KIRAN TUTORIALS

Seat No. | | | | | | | |

Std 10 (English) **Mathematics Part - II** **Date 01-10-20**

Time 1HRS	**Chapter 5.,5.00**	**Marks 20**

Q.1 Multiple Choice Questions **1**

1 Find the distance between points L (1, - 4) and M (- 5, 4).

a. 8 units b. 9 units c. 10 units d. 12 units

Ans Option c.

Hint : Use distance formula

Q.2 Answer the following. **2**

1 Find the distances between the following points.

P (- 6, - 3), Q (- 1, 9)

Ans Let P $\equiv$ (- 6, - 3) $\equiv$ (x_1, y_1), Q $\equiv$ (- 1, 9) $\equiv$ (x_2, y_2)

By distance formula.

$$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{[-1 - (-6)]^2 + [9 - (-3)]^2}$$

$$= \sqrt{(-1 + 6)^2 + (9 + 3)^2}$$

$$= \sqrt{(5)^2 + (12)^2}$$

$$= \sqrt{25 + 144}$$

$$= \sqrt{169}$$

$\therefore$ PQ = 13

$\therefore$ The distance between the points P and Q is 13.

2 Find the distances between the following points.

R (- 3a, a), S (a, - 2a)

Ans Let R $\equiv$ (- 3a, a) $\equiv$ (x_1, y_1),

S $\equiv$ (a, - 2a) $\equiv$ (x_2, y_2)

By distance formula.

$$RS = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{[a - (-3a)]^2 + (-2a - a)^2}$$

$$= \sqrt{(a + 3a)^2 + (-3a)^2}$$

$$= \sqrt{(4a)^2 + (-3a)^2}$$

$$= \sqrt{16a^2 + 9a^2}$$

$$= \sqrt{25a^2}$$

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$\therefore$ RS = 5a

∴ Distance between points A and B is 5a.

Q.3 Solve the following **6**

1 If point P(- 4, 6) divides the line segment AB with A(- 6, 10) and B(r, s) in the ratio 2:1, find the co-ordinates of B.

Ans

$-4 = \frac{2 \times r + 1 \times (-6)}{2 + 1}$ $\qquad 6 = \frac{2 \times s + 1 \times 10}{2 + 1}$

∴ $-4 = \frac{2r - 6}{3}$ $\qquad$ ∴ $6 = \frac{2s + 10}{3}$

∴ $-12 = 2r - 6$ $\qquad$ ∴ $18 = 2s + 10$

∴ $2r = -6$ $\qquad$ ∴ $2s = 8$

∴ $r = -3$ $\qquad$ ∴ $s = 4$

∴ Co-ordinates of point B are (- 3, 4).

2 Line PQ is parallel to line RS where points P,Q,R and S have co-ordinates (2, 4), (3, 6), (3, 1) and (5, k) respectively. Find value of k.

Ans

slope of the line $= \frac{y_2 - y_1}{x_2 - x_1}$

P(2, 4), Q(3, 6)

slope of the line PQ $= \frac{6-4}{3-2} = \frac{2}{1} = 2$

R(3, 1), S(5, k)

slope of the line RS $= \frac{k-1}{5-3} = \frac{k-1}{2}$

But line PQ || line RS

slope of line PQ = slope of line RS

∴ $2 = \frac{k-1}{2}$

∴ $4 = k - 1$

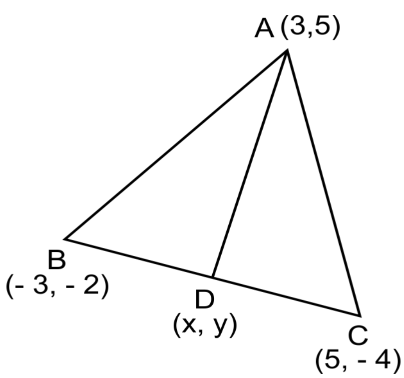
∴ $4 + 1 = k$

∴ $k = 5$

Q.4 Answer the following (Non textual)(Any One) **4**

1 A(3, 5), B(- 3, - 2), C(5, - 4) are the vertices of △ ABC. AD is the median of △ ABC. Find the equation of median AD.

Ans



AD is the median.

∴ D is the midpoint of side BC. Let D ≡ (x, y).

using midpoint formula,

$D(x, y) = \left(\frac{-3 + 5}{2}, \frac{-2 - 4}{2}\right)$

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$= \left(\frac{2}{2}, -\frac{6}{2}\right)$

$= (1, -3)$ $\therefore$ D (1, - 3)

Let A (3, 5) $\equiv (x_1, y_1)$ and

D (1, - 3) $\equiv (x_2, y_2)$ (Figure just for understanding)

To find the equation of median AD, use two-point form.

$$\frac{x - x_1}{x_1 - x_2} = \frac{y - y_1}{y_1 - y_2}$$

$\therefore \frac{x - 3}{3 - 1} = \frac{y - 5}{5 - (-3)}$ $\therefore \frac{x - 3}{3 - 1} = \frac{y - 5}{5 + 3}$

$\therefore \frac{x - 3}{2} = \frac{y - 5}{8}$

$\therefore$ 4 (x - 3) = y - 5 ... (Multiplying both the sides by 8)

$\therefore$ 4x - 12 = y - 5 $\therefore$ 4x - y - 12 + 5 = 0

$\therefore$ 4x - y - 7 = 0

The equation of median AD is 4x - y - 7 = 0

2 Find the equation of the line passing through the point of intersection of the line 4x + 3y + 2 = 0 and 6x + 5y + 6 = 0 and the point of intersection of the lines 4x - 3y - 17 = 0 and 2x + 3y + 5 = 0.

Ans To find the points of intersections of the given pairs of lines, we have to solve the equations.

4x + 3y + 2 = 0 $\therefore$ 4x + 3y = - 2 ... (1)

6x + 5y + 6 = 0 $\therefore$ 6x + 5y = - 6 ... (2)

Multiplying equation (1) by 5 and equation (2) by 3.

$20x + 15y = -10 \quad \ldots (3)$

$18x + 15y = -18 \quad \ldots (4)$ ... [Subtracting eq. (4) from eq. (3)]

$2x = 8$

$\therefore$ x = 4

Substituting x = 4 in equation (1),

4(4) + 3y = - 2

$\therefore$ 16 + 3y = - 2 $\therefore$ 3y = - 2 - 16

$\therefore$ 3y = - 18 $\therefore$ y = - 6

$\therefore$ the coordinates of the point of intersection of the first pair of lines are (4, - 6)

Let P (4, - 6) $\equiv (x_1, y_1)$ ... (a)

For the second pair of lines,

4x - 3y - 17 = 0 $\therefore$ 4x - 3y = 17 ... (i)

2x + 3y + 5 = 0 $\therefore$ 2x + 3y = - 5 ... (ii)

Adding equations (i) and (ii),

6x = 12 $\therefore$ x = 2

Substituting x = 2 in equation (ii),

2(2) + 3y = - 5

$\therefore$ 4 + 3y = - 5 $\therefore$ 3y = - 5 - 4

$\therefore$ 3y = - 9 $\therefore$ y = - 3

$\therefore$ the coordinates of the point of intersection of the second pair of lines are (2, - 3).

Let Q (2, - 3) $\equiv (x_2, y_2)$ ... (b)

The equation of a line in two-point form is

$$\frac{x - x_1}{x_1 - x_2} = \frac{y - y_1}{y_1 - y_2}$$

$\therefore$ the equation of line PQ is

$\frac{x - 4}{2} = \frac{y + 6}{-3}$ ... [From (a) and (b)]

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$\therefore$ - 3 (x - 4) = 2 (y + 6)

$\therefore$ - 3x + 12 = 2y + 12

$\therefore$ - 3x - 2y = 12 - 12 $\therefore$ - 3x - 2y = 0

i.e. 3x + 2y = 0

The equation of the required line is 3x + 2y = 0

Q.5 Answer the following(Any One) **4**

1 In the following examples, can the segment joining the given points form a triangle? If triangle is formed, state the type of the triangle considering sides of the triangle. L (6,4) , M (– 5,– 3) , N (– 6,8)

Ans Let $L \equiv (6, 4) \equiv (x_1, y_1)$

$M \equiv (-5, -3) \equiv (x_2, y_2)$,

$N \equiv (-6, 8) \equiv (x_3, y_3)$

By distance formula

$$LM = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(-5 - 6)^2 + (-3 - 4)^2}$$

= (-11)2 + (-7)2

= 121 + 49

$\therefore$ LM = 170 ... I

By distance formula,

MN = (x3 - x2)2 + (y3 - y2)2

= [- 6 - (- 5)]2 + [8 - (- 3)]2

= (- 6 + 5)2 + (8 +3)2

= (-1)2 + (11)2

= 1 + 121

$\therefore$ MN = 122 ... II

By distance formula,

LN = (x3 - x1)2 + (y3 - y1)2

= (- 6 - 6)2 + (8 - 4)2

= (- 12)2 + (4)2

= 144 + 16

= 160

= 16 × 10

$\therefore$ LN = 410 ... III

Now 170 > 410 > 122 ... From I, II, III

$\therefore$ AB ≠ BC + AC

$\therefore$ the points A (6, 4), B (– 5, – 3), and C (– 6, 8) are non collinear.

Any three points, when non-collinear, determine a unique triangle.

$\therefore$ The line segments joining the points A, B, C determine a triangle.

Here, AB ≠ BC + AC ... [From I, II, III]

$\therefore$ △ABC is a scalene triangle. [All three sides are unequal]

2 Determine whether the points are collinear.

L (– 2, 3), M(1, – 3), N(5, 4)

Ans Let L (– 2, 3) ≡ (x_1, y_1),

M (1,– 3) ≡ (x_2, y_2) and

N (5, 4) ≡ (x_3, y_3)

By distance formula,

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LM = x2 - x12 + (y2 - y1)2

= (1 + 2)2 + (- 3- 3)2
= (3)2 + (- 6)2
= 9 + 36
= 45
= 9 × 5
∴ LM = 35 ... I
By distance formula,
MN = (x3 - x2)2 + (y3 - y2)2
= (5 - 1)2 + [4 - (- 3)]2
= (4)2 + (4 + 3)2
= 42 + 72
= 16 + 49
MN = 65 ... II
By distance formula,
LN = (x3 - x1)2 + (y3 - y1)2
= [5 - (- 2)]2 +(4 - 3)2
= (5 + 2)2 + 12
= 72 + 1
= 49 + 1
= 50
= 25 × 2
∴ LN = 52 ... III
Now, 65 > 52 > 32 ... [From I, II, III]
∴ MN ≠ LM + LN
∴ Points P (– 2, 3), M (1, – 3) and N (5, 4) are non collinear.

Q.6 Answer the following (Any One) **3**

1 Show that A (-4, -7), B (- 1, 2), C (8, 5) and D (5, - 4) are the vertices of a rhombus ABCD.

Ans A (- 4, - 7), B (- 1, 2), C (8, 5), D (5, - 4)
According to distance formula,
AB = [- 1 - (-4)]2 + [2 - (-7)]2
∴ AB = 32 + 92
∴ AB = 9 + 81
∴ AB = 90 ... (1)
BC = [8- (- 1)]2 + (5-2)2
∴ BC = 92 + 32
∴ BC = 81 + 9
∴ BC = 90 ... (2)
CD = (5 - 8)2 + (- 4 - 5)2
∴ CD = (- 3)2 + (- 9)2
∴ CD = 9 + 81
∴ CD = 90 ... (3)
CD = [5 - (-4)]2 + [- 4 - (-7)]2
∴ AD = 92 + 32
∴ AD = 81 + 9
∴ AD = 90 ... (4)
From (1), (2), (3) and (4)
AB = BC = CD = AD
∴ □ABCD is a rhombus

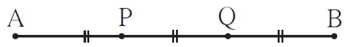
2 Find the co-ordinates of the points of trisection of the segment joining the points A (2, - 2) and B (- 7, 4).

Ans Let points P and Q be the points of trisection of the line segment joining the points A and B.

Point P and Q divide line segment AB into three parts.

AP = PQ = QB ... (I)

APPB = APPQ + QB = APAP + AP = AP2AP = 12 ... From (I)



Point P divides seg AB in the ratio 1:2.

x co-ordinate of point P = 1 × (-7) + 2 × 21 + 2 = - 7 + 43 = - 33 = - 1

y co-ordinate of point P = 1 × 4 + 2 ×(-2)1 + 2 = - 4 - 43 = 03 = 0

Point Q divides seg AB in the ratio 2:1 ∴ AQQD = 21

x co-ordinate of point Q = 2 × (- 7) + 1 × 22 + 1 = -14 + 23 = - 123 = - 4

y co-ordinate of point Q = 2 × 4 + 1 × - 22 + 1 = 8 - 23 = 63 = 2

∴ Co-ordinates of points of trisection are (- 1, 0) and (- 4, 2).