

**Sample Paper 7**  
**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.
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**SECTION - A**

(Attempt all questions from this Section.)

**QUESTION 1.**

Choose the correct answers to the questions from the given options.

[15]

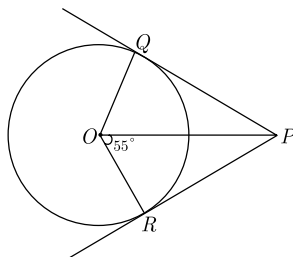
(Do not copy the questions, write the correct answer only.)

- (i) The manufacturing cost of an item is ₹800. The manufacturer marked up the price of his items by 60% and then sell them at a discount of 10%. If a consumer buy 10 such items, then the GST paid by him on the purchased is:
- |          |            |
|----------|------------|
| (a) ₹348 | (b) ₹1,169 |
| (c) ₹576 | (d) ₹1,425 |
- (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  $-2 \leq \frac{1}{2} - \frac{2x}{3}$ ,  $x \in R$ , then the largest value of  $x$  is:
- |                    |                   |
|--------------------|-------------------|
| (a) $\frac{15}{4}$ | (b) 4             |
| (c) 3              | (d) None of these |

- (iv) Which of the following is a root of the equation  $x^2 - 7x + 12 = 0$  ?  
(a) 5 (b) -1  
(c) 3 (d) -4
- (v) If  $x : y = 3 : 2$ , then  $(3x^2 + 2y^2) : (3x^2 - 2y^2)$  is:  
(a) 17 : 13 (b) 45 : 23  
(c) 27 : 8 (d) 35 : 19
- (vi) What is the remainder on dividing  $3x^2 - 5x + 11$  by  $2x + 5$  ?  
(a)  $\frac{39}{4}$  (b)  $\frac{169}{4}$   
(c)  $\frac{69}{4}$  (d)  $\frac{139}{4}$
- (vii) If  $A = \begin{bmatrix} 2 & 3 \\ 4 & 2 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  then the matrix  $BA$  is :  
(a)  $\begin{bmatrix} 16 & 10 \\ 10 & 16 \end{bmatrix}$  (b)  $\begin{bmatrix} 11 & 10 \\ 16 & 16 \end{bmatrix}$   
(c)  $\begin{bmatrix} 7 & 22 \\ 17 & 10 \end{bmatrix}$  (d)  $\begin{bmatrix} 10 & 7 \\ 22 & 17 \end{bmatrix}$
- (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) The mid-point of the line-segment  $AB$  is  $P(0, 4)$ , if the coordinates of  $B$  are  $(-2, 3)$  then the co-ordinates of  $A$  are  
(a)  $(2, 5)$  (b)  $(-2, -5)$   
(c)  $(2, 9)$  (d)  $(-2, 11)$
- (x) Which of the following is the slope of a line perpendicular to  $AB$  if  $A(-1, 6)$  and  $B(3, -2)$   
(a)  $\frac{1}{2}$  (b)  $-\frac{5}{3}$   
(c)  $\frac{1}{10}$  (d)  $\frac{3}{2}$
- (xi) It is given that,  $\Delta ABC \sim \Delta EDF$  such that  $AB = 5$  cm,  $AC = 7$  cm,  $DF = 15$  cm and  $DE = 12$  cm then the sum of the remaining sides of the triangles is  
(a) 23.05 cm (b) 16.8 cm  
(c) 6.25 cm (d) 24 cm

- (xii) In the given figure PQ and PR are tangents from P to a circle with centre O. If  $\angle POR = 55^\circ$ , then  $\angle QPR$  is

- (a)  $35^\circ$  (b)  $55^\circ$   
(c)  $70^\circ$  (d)  $80^\circ$



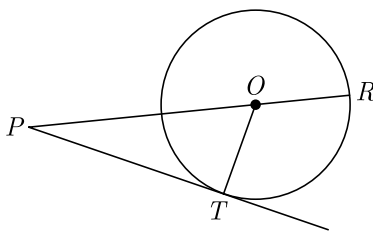
- (xiii) Ratio of volumes of two cylinders with equal height is

- (a)  $H : h$  (b)  $R : r$   
(c)  $R^2 : r^2$  (d) None of these

- (xiv) If  $\sin \theta = \frac{a}{b}$ , then  $\cos \theta$  is equal to

- (a)  $\frac{b}{\sqrt{b^2 - a^2}}$  (b)  $\frac{b}{a}$   
(c)  $\frac{\sqrt{b^2 - a^2}}{b}$  (d)  $\frac{a}{\sqrt{b^2 - a^2}}$

- (xv) In figure, on a circle of radius 7 cm, tangent PT is drawn from a point P such that  $PT = 24$  cm. If O is the centre of the circle, then the length of PR is



- (a) 30 cm (b) 28 cm  
(c) 32 cm (d) 25 cm

## QUESTION 2.

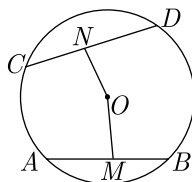
- (i) A solid is in the shape of a cone mounted on a hemisphere of same base radius. If the curved surface areas of the hemispherical part and the conical part are equal, then find the ratio of the radius and the height of the conical part. [4]

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- (ii) Priyanka has a recurring deposit account of ₹1000 per month at 10% per annum. If she gets ₹5550 as interest at the time of maturity, find the total time for which the account was held. [4]
- (iii) Prove that  $\sqrt{\sec^2 \theta + \operatorname{cosec}^2 \theta} = \tan \theta + \cot \theta$ . [4]

### QUESTION 3.

- (i) Mr. Sharma receives an annual income of ₹900 in buying 50 shares selling at ₹80. If the dividend declared is 20%, find the : [4]
- amount invested by Mr. Sharma.
  - percentage return on his investment.
- (ii) In the given figure,  $O$  is the centre of the circle,  $AB$  and  $CD$  are two chords of the circle.  $OM$  is perpendicular to  $AB$  and  $ON$  is perpendicular to  $CD$ . If  $AB = 24$  cm,  $OM = 5$  cm,  $ON = 12$  cm, find the [4]
- radius of the circle.
  - length of chord  $CD$ .



- (iii) The following tables shows the distribution of the heights of a group of factory workers. [5]

Height (in cm)	Number of workers
150-155	6
155-160	12
160-165	18
165-170	20
170-175	13
175-180	8
180-185	6

- Determine the cumulative frequencies.
- Draw the cumulative frequency curve on a graph paper.  
Use 2 cm = 5 cm height on one axis and 2 cm = 10 workers on the other.
- From your graph, write down the median height in cm.

**QUESTION 4.**

- (i) Find the values of  $x$  and  $y$ , if [3]

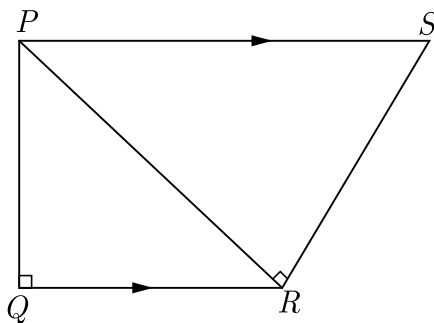
$$2 \begin{bmatrix} x & 7 \\ 9 & y-5 \end{bmatrix} + \begin{bmatrix} 6 & -7 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 10 & 7 \\ 22 & 15 \end{bmatrix}.$$

- (ii) Using a ruler and a pair of compass only, construct [3]

- (a) a  $\triangle ABC$ , given  $AB = 4$  cm,  $BC = 6$  cm and  $\angle ABC = 90^\circ$ .  
 (b) a circle that passes through the point  $A$ ,  $B$  and  $C$  and mark its centre as  $O$ .

- (iii) In the quadrilateral  $PQRS$ , [4]  
 $PS \parallel QR$ ,  $PQ \perp QR$  and  $PR \perp RS$ .

- (a)  $\triangle PQR \sim \triangle SRP$   
 (b) If  $PQ = 12$  cm,  $QR = 9$  cm, find  $PS$  and  $RS$ .  
 (c) Find area of  $\triangle PQR$  : area of  $\triangle SRP$ .

**QUESTION 5.**

- (i) The table below shows the daily expenditure on food of 25 households in a locality. Find the mean daily expenditure on food. [3]

Daily expenditure (in ₹)	100-150	150-200	200-250	250-300	300-350
Number of households	4	5	12	2	2

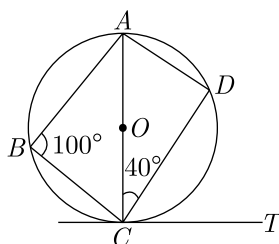
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- (ii) Sulekha bought the following Grocery Items from M/s Shri Ram Trading Company : [3]

S. No.	Item	Price	Quantity	Rate of GST	Discount
(a)	Sugar	₹40 Per Kg.	5 Kg.	5%	-
(b)	Tea	₹240 Per Kg.	1 Kg.	5%	-
(c)	Ghee	₹750 Per Pack	2 Pack	12%	10%
(d)	Toothpaste	₹50 Per Pack	2 Pack	18%	-

Find the:

- (a) Total GST paid.  
 (b) Total bill amount including GST.
- (iii) In the given circle with centre  $O$ ,  $\angle ABC = 100^\circ$ ,  $\angle ACD = 40^\circ$  and  $CT$  is a tangent to the circle at  $C$ . Find  $\angle ADC$  and  $\angle DCT$  [4]



## QUESTION 6.

- (i) Draw a histogram from the following frequency distribution and find the mode from the graph. [3]

Class	0-5	5-10	10-15	15-20	20-25	25-30
Frequency	2	5	18	14	8	5

- (ii) The fourth term of a G.P. is the square of its second term and the first term is  $-3$ . Determine its seventh term. [3]
- (iii) A sum of Rs. 280 is to be used towards four prizes. If each prize after the first is Rs. 20 less than its preceding prize, find the value of each of the prizes. [4]

## SECTION - B

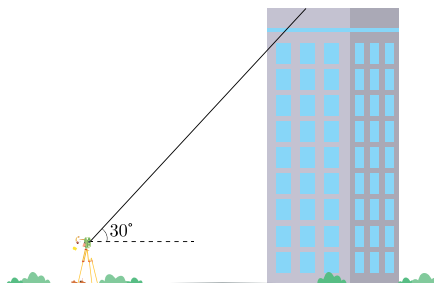
(Attempt any four questions.)

## QUESTION 7.

- (i)  $A(-1, 3)$ ,  $B(4, 2)$  and  $C(3, -2)$  are the vertices of a triangle. [5]  
 (a) Find the coordinates of the centroid  $G$  of the triangle.  
 (b) Find the equation of the line through  $G$  and parallel to  $AC$ .

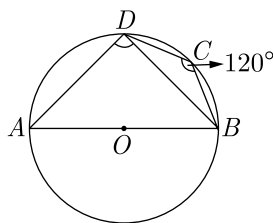
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- (ii) Height of a Building : A surveyor determines that the angle of elevation from a transit to the top of a building is  $30^\circ$ . The transit is positioned 2 meter above ground level and 30 meter from the building. Find the height of the building. [5]



### QUESTION 8.

- (i) Find the set of values of  $x$  satisfying  $3x - 5 \leq 7x + 3$  and  $5 - x \geq \frac{x}{4} - \frac{5}{4}$  Where  $x \in N$ . Also the graph the solution set on the number line. [3]
- (ii) In the given figure,  $AB$  is the diameter of a circle with centre  $O$ .  $\angle BCD$  is  $120^\circ$ . Find [3]
- $\angle BAD$ .
  - $\angle DBA$ .



- (iii) Calculate the coordinates of the point  $P$  which divides the line segment joining  $A (-3,3)$  and  $(2,-7)$  internally in the ratio  $2 : 3$ . [4]

### QUESTION 9.

- (i) If  $b$  is the mean proportional between  $a$  and  $c$ , prove that [3]

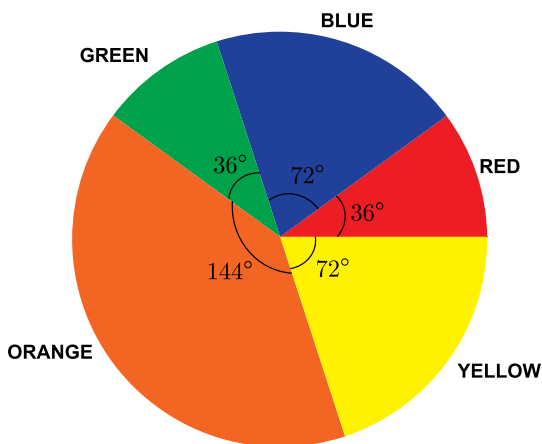
$$\frac{a^2 - b^2 + c^2}{a^{-2} - b^{-2} + c^{-2}} = b^4$$

- (ii) A train covers a distance of 360 km at a uniform speed. Had the speed been 5 km/h more, it would have taken 48 min less for the journey. Find the original speed of the train. [3]

- (iii) Construct a  $\triangle BCP$ , given  $BC = 5$  cm,  $BP = 4$  cm and  $\angle CBP = 45^\circ$ . [4]
- (a) Complete the rectangle  $ABCD$ , such that
- (a)  $P$  is equidistant from  $AB$  and  $BC$ .
- (b)  $P$  is equidistant from  $C$  and  $D$ .
- (b) Measure and record the length of  $AB$ .

### QUESTION 10.

- (i) The polynomials  $kx^3 + 3x^2 - 8$  and  $3x^3 - 5x + 8$  are divided by  $x + 2$ . If the remainder in each case is the same, find the value of  $k$ . [3]
- (ii) A survey was taken at a high school, and the results were put in a circle graph. The students were asked to list their favourite colours. The measurement of each central angle is shown. If a person is chosen at random from the school, find the probability of each response. [3]



- (a) What is the probability of favorite colour being red ?
- (b) What is the probability of favorite colour being blue or green ?
- (c) What is the probability of favorite colour not being red or blue?
- (d) What is the probability of favorite colour not being orange or green ?
- (e) What is the probability of favorite colour being red or blue?
- (iii) Use graph paper for this question. A point  $P$  is reflected to  $P'$  in the  $x$ -axis. The coordinates of its image are  $(4, -3)$ . Find : [4]
- (a) Coordinates of  $P$ .
- (b) coordinates of the image  $P''$  of  $P$  under reflection in the  $y$ -axis.
- (c) coordinates of the image  $Q'$  of the point  $Q(1, 2)$  in the line  $PP'$ .
- (d) coordinates of the image  $Q''$  of the point  $Q(1, 2)$  in the line  $PP''$ .