EXERCISE 23.4

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
$y - 2 = -3(x - 6)$
$y - 2 = -3x + 18$
$y + 3x - 20 = 0$
∴ 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^o.
By using the formula,
The equation of line is $[y - y_1 = m(x - x_1)]$
Here, angle, $\theta = 45^o$
The slope of the line, $m = \tan\theta$
$m = \tan 45^o$
$= 1$
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
$y - 3 = 1(x - (-2))$
$y - 3 = x + 2$
$x - y + 5 = 0$
∴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^o.
Solution:
Given:
A line which is passing through $(2, 2\sqrt{3})$, the angle is 75^o.
By using the formula,
The equation of line is $[y – y_1 = m(x – x_1)]$
Here, angle, $\theta = 75^o$
The slope of the line, $m = \tan \theta$
$m = \tan 75^o$
$= 3.73 = 2 + \sqrt{3}$
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, $\sin \theta = 3/5$

We know, $\sin \theta$ = perpendicular/hypotenuse
= 3/5

So, according to Pythagoras theorem,
$(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Perpendicular})^2$
$(5)^2 = (\text{Base})^2 + (3)^2$
$(\text{Base}) = \sqrt{(25 - 9)}$
$(\text{Base})^2 = \sqrt{16}$
Base = 4
Hence, $\tan \theta$ = perpendicular/base
= 3/4
The slope of the line, $m = \tan \theta$
= 3/4
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
$y - 2 = (¾)(x - 1)$
$4y - 8 = 3x - 3$
$3x - 4y + 5 = 0$
∴ The equation of line is $3x - 4y + 5 = 0$