

ICSE Board
Class X Mathematics

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.
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SECTION – A (40 Marks)

(Answer all questions from this Section)

Q. 1

a) Given $A = \begin{bmatrix} 2 & 0 \\ -1 & 7 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $A^2 = 9A + mI$. Find m . [3]

- b) If the speed of an aeroplane is reduced by 40km per hr, it takes 20 minutes more to cover 1200km. Find the speed of the aeroplane.

[3]

- c) A die has 6 faces marked by the given numbers as shown below: [4]

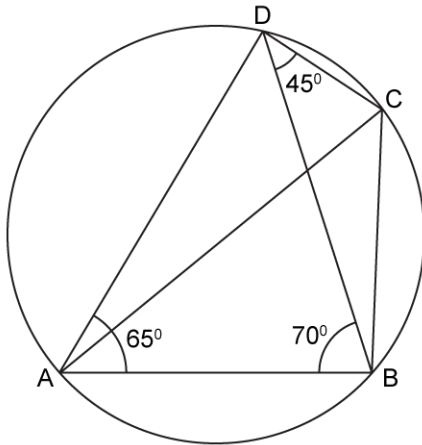


If the die is thrown once, what is the probability of getting

- (i) a positive integer
- (ii) an integer greater than -3
- (iii) the smallest integer

Q. 2

- a) The radius of a solid right cylinder increases by 20% and its height decreases by 20%. Find the percentage change in its volume (take cm as unit for length). [3]
- b) A sum of 700 is to be paid to give seven cash prizes to the students of a school for their overall academic performance. If the cost of each prize is 20 less than its preceding prize, find the value of each of the prizes. [3]
- c) In the given figure, $\angle BAD = 65^\circ$, $\angle ABD = 70^\circ$, $\angle BDC = 45^\circ$ [4]
(i) Prove that AC is a diameter of the circle
(ii) Find $\angle ACB$
(iii) Find $\angle DBC$

**Q. 3**

- a) 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]
- b) Prove the identity $(\sin \theta + \cos \theta)(\tan \theta + \cot \theta) = \sec \theta + \operatorname{cosec} \theta$. [3]
- c) Draw a histogram for the following distributions: [4]

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	12	20	26	18	10	6

Q. 4

- a) Solve the following inequation, write the solution set and represent it on the number line. [3]

$$-3(x-7) \geq 15 - 7x > \frac{x+1}{3}, x \in \mathbb{R}.$$

- b) A straight line passes through the points P(-1, 4) and Q(5, -2). It intersects the x-axis at point A and the y-axis at point B. M is the mid-point of the line segment AB. Find

- (i) the equation of the line
(ii) the co-ordinates of points A and B
(iii) the co-ordinates of point M [3]

- c) Solve the quadratic equation $x^2 - 3(x + 3) = 0$. Give your answer correct to two significant figures. [4]

SECTION - B (40 Marks)

(Answer **any four questions** from this Section)

Q. 5

- a) The first term of a GP is 27. If the 8th term is $\frac{1}{81}$, what will be the sum of 10 terms? [3]
- b) Mrs Kulkarni invests Rs. 1,31,040 in buying Rs. 100 shares at a discount of 9%. She sells shares worth Rs. 72,000 at a premium of 10% and the rest at a discount of 5%. Find her total gain or loss on the whole. [3]
- c) On a graph paper, plot the triangle ABC, whose vertices are at points A (3, 1), B (5, 0) and C (7, 4).
On the same diagram, draw the image of the triangle ABC under reflection in the origin O (0, 0). [4]

Q. 6

a)

If $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$ show that: $\frac{x^3}{a^3} + \frac{y^3}{b^3} + \frac{z^3}{c^3} = \frac{3xyz}{abc}$. [3]

b) Find the values of a, b, c and d if $\begin{bmatrix} a + 3b & 3c + d \\ 2a - b & c - 2d \end{bmatrix} = \begin{bmatrix} 5 & 8 \\ 3 & 5 \end{bmatrix}$. [3]

c) Prove that $\frac{\tan A}{(1 - \cot A)} + \frac{\cot A}{(1 - \tan A)} = (1 + \tan A + \cot A)$. [4]

Q. 7

a) Solve: $\frac{x}{3} + \frac{3}{6-x} = \frac{2(6+x)}{15}; (x \neq 6)$ [3]

b) In ΔABC , angle ABC is equal to twice the angle ACB , and the bisector of angle ABC meets the opposite side at point P . Show that $AB \times BC = BP \times CA$ [3]

c) Points A, B, C and D divide the line segment joining the point $(5, -10)$ and the origin in five equal parts. Find the co-ordinates of A, B, C and D . [4]

Q. 8

a) A can do a piece of work in ' x ' days and B can do the same work in $(x + 16)$ days. If both working together can do it in 15 days, calculate ' x '. [3]

b) In the following table, $\sum f = 200$ and mean = 73. Find the missing frequencies f_1 and f_2 . [3]

x	0	50	100	150	200	250
f	46	f_1	f_2	25	10	5

c) Draw a line $AB = 5$ cm. Mark a point C on AB such that $AC = 3$ cm. Using a ruler and a compass only, [4]

- (i) construct a circle of radius 2.5 cm passing through A and C
- (ii) construct two tangents to the circle from the external point B
- (iii) measure and record the length of the tangents

Q. 9

a) Mrs Khandelkar invests Rs 900 every month in a recurring deposit account for a period of 3 years at a simple interest rate of 8% pa. [3]

(i) Find the total interest she will earn at the end of the period.

(ii) Find the maturity value of her deposits.

b) $\left(\frac{3}{4}\right)^{\text{th}}$ part of a conical vessel of internal radius 5 cm and height 24 cm is full of water. The water is emptied into a cylindrical vessel with internal radius 10 cm. Find the height of water in the cylindrical vessel. [3]

c) A model of a ship is made to a scale 1:300. [4]

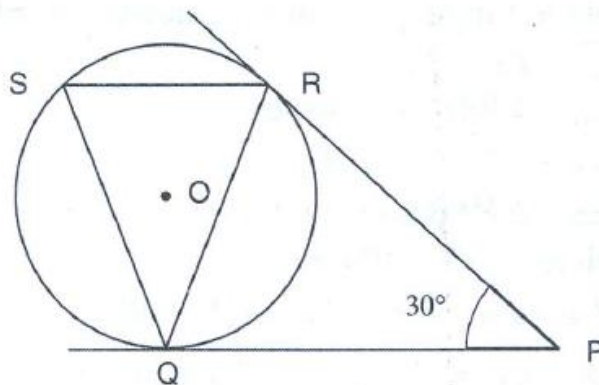
(i) The length of the model of the ship is 2 m. Calculate the length of the ship.

(ii) The area of the deck of the ship is $180,000 \text{ m}^2$. Calculate the area of the deck of the model.

(iii) The volume of the model is 6.5 m^3 . Calculate the volume of the ship.

Q. 10

a) In the given figure, tangents PQ and PR are drawn from an external point P to a circle with centre O, such that $\angle RPQ = 30^\circ$. A chord RS is drawn parallel to the tangent PQ. Find $\angle RQS$. [3]

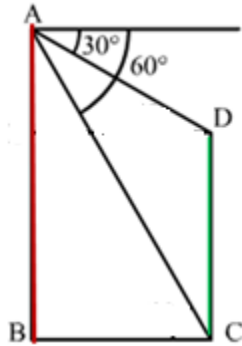


b) Find the values of a and b when the polynomial $f(x) = ax^3 + 3x^2 + bx - 3$ is exactly divisible by $(2x + 3)$ and leaves a remainder -3 when divided by $(x + 2)$. [3]

c) In the given figure, the height of a building $AB = 60$ m, the angles of depression of the top and bottom of a vertical lamp post CD are observed to be 30° and 60° , respectively. Find [4]

(i) the horizontal distance between AB and CD

(ii) the height of the lamp post



Q. 11

a) Find the sum of the first 40 positive integers divisible by (i) 3 (ii) 5 (iii) 6. [4]

b) The table shows the distribution of the scores obtained by 160 shooters in a shooting competition. Use a graph sheet and draw an ogive for the distribution. (Take 2 cm = 10 scores on the X-axis and 2 cm = 20 shooters on the Y-axis) [6]

Scores	0– 10	10– 20	20– 30	30– 40	40– 50	50– 60	60– 70	70– 80	80– 90	90– 100
No. of shooters	9	13	20	26	30	22	15	10	8	7

Use your graph to estimate the following:

(i) The median

(ii) The interquartile range

(iii) The number of shooters who obtained a score of more than 85%