



BOYS' HIGH SCHOOL AND COLLEGE
PRELIMINARY EXAMINATION (2024-25)
CLASS – X
MATHEMATICS

TIME 3:00 Hours

MM: 80

NOTE

Section A is compulsory. Attempt any four questions from Section B.
This intended marks for the questions or parts of questions are given in brackets. []

Section 'A' **[40 Marks]**

Note : Attempt all questions from this section.

Q.1 Choose the correct answers to the questions from the given options. (15)

(i) The quadratic equation whose one rational root is $3 + \sqrt{2}$ is

- (a) $x^2 - 7x + 5 = 0$ (b) $x^2 + 7x + 6 = 0$ (c) $x^2 - 7x + 6 = 0$ (d) $x^2 - 6x + 7 = 0$

(ii) Sonal opened a recurring deposit account in a bank and deposited Rs. 800 per month for 18 months, then the total money deposited in his account is

- (a) Rs 11400 (b) Rs 14400 (c) Rs 13680 (d) Rs 13880

(iii) How much should a man invest in Rs 80 shares selling at Rs 80 to obtain an annual income of Rs 1280, if the dividend declared is 20% :

- (a) Rs 7000 (b) Rs 9600 (c) Rs 6400 (d) Rs 6000

(iv) $(\sec^2 \theta - 1)(1 - \operatorname{cosec}^2 \theta)$ is equal to:

- (a) -1 (b) 1 (c) 0 (d) 2

(v) Mode and mean of a data are 12 k and 15 K. Median of the data is :

- (a) 12k (b) 14k (c) 15k (d) 16k

(vi) If $(x-2)$ is a factor of $x^3 + 2x^2 - kx + 10$, then K is :

- (a) -13 (b) 13 (c) 12 (d) -12

(vii) In a cylinder, if radius is halved and height is doubled then the volume will be:

- (a) Same (b) doubled (c) halved. (d) four times

(viii) If $A = \begin{bmatrix} 3 & 0 \\ 5 & 1 \end{bmatrix}$, then A^2 is :

- (a) $\begin{bmatrix} 9 & 0 \\ 20 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 9 & 20 \\ 0 & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & 9 \\ 20 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 20 & 1 \\ 9 & 0 \end{bmatrix}$

(ix) The 21st term of the A.P., whose first two terms are -3 and 4 is:

- (a) 17 (b) 137 (c) 143 (d) -143

(x) The reflection of the point $(-4, 3)$ in the X-axis is:

- (a) $(4, 3)$ (b) $(4, -3)$ (c) $(-4, -3)$ (d) $(-4, 3)$

(xi) The mid-point of the line segment joining the points $A = (-2, 8)$ and $B = (6, 4)$ is:

- (a) $(-4, -6)$ (b) $(2, 6)$ (c) $(-4, 2)$ (d) $(4, 2)$

(xii) The slope of a line parallel to the line passing through the points $(0, 8)$ and $(9, 5)$ is:

- (a) $3/7$ (b) $-3/7$ (c) $-1/3$ (d) $-7/3$

(xiii) The common ratio r of a geometric Progression whose first term is 3 and fourth term is 81 is:

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

(xiv) The coordinates of the vertices of ΔABC are respectively $(-4, -2)$, $(6, 2)$ and $(4, 6)$. The centroid G of ΔABC is:

- (a) $(2, 2)$ (b) $(2, 3)$ (c) $(0, -1)$ (d) $(3, 3)$



(xv) **Assertion (A)** : A die is thrown once and the probability of getting an odd number is $\frac{2}{3}$.

Reason (R): The sample space for odd numbers on a die is 1, 3, 5.

- (a) Both A and R are correct and R is the correct explanation of A.
 (b) Both A and R are correct but R is not the correct explanation of A.
 (c) A is false, R is true.
 (d) A is true, R is false.

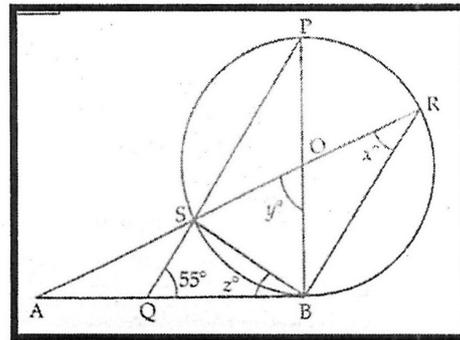
Q.2 (i) In the given diagram, O is the centre

of the circle and AB is a tangent to the circle at B. If angle PQB is 55° .

[4]

- (a) Find the value of angles x, y and z.
 (b) Prove that RB is parallel to PQ.

(ii) Solve the following inequation and represent the solution set on the number line;



$$2y - 3 \leq y + 1 \leq 4y + 7, y \in R$$

[4]

(iii) If $A = \begin{bmatrix} 4 \sin 30^\circ & \cos 0^\circ \\ \cos 0^\circ & 4 \sin 0^\circ \end{bmatrix}$ and $B = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$,

If $AX = B$, (a) Write the order of matrix X.

(b) Find the matrix "X"

[4]

Q.3 (i) The 2nd and 45th term of an Arithmetic Progression are 10 and 96 respectively. Find the first term and the common difference and hence find the sum of the first 15 terms.

[4]

(ii) The equation of a line is $4x - 3y + 12 = 0$. It meets the X-axis at point A and the Y axis at point B. Find.

(a) the coordinates of point A and B.

(b) the length of intercept AB, cut by the line within the coordinate axes.

[4]

(iii) Use a graph sheet to answer this question. Take 2cm=1 unit along the both axes.

(a) Plot the points A (-4, 2) and B (2, 4).

(b) A' is the image of A when reflected in the y-axis. Plot on the graph paper and write the coordinates of A'.

(c) B' is the image of B when reflected in the line AA'. Write the coordinates of B'.

(d) Write the geometric name of the figure ABA'B'.

[5]

Section 'B'

[40 Marks]

[Attempt any four questions from this section]

Q.4 (i) Rajeev invest 50 shares in 8%, Rs. 10 shares at Rs. 15. He sells the shares when the price rises to Rs. 30 and invests the proceeds in 12% Rs.100 shares at Rs. 125. Calculate :

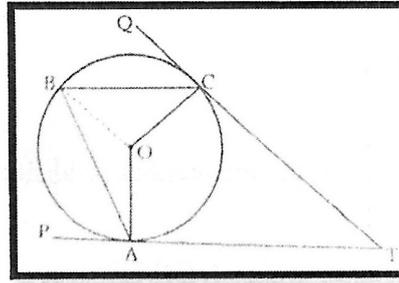
(a) the sale proceeds (b) the number of Rs. 125 shares, he buys and (c) the change in his annual income from dividend.

[3]

(ii) If $(x-2)$ is a factor of $2x^3 - x^2 - px - 2$. Find the value of p and with the value of p , factorise the above expression completely. [3]

(iii) 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:

(a) $\angle OBA$ and $\angle OBC$. (b) $\angle AOC$ and. (c) $\angle ATC$ [4]



Q.5 (i) Given $\frac{x^3 + 3x^2}{6x^2 + 8} = \frac{y^3 + 27y}{9y^2 + 27}$, using, Componendo and dividend, find $x:y$. [3]

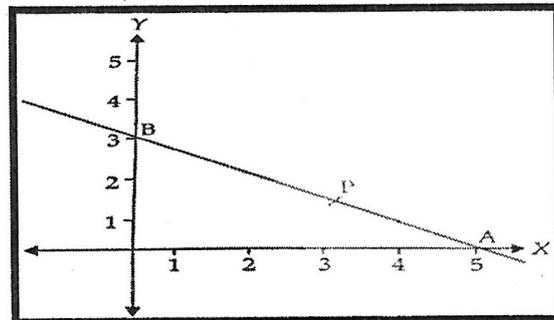
(ii) Prove the identity: $\frac{\sin A}{1 + \cos A} = \operatorname{cosec} A - \cot A$ [3]

(iii) Find the mean of the following distribution using the step- deviation method. [4]

Class-Interval	0- 8	8- 16	16 -24	24 -32	32 - 40	40 - 48
Frequency	10	20	14	16	18	22

Q.6 (i) If $A = \begin{bmatrix} 3 & 5 \\ 4 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 \\ 4 \end{bmatrix}$. Is the product AB possible? Give reason. If yes, then find AB . [3]

(ii) From the given figure:



- (a) Write down the coordinates of A and B.
- (b) If P divides AB in the ratio 2 : 3, find the coordinates of point P. [3]
- (c) Find the equation of a line parallel to the line AB and passing through origin.

(iii) Rahim visits the market and buys the following articles:

Medicines costing Rs. 950, GST @ 5%, a pair of shoes costing Rs 3000, GST @ 18% and a laptop bag costing Rs. 1000 with a discount of 30% GST @ 18%. Calculate :

- (a) The total amount of GST paid, and
- (b) The total bill amount including GST paid by Rahim. [4]

Q.7 (i) From the top of a cliff, the angle of depression of the top and bottom of a tower are observed to be 45° and 60° respectively. If the height of the tower is 20 m. Find :

- (a) the height of the cliff (b) the distance between the cliff and the tower. [5]

(ii) 40 students enter for a game of shot – put competition. The distance thrown (in meters) is recorded below. Use a graph paper to draw an ogive for the given distribution.

Find: (a) the median, (b) upper quartile, and (c) the number of students who cover a distance which is above 16.5 m. [5]

Distance(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

Q.8 (i) A box contains some black balls and 30 white balls. If the probability of drawing a black ball is two fifths of a white ball, then find the number of black balls in the box. [3]

(ii) The surface area of a solid metallic sphere is 616 cm². It is melted and recast into smaller spheres of diameter 3.5 cm. How many such spheres can be obtained? [3]

(iii) Using properties of proportion solve for x, given $\frac{\sqrt{2+x}+\sqrt{3-x}}{\sqrt{2+x}-\sqrt{3-x}} = 3$ [4]

Q.9 (i) Solve the quadratic equation $5x(x + 2) = 3$ and give your answer correct to decimal places. [3]

(ii) Find the 12th term of a G.P. whose 5th term is 64 and common ratio is 2. [3]

(iii) Using a ruler and a compass construct a triangle ABC in which AB = 7cm, $\angle CAB = 60^\circ$ and AC = 5 cm. Construct the locus of:

(a) Points equidistant from AB and AC (b) Points equidistant from BA and BC.

Hence construct a circle touching the three sides of the triangle internally. [4]

Q.10 (i) Mr. Goswami has a recurring deposit account and deposits Rs 750 per month for 24 months. If he gets Rs 19125 at the time of maturity, find the rate of interest. [3]

(ii) A car covers a distance of 400 km at a certain speed. Had the speed been 12 km/h more, the time taken for the journey would have been 1 h 40 min less. Find the original speed of the car. [3]

(Iii) Draw a histogram from the following frequency distribution and find the mode from the graph.. [4]

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