Find the value of f_1 and f_2. . [4]

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	17	f_1	32	f_2.	19	120

Q. 8.

(a) $(x-2)$ is a factor of the expression $x^3 + ax^2 + bx + 6$. When this expression is divided by $(x-3)$, it leaves the remainder 3. Find the values of 'a' and 'b'. [3]

(b) If a, b and c are in continued proportion, then prove that:
$(a + b + c)(a - b + c) = a^2 + b^2 + c^2$ [3]

(c) A vertical tower stands on a horizontal plane and is surmounted by a vertical flagstaff of height 'h'. At a point on the plane, the angle of elevation of the bottom of the flagstaff is α and that of the top of the flagstaff is β. Prove that the height of the tower is $\dfrac{h\tan\alpha}{\tan\beta - \tan\alpha}$. [4]

Q. 9.

(a) D is the midpoint of side BC of a ΔABC. AD is bisected at the point E and BE produced cuts AC at the point X. Prove that BE : EX = 3 : 1. [3]

(b) Show that the matrix $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$, satisfies the equation $A^3 - 4A^2 + A = 0$ [3]

(c) A man invests Rs. 3465 in buying shares of nominal value of Rs. 45 and sells them at a 10% premium. The dividend on the shares is 14% per annum.
i. Calculate the number of shares he buys
ii. Calculate the dividend he receives. [4]

Q. 10.

(a) The marks of 200 students in an exam were recorded as follows:

Marks%	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of students	7	11	20	46	57	37	15	7

Draw the cumulative frequency table and hence, draw the Ogive and use it to find:
i. The median
ii. The number of students who score more than 40% marks [6]

(b) A train covers a distance of 90 km at a uniform speed. Had the speed been 15 km per hour more, it would have taken 30 minute less for the journey. Find the original speed of the train. [4]

Q. 11.

(a) Construct a circle inscribed inside a given regular hexagon of side 3 cm. [3]

(b) A copper wire, 4 mm in diameter, is evenly wound about a cylinder whose length is 24 cm and diameter 20 cm so as to cover the whole surface. Find the length and weight of the wire assuming the specific gravity to be $8.8\, gm/cm^3$. [3]

(c) If $x = \dfrac{\sqrt{a+3b} + \sqrt{a-3b}}{\sqrt{a+3b} - \sqrt{a-3b}}$, Prove that: $3b^2 - 2ax + 3b = 0$ [4]