Lesson 8-3

Example 4: Write the equations of the lines in slope-intercept form that pass through the points.

$y = mx + b$

	I Do	We Do
Step 1: Find the slope $\frac{y_2 - y_1}{x_2 - x_1}$	(-3, 1) and (2, -1) $\frac{-1-1}{2-(-3)} = \frac{-2}{5} = m$	(3, 6) and (-1, 4) $\frac{6-4}{3-(-1)} = \frac{2}{4} = \frac{1}{2} = m$
Step 2: Substitute the slope and one of the points into slope-intercept form	$y = mx + b$ $-1 = \frac{-2}{5} \cdot \frac{2}{1} + b$	$y = mx + b$ $6 = \frac{1}{2} \cdot 3 + b$
Step 3: Solve for b	$-1 = -\frac{4}{5} + b$ $+\frac{4}{5} \quad +\frac{4}{5}$ $-\frac{1}{5} = b$	$6 = 1\frac{1}{2} + b$ $-1\frac{1}{2} \quad -1\frac{1}{2}$ $4\frac{1}{2} = b$
Step 4: Write the equation in slope intercept form	$y = -\frac{2}{5}x - \frac{1}{5}$	$y = \frac{1}{2}x + 4\frac{1}{2}$

	We Do	You Do
Step 1: Find the slope $\frac{y_2 - y_1}{x_2 - x_1}$	(4, 6) and (2, -1) $\frac{6-(-1)}{4-2} = \frac{7}{2} = m$	(-3, 0) and (-1, 1) $\frac{0-1}{-3-(-1)} = \frac{+1}{-2} = \frac{1}{2} = m$
Step 2: Substitute the slope and one of the points into slope-intercept form	$y = mx + b$ $6 = \frac{7}{14} \cdot \frac{12}{1} + b$	$y = mx + b$ $1 = \frac{1}{2} \cdot -1 + b$
Step 3: Solve for b	$6 = 14 + b$ $-14 \quad -14$ $-8 = b$	$1 = -\frac{1}{2} + b$ $+1\frac{1}{2} \quad +\frac{1}{2}$ $1\frac{1}{2} = b$
Step 4: Write the equation in slope intercept form	$y = \frac{7}{2}x + -8$ $y = \frac{7}{2}x - 8$	$y = \frac{1}{2}x + 1\frac{1}{2}$

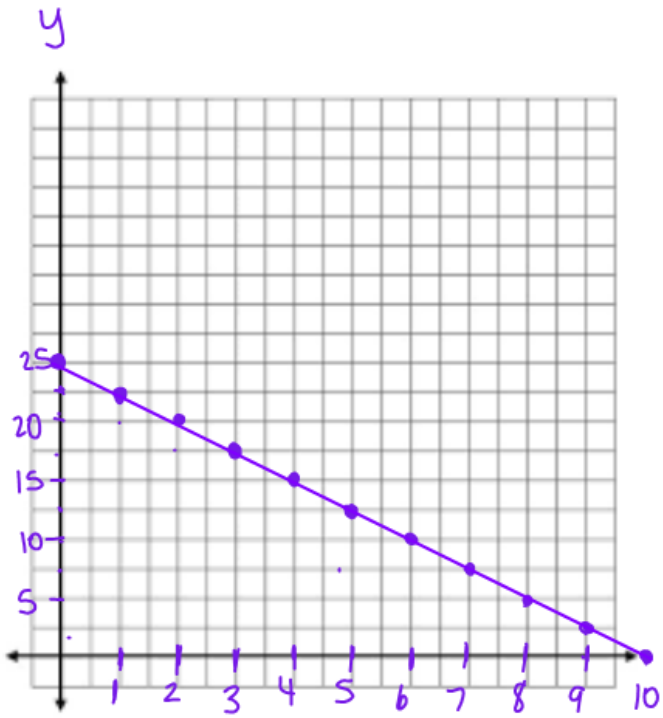
Example 3: Writing Slope-Intercept Form

Every time you buy a skin on Fort Nite, you have to pay $2.50. Your aunt gives you a gift card for $25. The equation y = -2.5x + 25 represents how much money is left on the card after x purchases. Graph the equation, and explain the meaning of the slope and y-intercept.

slope y-int.

$y = mx + b$

$y = -2.5x + 25$



$ on gift card

$\frac{-2.5}{1}$ rise / run

y-int: starting balance

slope: $2.50 per skin

Alex purchases a gym membership for $12 per month. Each time he goes to the gym, he has to pay $3. The equation y=3x + 12 represents how much he has to pay at the gym for x number of visits. Graph the equation and explain the meaning of the slope and y-intercept.

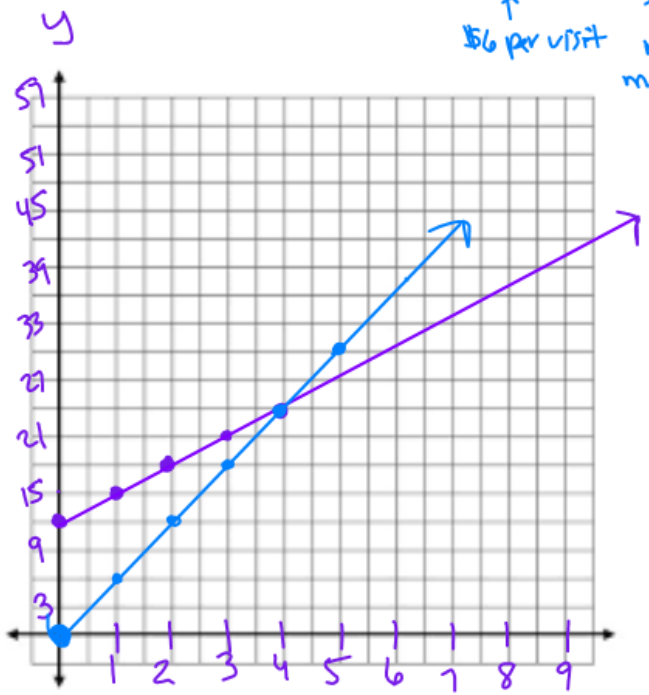
Noah decides not to purchase a gym membership, so he has to pay $6 each time he goes to the gym. The equation y = 6x represents how much he must pay at the gym for x number of visits. Graph the equation and explain the meaning of the slope and y-intercept.

$y = 6x + 0$
↑ $6 per visit ↑ no membership fee

$y = 3x + 12$
↑ ↑
Slope y-int.
cost per visit — membership fee

$y = 19.99x + 120$

$y = 25.99x + 0$



3 rise
1 run

Who chose the better membership option?

It depends → often - Alex
Not often - Noah

At what point in time have they spent the same amount of money?

4 visits

standard form	
Definition * linear equation * $Ax + By = C$	Example $-2x + 7y = 35$

Example 1: Find the x- and y-intercepts of each of the following lines.

I Do	We Do	You Do
$3x + 4y = 12$	$2x + 5y = 12$	$6x - 4y = 16$
x int: $y = 0$ $3x + 0 = 12$ $3x = 12$ $x = 4$ $(4, 0)$	y int: $x = 0$ $0 + 4y = 12$ $4y = 12$ $y = 3$ $(0, 3)$	x int: $y = 0$ $2x + 0 = 12$ $2x = 12$ $x = 6$ $(6, 0)$	y int: $x = 0$ $0 + 5y = 12$ $\frac{5y}{5} = \frac{12}{5}$ $y = 2\frac{2}{5}$ $(0, 2\frac{2}{5})$	x int: $y = 0$ $6x - 0 = 16$ $\frac{6x}{6} = \frac{16}{6}$ $x = 2\frac{4}{6}$ $x = 2\frac{2}{3}$ $(2\frac{2}{3}, 0)$	y int: $x = 0$ $0 - 4y = 16$ $\frac{-4y}{-4} = \frac{16}{-4}$ $y = -4$ $(0, -4)$

Example 2: Use the x- and y-intercepts to graph each equation.

$Ax + By = C$

I Do

$2x + y = 3$

x int
$y = 0$

$2x + 0 = 3$

$\frac{2x}{2} = \frac{3}{2}$

$x = 1.5$

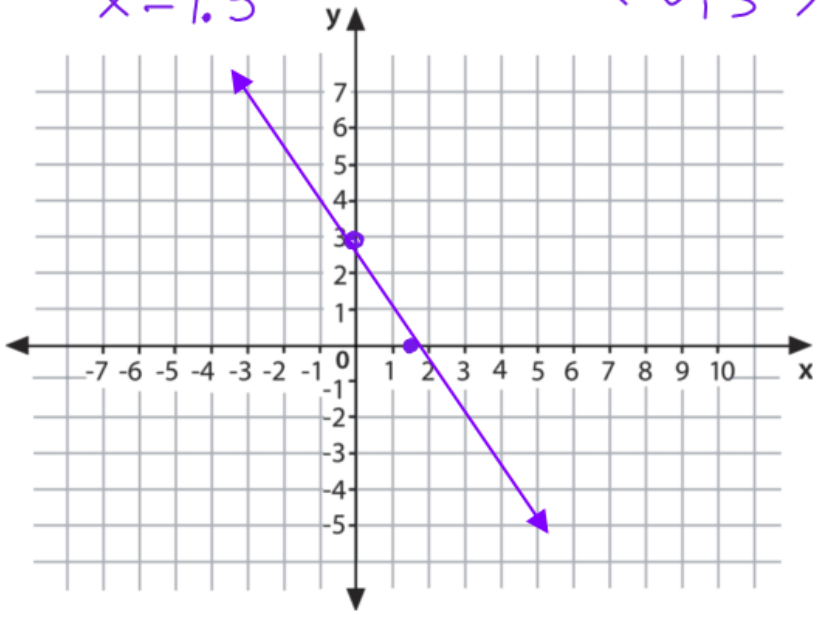
$(1.5, 0)$

y int
$x = 0$

$2(0) + y = 3$

$y = 3$

$(0, 3)$



We Do

$2x + 5y = 15$

~~$2x + y = 3$~~

x int

$2x + 5(0) = 15$

$\frac{2x}{2} = \frac{15}{2}$

$x = 7.5$

$(7.5, 0)$

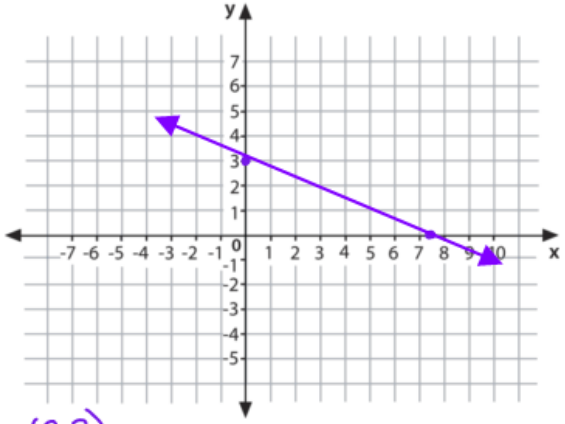
y int

$2(0) + 5y = 15$

$\frac{5y}{5} = \frac{15}{5}$

$y = 3$

$(0, 3)$



You Do

$4x - 3y = 9$

x int

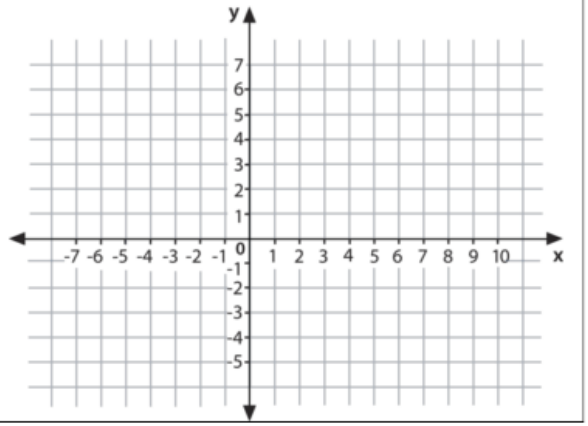
$4x - 3(0) = 9$

$4x = 9$

y int

~~$4(0)$~~ $-3y = 9$

$-3y = 9$



Example 2: Convert from standard form to slope-intercept form.

I Do	We Do
$Ax + By = C$ $3x + 5y = 12$ $-3x \quad -3x$ $\frac{5y}{5} = \frac{-3x}{5} + \frac{12}{5}$ $y = -\frac{3}{5}x + 2\frac{2}{5}$ $y = mx + b$	$2x + 6y = 18$ $-2x \quad -2x$ $\frac{6y}{6} = \frac{-2x}{6} + \frac{18}{6}$ $y = -\frac{1}{3}x + 3$ $y = mx + b$

We Do	You Do
$-4x - 6y = 20$ $+4x \quad +4x$ $\frac{-6y}{-6} = \frac{4x}{-6} + \frac{20}{-6}$ $y = -\frac{2}{3}x + -3\frac{2}{6}$ $-\frac{10}{3}$ $-3\frac{1}{3}$ $y = -\frac{2}{3}x - 3\frac{1}{3}$ $y = mx + b$	$7x - 12y = 24$

Example 2: Convert from slope-intercept form to standard form.

* standard form CANNOT have fractions

I Do	We Do
$2\left(y = \frac{1}{2}x + 3\right)$ $2y = 2 \cdot \frac{1}{2}x + 2 \cdot 3$ $2y = 1x + 6$ $-1x \quad -1x$ $-x + 2y = 6$ $Ax + By = C$	$4\left(y = \frac{3}{4}x - 6\right)$ $4y = 4 \cdot \frac{3}{4}x - 4 \cdot 6$ $4y = 3x - 24$ $-3x \quad -3x$ $-3x + 4y = -24$

We Do	You Do
$6\left(y = -\frac{2}{3}x - \frac{1}{6}\right)$ $6y = 6 \cdot -\frac{2}{3}x - 6 \cdot \frac{1}{6}$ $6y = -4x - 1$ $+4x \quad +4x$ $4x + 6y = -1$	$y = -\frac{2}{5}x - 7$