4.5: Graph Using Slope-Intercept Form

Goals: *Rewrite equations into slope-intercept form
*Identify slope and *y*-intercept of a line from an equation
*Identify slope and *y*-intercept of a line from a graph
*Graph a line using slope-intercept form

****RECALL**** $Ax + By = C$ is __Standard___ form of a line. It is simply one way to write the equation of a line.

Slope – Intercept Form:

$$y = mx + b$$

m is the slope, always the coefficient of *x*
b is the *y*-intercept, always being added or subtracted

Write the following equations in slope – intercept form if necessary, then identify the slope and the *y* – intercept:

*to write in slope-intercept form, *y* must be isolated

Ex: $y = 3x + 4$

$m = 3, b = 4$

Ex: $3x + y = 2$

$$\frac{-3x \quad -3x}{y = 2 - 3x}$$

$m = -3, b = 2$

Ex: $y = 5x - 3$

$m = 5, b = -3$

Ex: $3x - 3y = 12$

$$\frac{-3x \quad -3x}{\frac{-3y}{-3} = \frac{12 - 3x}{-3}}$$

$y = -4 + x$

$m = 1, b = -4$

Ex: $x + 4y = 6$

$$\frac{-x \quad -x}{\frac{4y}{4} = \frac{6 - x}{4}}$$

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

$m = -\frac{1}{4}, b = \frac{3}{2}$

Ex: $x + 3y = 9$

$$\frac{-x \quad -x}{\frac{3y}{3} = \frac{9 - x}{3}}$$

$y = 3 - \frac{1}{3}x$

$m = -\frac{1}{3}, b = 3$

Graph an equation of a line using slope – intercept form:

1. Make sure the equation is written in slope-intercept form (y is isolated)

2. Identify m and b. Be sure slope is written as a fraction so you can identify rise and run.

3. Start at y-intercept. Only choices are to move either up or down.

4. Starting from the y-intercept, move where the rise and run tell you to go.

5. Plot multiple points and connect with a ruler.

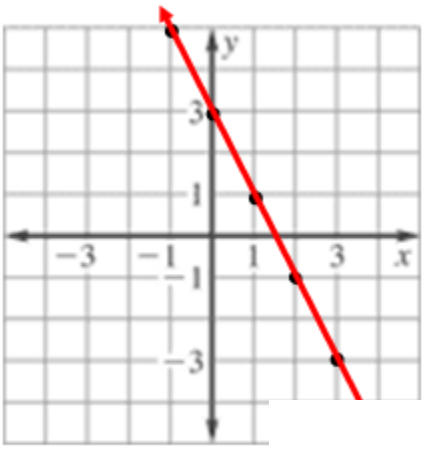
Graph using slope – intercept form:

Ex: $2x + y = 3$

$-2x \quad -2x$

$y = 3 - 2x$

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



Ex: $y = -2x + 5$

$m = -2$, $b = 5$

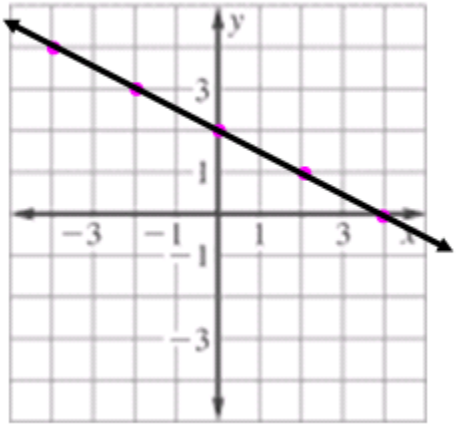
Ex: $x + 2y = 4$

$-x \quad -x$

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

$y = 2 - \frac{1}{2}x$

$m = -\frac{1}{2}$, $b = 2$



Ex: A violin teacher charges a one-time sheet-music fee of $20 for adults and no fee for children. The charge per hour for both is $20.

a) Write two equations to represent each situation.

x: Number of hours — Adults: $y = 20 + 20x$
y: Total cost — Children: $y = 20x$

b) How will these two graphs be related?

They will be parallel because they have the same slope.

Parallel Lines: Two lines are parallel when they have the same slope. If two lines have the same slope they increase or decrease at the same rate, and therefore will never intersect, making them parallel lines.

Ex: Line *A* passes through the points (–1, –1) and (2, 0)
Line *B* passes through the points (0, –3) and (5, –1)
Line *C* passes through the points (–2, –5) and (4, –3)

Which two lines, if any, are parallel? To decide which lines are parallel, find the slope of each line using the formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$ to determine their slopes. If two lines have the same slope then they are parallel.

Line *A*:

$m = \frac{0-(-1)}{2-(-1)}$

$m = \frac{1}{3}$

Line *B*:

$m = \frac{-1-(-3)}{5-(0)}$

$m = \frac{2}{5}$

Line *C*:

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

$m = \frac{2}{6} = \frac{1}{3}$

Lines *A* and *C* are parallel because they have the same slope.

Decide if the given lines are parallel. State why or why not.

Ex: $y = 3x + 7$
$2y - 6x = 8$

*Identify the slope of each line by putting them in slope-intercept form first. Then decide if they are parallel.

1st Line: $y = 3x + 7$

2nd Line: $2y = 8 + 6x$
$y = 4 + 3x$

Both lines have a slope of 3 so they are parallel

Ex: $y = \frac{1}{2}x + 4$
$2x - 4y = 16$

1st Line: $y = \frac{1}{2}x + 4$

2nd Line: $-4y = 16 - 2x$
$y = -4 + \frac{1}{2}x$

Yes, both lines have a slope of ½