Class 10-Mathematics

Instructions for students: The notes provided must be copied to the Maths copy and then do the homework in the same copy.

Exercise 11- continued

26. Solution:

$\quad$ A(-5, 4), B(-1, -2), C(5, 2)

$\quad$ AB $\quad = \quad \sqrt{(-1+5)^2 + (-2-4)^2}$

$\quad\quad\quad = \quad \sqrt{4^2 + -6^2} \quad\quad = \quad \sqrt{52}$

$\quad$ BC $\quad = \quad \sqrt{(5--1)^2 + (2--2)^2}$

$\quad\quad\quad = \quad \sqrt{6^2 + 4^2} \quad\quad = \quad \sqrt{52}$

$\quad$ AC $\quad = \quad \sqrt{(5--5)^2 + (2-4)^2}$

$\quad\quad\quad = \quad \sqrt{10^2 + 2^2} \quad\quad = \quad \sqrt{104}$

$\quad$ AB $\quad = \quad$ BC

$\quad$ AC^2 = AB^2 + BC^2 $\quad$ (104 = 52+52)

$\quad \therefore \Delta$ABC is an isosceles right angled triangle.

$\quad$ Let D(x, y) be the fourth vertex of square ABCD.

Now, midpoint of AC = midpoint of BD (Diagonals of square bisect each other)

$\Rightarrow \left(\frac{-5+5}{2}, \frac{4+2}{2}\right) \quad = \quad \left(\frac{-1+x}{2}, \frac{-2+y}{2}\right)$

$\Rightarrow (0, 3) \quad = \quad \left(\frac{-1+x}{2}, \frac{-2+y}{2}\right)$

$\Rightarrow$ -1+x = 0 , -2+y = 6

$\Rightarrow$ x=1, y=8 , D(1,8)

Home Work:

Solve **Exercise 11 Questions 26, 29, 31 and 35** in the Maths copy.

Practise Exercise 11.

Notes of chapter 12 in the next page.

Chapter 12

Equation of a Straight Line

Inclination: The angle(say θ) which a straight line makes with the positive direction of x axis (measured in anticlockwise direction) is called the inclination of the line.

Slope: If θ is the inclination of a line then **tan θ** is called its **slope(m).**

Intercepts: If a line meets x-axis at A and y-axis at B, then

OA is called the **x-intercept**.

OB is called **y-intercept(c)**

- Equation of a straight line parallel to x –axis: **y = b**
- Equation of x-axis : **y =0**
- Equation of a straight line parallel to y – axis: **x = a**
- Equation of y axis : **x = 0**
- Equation of a line in slope intercept form**: y = mx+ c**
- Equation of a line in point – slope form : **$(y - y_1) = m(x - x_1)$**
- Equation of a line in two point form : $(y - y_1) = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$
- Slope of a straight line = $\frac{y_2 - y_1}{x_2 - x_1}$

Exercise 12.1

19. Solution: Equation of line passing through points P(5, 1) and Q(1, -1) is

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

$$\Rightarrow (y - 1) = \frac{-1-1}{1-5}(x - 5)$$

$$\Rightarrow (y - 1) = \frac{-2}{-4}(x - 5)$$

$$\Rightarrow (y - 1) = \frac{1}{2}(x - 5)$$

$$\Rightarrow 2(y - 1) = (x - 5)$$

$$\Rightarrow 2y - 2 = x - 5$$

$$\Rightarrow x - 2y - 3 = 0$$

Substituting the values of coordinates of R(11, 4) in the above equation.

11 - 2×4 – 3 = 0

$\therefore$ P, Q and R are collinear (They are on the same straight line).

25. Solution:

x- intercept = 6

i.e., The required line meets x- axis at A(6, 0)

y- intercept = -4

i.e., The required line meets y- axis at B(0, -4)

Equation of straight line AB in two point form:

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

$$\Rightarrow (y - 0) = \frac{-4-0}{0-6}(x - 6)$$

$$\Rightarrow y = \frac{2}{3}(x - 6)$$

$$\Rightarrow 3y = 2x - 12 \qquad \Rightarrow 2x - 3y - 12 = 0$$

28. Solution:

Let 'a' be the equal positive intercepts.

The line meets the x-axis at (a, 0) and

y- axis at (0, a).

(3,2) is a point on the line.

Now, $\frac{0-2}{a-3} = \frac{2-a}{3-0}$

$\Rightarrow \frac{-2}{a-3} = \frac{2-a}{3} \qquad \Rightarrow -6 = (2-a)(a-3)$

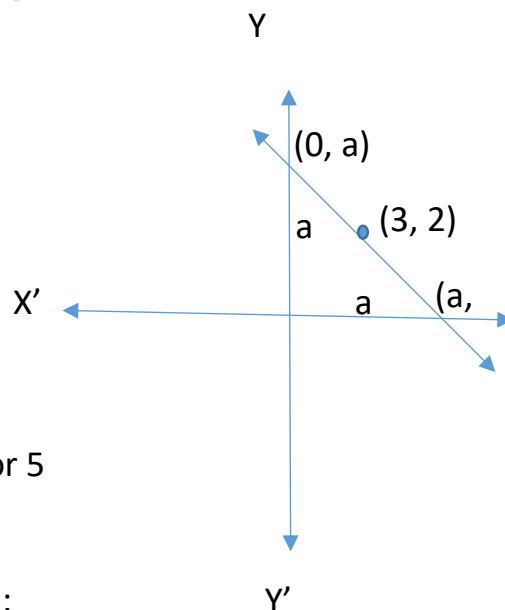$s\Rightarrow -6 = 5a - a^2 - 6 \Rightarrow 5a - a^2 = 0 \Rightarrow a = 0 \text{ or } 5$

i.e $a = 5$ (clearly $a \neq 0$)

Now, Equation of the line in two point form:

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

$$\Rightarrow y - 2 = -x + 3 \qquad \Rightarrow \mathbf{x + y - 5 = 0}$$

(figure with Y, X', Y' axes labels and points (0, a), (3, 2), (a, , with a markings)

Home Work: Solve **Exercise 12.1 Questions 8, 9, 12, 17, 20, 21, 23, 26, 31 and 33** in the Maths copy.

Practise all questions from exercise 12.1