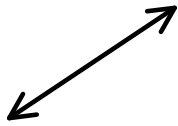# Linear Equations in Two Variables
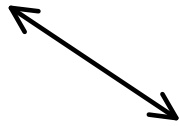
Slope - the ratio of the vertical rise to the horizontal run

$$m = \frac{\text{rise}}{\text{run}}$$

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

$m = $ positive $m = $ negative $m = 0$ $m = $ undefined

General Form - use when asked to write the equation of a line in general form

$$Ax + By + C = 0$$

$$3x - 4y - 7 = 0$$ $$-2x - 6y = 8$$

Standard Form - use when asked to write the equation of a line in standard form
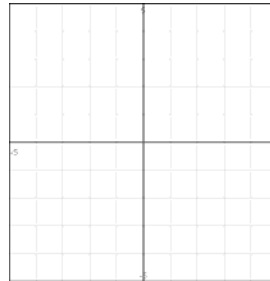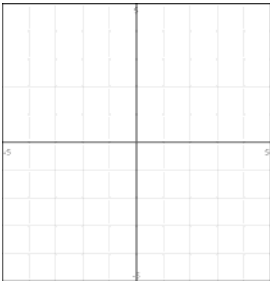
$$Ax + By = C$$

$$2x - 3y = 10$$ $$-5x - y = 9$$

Slope-Intercept Form - use when asked to graph a line

$$y = mx + b$$

$y = 3x - 1$ $\qquad\qquad\qquad\qquad\qquad\qquad$ $y = -x$

Point-Slope Form - use when asked to write the equation of a line

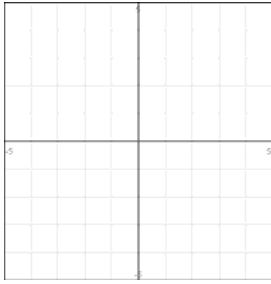$$y - y_1 = m(x - x_1)$$

Given: $m = \dfrac{1}{2}$, $(4, -3)$ $\qquad\qquad\qquad\qquad$ Given: $(-5, 2)$, $(4, -3)$

Vertical Line - an equation of the form $x = c$
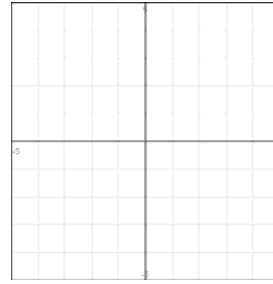
$x = 3$
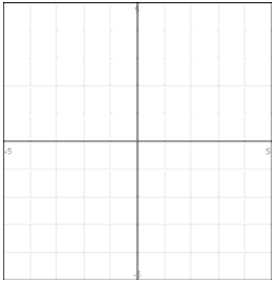
$x = -2$
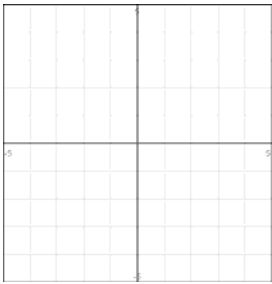
$x = 0$

Horizontal Line - an equation of the form $y = c$
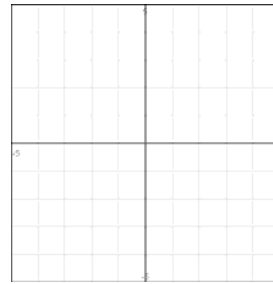
$y = 2$

$y = -4$

$y = 0$

Parallel Lines - have equal slopes

$m = 2$

$m = 0$

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

Perpendicular Lines - have negative, reciprocal slopes

$m = 2$

$m = 0$

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

1. Write each equation in standard form and in slope-intercept form. Identify the slope and the y-intercept.

   a) $6y = -2x - 13$

   b) $x = \dfrac{2}{5}y + 7$

c) $3x = 7y$

2. Write an equation in slope-intercept form for the line that contains the given point and the given slope.

a) $m = -4, \ (-2, -5)$

b) $m = \dfrac{1}{3}, \ (2, -4)$

c) $m = 0$, $(1,7)$ d) $m = $ undefined, $(0,-4)$

3. Write an equation in slope-intercept form for the line that contains the given points.

   a) $(-7,-3)$, $(6,8)$

b) $(-3,4)$, $(-3,7)$ c) $(0,8)$, $(2,8)$

4. Determine whether the lines L_1 and L_2 are parallel, perpendicular or neither.

a) $L_1 : (4,8)$, $(-4,2)$

$L_2 : (3,-5)$, $\left(-1, \dfrac{1}{3}\right)$

b) $L_1 : (0,-7)$, $(2,-3)$

$L_2 : (-1,-1)$, $(5,11)$

c) $L_1 : (4,1), \ (-4,-15)$
   $L_2 : (-12,-5), \ (6,4)$

5. Write the slope-intercept form of the equation of the line through the given point that is parallel and perpendicular to the given line.

   a) Point: $(-5,1)$
      Line: $x + y = 8$

b) Point: $(4,-3)$

   Line: $y = -7$

c) Point: $\left(\dfrac{1}{2}, 2\right)$

   Line: $x = 6$