ICSE Board
Class X Mathematics
Sample Paper 7

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) If $A = \begin{bmatrix} 3 & x \\ 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 9 & 16 \\ 0 & -y \end{bmatrix}$, find x and y when $A^2 = B.$ [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 8% per annum and Mr Britto gets Rs. 8,088 from the bank after 3 years, find the value of his monthly instalment. [3]

c) A bag contains 5 white balls, 6 red balls and 9 green balls. A ball is drawn at random from the bag. Find the probability that the ball drawn is [4]

      (i) a green ball
      (ii) a white or a red ball
      (iii) neither a green ball nor a white ball

Q. 2

a) Find the minimum length in cm and correct to the nearest whole number of a thin metal sheet required to make a hollow and closed cylindrical box of diameter 20 cm and height 35 cm. The width of the metal sheet is 1 m. Also, find the cost of the sheet at the rate of Rs. 56 per m. Find the area of the metal sheet required if 10% of it is wasted in cutting, overlapping etc. [3]

b) Mrs Gupta repays her total loan of 1,18,000 by paying instalments every month. If the instalment for the first month is 1,000 and it increases by 100 every month, what amount will she pay as the 30th instalment of the loan? What amount of the loan has she to still pay after the 30th instalment? [3]

c) In the given figure, AD is a diameter. O is the centre of the circle. AD is parallel to BC and ∠CBD = 32°.
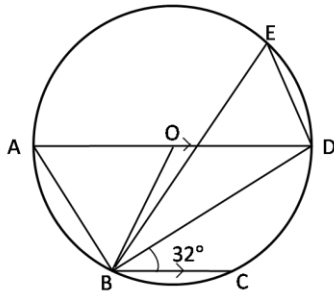
Find:

(i)   ∠OBD
(ii)   ∠AOB
(iii)   ∠BED [4]

Q. 3

a) Prove by factor theorem that [3]

(i)   (x – 2) is a factor of $2x^3 - 7x - 2$
(ii)   (2x + 1) is a factor of $4x^3 + 12x^2 + 7x + 1$
(iii)   (3x – 2) is a factor of $18x^3 - 3x^2 + 6x - 12$

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

c) Draw a histogram for the following distribution: [4]

Class Interval	30–39	40–49	50–59	60–69	70–79
Frequency	24	16	09	15	20

Q. 4

a) Find the values of x which satisfy the inequation:

$$-2 \leq \frac{1}{2} - \frac{2x}{3} \leq 1\frac{5}{6}, \; x \in N.$$

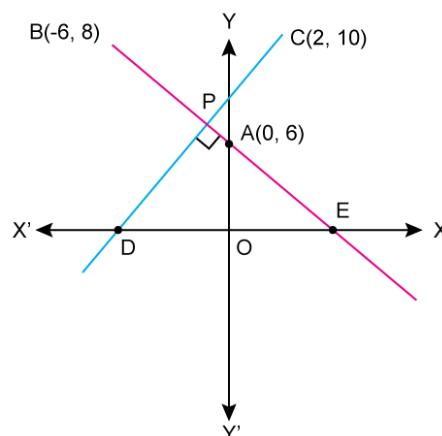Plot the solution on the number line. [3]

b) In the given figure. line AB meets the y-axis at point A. Line through C(2, 10) and D intersects line AB at a right angle at point R. Find

(i) equation of line AB
(ii) equation of line CD
(iii) co-ordinates of points E and D [3]

c) Given that 2 is a root of the equation $3x^2 - p(x + 1) = 0$ and that the equation $px^2 - qx + 9 = 0$ has equal roots, find the values of p and q. [4]

SECTION – B (40 Marks)
*(Answer **any four questions** from this Section)*

Q. 5

a)

Find a GP for which the sum of the first two terms is −4 and the fifth term is 4 times the third term. [3]

b) A man invests a certain sum on buying 15% Rs. 100 shares at 20% premium. Find

(i) His income from one share
(ii) The number of shares bought to have an income from the dividend as Rs. 6480
(iii) The sum invested [3]

c) Attempt this question on a graph paper.

1. Plot A(3, 2) and B(5, 4) on a graph paper. Take 2 cm = 1 unit on both axes.

2. Reflect A and B in the x-axis to A' and B', respectively. Plot these points also on the same graph paper.

3. Write down:

(i) the geometrical name of the figure ABB'A'

(ii) the measure of angle ABB'

(iii) the image of A'' of A when A is reflected in the origin

(iv) the single transformation that maps A' to A'' [4]

Q. 6

a) A school has 630 students. The ratio of the number of boys to the number of girls is 3:2. This ratio changes to 7:5 after the admission of 90 new students. Find the number of newly admitted boys. [3]

b) Prove:

$$\frac{1+\sin A}{\cos A}+\frac{\cos A}{1+\sin A}=2\sec A \qquad [3]$$
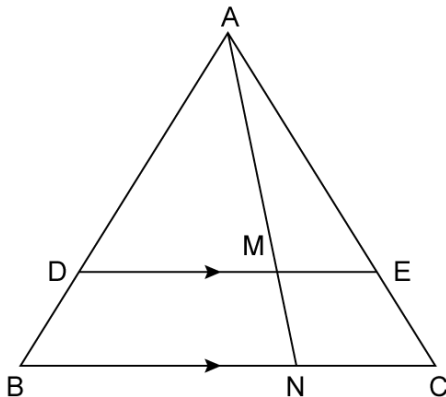
c) If $A = \begin{bmatrix} 5 & r \\ p & 7 \end{bmatrix}$, $B = \begin{bmatrix} q & 4 \\ 3 & s \end{bmatrix}$ and if $A + B = \begin{bmatrix} 9 & 7 \\ 5 & 8 \end{bmatrix}$, find the values of p, q, r and s. [4]

Q. 7

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

b) In the given figure, DE || BC, AE = 15 cm, EC = 9 cm, NC = 6 cm and BN = 24 cm.

Find the lengths of ME and DM. [3]

c) Calculate the ratio in which the line joining the points (−3, −1) and (5, 7) is divided by the line x = 2. Also, find the co-ordinates of the point of intersection. [4]

Q. 8

a) One pipe can fill a cistern in 3 hours less than the other. The two pipes together can fill the cistern in 6 hours 40 minutes. Find the time that each pipe will take to fill the cistern.   [3]

b) Find the arithmetic mean (correct to the nearest whole-number) by using the step-deviation method.   [3]

x	5	10	15	20	25	30	35	40	45	50
f	20	43	75	67	72	45	39	9	8	6

c) Construct a ΔABC with BC = 6.5 cm, AB = 5.5 cm, AC = 5 cm. Construct the in-circle of the triangle. Measure and record the radius of the in-circle.   [4]

Q. 9

a) Mr Patel deposits Rs 2,250 per month in a recurring deposit account for a period of 3 years. At the time of maturity, he will get Rs 90,990.

   (i) Find the rate of simple interest per annum

   (ii) Find the total interest earned by Mr Patel   [3]

b) A circus tent is in the shape of a cylinder surmounted by a conical top of the same diameter. If their common diameter is 56 m, the height of the cylindrical part is 6 m and the total height of the tent above the ground is 27 m, find the area of the canvas used in making the tent.   [3]

c) On a map drawn to a scale of 1:2,50,000, a triangular plot of land has the following measurements: AB = 3 cm, BC = 4 cm and ∠ABC = 90°. Calculate the actual lengths of AB and BC in km. Also find the length of AC in km.   [4]

Q. 10

a) Using the remainder theorem, factorise

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

b) Two concentric circles are of radii 6.5 cm and 2.5 cm. Find the length of the chord of the larger circle which touches the smaller circle. [3]
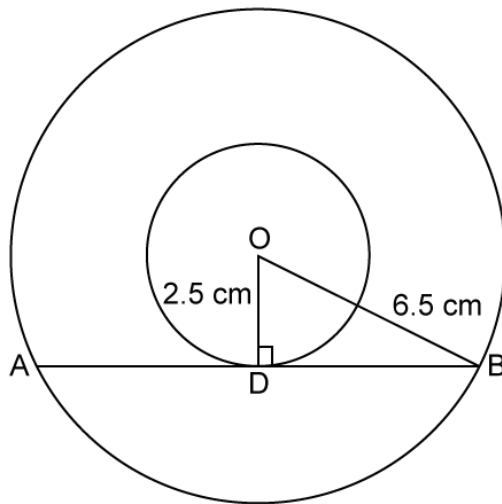
c) An aeroplane pilot, at an altitude of 250 m, observes the angles of depression of two boats on the opposite banks of a river to be 45° and 60°. Find the width of the river. Write the answer correct to the nearest whole number. [4]

Q. 11

a)

   Find the sum of n terms of the series

   $$\left(4 - \frac{1}{n}\right) + \left(4 - \frac{2}{n}\right) + \left(4 - \frac{3}{n}\right) + ...$$ [4]

b) Find the lower quartile, the upper quartile and the interquartile range for the following frequency distribution: [6]

Marks	30–40	40–50	50–60	60–70	70–80	80–90	90–100
No. of boys	10	12	14	12	9	7	6