FORMATIVE ASSESSMENT - II - 2023 - 24

MATHEMATICS

(English Medium)

20

Class : X] **(Max. Marks : 20)** **[Time : 45 Min.**

Name of the Student : ..... Roll No. : .....

I. Solve the following problems. **4 x 1 = 4**

1. **Statement 1 :** The distance between two points $(x_1, y_1), (x_2, y_2)$ is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ [ ]

   Statement 2 : The distance between origin and (x, y) is $\sqrt{(x^2 + y^2}$

   A) Statement 1 only correct B) Statement 2 only correct
   C) Both statements are correct D) Both statements are wrong

2. If $x + 2y - 3 = 0$ and $5x - ky + 8 = 0$ are parallel lines then k = [ ]
   A) – 10 B) 5 C) 10 D) – 5

3. The shape of the quadratic polynomial is _____ [ ]
   A) line B) circle C) parabola D) semi circle

4. The discriminant of the quadratic equation $2x^2 - 4x + 3 = 0$ is _____

II. Solve the following problems. **2 x 2 = 4**

5. Represent the statement as pair of linear equations in two variables "5 pencils and 7 pens together cost Rs.50 whereas 7 pencils and 5 pens together cost Rs. 46."

6. For what value of 'k', the equations $3x + 4y + 2 = 0$ and $9x + 12y + k = 0$ represent coincident lines.

III. Solve the following problem. **1 x 4 = 4**

7. Find two numbers whose sum is 27 and product is 182.

IV. Solve the following problem. **1 x 8 = 8**

8. a) Verify 1, –1 and –3 are the zeroes of the cubic polynomial $x^3 + 3x^2 - x - 3$ and check the relation between the zeroes and the coefficients.

   (OR)

   b) Find the Coordinates of the points of trisection of the line segment joining the points A(2, –2) and B(–7, 4)

1. Statement 1 : The distance between two points [c]
$(x_1, y_1), (x_2, y_2)$ is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Statement 2 : The distance between origin and (x, y) is $\sqrt{x^2 + y^2}$
A) Statement 1 only correct B) Statement 2 only correct
C) Both statements are correct D) Both statements are wrong

2. If $x + 2y - 3 = 0$ and $5x - ky + 8 = 0$ are parallel lines then $k =$ [A]
A) -10 B) 5 C) 10 D) -5

Sol: $\frac{a_1}{a_2} = \frac{b_1}{b_2} \Rightarrow \frac{1}{5} = \frac{2}{-k} \Rightarrow -k = 10 \Rightarrow k = -10$

3. The shape of the quadratic polynomial is_____ [C]
A) line B) circle C) parabola D) semi circle

4. The discriminant of the quadratic equation $2x^2 - 4x + 3 = 0$ is -8

Sol: Discriminant $= b^2 - 4ac = (-4)^2 - 4 \times 2 \times 3 = 16 - 24 = -8$

5. Represent the statement as pair of linear equations in two variables "5pencils and 7 pens together cost Rs.50 whereas 7 pencils and 5 penstogether cost Rs. 46."

Sol: Let the cost of pencil=₹ x and the cost of pen=₹ y

5 pencils + 7 pens =50$\Rightarrow 5x + 7y = 50 \rightarrow (1)$

7 pencils + 5 pens =46$\Rightarrow 7x + 5y = 46 \rightarrow (2)$

6. For what value of 'k', the equations $3x + 4y + 2 = 0$ and$9x + 12y + k = 0$ represent coincident lines.

Sol: $3x + 4y + 2 = 0$; $a_1 = 3,\ b_1 = 4,\ c_1 = 2$

$9x + 12y + k = 0$; $a_2 = 9,\ b_2 = 12,\ c_2 = k$

If given pair of equations represents coincident lines then

$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \Rightarrow \frac{3}{9} = \frac{4}{12} = \frac{2}{k} \Rightarrow \frac{1}{3} = \frac{1}{3} = \frac{2}{k}$

$\Rightarrow k \times 1 = 2 \times 3$

$\Rightarrow k = 6$

7. Find two numbers whose sum is 27 and product is 182.

Sol: Let one number $= x$, The second number$= 27 - x$

Product of numbers=182

$x(27 - x) = 182$

$27x - x^2 = 182$

$-x^2 + 27x - 182 = 0$

$x^2 - 27x + 182 = 0$

$x^2 - 13x - 14x + 182 = 0$

$x(x - 13) - 14(x - 13) = 0$

$(x - 13)(x - 14) = 0$

$x-13=0 \quad or \quad x-14=0$

$x=13 \quad or \quad x=14$

If $x=13$ the required numbers are 13 and 14.

If $x=14$ the required numbers are 14 and 13.

8. a) Verify 1, –1 and –3 are the zeroes of the cubic polynomial x^3+3x^2-x-3 and check the relation between the zeroesand the coefficients.

Sol: $p(x)=x^3+3x^2-x-3$

Coefficient of $x^3=a=1$
Coefficient of $x^2=b=3$
Coefficient of $x=c=-1$
Constant term $=d=-3$

$p(1)=(1)^3+3(1)^2-1-3$

$=1+3-1-3=4-4=0$

$p(-1)=(-1)^3+3(-1)^2-(-1)-3$

$=-1+3+1-3=4-4=0$

$p(-3)=(-3)^3+3(-3)^2-(-3)-3$

$=-27+27+3-3=30-30=0$

$p(1)=0, p(-1)=0 \ and \ p(-3)=0$

$\therefore 1, -1$ and -3 are the zeroes of the cubic polynomial x^3+3x^2-x-3.

Now $\alpha=1, \ \beta=-1 \ and \ \gamma=-3$

$$\alpha+\beta+\gamma=1+(-1)+(-3)=-3=\frac{-3}{1}=\frac{-b}{a}$$

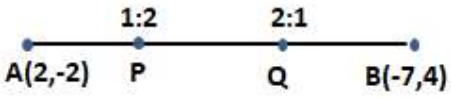
$$\alpha\beta+\beta\gamma+\gamma\alpha=1\times(-1)+(-1)\times(-3)+(-3)\times 1=-1+3-3=-1=\frac{-1}{1}=\frac{c}{a}$$

$$\alpha\beta\gamma=1\times(-1)\times(-3)=3=\frac{-(-3)}{1}=\frac{-d}{a}$$

b) Find the Coordinates of the points of trisection of the line segmentjoining the points A(2, –2) and B(–7, 4)

Sol: A(2,–2) and B(–7, 4).

$(x_1, y_1) \qquad (x_2, y_2)$



Let P divides AB internally in the ratio 1 : 2.$= m_1 : m_2$

$$P(x,y)=\left(\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right)$$

$$=\left(\frac{1(-7)+2(2)}{1+2}, \frac{1(4)+2(-2)}{1+2}\right)$$

$$=\left(\frac{-7+4}{3}, \frac{4-4}{3}\right)=\left(\frac{-3}{3}, \frac{0}{3}\right)=(-1,0)$$

Let Q divides AB internally in the ratio 2:1=$m_1 : m_2$

$$Q(x,y)=\left(\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right)$$

$$=\left(\frac{2(-7)+1(2)}{2+1}, \frac{2(4)+1(-2)}{2+1}\right)$$

$$=\left(\frac{-14+2}{3}, \frac{8-2}{3}\right)=\left(\frac{-12}{3}, \frac{6}{3}\right)=(-4,2)$$

Required trisectional points are P(-1, 0) and Q(-4, 2).