Sample Paper 5

ICSE 2024 EXAMINATION
MATHEMATICS

Time: Two and half hours **Max. Marks: 80**

General Instructions:

1. Answer to this paper must be written on the paper provided separately.
2. You will not be allowed to write during first 15 minutes.
3. This time is to be spent in reading the question paper.
4. The time given at the head of this Paper is the time allowed for writing the answers.
5. Attempt all questions from Section A and any four questions from Section B.
6. All working, including rough work, must be clearly shown, and must be done on the same sheet as the rest of the answer.
7. Omission of essential working will result in loss of marks.
8. The intended marks for questions or parts of questions are given in brackets [ ].
9. Mathematical tables are provided.

SECTION - A

(Attempt all questions from this Section.)

QUESTION 1.

Choose the correct answers to the questions from the given options. [15]

(Do not copy the questions, write the correct answer only.)

(i) Rakhi buy goods worth ₹7,750 from a grocery store. Since, she has a membership card, so she gets a discount of 15% on ₹5,000. If the GST charged is 18%, then the total amount she has to pay for the goods is:

(a) ₹8,260 (b) ₹7,890
(c) ₹6,306 (d) ₹7,375

(ii) Mr. Verma is having a R.D. account at Self Help Group Society. He deposited ₹2,500 per month for 2 years. At the time of maturity, he got ₹67,500. The total interest earned by him during this period is

(a) ₹8,500 (b) ₹8,000
(c) ₹7,000 (d) ₹7,500

(iii) Solution set of inequation $5 - 2x \geq x - 10$, given that $x \in N$, will be

(a) {0, 1, 2, 3, 4, 5} (b) {1, 2, 3, 4}
(c) {1, 2, 3, 4, 5} (d) {0, 1, 2, 3, 4}

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(iv) If one root of a quadratic equation $6x^2 - x - k = 0$ is $\frac{2}{3}$, then the value of k is:
(a) 2 (b) 1/9
(c) 8/3 (d) 1

(v) If $x : 50 = 3 : 2$, then value of x is_____.
(a) 75 (b) 65
(c) 55 (d) 50

(vi) What is the value of the polynomial $3x^2 + 5x - 4$ at $x = -3$?
(a) 28 (b) 22
(c) 64 (d) 8

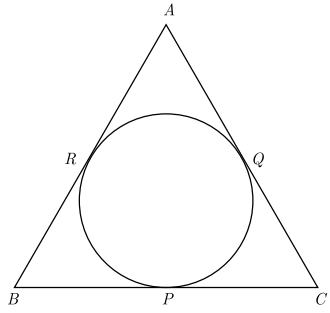
(vii) If $x\begin{bmatrix} -1 \\ 2 \end{bmatrix} + 4\begin{bmatrix} 3 \\ -y \end{bmatrix} = \begin{bmatrix} 11 \\ -6 \end{bmatrix}$, then the respective values of x and y are :
(a) -1, 2 (b) 1, 2
(c) 1, -2 (d) -1, -2

(viii) In an AP, if $a = 3.5$, $d = 0$ and $n = 101$, then a_n will be
(a) 0 (b) 3.5
(c) 103.5 (d) 104.5

(ix) Which of the following is the equation of a line with x-intercept -3 and passing through the point $(-2, 5)$.
(a) $5x + y - 15 = 0$ (b) $x - 5y + 15 = 0$
(c) $x + 5y - 15 = 0$ (d) $5x - y + 15 = 0$

(x) Two poles of height 6 m and 11 m stand vertically upright on a plane ground. If the distance between their foot is 12 m, then distance between their tops is
(a) 12 m (b) 14 m
(c) 13 m (d) 11 m

(xi) In the given figure sides BC, CA and AB of ΔABC touch a circle at the points P,Q and R respectively. if $PC = 5$ cm, $AR = 4$ cm and $RB = 6$ cm, then the perimeter of ΔABC is
(a) 60 cm (b) 45 cm
(c) 30 cm (d) 15 cm



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(xii) Ratio of lateral surface areas of two cylinders with equal height is

(a) $1 : 2$ (b) $H : h$

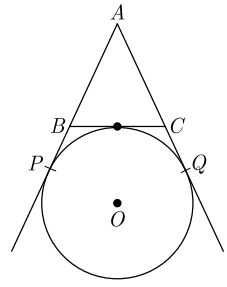
(c) $R : r$ (d) None of these

(xiii) A chord of a circle of radius 10 cm, subtends a right angle at its centre. The length of the chord (in cm) is

(a) $\frac{5}{\sqrt{2}}$ (b) $5\sqrt{2}$

(c) $10\sqrt{2}$ (d) $10\sqrt{3}$

(xiv) In figure, AP, AQ and BC are tangents of the circle with centre O. If $AB = 5\,\text{cm}$, $AC = 6$ cm and $BC = 4$ cm, then the length of AP (in cm) is

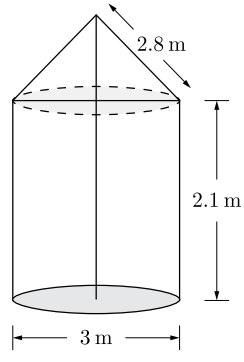


(a) 15 (b) 10

(c) 9 (d) 7.5

QUESTION 2.

(i) A tent is in the shape of cylinder surmounted by a conical top of same diameter. If the height and diameter of cylindrical part are 2.1 m and 3 m respectively and the slant height of conical part is 2.8 m, find the cost of canvas needed to make the tent if the canvas is available at the rate of Rs.500 per square meter. Use $\pi = \frac{22}{7}$. [4]



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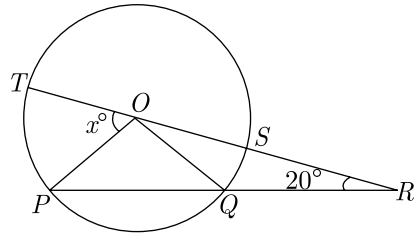
(ii) Rekha opened a recurring deposit account for 20 months. The rate of interest is 9% per annum and Rekha receives ₹ 441 as interest at the time of maturity. Find the amount Rekha deposited each month. [4]

(iii) Prove that [4]
$(\operatorname{cosec}\theta - \sin\theta)(\sec\theta - \cos\theta)(\tan\theta + \cot\theta) = 1$

QUESTION 3.

(i) Amit sold some ₹20 shares paying 8% dividend at ₹18 and invested the proceeds in ₹10 shares paying 12% dividend at 50% premium. If the change in his annual income is ₹360, find the number of shares sold by Mr Amit. [4]

(ii) In the figure given below, O is the centre of the circle. If $QR = OP$ and $\angle QRP = 20^\circ$. Find the value of 'x' giving reasons. [4]



(iii) Using a graph paper, draw an ogive for the following distribution which shows the marks obtained in the General Knowledge paper by 100 students. [5]

Marks	Number of students
0-10	5
10-20	10
20-30	20
30-40	25
40-50	15
50-60	12
60-70	9
70-80	4
Total	100

Use the ogive to estimate

(a) the median.

(b) the number of students, who score marks above 65.

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SECTION - B

(Attempt any four questions.)

QUESTION 4.

(i) Simplify [3]

$$\sin A\begin{bmatrix}\sin A & -\cos A\\ \cos A & \sin A\end{bmatrix}+\cos A\begin{bmatrix}\cos A & \sin A\\ -\sin A & \cos A\end{bmatrix}$$

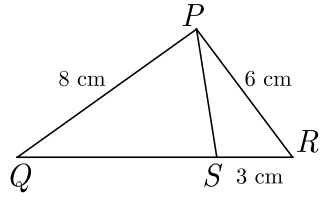
(ii) Draw a circle of radius 3.5 cm. Mark a point P outside the circle at a distance of 6 cm from the centre. Construct two tangents from P to the given circle. Measure and write down the length of one tangent. [3]

(iii) PQR is triangle. S is a point on the side QR of ΔPQR such that $\angle PSR = \angle QPR$. Given $QP = 8$ cm, $PR = 6$ cm and $SR = 3$ cm. [4]

(a) Prove $\Delta PQR \sim \Delta SPR$.

(b) Find the length of QR and PS.

(c) $\frac{\Delta PQR}{\Delta SPR}$.



QUESTION 5.

(i) The marks obtained by 110 students in an examination are given below [3]

Marks	30-35	35-40	40-45	45-50	50-55	55-60	60-65
Number of Students	14	16	28	23	18	8	3

Find the mean marks of the students.

(ii) Kiran bought the following electronic items from an electronics store: [3]

S. No.	Item	Price	Rate of GST	Discount
(a)	Air Conditioner	₹65000	28%	₹5000
(b)	Refrigerator	₹30000	28%	-

Find the:

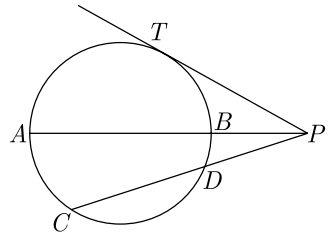
(a) Total GST paid.

(b) Total bill amount including GST.

(iii) In the given figure, diameter AB and chord CD of a circle meet at P. PT is a tangent to the circle at T and $CD = 7.8$ cm, $PD = 5$ cm, $PB = 4$ cm. Find [4]

(a) AB,

(b) the length of tangent PT.



QUESTION 6.

(i) If the fourth, seventh and tenth terms of a GP. are x, y, z respectively, prove that x, y, z are in G.P. [3]

(ii) The first and the second terms of a G.P. are x^{-4} and x^{m}. If its 8^{th} term is x^{52}, then find the value of m. [3]

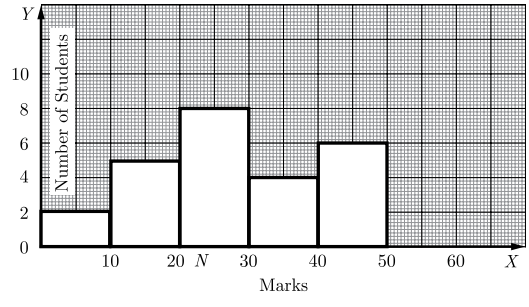
(iii) The histogram adjacent represents the scores obtained by 25 students in a Mathematics mental test. [4]

Use the data to

(a) frame a frequency table

(b) to calculate mean

(c) to determine the modal class



QUESTION 7.

(i) If the straight lines $3x - 5y = 7$ and $4x + ay + 9 = 0$ are perpendicular to one another, find the value of a. [5]

(ii) The tallest free-standing tower in the world is the CN Tower in Toronto, Canada. The tower includes a rotating restaurant high above the ground. [5]

From a distance of 208 meter the angle of elevation to the pinnacle of the tower is 60°. The angle of elevation to the restaurant from the same vantage point is 45°.

(a) How tall is the CN Tower?

(b) How far below the pinnacle of the tower is the restaurant located?

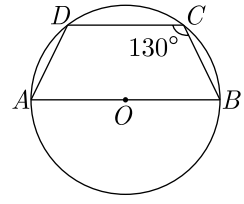
QUESTION 8.

(i) Solve the following inequation and graph the solution set on the number line $2x-3 < x+2 \leq 3x+5 \;\; x \in R$ [3]

(ii) In the given figure, AB is the diameter of a circle with centre O and $\angle BCD = 130^\circ$. Find

(a) $\angle DAB$. [3]

(b) $\angle DBA$.



(iii) $P(1,-2)$ is a point on the line segment joining $A(3,-6)$ and $B(x,y)$ such that $AP : PB$ is equal to $2 : 3$. Find the coordinates of B. [4]

QUESTION 9.

(i) Using properties of proportion find $x : y$, given [3]

$$\frac{x^2+2x}{2x+4} = \frac{y^3+3y}{3y+9}$$

(ii) A two digit number is such that product of its digits is 14. If 45 is added to the number, the digits interchange their places. Find the number. [3]

(iii) Construct a ΔABC with $AB = 7$ cm, $BC = 8$ cm and $\angle ABC = 60^\circ$, locate by construction the point P, such that [4]

(a) P is equidistant from B and C.

(b) P is equidistant from AB and BC.

(c) Measure and record the length of PB.

QUESTION 10.

(i) Using the factor theorem, show that $(x - 2)$ is a factor of $x^3 + x^2 - 4x - 4$. [3]
Hence factorise the polynomial completely.

(ii) An insurance company selected 1000 drivers at random in a particular city to determine a relationship between age and accidents. The data obtained are listed in following table. [3]

Age	0	1	2	3	Over 3
Under 20	50	62	53	35	20
20–29	64	93	67	40	36
30–39	82	68	32	14	4
40–49	38	32	20	7	3
Over 49	43	50	35	28	24

Compute the probabilities of the following events for a driver chosen at random in the city:

(a) E_1 : being under 20 years old and having exactly three accidents in 1 year
(b) E_2 : being 30–39 years old and having one or more accidents in 1 year
(c) E_3 : having no accidents in 1 year
(d) E_4 : being under 20 years old or having exactly three accidents in 1 year

(iii) Use a graph sheet for this question. Take 1 cm = 1 unit along both x and y-axis. [4]

(a) Plot the following points. $A(0, 5)$, $B(3, 0)$, $C(1, 0)$ and $D(1, -5)$
(b) Reflect the points B, C and D on the Y-axis and name them as B', C' and D' respectively.
(c) Write down the coordinates of B', C' and D'.
(d) Join the points A, B, C, D, D', C', B', A' in order and give a name to the closed figure $ABCDD'C'B'$.

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