

Equations of Lines in Different Forms

Slope intercept form

$$y = m x + b$$

[The slope intercept](#) form is useful if the slope m and the y intercept $(0, b)$ are known.

Example 1: The equation of a line with slope -2 and y intercept $(0, 3)$ is written as follows:

$$y = -2x + 3$$

Point Slope Form

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

The point slope form is useful if the slope m and a point (x_1, y_1) through which the line passes are known.

Example 2: The equation of a line that passes through the point $(5, 7)$ and has slope -3 may be written as follows:

$$y - 7 = -3 (x - 7)$$

$$y - 7 = -3x + 21$$

$$3x + y - 7 - 21 = 0 \Rightarrow 3x + y - 28 = 0$$

General Equation of a Line

$ax + by + c = 0$, where a , b and c are constants.

Two-Point Form

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

Find the equation of the straight line passing through the points $(2, 3)$ and $(6, -5)$.

Ans: $2x + y + 1 = 0$

Find the equation of straight line passing through the points $A(0, 8)$ and $B(2, 3)$.

Consider the points $A(0, 8) = (x_1, y_1)$ and $B(2, 3) = (x_2, y_2)$. Now using these points in the two point form of the equation of straight line, we get

$$\begin{aligned}\frac{y-y_1}{y_2-y_1} &= \frac{x-x_1}{x_2-x_1} \\ \Rightarrow \frac{y-8}{3-8} &= \frac{x-0}{2-0} \\ \Rightarrow \frac{y-8}{-5} &= \frac{x}{2} \\ \Rightarrow 2(y-8) &= -5x \\ \Rightarrow 5x + 2y - 16 &= 0\end{aligned}$$