# HALF YEARLY EXAMINATION: 2024-2025

## CLASS : X

## SUBJECT : MATHEMATICS

NAME OF STUDENT:..... MAX. MARKS: 80

DATE:..... TIME: 3 HOURS

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

**Section: A [40marks]**

**(Attempt all questions from this Section)**

**Q1.**Choose the correct answers to the questions from the given options. [15]

**(i)** Asif deposited Rs 600 per month for $1\frac{1}{2}$ years in a recurring deposit account. If he received Rs 750 as interest, then the maturity value is

(a) Rs 10800 (b) Rs 11550

(c) Rs 10750 (d) none of these

**(ii)**The solution set representing the following number line is


(a) $\{x:x \in R, -4 \leq x < 2\}$ (b) $\{x:x \in R, -4 < x \leq 2\}$

(c) $\{x:x \in R, -4 < x < 2\}$ (d) $\{x:x \in R, -4 \leq x \leq 2\}$

**(iii)**If $(x^2-4)$ is a factor of polynomial $x^3 + x^2 - 4x-4$, then its factors are

(a) (x-2)(x+2)(x+1) (b) (x-2)(x+2)(x-1)

(c) (x-2)(x-2)(x+1) (d) (x-2)(x-2)(x-1)

**(iv)** The sum of money required to buy 50, Rs 40 shares at Rs 38.50 is:

(a) Rs 1920 (b)Rs 1924

(c) Rs 1925 (d)Rs 1952

**(v)** Consider the following equation: $k^2x^2 - 2kx + 1 = 0$.

**Assertion (A):** This equation has equal roots for all non-zero values of 'k'.

**Reason (R):** When roots are equal then the discriminant is zero.

(a) (A) is true, (R) is false. (b) (A) is false, (R) is true.

(c) Both (A) and (R) are true. (d) Both (A) and(R) are false.

**(vi)**If the first term of an A.P. is -5 and the common difference is 2, then the sum of its first 6 terms is

(a) 0 (b) 5

(c) 6 (d)15

**(vii)**An article which is marked at Rs 1200 is available at a discount of 20% and the rate of GST is 18%. The amount of SGST is:

(a) Rs 216.00 (b) Rs 172.80

(c) Rs 108.00 (d) Rs 86.40

**(viii)** Equation of a line parallel to y = 3x + 5 and passing through the origin is:

(a) y = 3x (b) y= 3x + 5

(c) 3y = x (d) y = 3x + 8

**(ix)**'x' is the mean proportion between $\frac{1}{2}$ and 128. The value of x is :

(a) 8 (b)16

(c) 32 (d)64

**(x)** The 11th term of the G.P. $\frac{1}{8}$, $-\frac{1}{4}$, 2, -1,-------is

(a) 64 (b) -64

(c) 128 (d) -128

**(xi)**33-3p, 8+4p and 28+2p are consecutive terms of an Arithmetic Progression (A.P.) in the given order. The value of p is :

(a) 10 (b) 5

(c) 9 (d) -5

**(xii)** If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, then $A^2$ =

(a) $\begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix}$ (b) $\begin{bmatrix} 8 & -5 \\ 5 & 3 \end{bmatrix}$

(c) $\begin{bmatrix} 8 & -5 \\ -5 & -3 \end{bmatrix}$ (d) $\begin{bmatrix} 8 & -5 \\ -5 & 3 \end{bmatrix}$

**(xiii)** If one end of a diameter of a circle is (2,3) and the centre is (-2,5), then the other end is

(a) (-6,7) (b) (6,-7)

(c) (0,8) (d) (0,4)

**(xiv)** If $\Delta ABC \sim \Delta PQR$, area of $\Delta ABC = 81\ cm^2$, area of $\Delta PQR = 144 cm^2$ and QR = 6 cm, then length of BC is

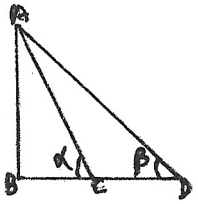
(a) 4 cm (b) 4.5 cm

(c) 9cm (d) 12 cm

**(xv)** With reference to the given diagram:

**Assertion(A):** $\cos\alpha < \cos\beta$

**Reason(R) :** $\alpha > \beta$



(a)A is true, R is false (b)A is false, R is true

(c)Both A and R are true (d)Both A and R are false

**Q2.(i)** The first and the last terms of an A.P. are 17 and 350 respectively. If the common difference is 9, how many terms are there and what is their sum? [4]

**(ii)**Solve the following quadratic equation $4x^2 - 7x + 2 = 0$; and give the answer correct to two significant figures. [4]

**(iii)**If $2x^3 + ax^2 + bx - 2$ has a factor (x+2) and leaves a remainder 7 when divided by 2x-3, find the values of a and b. With these values of a and b, factorise the given polynomial completely. [4]

**Q3.(i)**Given matrix $A = \begin{bmatrix} 1 & 1 \\ 8 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$. Find matrix X if $X = A^2 - 4A + AB$. [4]

**(ii)** Prove the following identity: $(\sin\theta + \cos\theta)(\operatorname{cosec}\theta - \sec\theta) = \operatorname{cosec}\theta.\sec\theta - 2\tan\theta$. [4]

**(iii)**Use graph paper for this question. [5]

A(0,3), B(3,-2) and O(0,0) are the vertices of triangle ABO.

(a)Plot the triangle on a graph sheet taking 2cm=1unit on both the axes.

(b)Plot D the reflection of B in the y-axis, and write it coordinates.

(c)Give the geometrical name of the figure ABOD.

**Section: B [40 Marks]**

**(Attempt any four questions from this Section.)**

**Q4.(i)**How many terms of the series of G.P. $\frac{2}{9} - \frac{1}{3} + \frac{1}{2} +$----will make the sum $\frac{55}{72}$ ? [3]

**(ii)**A man invests Rs 4500 in shares of a company which is paying 7.5% dividend. If Rs 100 shares are available at a discount of 10%, find (a) the number of shares he purchases. (b) his annual income. [3]

**(iii)** A line segment joining P(2,-3) and Q(0,-1) is cut by the x-axis at the point R. A line AB cuts the y axis at T(0,6) and is perpendicular to PQ at S. Find the: (a)equation of line PQ (b) equation of line AB (c ) coordinates of points R and S. [4]

**Q5.(i)**In what ratio does the x-axis divide the line segment joining the points (-4,-6) and (-1,7)? Also find the coordinates of the point of division. [3]

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

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

(iii)Using the properties of proportion, solve for x, given: $\frac{2x+\sqrt{4x^2-1}}{2x-\sqrt{4x^2-1}} = 4$. [4]

**Q6.(i)** The sum of the first five terms and the sum of first seven terms of the same A.P. is 167. If the sum of first ten terms of this A.P. is 235, find the sum of first twenty terms. [3]

**(ii)** Mr. Britto deposits a certain sum of money each month in a Recurring Deposit Account of a bank. If the rate of interest is 8% per annum and Mr. Britto gets Rs 8088 from the bank after 3 years, find the value of his monthly instalment. [3]

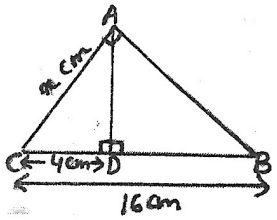
**(iii)**As observed from the top of a 80m tall light house, the angles of depression of two ships on the same side of the light house in horizontal line with its base are $30^0$ and $40^0$ respectively. Find the distance between the two ships. Give your answer correct to the nearest metre. [4]

**Q7.(i)** Prove that: $\frac{sinA}{1+cotA} - \frac{cosA}{1+tanA}$ = sinA - cosA [3]

(ii)In the given figure, BC=16cm, CD= 4cm and CA= xcm.

(a)Prove:ΔACB ~ΔDCA.

(b)Find the value of x. [3]




(iii) A shopkeeper buy goods worth Rs 4000 and sells these at a profit of 20% to a consumer in the same state. If GST is charged at 5%, find: (a)the selling price (excluding tax) of the goods.(b)CGST paid by the consumer. (c )SGST paid by the consumer. (d)the total amount paid by the consumer. [4]

**Q8.(i)**On a map drawn to a scale of 1:50000, a rectangular plot of land ABCD has the following dimensions. AB = 6cm; BC= 8cm. Find : (i)the actual length of the diagonal AC of the plot in km. (ii)the actual area of the plot in sq.km. [3]

**(ii)** The roots of equation $(q-r)x^2 + (r-p)x + (p-q) = 0$ are equal. [3]

Prove that: 2q = p + r, that is p,q &r are in A.P.

(iii)Two water pipes together can fill a tank in $9\frac{3}{8}$ hours. The pipe of larger diameter takes 10 hour less than the smaller one to fill the tank separately. Find the time in which each pipe can fill the tank separately. [4]

**Q9.(i)**Use factor theorem to factorise completely $x^3 + x^2 - 4x - 4$. [3]

**(ii)**Diagonals of a trapezium ABCD with AB||DC intersect each other at the point O. If AB = 2CD, find the ratio of the areas of triangles AOB and COD . [3]

**(iii)**If x, y and z are in continued proportion, Prove that [4]

$$\frac{x}{y^2 z^2} + \frac{y}{z^2 x^2} + \frac{z}{x^2 y^2} = \frac{1}{x^3} + \frac{1}{y^3} + \frac{1}{z^3}$$

**Q10.(i)** The following bill shows the GST rate and the marked price of articles: [3]

Rajdhani Departmental Store

| S.No. | Item | Marked Price | Discount | Rate of GST |
|---|---|---|---|---|
| (a) | Dry fruits (1kg) | Rs 1200 | Rs 100 | 12% |
| (b) | Packed Wheat flour(5kg) | Rs 286 | Nil | 5% |
| (c) | Bakery products | Rs 500 | 10% | 12% |

Find the total amount to be paid (including GST) for the above bill.

(ii)Find the coordinates of the centroid P of the ΔABC, whose vertices are A(-1,3), B(3,-1) and C(0,0).Hence, find the equation of a line passing through P and parallel to AB. [3]

(iii) If $\begin{bmatrix} a & 1 \\ 1 & 0 \end{bmatrix}\begin{bmatrix} 4 & 3 \\ -3 & 2 \end{bmatrix} = \begin{bmatrix} b & 11 \\ 4 & c \end{bmatrix}$, find a, b and c. [4]

**END**