VIVEK TUTORIALS

X (English)

(Special Test)

Mathematics Part - II-(5)

DATE: 21-02-19

TIME: 1 Hr

MARKS: 40

SEAT NO:

Q.1 Multiple Choice Questions 3

1 Out of the following, point …………… lies to the right of the origin on X- axis.

a. (-2,0) b. (0,2) c. (2,3) d. (2,0)

Ans Option d.

2 Point P is the midpoint of seg AB. If co-ordinates of A and B are (-4, 2) and (6, 2) respectively then find the co-ordinates of point P.

a. (- 1, 2) b. (1, 2) c. (1, - 2) d. (- 1, - 2)

Ans (1, 2)

3 Seg AB is parallel to Y-axis and coordinates of point A are (1,3) then co-ordinates of point B can be ……………

a. (3,1) b. (5,3) c. (3,0) d. (1,-3)

Ans Option d

Q.2 Solve the following 4

1 Find the distance between each of the following pairs of points.

P (– 5, 7), Q (– 1, 3)

Ans Let P (– 5, 7) $\equiv (x_1, y_1)$ and

Q (– 1, 3) $\equiv (x_2, y_2)$

By distance formula,

$$PQ = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$
$$= \sqrt{[(-5) - (-1)]^2 + (7 - 3)^2}$$
$$= \sqrt{(-5 + 1)^2 + 4^2}$$
$$= \sqrt{(-4)^2 + 4^2}$$
$$= \sqrt{16+16}$$
$$= \sqrt{32}$$
$$= \sqrt{16\times 2}$$
$$\therefore PQ = 4\sqrt{2} \text{ units}$$

$\therefore$ The distance between the points P and Q is $4\sqrt{2}$ units.

2 Find the distance between each of the following pairs of points.

R (0, – 3), S $\left(0, \frac{5}{2}\right)$

Ans Let R (0, – 3) $\equiv (x_1, y_1)$ and

S (0, 2.5) $\equiv (x_2, y_2)$

By distance formula,

$$RS = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(0-0)^2 + [2.5 - (-3)]^2}$$

$= \sqrt{0^2 + (2.5 + 3)^2}$

$= \sqrt{0+5.5^2}$

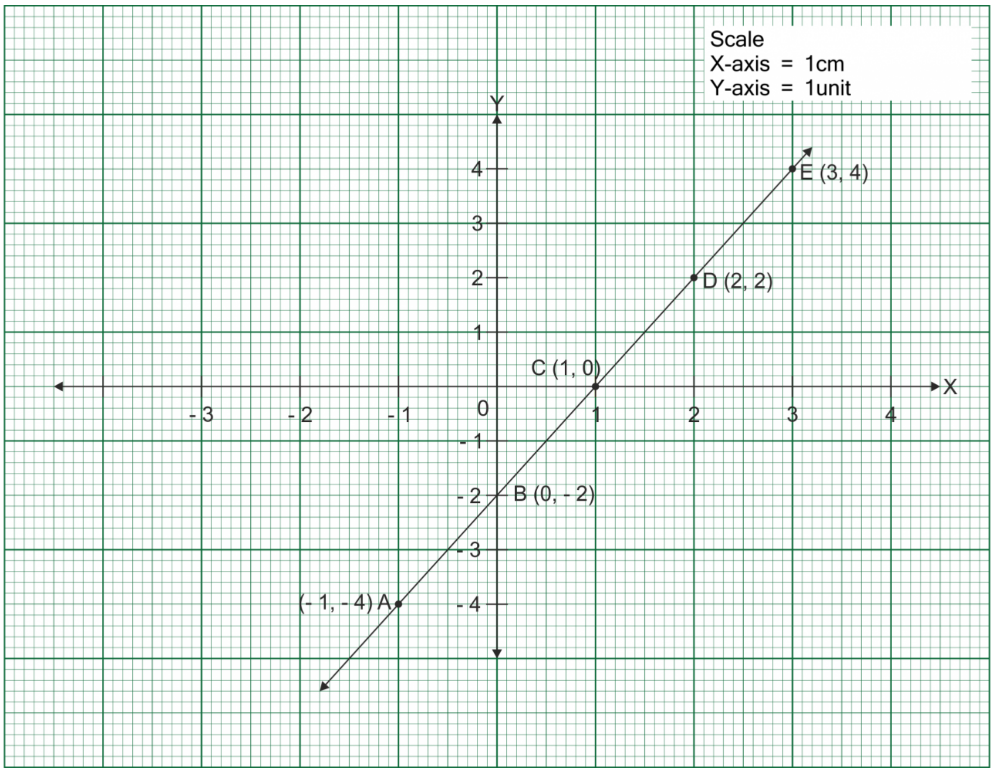
$= \sqrt{5.5^2}$

∴ RS = 5.5 units

∴ The distance between the points R and S is 5.5 units.

Q.3 Attempt the following 4

1 Complete the table below the graph with the help of the following graph.



Write your observation from the table.

Sr. No.	First point	Second point	Co-ordinates of first point (x_1, y_1)	Co-ordinates of second point (x_2, y_2)	$\frac{y_2 - y_1}{x_2 - x_1}$
1	C	E	(1, 0)	(3, 4)	$\frac{\_\_\_\_\_}{\_\_\_\_\_} =$
2	A	B	(− 1, − 4)	(0, − 2)	$\frac{\_\_\_\_\_}{\_\_\_\_\_} =$
3	B	D	(0, − 2)	(2, 2)	$\frac{\_\_\_\_\_}{\_\_\_\_\_} =$

∴ For any two points (x_1, y_1) and (x_2, y_2) on a line graph, the ratio $\frac{y_2 - y_1}{x_2 - x_1}$ is always constant.

Ans 1) $\frac{4}{2}$ 2) 2 3) $\frac{2}{1}$ 4) 2 5) $\frac{4}{2}$ 6) 2

2 Angles made by the line with the positive direction of X-axis are given. Find the slope of these lines. 45°

Here θ = 45°

∴ slope of the line = _____

= tan _____°

= _____

Ans 1) tan θ 2) 45 3) 1

Q.4 Answer the following 6

1 Find k, if B(k, -5), C(1, 2) and slope of the line is 7.

Ans Let $B(K, -5) \equiv (x_1, y_1)$, $C(1, 2) \equiv (x_2, y_2)$

Slope of line BC = $\frac{y_2-y_1}{x_2-x_1}$

$\therefore \quad 7 = \frac{2-(-5)}{1-k}$

$\therefore \quad 7 = \frac{2+5}{1-k}$

$\therefore \quad 7 \times (1 - k) = 7$

$\therefore \quad 7 - 7k = 7$

$\therefore \quad 7 - 7 = 7k$

$\therefore \quad 0 = 7k$

$\therefore \quad k = \frac{0}{7}$

$\therefore \quad k = 0$

2 Write the equation of a line passing through the point (- 3, - 1) and having slope $\frac{2}{3}$.

Ans Let $(-3, -1) \equiv (x_1, y_1)$, Using slope-point form:

$x - y_1 = m(x - x_1)$

$\therefore \quad y - (-1) = \frac{2}{3}[x - (-3)]$

$\therefore \quad y + 1 = \frac{2}{3}(x + 3)$

$\therefore \quad 3y + 3 = 2x + 6$ ... (Multiplying both the sides by 3)

$\therefore \quad -2x + 3y + 3 - 6 = 0 \quad \therefore \quad -2x + 3y - 3 = 0$

$\therefore \quad 2x - 3y + 3 = 0$ ... (Multiplying by - 1)

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

3 If the slope of the line joining points (k, - 3) and (4, 5) is $\frac{1}{2}$, then find the value of k.

Ans Let $A(k, -3) \equiv (x_1, y_1)$ and $B(4, 5) \equiv (x_2, y_2)$

The slope of line AB = $\frac{y_2 - y_1}{x_2 - x_1} = \frac{5-(-3)}{4-k} = \frac{5+3}{4-k} = \frac{8}{4-k}$

The slope is given to be $\frac{1}{2}$.

$\therefore \quad \frac{8}{4-k} = \frac{1}{2} \quad \therefore \quad 16 = 4 - k \quad \therefore \quad k = 4 - 16$

$\therefore \quad k = -12$

The value of k is - 12

Q.5 Solve the following 9

1 Find the equation of the line passing through (2, - 1) and parallel to 3x + 4y = 10.

Ans The given line is 3x + 4y = 10.

$\therefore \quad 4y = 10 - 3x \quad \therefore \quad y = -\frac{3x}{4} + \frac{5}{2}$.

$\therefore$ the slope (m) of this line is $-\frac{3}{4}$.

Parallel lines have the same slope.

$\therefore$ the line passing through (2, -1) has slope (m) = $-\frac{3}{4}$

Let $(2, -1) \equiv (x_1, y_1)$

Using point-slope form : $y - y_1 = m(x - x_1)$

$y - (-1) = -\frac{3}{4}(x - 2)$

$\therefore$ $4y + 4 = -3x + 6$ ... (Multiplying both the sides by 4)

$\therefore$ $3x + 4y + 4 - 6 = 0$ $\therefore$ $3x + 4y - 2 = 0$.

The equation of the required line is $3x + 4y - 2 = 0$

2 Find the point on the X-axis which is equidistant from A $(-3, 4)$ and B $(1, -4)$.

Ans Let point P $(x, 0)$ be equidistant from

Points A $(-3, 4)$ and B $(1, -4)$

$\therefore$ PA = PB

$\therefore$ $\sqrt{[x-(-3)]^2 + (0-4)^2} = \sqrt{(x-1)^2 + [0-(-4)]^2}$ ... Distance formula

$\therefore$ $\sqrt{(x+3)^2 + (-4)^2} = \sqrt{(x-1)^2 + (4)^2}$

$\therefore$ $(x+3)^2 + (-4)^2 = (x-1)^2 + (4)^2$ ... (squaring both the sides)

$\therefore$ $x^2 + 6x + 9 + 16 = x^2 - 2x + 1 + 16$

$6x + 25 = -2x + 17$

$6x + 2x = 17 - 25$

$\therefore$ $8x = -8$

$\therefore$ $x = \frac{-8}{8}$

$\therefore$ $x = -1$

$\therefore$ P $(-1, 0)$ is a point on the X axis which is equidistant from the points A $(-3, 4)$ and B $(1, -4)$.

3 Find the ratio in which point P $(k, 7)$ divides the segment joining A $(8, 9)$ and B $(1, 2)$. Also find k.

Ans Let point P divides seg AB in the ratio m : n

Let A $(8, 9) \equiv (x_1, y_1)$,

B $(1, 2) \equiv (x_2, y_2)$ and

P $(k, 7) \equiv (x, y)$

By section formula

$y = \frac{my_2 + ny_1}{m + n}$

$\therefore$ $7 = \frac{m(2) + n(9)}{m + n}$

$\therefore$ $7m + 7n = 2m + 9n$

$\therefore$ $7m + 2m = 9n - 7n$

$\therefore$ $5m = 2n$

$\therefore$ $\frac{m}{n} = \frac{2}{5}$

Now $x = \frac{mx_2 + nx_1}{m + n}$

$\therefore$ $k = \frac{2(1) + 5(8)}{2 + 5}$

$\therefore$ $k = \frac{2 + 40}{7}$

$\therefore$ $k = \frac{42}{7}$

$\therefore$ $k = 6$

$\therefore$ The ratio in which the point P divides seg AB is 2 : 5 and the value of k is 6.

Q.6 Answer the following 8

1 Find the equation of the straight line passing through the origin and the point of intersection of the lines $x + 2y = 7$ and $x - y = 4$.

Ans First we find the coordinates of the point of intersection of the given two lines by solving the equations.
The coordinates of origin are (0, 0).
Then, we find the equation of a line passing through given two points.

x-y=4-+-3y=3 ... (1)... (2)

∴ y = 33

∴ y = 1

Substituting y = 1 in equation (2),

x - (1) = 4

∴ x = 4 + 1

∴ x = 5

∴ the coordinates of the point of intersection of the given two lines are (5, 1).

Now we find the equation of a line passing through the points (0, 0) and (5, 1).

Let (0, 0) ≡(x_1, y_1) and (5, 1) ≡ (x_2, y_2)

The equation of the line is x - x1x1 - x2 = y - y1y1 - y2

∴ x - 00 - 5 = y - 00 - 1

∴ x- 5 = y- 1

∴ x5 = y

∴ x = 5y

∴ x - 5y = 0

The equation of the required line is x - 5y = 0

2 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 ≡ (6, 4) ≡ (x_1, y_1)

M ≡ (– 5, – 3) ≡ (x_2, y_2),

N ≡ (– 6, 8) ≡ (x_3, y_3)

By distance formula

LM = (x2 - x1)2 + (y2 - y1)2

= (- 5 - 6)2 + (-3- 4)2

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

= 121 + 49

∴ 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

∴ 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

= 160 × 10

∴ LN = 410 ... III

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

∴ AB ≠ BC + AC

∴ 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.

∴ The line segments joining the points A, B, C determine a triangle.

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

∴ △ABC is a scalene triangle. [All three sides are unequal]

Q.7 Answer the following 6

1 Show that the line joining the points A (4, 8) and B (5, 5) is parallel to the line joining the points C (2,4) and D (1,7).

Ans Let A (4, 8) ≡(x_1, y_1),

B (5, 5) ≡(x_2, y_2),

C (2, 4) ≡(x_3, y_3),

D (1, 7) ≡(x_4, y_4),

Slope of line AB = y2 - y1x2 - x1

= 5-85-4

= - 31

∴ Slope of line AB = -3 ... I

Slope of line CD = y4 - y3x4 - x3

= 7-41-2

= 3- 1

∴ Slope of line CD = -3 ... II

∴ Slope of line AB = Slope of line CD ... [From I, II]

∴ Line AB || Line CD.

Hence, the two lines joining the given points are parallel.

2 In each of the following examples find the co-ordinates of point A which divides segment PQ in the ratio a : b.
P (– 3, 7), Q (1, – 4), a : b = 2 : 1

Ans Let P (– 3, 7)≡(x_1, y_1),

Q (1, – 4)≡(x_2, y_2) and

A≡(x_1, y)

Here x_1 = – 3, y_1 = 7, x_2 = 1,

y_2 = – 4, m = 2 and n = 1

By section formula

x = mx2 + nx1m + n , y = my2 + ny1m + n

= 2 (1)+1 (-3)2 + 1 = 2 (-4) + 1 (7)2+1

= 2-33 = - 8+73

∴ x = - 13 ∴ y = - 13

∴ The coordinates of point A are - 13, -13.