

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° with the x - axis.

Solution:

Given:

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

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

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

$$y = mx$$

∴ 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° .

Solution:

Given:

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

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

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

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

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

∴ 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 $3x - 4y + 5 = 0$