

**EXERCISE 23.4****PAGE NO: 23.29**

**1. Find the equation of the straight line passing through the point (6, 2) and having slope  $-3$ .**

**Solution:**

Given, A straight line passing through the point (6, 2) and the slope is  $-3$

By using the formula,

The equation of line is  $[y - y_1 = m(x - x_1)]$

Here, the line is passing through (6, 2)

It is given that, the slope of line,  $m = -3$

Coordinates of line are  $(x_1, y_1) = (6, 2)$

The equation of line  $= y - y_1 = m(x - x_1)$

Now, substitute the values, we get

$$y - 2 = -3(x - 6)$$

$$y - 2 = -3x + 18$$

$$y + 3x - 20 = 0$$

$\therefore$  The equation of line is  $3x + y - 20 = 0$

**2. Find the equation of the straight line passing through  $(-2, 3)$  and indicated at an angle of  $45^\circ$  with the  $x$  - axis.**

**Solution:**

Given:

A line which is passing through  $(-2, 3)$ , the angle is  $45^\circ$ .

By using the formula,

The equation of line is  $[y - y_1 = m(x - x_1)]$

Here, angle,  $\theta = 45^\circ$

The slope of the line,  $m = \tan \theta$

$$m = \tan 45^\circ$$

$$= 1$$

The line passing through  $(x_1, y_1) = (-2, 3)$

The required equation of line is  $y - y_1 = m(x - x_1)$

Now, substitute the values, we get

$$y - 3 = 1(x - (-2))$$

$$y - 3 = x + 2$$

$$x - y + 5 = 0$$

$\therefore$  The equation of line is  $x - y + 5 = 0$

**3. Find the equation of the line passing through  $(0, 0)$  with slope  $m$**

**Solution:**

Given:

A straight line passing through the point  $(0, 0)$  and slope is  $m$ .

By using the formula,

The equation of line is  $[y - y_1 = m(x - x_1)]$

It is given that, the line is passing through  $(0, 0)$  and the slope of line,  $m = m$

Coordinates of line are  $(x_1, y_1) = (0, 0)$

The equation of line =  $y - y_1 = m(x - x_1)$

Now, substitute the values, we get

$$y - 0 = m(x - 0)$$

$$y = mx$$

$\therefore$  The equation of line is  $y = mx$ .

**4. Find the equation of the line passing through  $(2, 2\sqrt{3})$  and inclined with  $x -$  axis at an angle of  $75^\circ$ .**

**Solution:**

Given:

A line which is passing through  $(2, 2\sqrt{3})$ , the angle is  $75^\circ$ .

By using the formula,

The equation of line is  $[y - y_1 = m(x - x_1)]$

Here, angle,  $\theta = 75^\circ$

The slope of the line,  $m = \tan \theta$

$$m = \tan 75^\circ$$

$$= 3.73 = 2 + \sqrt{3}$$

The line passing through  $(x_1, y_1) = (2, 2\sqrt{3})$

The required equation of the line is  $y - y_1 = m(x - x_1)$

Now, substitute the values, we get

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

$$y - 2\sqrt{3} = (2 + \sqrt{3})x - 7.46$$

$$(2 + \sqrt{3})x - y - 4 = 0$$

$\therefore$  The equation of the line is  $(2 + \sqrt{3})x - y - 4 = 0$

**5. Find the equation of the straight line which passes through the point  $(1, 2)$  and makes such an angle with the positive direction of  $x -$  axis whose sine is  $3/5$ .**

**Solution:**

A line which is passing through  $(1, 2)$

To Find: The equation of a straight line.

By using the formula,

The equation of line is  $[y - y_1 = m(x - x_1)]$

Here,  $\sin \theta = 3/5$

$$\begin{aligned}\text{We know, } \sin \theta &= \text{perpendicular/hypotenuse} \\ &= 3/5\end{aligned}$$

$$\begin{aligned}\text{So, according to Pythagoras theorem,} \\ (\text{Hypotenuse})^2 &= (\text{Base})^2 + (\text{Perpendicular})^2 \\ (5)^2 &= (\text{Base})^2 + (3)^2 \\ (\text{Base}) &= \sqrt{(25 - 9)} \\ (\text{Base})^2 &= \sqrt{16} \\ \text{Base} &= 4\end{aligned}$$

$$\begin{aligned}\text{Hence, } \tan \theta &= \text{perpendicular/base} \\ &= 3/4\end{aligned}$$

$$\begin{aligned}\text{The slope of the line, } m &= \tan \theta \\ &= 3/4\end{aligned}$$

The line passing through  $(x_1, y_1) = (1, 2)$

The required equation of line is  $y - y_1 = m(x - x_1)$

Now, substitute the values, we get

$$y - 2 = (3/4)(x - 1)$$

$$4y - 8 = 3x - 3$$

$$3x - 4y + 5 = 0$$

$\therefore$  The equation of line is  $3x - 4y + 5 = 0$