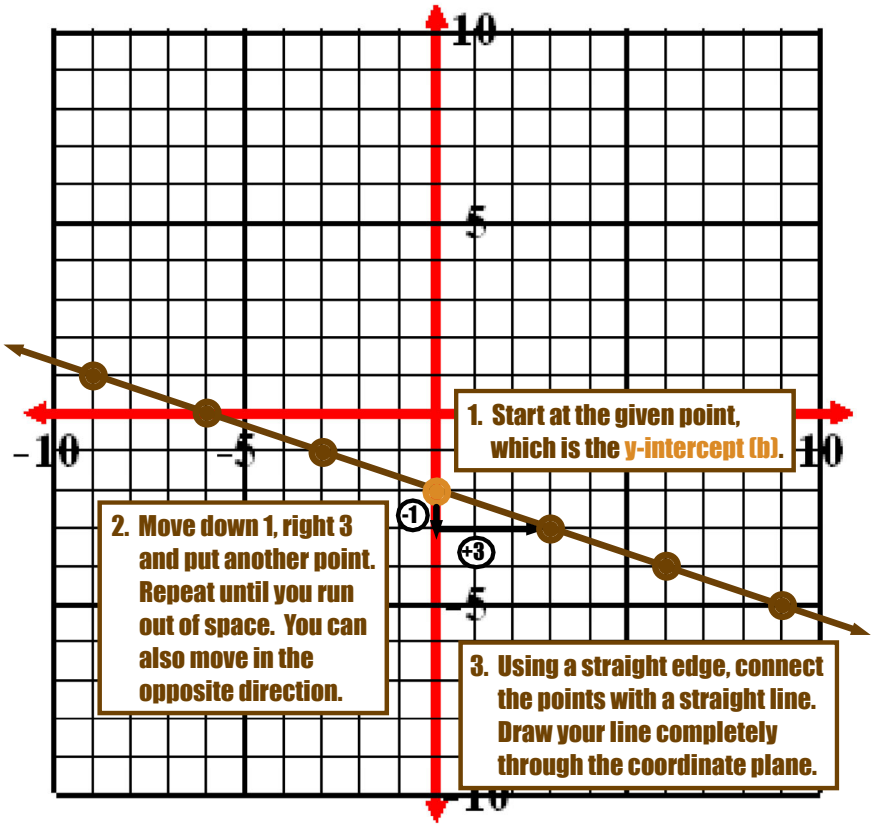
PRINCIPLES - LESSON 8A
WRITING EQUATIONS OF LINES

Recall: To graph a linear equation WITHOUT making a table, we can use the slope and y-intercept.

ex1) Graph: $y = -\frac{1}{3}x - 2$

$y = mx + b$

$m = -\frac{1}{3}$ $\quad$ $b = -2$

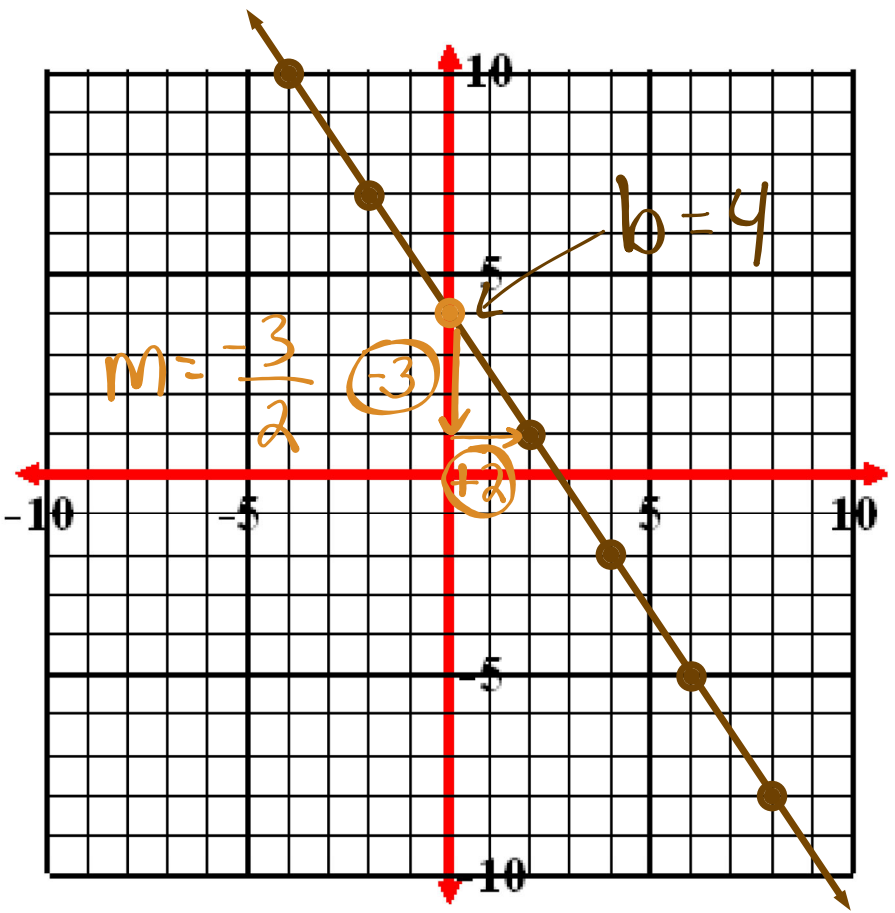


WORKING BACKWARDS

If we can create a graph from an equation just by noting the slope and the y-intercept, then we reverse the process.

ex2) This line shows the solutions of which equation?

Hint: the equation of a line is written as y = mx + b.



We need to know the slope and the y-intercept.

$m = \frac{-3}{2}$ $b = 4$

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

WRITING EQUATIONS OF LINES

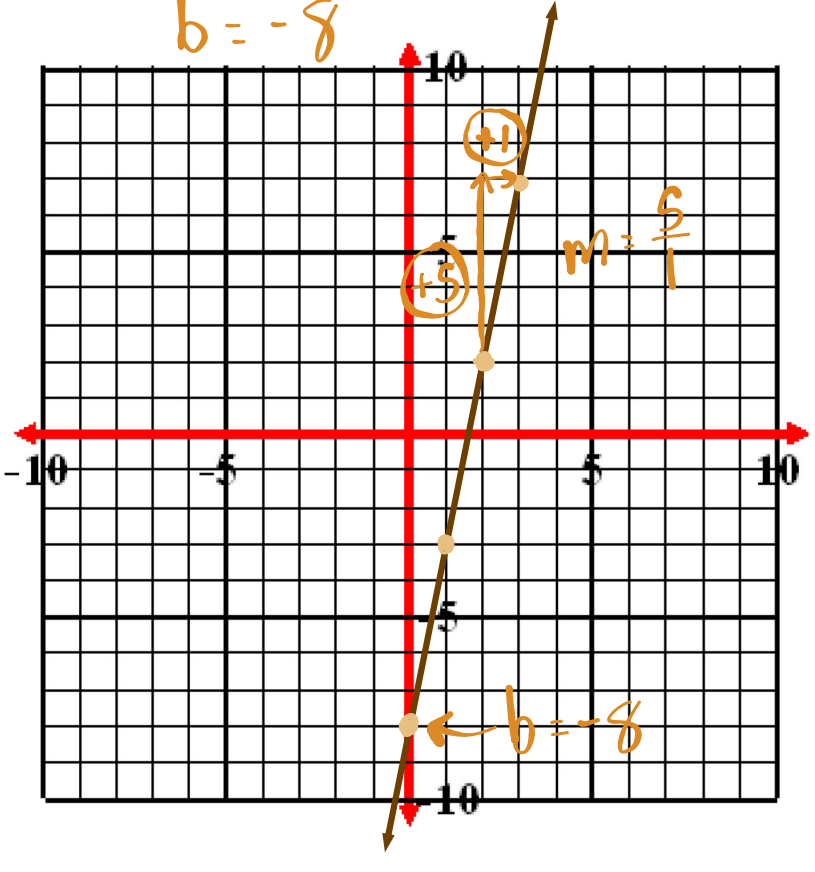
To write the equation of a line in slope-intercept form, you need 2 things:

1. SLOPE (m)
2. Y-INTERCEPT (b)

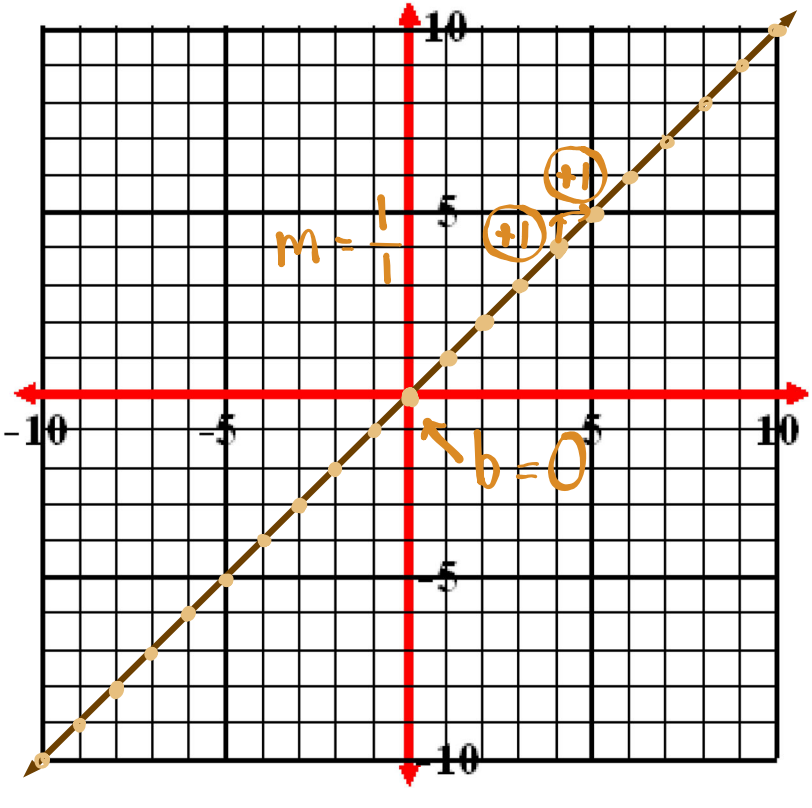
WRITING EQUATIONS OF LINES

Write the equation of each line. $(y = mx + b)$

ex3) $m = \frac{5}{1}$ $b = -8$ $y = 5x - 8$



ex4) $m = \frac{1}{1}$ $b = 0$ $y = 1x + 0$ OR $y = x$



WRITING EQUATIONS OF LINES

ex5) Write the equation of the line that passes through the points (2, 10) and (-1, 4).

x_1 y_1 x_2 y_2

Find SLOPE:

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

$$m = \frac{(4)-(10)}{(-1)-(2)} = \frac{-6}{-3}$$

$$m = 2$$

Find Y-INTERCEPT:

$$y = mx + b$$

$$(10) = (2)(2) + b$$

$$10 = 4 + b$$

$$6 = b$$

m is the slope we just determined. x and y are the coordinates of ANY point on the line. I'll use (2, 10).

Write equation: $y = mx + b \rightarrow \boxed{y = 2x + 6}$

WRITING EQUATIONS OF LINES

ex6) Write the equation of the line that passes through the points (4, -2) and (8, -5).

x_1 y_1 x_2 y_2

Find SLOPE:

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

$$m = \frac{(-5)-(-2)}{(8)-(4)} = \frac{-3}{4}$$

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

Find Y-INTERCEPT:

$$y = mx + b$$

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

$$-2 = -3 + b$$

$$1 = b$$

m is the slope we just determined. x and y are the coordinates of ANY point on the line. I'll use (4, -2).

Write equation: $y = mx + b \rightarrow \boxed{y = -\frac{3}{4}x + 1}$

WRITING EQUATIONS OF LINES

ex7) Write the equation of the line that passes through the points (-3, 3) and (0, -2).

x_1 y_1 x_2 y_2

Find SLOPE:

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

$$m = \frac{(-2)-(3)}{(0)-(-3)} = \frac{-5}{3}$$

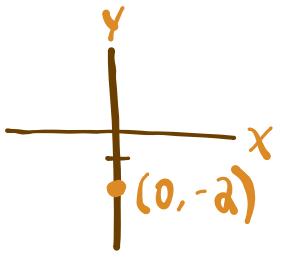
$$\underline{m = -\frac{5}{3}}$$

Find Y-INTERCEPT:

We don't have to work to find the y-intercept this time.

We are given the point (0, -2), which is on the y-axis and is therefore the y-intercept!

$$\underline{b = -2}$$



Write equation:

$$y = mx + b \Rightarrow \boxed{y = -\frac{5}{3}x - 2}$$

WRITING EQUATIONS OF LINES

ex7) Write the equation of the line that passes through the point (1, 3) and has slope 3.

Find SLOPE:

We are given the slope this time.

$m = 3$

Find Y-INTERCEPT:

$y = mx + b$

$(3) = (3)(1) + b$

$3 = 3 + b$

$0 = b$

This line passes through the origin.

m is the slope we just determined. x and y are the coordinates of ANY point on the line. I'll use (1, 3). It's a good choice because it's the only point we have.

Write equation: $y = mx + b \rightarrow y = 3x + 0$ OR $\boxed{y = 3x}$

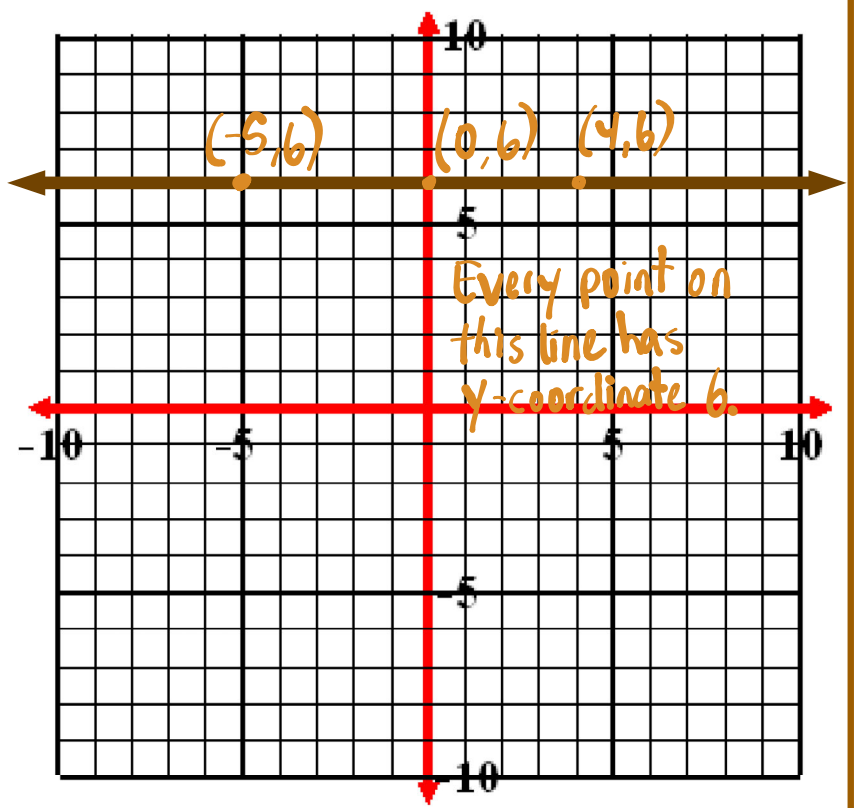
WRITING EQUATIONS OF LINES

Write the equation of each line.

ex9) $y = 6$

y = constant

Always a HORIZONTAL line.



ex10) $x = 6$

x = constant

Always a VERTICAL line.