LEARNING OBJECTIVE: We will write the equation of a line given two points. (G8M4L19)

ACTIVATING PRIOR KNOWLEDGE:
We can convert from slope-intercept to standard form

$y = \dfrac{2}{3}x + \dfrac{8}{3}$ $-\dfrac{2}{3}x \quad -\dfrac{2}{3}x$ $-3\left(-\dfrac{2}{3}x + y = \dfrac{8}{3}\right)$ $+2x - 3y = -8$ STANDARD FORM	$y = \dfrac{4}{5}x + 8$ $-\dfrac{4}{5}x \quad -\dfrac{4}{5}x$ $-5\left(-\dfrac{4}{5}x + y = 8\right)$ $\boxed{4x - 5y = -40}$

CONCEPT DEVELOPMENT:

We can graph lines if we know…	We can write equations if we know…
Standard form of a linear equation FIND x-intercept & y-intercept, plot points, draw line.	The graph of the line. FIND y-intercept & slope
Slope intercept form of a linear equation FIND y-intercept. Use slope to plot next point. draw line	The slope of the line and the *y*-intercept. Write equation in y=mx+b form

We can also write the equation for a line if we know any two points on the line (or even one point and a slope)…we just need to determine the slope and figure out the y-intercept.
Example: Write an equation for the line that passes through the points $(1, -2)$ and $(3, 5)$.
1. Determine the slope by using the slope formula

$$m = \frac{\Delta y}{\Delta x} = \frac{5 - (-2)}{3 - 1} = \frac{7}{2} \qquad \frac{-2 - 5}{1 - 3} = \frac{-7}{-2}$$

2. Find the y-intercept.

$$y = mx + b$$
$$y = \frac{7}{2}x + b$$
$$5 = \frac{7}{2}(3) + b \qquad \text{or} \qquad -2 = \frac{7}{2}(1) + b$$

$$\boxed{y = \frac{7}{2}x - \frac{11}{2}}$$

1   $\dfrac{10}{2} = \dfrac{21}{2} + b \qquad\qquad -\dfrac{4}{2} = \dfrac{7}{2} + b$

$\quad -\dfrac{11}{2} = b \qquad\qquad\qquad -\dfrac{11}{2} = b$

Guided Practice:

Steps for Writing Equations When Given Two Points
1. Determine the slope by using the slope formula or by looking closely at graph of the line.
2. In your slope-intercept form ($y = mx + b$), substitute your slope (m) and a point (x, y) to solve for the y-=intercept *(b)*.
3. Rewrite in slope-intercept form.
4. Rewrite in standard form.

Write an equation for the following line:	Write an equation for the following line:
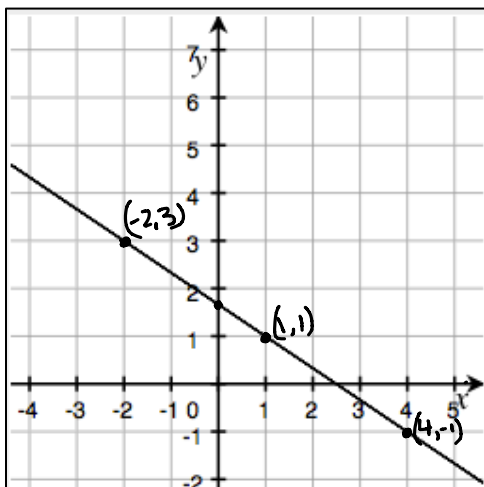
Slope negative
Y int. Not an integer · $1 < y\text{-int} < 2$
Slope $= -\frac{2}{3}$
$y = -\frac{2}{3}x + b$
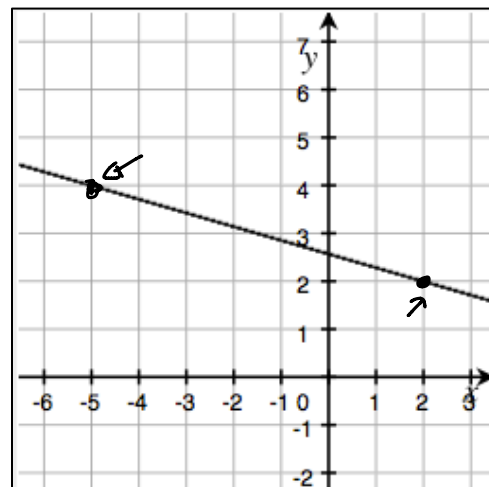$1 = -\frac{2}{3} + b$ $b = \frac{5}{3}$

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

$y = -\frac{2}{7}x + b$
$2 = \frac{2}{7}(2) + b$
$\frac{14}{7} = -\frac{4}{7} + b$ $b = \frac{18}{7}$ $b = \frac{10}{7}$
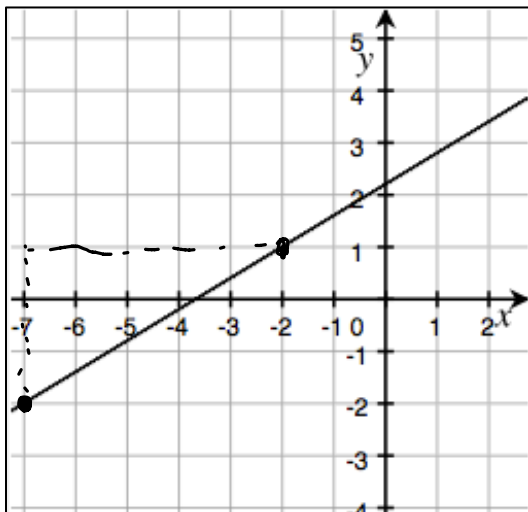
Slope-Intercept:

$$y = -\frac{2}{3}x + \frac{5}{3}$$

$+\frac{2}{3}x \qquad +\frac{2}{3}x$

Slope-Intercept:

$$y = -\frac{2}{7}x + \frac{18}{7}$$

$+\frac{2}{7}x \qquad +\frac{2}{7}x$

$7\left(\frac{2}{7}x + y = \frac{18}{7}\right)$

Standard Form: $3\left(\frac{2}{3}x + y = \frac{5}{3}\right)$

$$2x + 3y = 5$$

Standard Form:

$$2x + 7y = 18$$

Write an equation for the following line:	Write an equation for the following line:

Left column:

$m = \dfrac{3}{5}$

$y = \dfrac{3}{5}x + b$

$-2 = \dfrac{3}{5}(-7) + b$

$-2 = -\dfrac{21}{5} + b$

$-\dfrac{10}{5} = -\dfrac{21}{5} + b$

$+\dfrac{11}{5} = b$

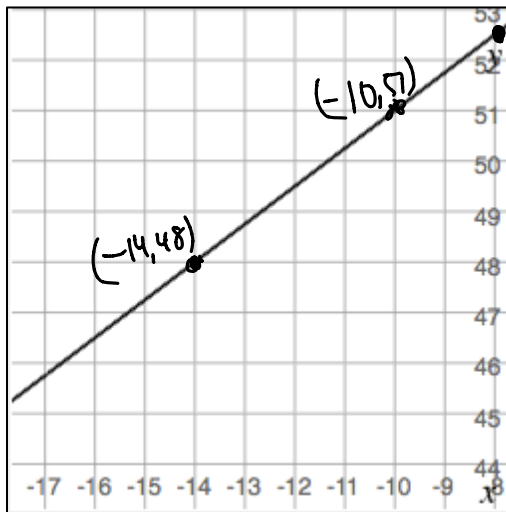Slope-Intercept: $\boxed{y = \dfrac{3}{5}x + \dfrac{11}{5}}$

$-\dfrac{3}{5}x \quad -\dfrac{3}{5}x$

$-5\left(-\dfrac{3}{5}x + y = \dfrac{11}{5}\right)$

Standard Form: $\boxed{3x - 5y = -11}$

Right column:

$m = \dfrac{3}{4}$

$y = \dfrac{3}{4}x + b$

$51 = \dfrac{3}{4}(-10) + b$

$51 = -\dfrac{30}{4} + b$

$\dfrac{204}{4} = -\dfrac{30}{4} + b$

$\dfrac{234}{4} = b$

Slope-Intercept:

$y = \dfrac{3}{4}x + 58\tfrac{1}{2}$

$-4\left(-\dfrac{3}{4}x + y = 58\tfrac{1}{2}\right)$

Standard Form: $\boxed{3x - 4y = -234}$

Write the equation of the line that passes through the points $(-4, 5)$ and $(2, 3)$.

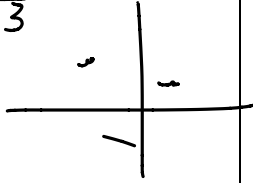$m = \dfrac{5-3}{-4-2} = \dfrac{2}{-6} = -\dfrac{1}{3}$

$y = -\dfrac{1}{3}x + b$

$5 = \left(-\dfrac{1}{3}\right) - 4 + b$

$5 = \dfrac{4}{3} + b$

$\boxed{y = -\dfrac{1}{3}x + \dfrac{11}{3}}$

$\dfrac{15}{3} - \dfrac{4}{3} = b$

$\dfrac{11}{3} = b$

$3\left(\dfrac{1}{3}x + y = \dfrac{11}{3}\right)$

$\boxed{x + 3y = 11}$

Write the equation of the line that passes through the points $(-1, -3)$ and $(2, -2)$.

Write the equation of the line that passes through the points $(12, 12)$ and $(14, 2)$.

Write the equation of the line that passes through the points $(-3, 2)$ and $(2, -13)$.

Independent Practice:

Do Problem Set from Lesson 21.

Closure:

What is the minimum information you need to have in order to determine the equation for a line?

Teacher Notes:

Lesson 21 in ENY
Do IM Peaches and plums