Sample Paper 10

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)   Amount of dividend on 1200 shares of ₹50 each of at the rate of 12% is :
    (a)   ₹6001   (b) ₹6000
    (c)   ₹6050   (d) ₹7200

(ii)   Manish deposited ₹1500 per month in a recurring deposit account for 2 years. What is the amount payable to him on maturity if the rate of interest is 8% per annum.
    (a)   ₹3,900   (b) ₹4,200
    (c)   ₹4,500   (d) ₹5,000

(iii)   If $-3x + 17 < -13$, then
    (a) $x > 10$ (b) $x < 10$
    (c) $x \leq 10$ (d) $x \geq 10$

(iv)   The value of k, for which the roots of $x^2 + kx - 1 = 0$ are real and unequal is:
    (a)   0   (b) -1
    (c)   2   (d) Any number

(v)   If $x^2 + 4y^2 = 4xy$, then $x : y$ is:
    (a)   1 : 4   (b) 4 : 1
    (c)   2 : 1   (d) 1 : 2

(vi)   If $(x-3)$ is a factor of $x^2 + x - a$, then the value of a is_____.
    (a) -12 (b) 12
    (c)   6   (d) -6

(vii)   If $A = \begin{bmatrix} -1 & 1 \\ a & b \end{bmatrix}$ and $A^2 = I_2$, then the values of a and b are :
    (a) $a = 1,\ b = 0$ (b) $a = b = 1$
    (c) $a = 0,\ b = 1$ (d) $a = b = 0$

(viii)   What is the common difference of an AP in which $a_{18} - a_{14} = 32$?

    (a)   8   (b) -8
    (c) -4 (d) 4

(ix)   If the centre of a circle is $(3, 5)$ and end points of a diameter are $(4, 7)$ and $(2, y)$, then the value of y is
    (a)   3   (b) -3
    (c)   7   (d) 4

(x)   A straight line passes through the points $P(2, -5)$ and $Q(4, 3)$. What is the slope of the line PQ ?
    (a)   2   (b)   3
    (c)   4   (d) -3

(xi)   It is given that $\Delta ABC \sim \Delta PQR$ with $\dfrac{BC}{QR} = \dfrac{1}{4}$. Then $\dfrac{\text{ar}(\Delta PRQ)}{\text{ar}(\Delta BCA)}$ is equal to
    (a)   16   (b) 3
    (c) $\frac{1}{4}$ (d) $\frac{1}{16}$

(xii)   In the adjoining figure, PT is a tangent at point C of the circle. O is the circumference of ΔABC. If $\angle ACP = 118°$, then the measure of $\angle x$ is
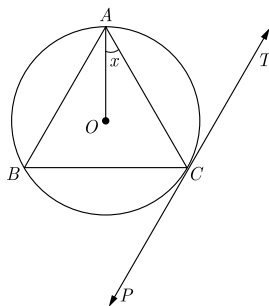
   (a)   28°   (b) 32°
    (c)   42°   (d) 38°

(xiii) A right circular cylinder of radius r and height h (where, $h > 2r$) just encloses a sphere
   of diameter

   (a) r (b) $2r$
   (c) h (d) $2h$

(xiv) If $\sin \alpha = \frac{1}{2}$ and $\cos \beta = \frac{1}{2}$, then the value of $(\alpha + \beta)$ is

   (a) $0°$ (b) $30°$
   (c) $60°$ (d) $90°$

(xv) Two circles of radii 20 cm and 37 cm intersect in A and B. If O_1 and O_2 are their centres
   and $AB = 24$ cm, then the distance $O_1 O_2$ is equal to

   (a)   44 cm   (b) 51 cm
   (c)   40.5 cm   (d) 45 cm

QUESTION 2.

(i)   A hemispherical and a conical hole is scooped out of a solid wooden cylinder. Find the
   volume of the remaining solid where the measurements are as follows   [4]
   The height of the solid cylinder is 7 cm, radius of each of hemisphere, cone and cylinder is
   3 cm. Height of cone is 3 cm. Give your answer correct to the nearest whole number. [Take
 $\pi = \frac{22}{7}$].
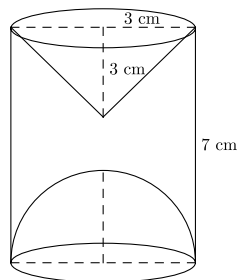
(ii)   Mohan has a recurring deposit account in a bank for 2 years at 6% per annum simple
   interest. If the gets ₹1200 as interest at the time of maturity, then find   [4]
   (a)   the monthly installment.
   (b)   the amount of maturity.

(iii) Prove that $\dfrac{\cos A}{1 + \sin A} + \tan A = \sec A$.   [4]

QUESTION 3.

(i)   Ashok invested ₹26400 on 12%, ₹25 shares of a company. If he receives a dividend of ₹2475,
   then find the   [4]
   (a) number of shares he bought.
   (b) market value of each share.

(ii) In the given figure, AB and CD are two parallel chords and O is the centre. If the radius of the circle is 15 cm, find the distance MN between the two chords of length 24 cm and 18 cm, respectively. [4]
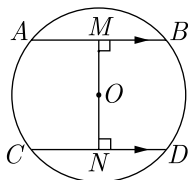
(iii) The table shows the distribution of the scores obtained by 160 shooters in a shooting competition. Use a graph and draw an ogive for the distribution. [5]
(Take 2 cm = 10 scores on the x-axis and 2 cm = 20 shooters on the y-axis).

Scores	Number of Shooters
0-10	9
10-20	13
20-30	20
30-40	26
40-50	30
50-60	22
60-70	15
70-80	10
80-90	8
90-100	7

Use your graph to estimate the following
  (a) The median
  (b) The interquartile range
  (c) The number of shooters who obtained a score of more than 85 %.

SECTION - B

(Attempt any four questions.)

QUESTION 4.

(i) If $A = \begin{bmatrix} 1 & 3 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 1 \\ -3 & 2 \end{bmatrix}$ and $A^2 - 5B^2 = 5C$. Find matrix C is a by 2 matrix. [3]

(ii) Using ruler and compass only, construct a $\triangle ABC$ such that $BC = 5$ cm and $AB = 6.5$ cm
      and $\angle ABC = 120°$ [3]
      (a) Construct a circumcircle of $\triangle ABC$.
      (b) Construct a cyclic quadrilateral $ABCD$, such that D is equidistant from AB and
           BC.

(iii) In the given figure, $\triangle ABC$ and $\triangle AMP$ are right angled at B and M respectively. Given,
      $AC = 10$ cm, $AP = 15$ cm and $PM = 12$ cm.   [4]
      (a) Prove that $\triangle ABC \sim \triangle AMP$.
      (b) Find AB and BC.
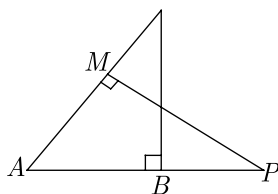
QUESTION 5.

(i) If the median for the following frequency distribution is 28.5, find the value of x and y
     :   [3]

| Class	Frequency
0-10	5
10-20	x
20-30	20
30-40	15
40-50	y
50-60	5
Total	60

(ii) Rishika has arranged a party on her birthday in an orphanage. She bought three different
      types of ice creams- Vanilla, Butterscotch and Strawberry as given below :   [3]

S.No.	Ice-cream	Price (Per Litre)	Quantity	Discount
(a)	Vanilla	₹100	10 Litre	5%
(b)	Butterscotch	₹150	10 Litre	20%
(c)	Strawberry	₹150	10 Litre	20%

The GST Rate is 18%. Find the:
(a) Total GST paid.
(b) Total bill amount including GST.

(iii)   In the following figure, $AB = 7$ cm and $BC = 9$.   [4]
    (a)   Prove that $\triangle ACD \sim \triangle DCB$.
    (b)   Find the length of CD.
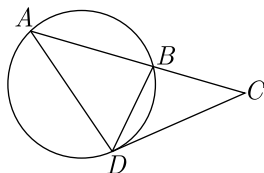
QUESTION 6.

(i)   Three numbers are in A.P. and their sum is 15. If 1, 4 and 19 are added to these numbers respectively, the resulting numbers are in G.P. Find the numbers.   [3]

(ii)   A man repays a loan of Rs. 3250 by paying Rs. 20 in the first month and then increases the payment by Rs. 15 every month. How long will it take him to clear the loan?   [3]

(iii)   Following frequency distribution shows the expenditure on milk of 60 households in a locality :   [4]

Daily milk expenditure (Rs.)	Number of households
0-30	10
30-60	12
60-90	18
90-120	12
120-150	8

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

QUESTION 7.

(i)   The slope of a line joining $P(6,k)$ and $Q(1 - 3k,3)$ is $\frac{1}{2}$. Find   [5]
    (a) k.
    (b)   mid-point of PQ, using the value of k found in (i).

(ii)   The Washington Monument is a large, tall, white obelisk near the west part of the National Mall in Washington, D.C. It was built to remember George Washington, who was the first President of the United States. It is the tallest stone structure in the world.   [5]

From a point A on a line from the base of the Washington Monument, the angle of elevation to the top of the monument is $45°$. From a point 125 m away from A and on the same line, the angle to the top is $30°$. Find the height of the Washington Monument.
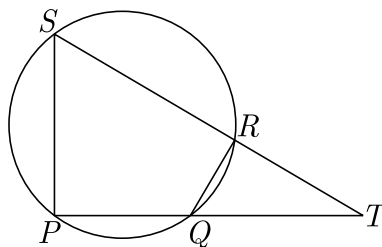
QUESTION 8.

(i)   Solve the following inequation, write the solution set and represent it on the number line.
$-3(x-7) \geq 15 - 7x > \frac{x+1}{3}$, $x \in R$ [3]

(ii) In the given figure, $PQRS$ is a cyclic quadrilateral, PQ and SR produced meet at T. [3]
      (a)   Prove $\Delta\, TPS \sim \Delta\, TRQ$.
      (b)   Find SP, if $TP = 18$ cm, $RQ = 4$ cm and $TR = 6$ cm.
      (c)   Find area of quadrilateral $PQRS$, if area of $\Delta\, PTS = 27$ cm².

(iii)   If the line segment joining the points $A(2,1)$ and $B(5,-8)$ is trisected at the points P and Q, find the coordinates P. [4]

QUESTION 9.

(i)   If b is the mean proportion between a and c, show that : [3]
$$\frac{a^4 + a^2 b^2 + b^4}{b^4 + b^2 c^2 + c^4} = \frac{a^2}{c^2}$$

(ii)   The sum of ages (in years) of a son and his father is 35 years and product of their ages is 150 years, find their ages. [3]

(iii)   Construct an isosceles $\triangle ABC$, such that $AB = 6$ cm, $BC = AC = 4$ cm. Bisect $\angle C$ inernally and mark a point P on this bisector, such that $CP = 5$ cm. Find the points Q and R, which are 5 cm from P and 5 cm from the line AB. [4]

QUESTION 10.

(i)   Let R_1 and R_2 are remainders when the polynomials $x^3 + 2x^2 - 5ax - 7$ and $x^3 + ax^2 - 12x + 6$ are divided by $x + 1$ and $x - 2$ respectively. If $2R_1 + R_2 = 6$, find the value of a. [3]

(ii)   Each of the letters of the word 'AUTHORIZES' is written on identical circular disc and put in a bag. They are well shuffled. If a disc is drawn at random from the bag, what is the probability that the letter is [3]
(a)   a vowel?
(b)   one of the first 9 letters of the English alphabet which appears in the given word?
(c)   one of the last 9 letters of the English alphabet which appears in the given word?

(iii)   Use graph paper for this question. Points (3, 0) and (−1, 0) are invariant points under reflection in the line L_1; points $(0, -3)$ and (0, 1) are invariant points on reflection in line L_2. [4]
(a)   Find the lines L_1 and L_2.
(b)   Write down the images of points $P(3, 4)$ and $Q(-5, -2)$ on reflection in L_1. Name the images as P' and Q' respectively.
(c)   Write down the images of P and Q on reflection in L_2. Name the images as P'' and Q'' respectively.
(d)   State or describe a single transformation that maps P' onto P''.

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