Sample Paper 1

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) Fill in the missing entries for transaction within the same city.

Listed price	₹1,200
Discount	20%
Discount Price	a
GST	18%
CGST	b
SGST	c
IGST	d

(a) $a = ₹960,\ b = c = ₹86.40,\ d = 0$
(b) $a = ₹240,\ b = c = ₹21.60,\ d = ₹21.60$
(c) $a = ₹960,\ b = c = ₹172.80,\ d = ₹21.60$
(d) $a = ₹240,\ b = c = ₹43.20,\ d = 0$

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(ii) Reena deposited ₹1000 per month for 12 months in a Paytm Bank's recurring deposit account. If the bank pays interest at a rate of 9% per annum, then the total amount deposited by Reena during this period is:

(a) ₹12,000 (b) ₹20,400
(c) ₹15,000 (d) ₹18,000

(iii) If $x \in N$ 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 quadratic equation $2x^2 + kx + 2 = 0$ has equal roots, if the value of k is:

(a) -4 (b) 2
(c) ± 4 (d) 4

(v) If $x : y = 5 : 3$, then the value of $(8x - 5y)\,(8x - 5y) : (6x + 7y)$ is:

(a) 24 : 27 (b) 35 : 37
(c) 25 : 9 (d) 25 : 17

(vi) The remainder when $f(x) = x^2 - 5x + 7$ is divided by $x - 1$, is:

(a) 3 (b) 8
(c) 4 (d) 12

(vii) If $\begin{bmatrix} 2 & 0 \\ 0 & 4 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ -8 \end{bmatrix}$, the value of x and y respectively are :

(a) 1, −2 (b) −2, 1
(c) 1, 2 (d) −2, −1

(viii) The n^{th} term of the AP a, $3a$, $5a$, ... is

(a) na (b) $(2n - 1)\,a$
(c) $(2n + 1)\,a$ (d) $2na$

(ix) The centroid of the triangle whose vertices are $(3, -7), (-8, 6)$ and $(5, 10)$ is

(a) (0, 9) (b) (0, 3)
(c) (1, 3) (d) (3, 5)

(x) What is the slope of a line whose inclination is $60°$.

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

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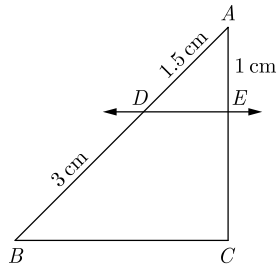
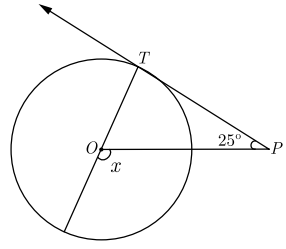
(xi) In the given figure, $DE \parallel BC$. The value of EC is



(a) 1.5 cm (b) 3 cm
(c) 2 cm (d) 1 cm

(xii) In the given figure PT is a tangent at T to the circle with centre O. if $\angle TPO = 25^\circ$, then the value of x is

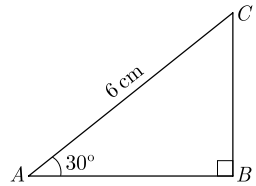
(a) 25^o (b) 65^o
(c) 115^o (d) 90^o



(xiii) If the radius of the sphere is increased by 100%, the volume of the corresponding sphere is increased by

(a) 200% (b) 500%
(c) 700% (d) 800%

(xiv) In the adjoining figure, the length of BC is



(a) $2\sqrt{3}$ cm (b) $3\sqrt{3}$ cm
(c) $4\sqrt{3}$ cm (d) 3 cm

(xv) From an external point Q, the length of tangent to a circle is 12 cm and the distance of Q from the centre of circle is 13 cm. The radius of circle (in cm) is

(a) 10 (b) 5
(c) 12 (d) 7

QUESTION 2.

(i) DK Jain runs a company that makes ball bearings. The bearings are shipped in boxes that are then loaded onto trucks. Each bearing has a diameter of 18 mm. [4]

(a) Each box can hold $3888\pi\ \text{cm}^3$ of ball bearings. How many ball bearings can a box hold?

(b) Each ball bearing has a mass of 4 gm. Determine the mass of each box.

(c) The maximum mass a truck can carry is 11000 kg. What is the maximum number of boxes that can be loaded into a truck?

(ii) Ritesh opened a R.D. account in a Bank for 20 months. If the rate of interest is 9% per annum and he received ₹882 as interest at the end of maturity, find the monthly installment. [4]

(iii) Prove that [4]

$(1 + \tan A - \sec A) \times (1 + \tan A + \sec A) = 2\tan A$

QUESTION 3.

(i) A company with 500 shares of nominal value ₹ 120 declares and annual dividend of 15%. Calculate. [4]

(a) the total amount of dividend paid by the company.

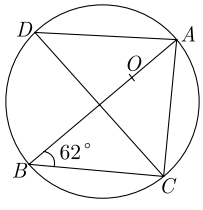
(b) annual income of Mr. Sharma who holds 80 shares of the company.

If the return percent of Mr. Sharma from his shares is 10%, find the market value of each share.

(ii) In the given figure A, B, C and D are points on the circle with centre O. Given $\angle ABC = 62^\circ$. Find : [4]

(a) $\angle ADC$

(b) $\angle BAC$



(iii) Use graph paper to answer this question. During a medical checkup of 60 students in a school, weights were recorded as [5]

Weight (in kg)	**Number of students**
28−30	2
30−32	4
32−34	10
34−36	13
36−38	15
38−40	9
40−42	5
42−44	2

Taking 2 cm − 2 kg along axis and 2 cm = 10 students along the other axis draw an ogive. your graph to find the :

(a) median
(b) upper Quartile.
(c) number of students whose weight is above 37 kg.

SECTION - B

(Attempt any four questions.)

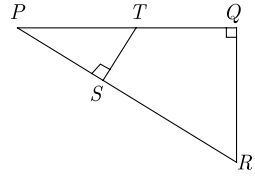
QUESTION 4.

(i) If $A=\begin{bmatrix}1 & 3\\ 2 & 4\end{bmatrix}$, $B=\begin{bmatrix}1 & 2\\ 2 & 4\end{bmatrix}$, $C=\begin{bmatrix}4 & 1\\ 1 & 5\end{bmatrix}$ and $I=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ [3]

Find $A(B+C)-14I$.

(ii) Using ruler and compass construct a triangle ABC in which $AB=6\,\text{cm}$, $\angle BAC=120^\circ$ and $AC=5\,\text{cm}$. Construct a circle passing through A, B, and C. Measure and write down the radius of the circle. [3]

(iii) In the given figure, $\angle PQR = \angle PST = 90^\circ$, $PQ = 5\,\text{cm}$ and $PS = 2\,\text{cm}$. [4]



(a) Prove that $\Delta PQR \sim \Delta PST$.
(b) Find Area of ΔPQR: Area of quadrilateral $SRQT$.

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QUESTION 5.

(i) Find the mean of the following distribution : [3]

Class	10-25	25-40	40-55	55-70	70-85	85-100
Frequency	2	3	7	6	6	6

(ii) Mrs. Arora bought the following articles from a departmental store: [3]

S. No.	Item	Price	Rate of GST	Discount
(a)	Hair oil	₹1200	18%	₹100
(b)	Cashew nuts	₹600	12%	-

Find the:

(a) Total GST paid.

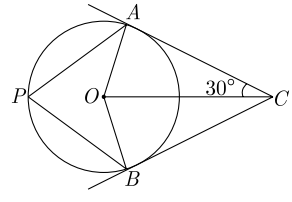
(b) Total bill amount including GST.

(iii) In the given figure, O is the centre of the circle. Tangents at A and B meet at C. If $\angle ACO = 30^\circ$, find [4]

(a) $\angle BCO$.

(b) $\angle AOB$.

(c) $\angle APB$.



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 sum of four consecutive numbers in an AP is 32 and the ratio of the product of the first and the last term to the product of two middle terms is 7:15. Find the numbers. [3]

(iii) Marks obtained by 100 students in an examination are given below : [4]

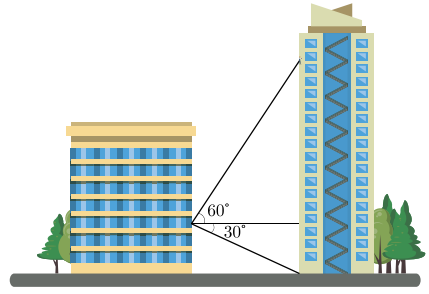
Marks	0-10	10-20	20-30	30-40	40-50	50-60
Number of Students	5	15	20	28	20	12

Draw a histogram for the given data using a graph paper and find the mode.

QUESTION 7.

(i) ABC is a triangle whose vertices are $A(1, -1)$, $B(0, 4)$ and $C(-6, 4)$. [5]
D is the mid point of BC. Find the:
(a) coordinates of D.
(b) equation of the median AD.

(ii) From his hotel room window on the fourth floor, Ranjan notices some window washers high above him on the hotel across the street. [5]

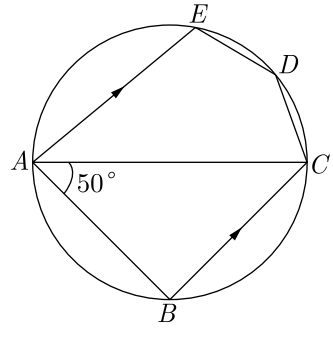


Curious as to their height above ground, he quickly estimates the buildings are 60 m apart, the angle of elevation to the workers is about 60°, and the angle of depression to the base of the hotel is about 30°.
(a) How high above ground is the window of Ranjan's hotel room?
(b) How high above ground are the workers?

QUESTION 8.

(i) Solve the following inequation. Write down the solution set and represent it on the real number line. [3]
$-5(x-9) \geq 17 - 9x > x + 2,\ x \in R$

(ii) In the given figure, $ABCDE$ is a pentagon inscribed in a circle such that AC is a diameter and side $BC \,||\, AE$. If $\angle BAC = 50^\circ$, then find giving reasons [3]



(a) $\angle ACB$ (b) $\angle EDC$ (c) $\angle BEC$

Hence prove that BE is also a diameter.

(iii) If the point $C\,(-1,\,2)$ divides internally the line segment joining $A\,(2,\,5)$ and B in ratio 3 : 4, find the coordinates of B. [4]

QUESTION 9.

(i) If $a : b = 5 : 3$, then find $(5a + 8b) : (6a - 7b)$. [3]

(ii) Sum of the areas of two squares is 468 m^2. If the difference of their perimeter is 24 m, find the sides of the squares. [3]

(iii) Using a ruler and compass only. [4]

(a) Construct a ΔABC with the following data, $AB = 3.5$ cm, $BC = 6$ cm and $\angle ABC = 120^\circ$.

(b) In the same diagram, draw a circle with BC as diameter. Find a point P on the circumference of the circle that is equidistant from AB and BC.

(c) Measure $\angle BCP$.

QUESTION 10.

(i) Find the remainder, when $2x^3 - 3x^2 + 7x - 8$ is divided by $x - 1$. [3]

(ii) In a sample of 50 people, 21 had type O blood, 22 had type A blood, 5 had type B blood, and 2 had type AB blood. Set up a frequency distribution and find the following probabilities. [3]

(a) What is the probability that a person has type O blood ?

(b) What is the probability that a person has type A or type B blood ?

(c) What is the probability that a person has neither type A nor type O blood ?

(d) What is the probability that a person does not have type AB blood ?

(iii) Use graph paper for this question. A point P under reflection in y-axis is mapped onto $P'\,(4, 3)$. [4]

(a) Find the coordinates of P.

(b) Find the coordinates of the image of P under reflection in the line $x = -1$.

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