Sample Paper 2

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) An article is marked at ₹1,000. A dealer sells it at 5% profit. If the rate of GST is 18%, then the total amount paid by a consumer to buy it, is:

(a) ₹1,324 (b) ₹1,239

(c) ₹1,120 (d) ₹1,180

(ii) Naresh deposited ₹400 per month for 15 months in Federal bank's recurring deposit account. If the bank pays interest at a rate of 10% per annum, then the interest earned by Naresh during this period is:

(a) ₹350 (b) ₹250

(c) ₹400 (d) ₹300

(iii) If $x \in W$ then the solution of $x \leq 3$ is:

(a) $\{0, 1, 2\}$ (b) $\{1, 2, 3\}$

(c) $\{1, 2\}$ (d) $\{0, 1, 2, 3\}$

(iv) The nature of roots of the equation $5x^2 - 6x + 7 = 0$ is:

(a) two distinct real roots (b) two equal real roots

(c) no real roots (d) more than 2 real roots

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(v) If $2x+3y:3x+5y=18:29$, then the ratio $x:y$ is:

(a) 2 : 3 (b) 3 : 5

(c) 3 : 4 (d) 5 : 29

(vi) What is the remainder obtained on dividing $f(x)=6x^3-3x^2-8x+7$ by $x-2$:

(a) – 37 (b) 27

(c) 37 (d) –27

(vii) If $A\begin{bmatrix} 2 & 0 \\ -1 & 7 \end{bmatrix}$ then A^2 is :

(a) $\begin{bmatrix} 4 & 0 \\ 1 & 49 \end{bmatrix}$ (b) $\begin{bmatrix} 4 & 0 \\ -9 & 49 \end{bmatrix}$

(c) $\begin{bmatrix} 4 & 0 \\ 9 & 49 \end{bmatrix}$ (d) $\begin{bmatrix} 4 & 9 \\ -9 & 49 \end{bmatrix}$

(viii) The common difference of the AP $\frac{1}{p}, \frac{1-p}{p}, \frac{1-2p}{p}$, ... is

(a) 1 (b) $\frac{1}{p}$

(c) -1 (d) $-\frac{1}{p}$

(ix) The ratio in which the point $(2, y)$ divides the join of $(-4, 3)$ and (6, 3), hence the value of y is

(a) $2:3, y=3$ (b) $3:2, y=4$

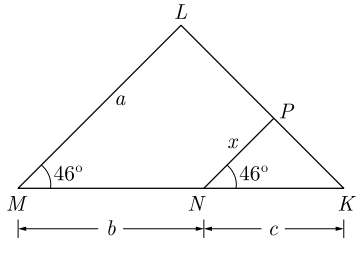
(c) $3:2, y=3$ (d) $3:2, y=2$

(x) Which of the following is the equation of the straight line whose inclination is 45° and whose y-intercept is –3.

(a) $x-y-1=0$ (b) $-x+y+3=0$

(c) $x-y-3=0$ (d) $x-y+1=0$

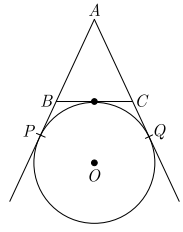
(xi) In the given figure, x is



(a) $\frac{ab}{a+b}$ (b) $\frac{ac}{b+c}$

(c) $\frac{bc}{b+c}$ (d) $\frac{ac}{a+c}$

(xii) 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

(xiii) A sphere is melted and half of the melted liquid is used to form 11 identical cubes, whereas the remaining half is used to form 7 identical smaller spheres. The ratio of the side of the cube to the radius of the new small sphere is

(a) $\left(\frac{4}{3}\right)^{1/3}$ (b) $\left(\frac{8}{3}\right)^{1/3}$
(c) $(3)^{1/3}$ (d) 2

(xiv) If $\sin A = \frac{1}{2}$, then the value of $\cot A$ is

(a) $\sqrt{3}$ (b) $\frac{1}{\sqrt{3}}$
(c) $\frac{\sqrt{3}}{2}$ (d) 1

(xv) QP is a tangent to a circle with centre O at a point P on the circle. If $\Delta\, OPQ$ is isosceles, then $\angle\, OQR$ equals to

(a) 30° (b) 45°
(c) 60° (d) 90°

QUESTION 2.

(i) Suppose a sugar cone is 10 centimeters deep and has a diameter of 4 centimeters. A spherical scoop of ice cream with a diameter of 4 centimeters rests on the top of the cone. [4]

(a) If all the ice cream melts into the cone, will the cone overflow? Explain.

(b) If the cone does not overflow, what percent of the cone will be filled?

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(ii) Meena deposited ₹700 per month in a R.D. account for $1\frac{1}{4}$ years at bank. If the matured value of this account is ₹11,130, find the interest received. [4]

(iii) Prove that : $\dfrac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = \tan A$. [4]

QUESTION 3.

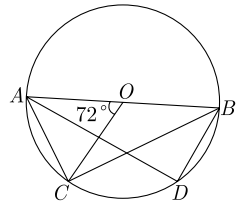
(i) How much cash is obtained by selling : [4]

(a) fifty, ₹20 shares at ₹2.50 premium ?

(b) one hundred, ₹20 shares at ₹1.75 discount ?

(c) two hundred fifty, ₹200 shares at par ?

(ii) In the figure below, O is the centre of the circle and AB is diameter. If $AC = BD$ and $\angle AOC = 72°$. Find [4]



(a) $\angle ABC$

(b) $\angle BAD$

(c) $\angle ABD$

(iii) 40 students enter for a game of shot-put competition. The distance thrown (in metres) is recorded below [5]

Distance in m	Number of Students
12-13	3
13-14	9
14-15	12
15-16	9
16-17	4
17-18	2
18-19	1

Use a graph paper to draw an ogive for the above distribution. Use a scale of 2 cm = 1 m on one axis and 2 cm = 5 students on the other axis.

Hence using your graph find

(a) the median

(b) Upper Quartile

(c) Number of students who cover a distance which is above $16\frac{1}{2}$ m.

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SECTION - B

(Attempt any four questions.)

QUESTION 4.

(i) Find the values of x, y, a and b if [3]

$$\begin{bmatrix} x+y & a+b \\ a-b & x-3y \end{bmatrix} = \begin{bmatrix} 5 & -1 \\ 3 & -7 \end{bmatrix}$$

(ii) Use ruler and compass only for answering this question. [3]

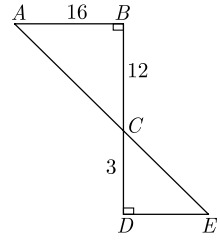
Draw a circle of radius 4 cm. Mark the centre as O. Mark a point P outside the circle at a distance of 7 cm from the centre. Construct two tangents to the circle from the external point P. Measure and write down the length of any one tangent.

(iii) In given figure AB and ED are perpendiculars to BD. AE meets BD at C. If $AB = 16$ cm, $BC = 12$ cm and $CD = 3$ cm : [4]

(a) Show that $\Delta ABC \sim \Delta EDC$

(b) Find the lengths of DE and CE.

(c) Find area ΔABC : area ΔEDC.



QUESTION 5.

(i) Find the mean number of plants per house from the following data : [3]

Number of plants	0-2	2-4	4-6	6-8	8-10	10-12	12-14
Number of houses	1	2	1	5	6	2	3

(ii) Riya bought the following articles from a departmental store : [3]

S. No.	Item	Price	Rate of GST
1.	Fruit Juice	₹300	12%
2.	Coffee	₹1200	5%

Find the :

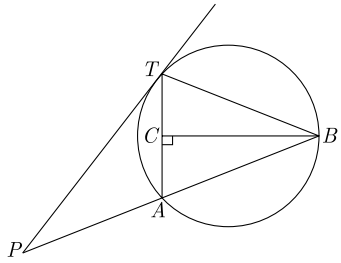
(a) Total GST paid.

(b) Total bill amount including GST.

(iii) In the given figure, PT is a tangent to the circle at T, chord BA is produced to meet the tangent at P. Perpendicular BC bisects the chord TA at C. If $PA = 9$ cm and $TB = 7$ cm, find the lengths of : [4]

(a) AB

(b) PT



QUESTION 6.

(i) The 5^{th}, 8^{th} and 11^{th} terms of a G.P. are p, q and s respectively. Show that $q^2 = ps$. [3]

(ii) The digit of a positive number of three digits are in AP and their sum is 15. The number obtained by reversing the digits is 594 less then the original number. Find the number. [3]

(iii) Draw a Histogram for the given data, using a graph paper. [4]

Weekly wages (in ₹)	Number of people
3000-4000	4
4000-5000	18
5000-6000	9
6000-7000	6
7000-8000	7
8000-9000	2
9000-10000	4

Estimate the mode from the graph.

QUESTION 7.

(i) M and N are two points on the X-axis and Y-axis, respectively. $P(3, 2)$ divides the line segment MN in the ratio 2 : 3. [5]

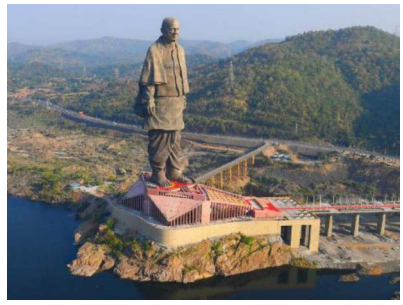
Find

(a) the coordinates of M and N.

(b) slope of the line MN.

(ii) Statue of Unity is a colossal statue of Indian statesman and independence activist Sardar Vallabh bhai Patel, who was the first Deputy Prime Minister and Home minister of

independent India. [5]



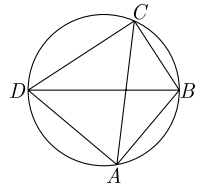
(a) For a person standing 240 m from the center of the base of the statue, the angle of elevation to the top of the statue is 45°. How tall is the statue?

(b) A cop in helicopter near the top of the statue, notices a car wreck some distance from the statue. If the angle of depression from the cop's eyes to the wreck is 60°, how far away is the accident from the centre of base of the statue?

QUESTION 8.

(i) Solve the following inequation, and graph the solution on the number line: [3]
$2x-5 \leq 5x+4 < 11,\ x \in R$.

(ii) In the given figure PQ is a tangent to the circle at A. AB and AD are bisectors of $\angle CAQ$ and $\angle PAC$. If $\angle BAQ = 30^\circ$, prove that [3]
(a) BD is a diameter of the circle.
(b) ABC is an isosceles triangle.



(iii) In what ratio does the point $P(2,-5)$ divide the line segment joining the points A(-3,5) and $B(4,-9)$)? [4]

QUESTION 9.

(i) What number must be added to each of the numbers 4, 6, 8, 11 in order to get the four numbers in proportion? [3]

(ii) A two digit number is four times the sum of the digits. It also equal to 3 times the product of digits. Find the number. [3]

(iii) Use ruler and compass only for this question. [4]
(a) Construct ΔABC, where $AB = 3.5$ cm, $\angle ABC = 60^\circ$.
(b) Construct the locus of points inside the triangle, which are equidistant from BA and

BC.

(c) Construct the locus of points inside the triangle which are equidistant from B and C.

(d) Mark the point P which is equidistant from AB, BC and also equidistant from B and C. Measure and record the length of PB.

QUESTION 10.

(i) Factorize completely using factor theorem: [3]

$2x^3 - x^2 - 13x - 6$

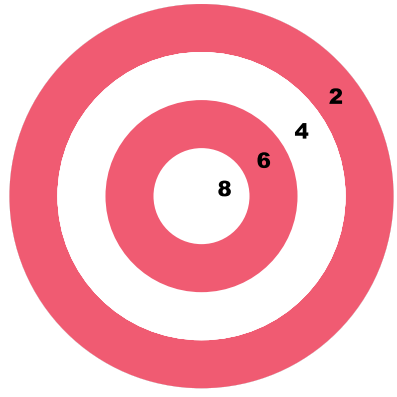
(ii) A circular dartboard has a total radius of 8 inch, with circular bands that are 2 inch wide, as shown in figure. Abhinav is skilled enough to hit this board 100% of the time so he always score at least two points each time he throw a dart. Assume the probabilities are related to area, on the next dart that he throw. [3]

(a) What is the probability that he score at least 4 ?

(b) What is the probability that he score at least 6 ?

(c) What is the probability that he hit bull's eye ?

(d) What is the probability that he score exactly 4 points ?



(iii) Use a graph paper for this question (take 10 small divisions = 1 unit on both the axes). P and Q have coordinates $(0,5)$ and $(-2,4)$. [4]

(a) P is invariant, when reflected in an axis. Name the axis.

(b) Find the image of Q on reflection in the axis found in (i).

(c) $(0,k)$ on reflection in the origin in invariant. What the value of k.

(d) Write the coordinates of the image of Q, obtained by reflection it in origin followed in X-axis.

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