

The Equation of a Line in the form $Ax + By + C = 0$

The equation $Ax + By + C = 0$ is the equation in **Standard Form**.

$$\mathbf{Ax + By + C = 0}$$

In Standard Form, the coefficient in front of x is always positive, and there are no fractions.

Express each of the equations in the form $y = mx + b$. Then, determine the slope and the y -intercept of each of the lines.

a) $4x + 2y - 6 = 0$

b) $x - 3y - 9 = 0$

c) $3x + y + 7 = 0$

d) $2x - y = 0$

2 Express each of the equations in the form $Ax + By + C = 0$.

a) $y = 5x + 3$

b) $y = -3x + 2$

c) $y = \frac{4}{5}x - 2$

The Equation of a Line in the form $y - y_1 = m(x - x_1)$

The equation $y - y_1 = m(x - x_1)$ is the equation in **Point-Slope Form**.

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

3 Express each of the equations in the form $y = mx + b$. Then, determine the slope and the y-intercept of each of the lines.

a) $y - 9 = -2(x - 4)$

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

c) $y - 8 = -\frac{3}{4}(x + 12)$

4 Then convert the above equations to Standard form $Ax + By + C = 0$

The equation of a line in the form $Ax + By + C = 0$

The equation $Ax + By + C = 0$ is a line in Standard Form.

$$\underline{Ax} + \underline{By} + \underline{C} = \underline{0}$$

Rules:

- 1) the coefficient of x must be positive ✓
- 2) No fractions or decimals allowed! ✓
- 3) Everything on one side equal to zero ✓

Rewrite each equation below in the form $y = mx + b$. Then, determine the slope and y -intercept of each line.

a) $4x + 2y - 6 = 0$

$$2y - 6 = -4x$$
$$\frac{2y}{2} = \frac{-4x + 6}{2}$$
$$y = -\frac{4x}{2} + \frac{6}{2}$$
$$y = -2x + 3$$

b) $x - 3y - 9 = 0$

$$\frac{1}{3}x - 9 = \frac{3y}{3}$$
$$\frac{1}{3}x - 3 = y$$

c) $3x + y + 7 = 0$

$$y = -3x - 7$$

d) $2x - y = 0$

$$2x = y$$
$$y = 2x$$

2 Change each equation into standard form ($Ax + By + C = 0$).

a) $y = 5x + 3$

$$0 = \underline{5}x - y + 3$$

b) $y = -3x + 2$

$$\underline{3}x + y - 2 = 0$$

c) $y = \frac{4}{5}x - 2$

$$\downarrow$$
$$\underline{5}(0) = \underline{5}\left(\frac{4}{5}x\right) - \underline{5}(y) - \underline{5}(2)$$

$$0 = 4x - 5y - 10$$

The Equation of a Line in the form $y - y_1 = m(x - x_1)$

The equation $y - y_1 = m(x - x_1)$ is the equation in **Point-Slope Form**.

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

3 Express each of the equations in the form $y = mx + b$. Then, determine the slope and the y-intercept of each of the lines.

a) $y - 9 = -2(x - 4)$

$$y - 9 = -2x + 8$$

$$y = -2x + 17$$

$$m = -2$$

$$b = 17$$

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

$$y + 1 = \frac{1}{2}x - \frac{5}{2}$$

$$y = \frac{1}{2}x - \frac{7}{2}$$

$$m = \frac{1}{2}$$

$$b = -\frac{7}{2}$$

c) $y - 8 = -\frac{3}{4}(x + 12)$

$$y - 8 = -\frac{3}{4}x - 9$$

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

$$m = -\frac{3}{4}$$

$$b = -1$$

4 Then convert the above equations to Standard form $Ax + By + C = 0$

a) $2x + y - 17 = 0$

b) $2y = 1x - 7$

$$0 = 1x - 2y - 7$$

c) $4y = -3x - 4$

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