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) Find the value of 'k' if $(x - 2)$ is a factor of $x^3 + 2x^2 - kx + 10$.

Hence determine whether $(x + 5)$ is also a factor. [3]

(b) If $A = \begin{bmatrix} 3 & 5 \\ 4 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 \\ 4 \end{bmatrix}$, is the product AB possible? Give a reason. If yes, find AB. [3]

(c) Michael buys shares of face value $ 50 of a company which pays 10 % dividend.

At what price did he buy each share from the market if his profit is 16 % on his investment? [4]

Question 2

(a) From a pack of 52 playing cards all cards whose numbers are multiples of 3 are removed. A card is now drawn at random. [3]
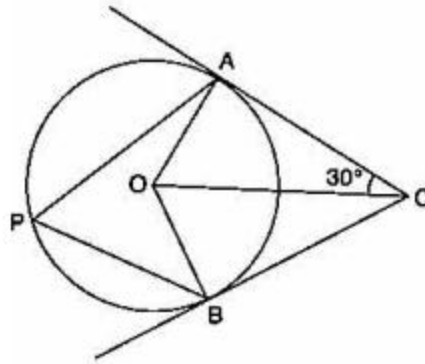
(i) a face card (King, Jack or Queen)   (ii) an even numbered red card

(b) Solve the following equation:

$x - \dfrac{18}{x} = 6$. Give your answer correct to two significant figures.   [3]

(c) In the given figure O is the centre of the circle. Tangents A and B meet at C. If $\angle ACO = 30°$, find

  (i) $\angle BCO$ (ii) $\angle AOB$ (iii) $\angle APB$ [4]
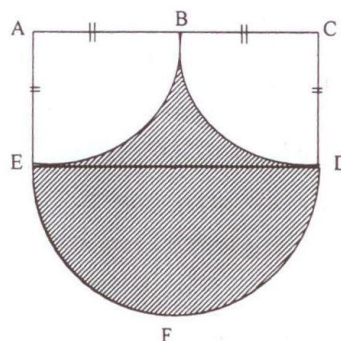

Question 3

(a) Ahmed has a recurring deposit account in a bank. He deposits Rs. 2,500 per month for 2 years. If he gets Rs. 66,250 at the time of maturity, find

  (i) The interest paid by the bank

  (ii) The rate of interest

(b) Calculate the area of the shaded region, if the diameter of the semi circle is equal to 14 cm.

  Take $\pi = \dfrac{22}{7}$.

(c) ABC is a triangle and G(4, 3) is the centroid of the triangle. If A = (1, 3), B = (4, b) and C = (a, 1), find 'a' and 'b'. Find length of side BC.   [4]

Question 4

(a) Solve the following inequation and represent the solution set on the number line
$2x - 5 \leq 5x + 4 < 11$, where $x \in I$ [3]

(b) Evaluate without using trigonometric tables. [4]

$$2\left(\frac{\tan 35^o}{\cot 55^o}\right)^2 + \left(\frac{\cot 55^o}{\tan 35^o}\right) - 3\left(\frac{\sec 40^o}{\cosec 50^o}\right)$$

(c) A Mathematics aptitude test of 50 students was recorded as follows: [4]

Marks	50 - 60	60 - 70	70 - 80	80 - 90	90 – 100
No. of Students	4	8	14	19	5

Draw a histogram from the above data using a graph paper and locate the mode.

SECTION B (40 Marks)

Attempt any four questions from this section

Question 5

(a) ABCD is a square. If the coordinates of A and C are (5, 4) and (-1, 6); find the coordinates of B and D.

[3]

(b) A solid cone of radius 5 cm and height 8 cm is melted and made into small spheres of radius 0.5 cm. Find the number of spheres formed. [3]

(c) ABCD is a parallelogram where A(x, y), B(5, 8), C(4, 7) and D(2, -4). Find [4]

(i) Coordinates of A

(ii) Equation of diagonal BD

Question 6

(a) Use a graph paper to answer the following questions (Take 1 cm = 1 unit on both axes) [4]

    (i) Plot A(4,4), B(4,-6) and C(8,0), the vertices of a triangle ABC.

    (ii) Reflect ABC on the y-axis and name it A'B'C'.

    (iii) Write the coordinates of the images A', B' and C'.

    (iv) Give a geometrical name for the figure AA' C' B' BC.

(b) 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]

(c) Find the arithmetic mean (correct to the nearest whole-number) by using step-deviation method.

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

[4]

Question 7

(a) Using componendo and dividendo, find the value of x

$$\frac{\sqrt{3x + 4} + \sqrt{3x - 5}}{\sqrt{3x + 4} - \sqrt{3x - 5}} = 9$$ [3]

(b) If $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 4 & -2 \\ -1 & 3 \end{bmatrix}$ and I is the identity matrix of the same order and A^t is the transpose of matrix A, find $A^t.B + BI$. [3]

(c)   In the adjoining figure ABC is a right angled triangle with $\angle$ BAC = 90°.   [4]

(i) Prove $\triangle$ ADB $\sim$ $\triangle$ CDA.

(ii) If BD = 18 cm CD = 8 cm Find AD.

(iii) Find the ratio of the area of $\triangle$ ADB is to area of $\triangle$ CDA.
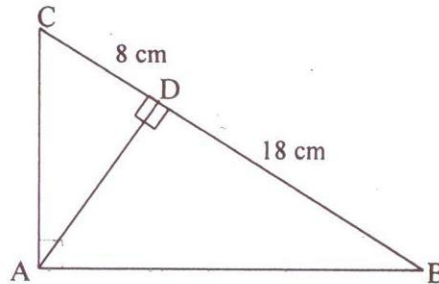
Question 8

(a) (i) Using step–deviation method, calculate the mean marks of the following distribution.

   (ii) State the modal class.   [4]

Class interval	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75	75 - 80	80 - 85	85 – 90
Frequency	5	20	10	10	9	6	12	8

(b)   Marks obtained by 200 students in an examination are given below: [6]

   Draw an ogive for the given distribution taking 2 cm = 10 marks on one axis and 2 cm = 20 students on the other axis. Using the graph, determine

   (i)   The median marks.

   (ii) The number of students who failed if minimum marks required to pass is 40.

   (iii) If scoring 85 and more marks is considered as grade one, find the number of students who secured grade one in the examination.

Question 9

(a)   Mr. Parekh invested Rs. 52,000 on Rs. 100 shares at a discount of Rs. 20 paying 8% dividend. At the end of one year he sells the shares at a premium of Rs. 20. find

   (i) The annual dividend.

   (ii) The profit earned including his dividend.   [3]

(b)   Draw a circle of radius 3.5 cm. Marks a point P outside the circle at a distance of 6 cm from the centre. Construct two tangents from P to the given circle. Measure and write down the length of one tangent.   [3]

(c)   Prove that (cosec A – sin A)(sec A – cos A) sec² A = tan A.   [4]

Question 10

(a) 6 is the mean proportion between two numbers x and y and 48 is the third proportional of x and y. Find the numbers. [3]

(b) In Δ ABC, angle ABC is equal to twice the angle ACB, and bisector of angle ABC meets the opposite side at point P. Show that :CB : BA = CP : PA

[3]

(c) A man observes the angle of elevation of the top of a building to be 30°. He walks towards it in a horizontal line through its base. On covering 60 m the angle of elevation changes to 60°. Find the height of the building correct to the nearest metre.

[4]

Question 11.

(a) ABC is a triangle with AB = 10 cm, BC = 8 cm and AC = 6 cm (not drawn to scale). Three circles are drawn touching each other with the vertices as their centres. Find the radii of the three circles. [3]
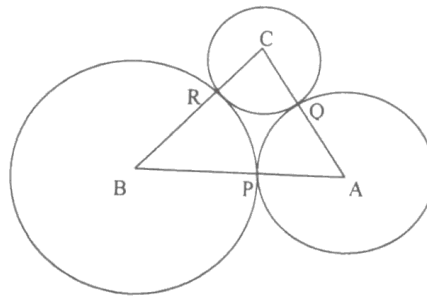
(b) Rs. 480 is divided equally among 'x' children. If the numbers of children were 20 more then each would have got Rs. 12 less. Find 'x'. [3]

(c) Given equation of line L, is y = 4. [4]

(i) Write the slope of line L_2, if L_2, is the bisector of angle O.

(ii) Write the co–ordinates of point P.

(iii) Find the equation of L_2.