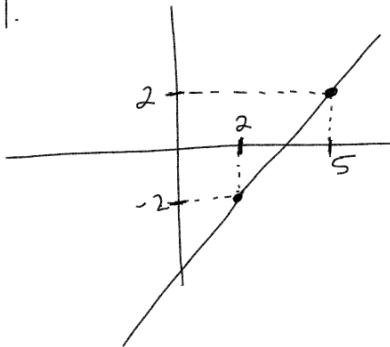Pre-Algebra
Linear Functions
Example 3

Write an equation for the following lines in point-slope form:
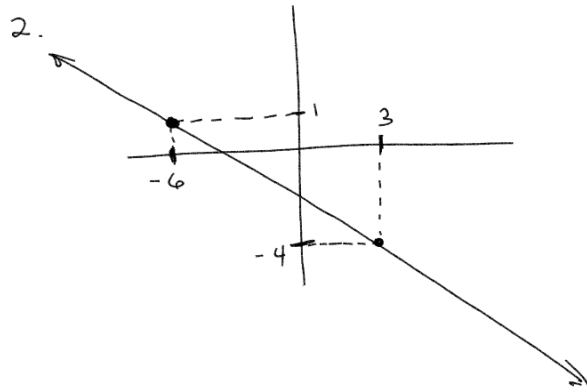
1.

2.

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

$$x_1 = 5 \qquad y_1 = 2$$

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

$$= \frac{2 - (-2)}{5 - 2}$$

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

$$\therefore (y - 2) = \frac{4}{3}(x - 5)$$

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

$$x_1 = -6 \qquad y_1 = 1$$

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

$$= \frac{1 - (-4)}{-6 - 3}$$
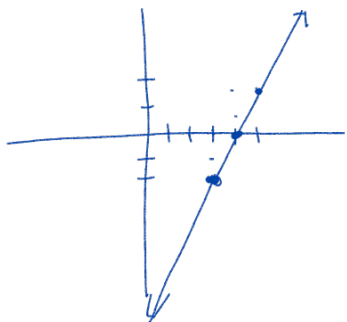
$$= \frac{5}{-9}$$

$$= -\frac{5}{9}$$

$$\therefore (y - 1) = -\frac{5}{9}(x + 6)$$
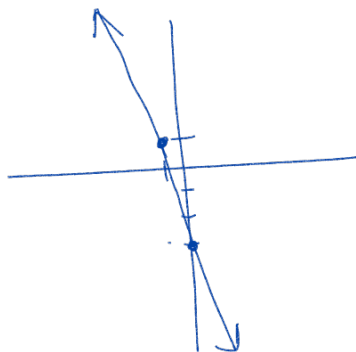
Plot the following equations:

1. $(y+2) = 2(x-3)$

    $m = 2$ thru poin $(3, -2)$

$M = \dfrac{rise}{run} = \dfrac{2}{1} = \dfrac{\text{Go up } 2}{\text{Go RIGHT } 1}$

2. $(y-1) = -4(x+1)$

    $m = -4$ thru $(-1, 1)$

$m = \dfrac{-4}{1} = \dfrac{\text{DOWN } 4}{\text{RIGHT } 1}$

Write an equation for a line parallel to the given equation and passes through the given point:

1. $y = 4x + 1$

    $(0, 2)$

* PARALLEL LINES HAVE THE SAME SLOPE *

    $m = 4$ thru $(0, 2)$

    $(y - 2) = 4(x - 0)$

    $\dfrac{y - 2 = 4x}{+2 \qquad +2}$

    $y \quad = 4x + 2$

    $\boxed{y = 4x + 2}$

2. $4x + 3y = 10$

    $(4, 3)$

    $4x + 3y = 10$

    $\dfrac{-4x \qquad\qquad -4x}{3y = 10 - 4x}$

    $\dfrac{3y}{3} = \dfrac{10}{3} - \dfrac{4x}{3}$

    $y = \dfrac{10}{3} - \dfrac{4}{3}x$

    $m = -\dfrac{4}{3}$ thru $(4, 3)$

    $(y - 3) = -\dfrac{4}{3}(x - 4)$

    $\dfrac{y - 3 = -\dfrac{4}{3}x + \dfrac{16}{3}}{+3 \qquad\qquad +3}$

    $y = -\dfrac{4}{3}x + \dfrac{16}{3} + \dfrac{9}{3}$

    $\boxed{y = -\dfrac{4}{3}x + \dfrac{25}{3}}$

Write an equation for al one perpendicular to the given equation and passes through the given point:

1. $y = 4x + 2$
   $(0,0)$

2. $y = -3x + 1$
   $(0,0)$

* PERPENDICULAR LINES HAVE SLOPES THAT ARE OPPOSITE RECIPROCALS
          OF EACH OTHER *

$m = \dfrac{4}{1}$

$m_\perp = -\dfrac{1}{4}$

$(y-0) = -\dfrac{1}{4}(x-0)$

$y = -\dfrac{1}{4}x$

$m = -\dfrac{3}{1}$

$m_\perp = \dfrac{1}{3}$

$(y-0) = \dfrac{1}{3}(x-0)$

$y = \dfrac{1}{3}x$