

# ICSE Class 10 Maths Question Paper 2020

## MATHEMATICS

*(Two hours and a half)*

*Answers to this Paper must be written on the paper provided separately.*

*You will **not** be allowed to write during the first 15 minutes.*

*This time is to be spent in reading the question paper.*

*The time given at the head of this Paper is the time allowed for writing the answers.*

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*Attempt **all** questions from **Section A** and **any four** questions from **Section B**.*

*All working, including rough work, must be clearly shown and must be done on the same sheet as the rest of the answer.*

*Omission of essential working will result in loss of marks.*

*The intended marks for questions or parts of questions are given in brackets [ ].*

*Mathematical tables are provided.*

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### SECTION A (40 Marks)

*Attempt **all** questions from this Section.*

#### Question 1

- (a) Solve the following Quadratic Equation: [3]

$$x^2 - 7x + 3 = 0$$

Give your answer correct to two decimal places.

- (b) Given  $A = \begin{bmatrix} x & 3 \\ y & 3 \end{bmatrix}$  [3]

If  $A^2 = 3I$ , where  $I$  is the identity matrix of order 2, find  $x$  and  $y$ .

- (c) Using ruler and compass construct a triangle ABC where  $AB = 3$  cm,  $BC = 4$  cm and  $\angle ABC = 90^\circ$ . Hence construct a circle circumscribing the triangle ABC. Measure and write down the radius of the circle. [4]

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**This paper consists of 7 printed pages and 1 blank page.**

### Question 2

(a) Use factor theorem to factorise  $6x^3 + 17x^2 + 4x - 12$  completely. [3]

(b) Solve the following inequation and represent the solution set on the number line. [3]

$$\frac{3x}{5} + 2 < x + 4 \leq \frac{x}{2} + 5, \quad x \in R$$

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

| Weekly Wages (in ₹) | No. of People |
|---------------------|---------------|
| 3000 – 4000         | 4             |
| 4000 – 5000         | 9             |
| 5000 – 6000         | 18            |
| 6000 – 7000         | 6             |
| 7000 – 8000         | 7             |
| 8000 – 9000         | 2             |
| 9000 – 10000        | 4             |

Estimate the mode from the graph.

### Question 3

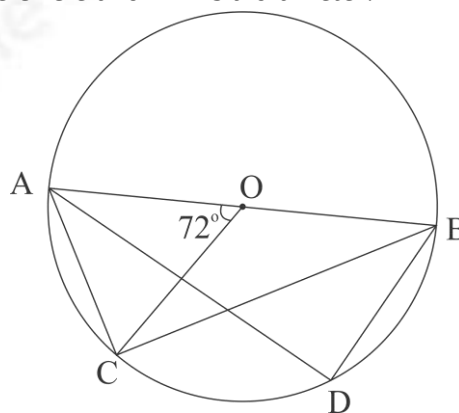
(a) In the figure given below, O is the centre of the circle and AB is a diameter. [3]

If  $AC = BD$  and  $\angle AOC = 72^\circ$ . Find:

(i)  $\angle ABC$

(ii)  $\angle BAD$

(iii)  $\angle ABD$



(b) Prove that: [3]

$$\frac{\sin A}{1 + \cot A} - \frac{\cos A}{1 + \tan A} = \sin A - \cos A$$

(c) In what ratio is the line joining  $P(5, 3)$  and  $Q(-5, 3)$  divided by the y-axis? Also find the coordinates of the point of intersection. [4]

#### Question 4

- (a) A solid spherical ball of radius 6 cm is melted and recast into 64 identical spherical marbles. Find the radius of each marble. [3]
- (b) Each of the letters of the word 'AUTHORIZES' is written on identical circular discs 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]
- (i) a vowel
  - (ii) one of the first 9 letters of the English alphabet which appears in the given word
  - (iii) one of the last 9 letters of the English alphabet which appears in the given word?
- (c) Mr. Bedi visits the market and buys the following articles: [4]
- Medicines costing ₹ 950, GST @ 5%
- A pair of shoes costing ₹ 3000, GST @ 18%
- A Laptop bag costing ₹ 1000 with a discount of 30%, GST @ 18%.
- (i) Calculate the total amount of GST paid.
  - (ii) The total bill amount including GST paid by Mr. Bedi.

#### SECTION B (40 Marks)

*Attempt any **four** questions from this Section*

#### Question 5

- (a) A company with 500 shares of nominal value ₹ 120 declares an annual dividend of 15%. Calculate: [3]
- (i) the total amount of dividend paid by the company.
  - (ii) 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.

- (b) The mean of the following data is 16. Calculate the value of  $f$ . [3]

|                 |   |    |     |    |    |
|-----------------|---|----|-----|----|----|
| Marks           | 5 | 10 | 15  | 20 | 25 |
| No. of Students | 3 | 7  | $f$ | 9  | 6  |

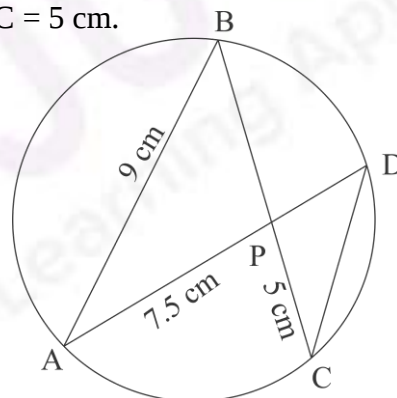
- (c) The 4<sup>th</sup>, 6<sup>th</sup> and the last term of a geometric progression are 10, 40 and 640 respectively. If the common ratio is positive, find the first term, common ratio and the number of terms of the series. [4]

### Question 6

- (a) If  $A = \begin{bmatrix} 3 & 0 \\ 5 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} -4 & 2 \\ 1 & 0 \end{bmatrix}$  [3]

Find  $A^2 - 2AB + B^2$

- (b) In the given figure  $AB = 9$  cm,  $PA = 7.5$  cm and  $PC = 5$  cm. [3]  
Chords AD and BC intersect at P.



- (i) Prove that  $\triangle PAB \sim \triangle PCD$   
(ii) Find the length of CD.  
(iii) Find area of  $\triangle PAB$  : area of  $\triangle PCD$
- (c) From the top of a cliff, the angle of depression of the top and bottom of a tower are observed to be  $45^\circ$  and  $60^\circ$  respectively. If the height of the tower is 20 m. [4]  
Find:  
(i) the height of the cliff  
(ii) the distance between the cliff and the tower.

### Question 7

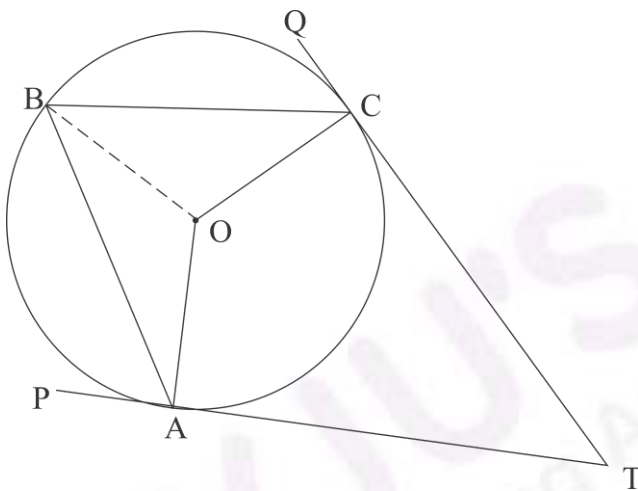
- (a) Find the value of ' $p$ ' if the lines,  $5x - 3y + 2 = 0$  and  $6x - py + 7 = 0$  are perpendicular to each other. Hence find the equation of a line passing through  $(-2, -1)$  and parallel to  $6x - py + 7 = 0$ . [3]

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

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

- (c) In the given figure TP and TQ are two tangents to the circle with centre O, touching at A and C respectively. If  $\angle BCQ = 55^\circ$  and  $\angle BAP = 60^\circ$ , find: [4]

- (i)  $\angle OBA$  and  $\angle OBC$   
 (ii)  $\angle AOC$   
 (iii)  $\angle ATC$



### Question 8

- (a) What must be added to the polynomial  $2x^3 - 3x^2 - 8x$ , so that it leaves a remainder 10 when divided by  $2x + 1$ ? [3]
- (b) Mr.Sonu has a recurring deposit account and deposits ₹ 750 per month for 2 years. If he gets ₹ 19125 at the time of maturity, find the rate of interest. [3]
- (c) Use graph paper for this question. [4]

Take 1 cm = 1 unit on both  $x$  and  $y$  axes.

- (i) Plot the following points on your graph sheets:

$A(-4, 0)$ ,  $B(-3, 2)$ ,  $C(0, 4)$ ,  $D(4, 1)$  and  $E(7, 3)$

- (ii) Reflect the points B, C, D and E on the  $x$ -axis and name them as B', C', D' and E' respectively.

- (iii) Join the points A, B, C, D, E, E', D', C', B' and A in order.

- (iv) Name the closed figure formed.

**Question 9**

- (a) 40 students enter for a game of shot-put competition. The distance thrown (in metres) is recorded below: [6]

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

- (i) the median
  - (ii) Upper Quartile
  - (iii) Number of students who cover a distance which is above  $16\frac{1}{2}$  m.
- (b) If  $x = \frac{\sqrt{2a+1} + \sqrt{2a-1}}{\sqrt{2a+1} - \sqrt{2a-1}}$ , prove that  $x^2 - 4ax + 1 = 0$  [4]

**Question 10**

- (a) If the 6<sup>th</sup> term of an A.P. is equal to four times its first term and the sum of first six terms is 75, find the first term and the common difference. [3]
- (b) The difference of two natural numbers is 7 and their product is 450. [3]  
Find the numbers.
- (c) Use ruler and compass for this question. Construct a circle of radius 4.5 cm. [4]  
Draw a chord. AB = 6 cm.
- (i) Find the locus of points equidistant from A and B.  
Mark the point where it meets the circle as D.
  - (ii) Join AD and find the locus of points which are equidistant from AD and AB.  
Mark the point where it meets the circle as C.
  - (iii) Join BC and CD. Measure and write down the length of side CD of the quadrilateral ABCD.

### Question 11

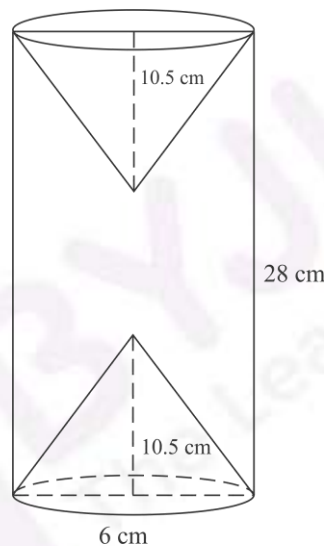
(a) A model of a high rise building is made to a scale of 1 : 50. [3]

(i) If the height of the model is 0.8 m, find the height of the actual building.

(ii) If the floor area of a flat in the building is  $20 \text{ m}^2$ , find the floor area of that in the model.

(b) From a solid wooden cylinder of height 28 cm and diameter 6 cm, two conical cavities are hollowed out. The diameters of the cones are also of 6 cm and height 10.5 cm. [3]

Taking  $\pi = \frac{22}{7}$  find the volume of the remaining solid.



(c) Prove the identity [4]

$$\left( \frac{1 - \tan \theta}{1 - \cot \theta} \right)^2 = \tan^2 \theta$$