

Equation of a line

SLOPE-intercept form:

$$y = mx + b$$

where m represents the slope of the line and b is the y -coordinate of the y -intercept.

example 1: $y = -\frac{3}{8}x - \frac{5}{2}$

In this equation the slope is $-\frac{3}{8}$
and the y -intercept is $(0, -\frac{5}{2})$

Note: Recall that at a y -intercept, the x value is always zero.

example 2: write the equation
 $3x - 2y = 7$ in slope intercept
form

TO do this we simply solve the equation
for y .

$$3x - 2y = 7$$

$$\underline{-3x} \quad \underline{-3x}$$

$$-2y = -3x + 7$$

$$\frac{-2y}{-2} = \frac{-3x}{-2} + \frac{7}{-2}$$

$$\Rightarrow y = \frac{3}{2}x - \frac{7}{2}$$

now that we have the equation in slope intercept form, it is easy to identify the slope and y-intercept.

↳

slope =

↳

y-intercept =

example 3: write the equation of the line that passes through the point $(0, -2)$ and has a slope of $\frac{7}{15}$.

$$y = mx + b$$

↳

m = _____

↳

b = _____

↳

so we get $y =$ _____

example 4: write the equation of the line that passes through the point (2,3) and has a slope of $-\frac{3}{4}$

This problem is a little more involved than example 3 because the point given is NOT the y-intercept (x value is NOT zero).

First we identify m (the slope)

$m = -\frac{3}{4}$ so $y = mx + b$ becomes

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

Now to solve for b we replace the x and y with the values from the given point.

$$(2,3) \Rightarrow x = 2$$

$$y = 3$$

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

$$\Rightarrow 3 = -\frac{3}{4}(2) + b$$

solve for b : $3 = -\frac{3}{2} + b$

$$3 = -\frac{3}{2} + b$$

$$\frac{+3}{2} \quad \frac{+3}{2}$$

$$3 + \frac{3}{2} = b$$

$$\frac{6}{2} + \frac{3}{2} = b$$

$$\frac{9}{2} = b$$

So our final answer is

$$y = -\frac{3}{4}x + \frac{9}{2}$$

example 5: Find the equation of the line that passes through the points $(1, 2)$ and $(0, -3)$

First we must find the slope, using the slope formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\begin{aligned} m &= \frac{2 - (-3)}{1 - 0} \\ &= \frac{2 + 3}{1} \\ &= \frac{5}{1} \\ &= 5 \end{aligned}$$

SO NOW $y = mx + b$
becomes $y = 5x + b$

NOW we must find b . we can use
either point to do this.

Let's use $(0, -3)$

$$\begin{aligned} \text{Then } y &= 5x + b \\ \text{becomes } \downarrow \quad \downarrow \\ -3 &= 5(0) + b \end{aligned}$$

$$\begin{aligned} -3 &= 0 + b \\ -3 &= b \end{aligned}$$

SO OUR final answer is

$$y = \underline{\hspace{2cm}}$$

Equation of a Line Practice Problems

1. Write the equation $4x + 3y = 6$ in slope-intercept form.

Write the equation of the line with the following properties:

2. Slope = 5, passes through (0, 0)

3. Passes through the points (-1, 3) and (4, -1)