

**ICSE Board**  
**Class X Mathematics**  
**Board Question Paper 2016**  
**(Two and a half hours)**

*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) Using remainder theorem, find the value of  $k$  if on dividing  $2x^3 + 3x^2 - kx + 5$  by  $x - 2$ , leaves a remainder 7. [3]
- (b) Given  $A = \begin{bmatrix} 2 & 0 \\ -1 & 7 \end{bmatrix}$  and  $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  and  $A^2 = 9A + mI$ . Find  $m$ . [4]
- (c) The mean of following number is 68. Find the value of ' $x$ '  
45, 52, 60,  $x$ , 69, 70, 26, 81 and 94  
Hence estimate the median. [3]

**Question 2**

- (a) The slope of a line joining  $P(6, k)$  and  $Q(1 - 3k, 3)$  is  $\frac{1}{2}$ . Find
- (i)  $k$
- (ii) Midpoint of  $PQ$ , using the value of ' $k$ ' found in (i). [3]
- (b) Without using trigonometrical tables, evaluate:
- $$\operatorname{cosec}^2 57^\circ - \tan^2 33^\circ + \cos 44^\circ \operatorname{cosec} 46^\circ - \sqrt{2} \cos 45^\circ - \tan^2 60^\circ$$
- [4]

- (c) A certain number of metallic cones, each of radius 2 cm and height 3 cm are melted and recast into a solid sphere of radius 6 cm. Find the number of cones. [3]

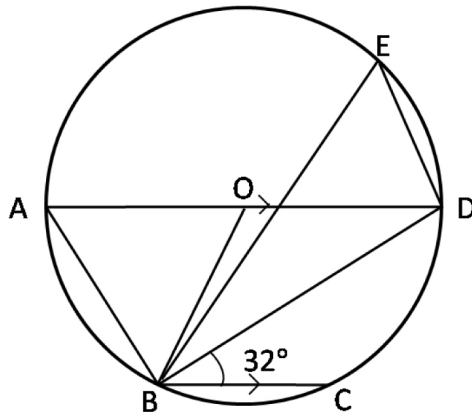
### Question 3

- (a) Solve the following inequation, write the solution set and represent it on the number line. [3]

$$-3(x-7) \geq 15 - 7x > \frac{x+1}{3}, x \in \mathbb{R}$$

- (b) In the figure given below, AD is a diameter. O is the centre of the circle. AD is parallel to BC and  $\angle CBD = 32^\circ$ . Find:

- (i)  $\angle OBD$  [4]  
 (ii)  $\angle AOB$   
 (iii)  $\angle BED$



- (c) If  $(3a + 2b) : (5a + 3b) = 18 : 29$ . Find  $a : b$ . [3]

### Question 4

- (a) A game of numbers has cards marked with 11, 12, 13, ... 40. A card is drawn at random. Find the Probability that the number on the card drawn is :

- (i) A perfect square  
 (ii) Divisible by 7 [3]

- (b) Use graph paper for this question. (Take 2 cm = 1 unit along both x and y axis.) Plot the points O (0, 0), A (-4, 4), B (-3, 0) and C (0,-3)

- (i) Reflect points A and B on the y axis and name them A' and B' respectively. Write down their coordinates.

- (ii) Name the figure OACB'A'.

- (iii) State the line of symmetry of this figure [4]

- (c) Mr. Lalit invested Rs. 5000 at a certain rate of interest, compounded annually for two years. At the end of first year it amounts to Rs. 5325. Calculate
- (i) The rate of interest
- (ii) The amount at the end of second year, to the nearest rupee. [3]

### SECTION B (40 Marks)

Attempt any **four** questions from this Section

#### Question 5

- (a) Solve the quadratic equation  $x^2 - 3(x + 3) = 0$ ; Give your answer correct two significant figures. [3]
- (b) A page from the savings bank account of Mrs. Ravi is given below.

Date	Particulars	Withdrawal (Rs.)	Deposit (Rs.)	Balance (Rs.)
April 3rd 2006	B/F			6000
April 7 <sup>th</sup>	By cash		2300	8300
April 15 <sup>th</sup>	By cheque		3500	11800
May 20 <sup>th</sup>	To self	4200		7600
June 10 <sup>th</sup>	By cash		5800	13400
June 15 <sup>th</sup>	To self	3100		10300
August 13 <sup>th</sup>	By cheque		1000	11300
August 25 <sup>th</sup>	To self	7400		3900
September 6 <sup>th</sup> 2006	By cash		2000	5900

She closed the account on 30<sup>th</sup> September, 2006. Calculate the interest Mrs. Ravi earned at the end of 30<sup>th</sup> September, 2006 at 4.5% per annum interest. Hence, find the amount she receives on closing the account. [4]

- (c) In what time will Rs.1500 yield Rs.1996.50 as compound interest at 10% per annum compounded annually? [3]

#### Question 6

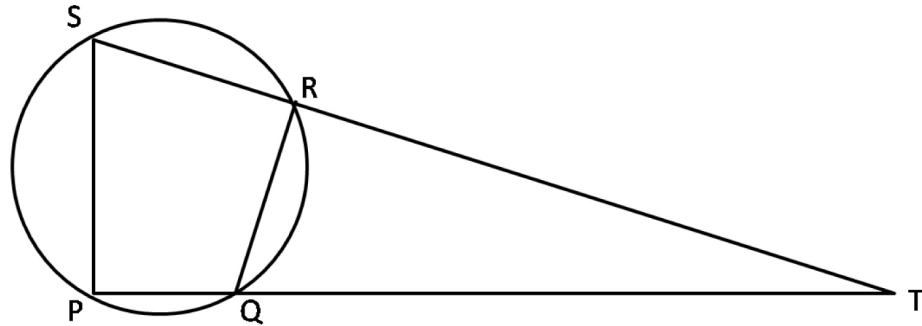
- (a) Construct a regular hexagon of side 5 cm. Hence construct all its lines of symmetry and name them. [3]

(b) In the given figure PQRS is a cyclic quadrilateral PQ and SR produced meet at T. [4]

(i) Prove  $\triangle TPS \sim \triangle TRQ$ .

(ii) Find SP if TP = 18 cm, RQ = 4 cm and TR = 6 cm.

(iii) Find area of quadrilateral PQRS if area of  $\triangle PTS = 27 \text{ cm}^2$ .



(c) Given matrix  $A = \begin{bmatrix} 4 \sin 30^\circ & \cos 0^\circ \\ \cos 0^\circ & 4 \sin 30^\circ \end{bmatrix}$  and  $B = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$

If  $AX = B$

(i) Write the order of matrix X.

(ii) Find the matrix 'X'.

[3]

### Question 7

(a) An aeroplane at an altitude of 1500 metres finds that two ships are sailing towards it in the same direction. The angles of depression as observed from the aeroplane are  $45^\circ$  and  $30^\circ$  respectively. Find the distance between the two ships. [4]

(b) The table shows the distribution of the scores obtained by 160 shooters in a shooting competition. Use a graph sheet and draw an ogive for the distribution. (Take 2 cm = 10 scores on the X-axis and 2 cm = 20 shooters on the Y-axis). [6]

Scores	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of shooters	9	13	20	26	30	22	15	10	8	7

Use your graph to estimate the following:

(i) The median.

(ii) The interquartile range.

(iii) The number of shooters who obtained a score of more than 85%.

### Question 8

(a) If  $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$  show that  $\frac{x^3}{a^3} + \frac{y^3}{b^3} + \frac{z^3}{c^3} = \frac{3xyz}{abc}$  [3]

(b) Draw a line AB = 5 cm. Mark a point C on AB such that AC = 3 cm. Using a ruler and a compass only, construct :

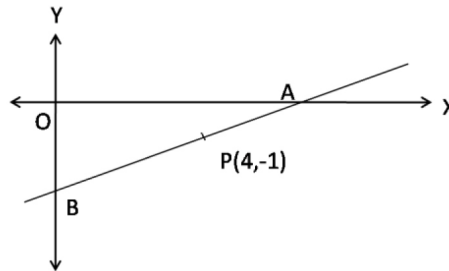
(i) A circle of radius 2.5 cm, passing through A and C.

(ii) Construct two tangents to the circle from the external point B. Measure and record the length of the tangents. [4]

(c) A line AB meets X – axis at A and Y –axis at B. P (4, -1) divides AB in the ratio 1:2. [3]

(i) Find the coordinates of A and B.

(ii) Find the equation of the line through P and perpendicular to AB.



### Question 9

(a) A dealer buys an article at a discount of 30% from the wholesaler, the marked price being Rs. 6000. The dealer sells it to a shopkeeper at a discount of 10% on the marked price. If the rate of VAT is 6%, find [3]

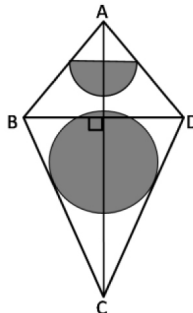
(i) The price paid by the shopkeeper including the tax.

(ii) The VAT paid by the dealer.

(b) The given figure represents a kite with a circular and a semicircular motifs stuck on it. The radius of a circle is 2.5 cm and the semicircle is 2 cm. If diagonals AC and BD are of lengths 12 cm and 8 cm respectively, find the area of the: [4]

(i) Shaded part. Give your answer correct to the nearest whole number.

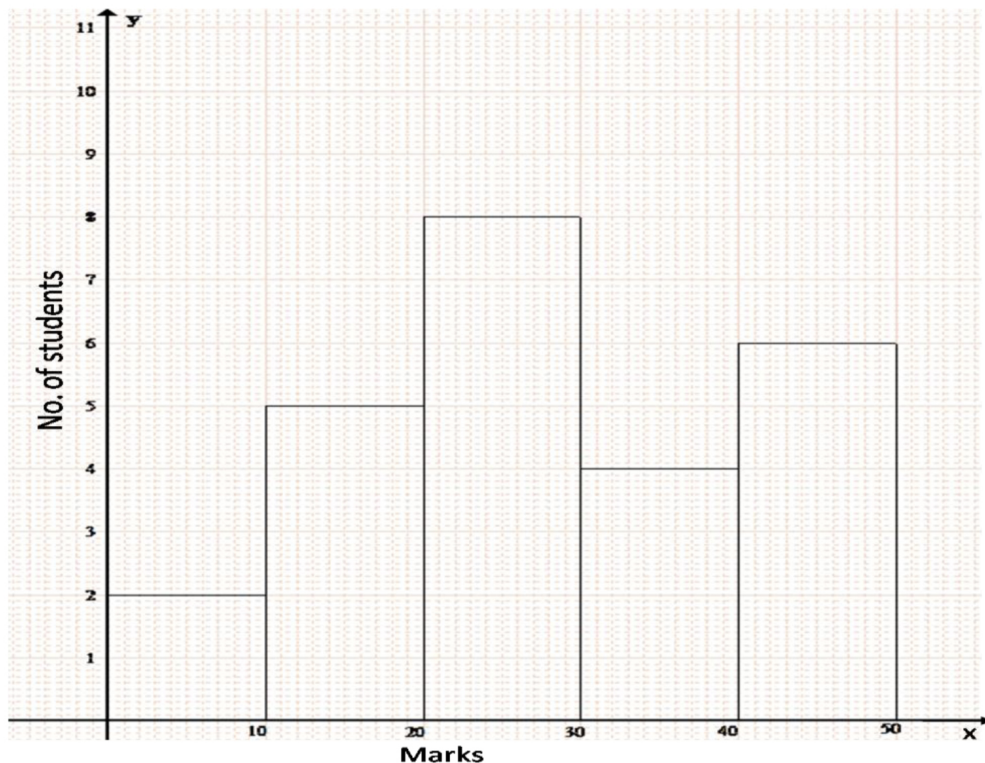
(ii) Unshaded part.



- (c) A model of a ship is made to a scale 1 : 300 [3]
- The length of the model of ship is 2 m. Calculate the lengths of the ship.
  - The area of the deck ship is  $180,000 \text{ m}^2$ . Calculate the area of the deck of the model.
  - The volume of the model is  $6.5 \text{ m}^3$ . Calculate the volume of the ship.

### Question 10

- (a) Mohan has a recurring deposit account in a bank for 2 years at 6% p.a. simple interest. If he gets Rs. 1200 as interest at the time of maturity, find: [3]
- the monthly installment
  - the amount of maturity
- (b) The histogram below represents the scores obtained by 25 students in a mathematics mental test. Use the data to : [4]
- Frame a frequency distribution table
  - To calculate mean
  - To determine the Modal class



- (c) A bus covers a distance of 240 km at a uniform speed. Due to heavy rain its speed gets reduced by 10 km/h and as such it takes two hrs longer to cover the total distance. Assuming the uniform speed to be 'x' km/h, form an equation and solve it to evaluate 'x'. [3]

### Question 11

(a) Prove that  $\frac{\cos A}{1+\sin A} + \tan A = \sec A$ . [3]

(b) Use ruler and compasses only for the following questions. All construction lines and arcs must be clearly shown. [4]

(i) Construct a  $\triangle ABC$  in which  $BC = 6.5$  cm,  $\angle ABC = 60^\circ$ ,  $AB = 5$  cm.

(ii) Construct the locus of points at a distance of 3.5 cm from A.

(iii) Construct the locus of points equidistant from AC and BC.

(iv) Mark 2 points X and Y which are a distance of 3.5 cm from A and also equidistant from AC and BC. Measure XY.

(c) Ashok invested Rs. 26,400 on 12%, Rs. 25 shares of a company. If he receives a dividend of Rs. 2,475. Find the : [3]

(i) number of shares he bought

(ii) Market value of each share