

1. What are the slope and y-intercept of each line?

a) $y = 5x - 3$

b) $y = -x$

c) $y = \frac{x}{3} + 4$

d) $y = -2$

$$m=5 \quad y\text{-int}=-3$$

$$m=-1 \quad y\text{-int}=0$$

$$m=\frac{1}{3} \quad y\text{-int}=4$$

$$m=0 \quad y\text{-int}=-2$$

2. Express each equation in slope-intercept form.

a) $4x + 5y - 20 = 0$
 $-4x \quad +20 \quad -4x \quad +20$

$$5y = -4x + 20$$

$$y = -\frac{4}{5}x + 4$$

b) $2x - 3y = 6$

$$-2x \quad -2x$$

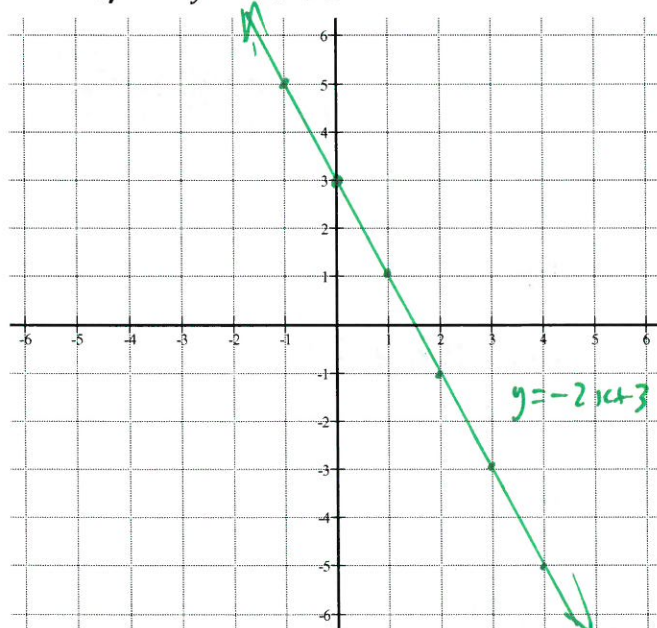
$$-3y = -2x + 6$$

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

3. Sketch the graph of each line using the slope and y-intercept.

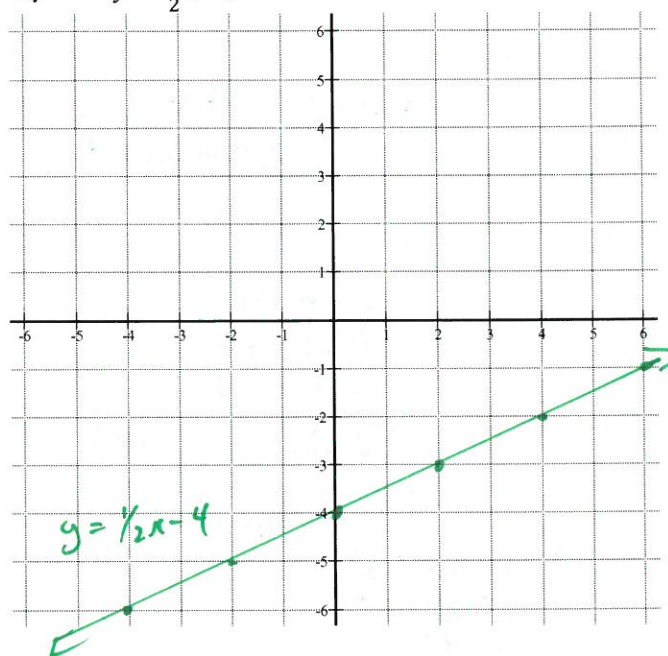
a) $y = -2x + 3$

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

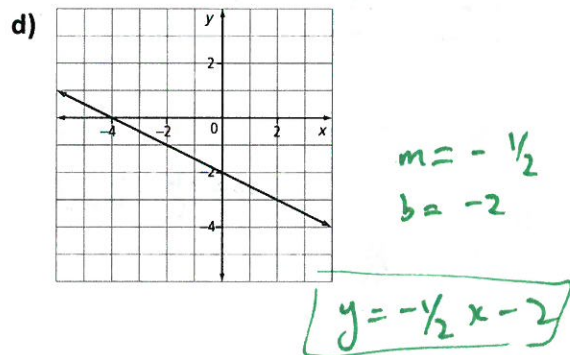
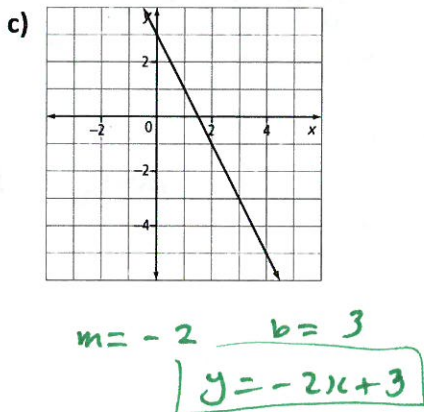
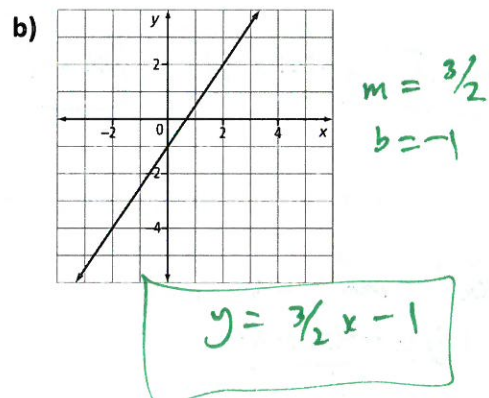
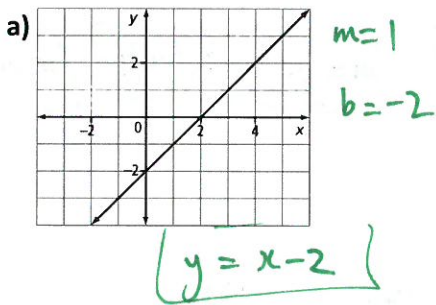


b) $y = \frac{1}{2}x - 4$

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



4. Write the equation of each line in the slope-intercept form.



5. Write the equation of each line in the slope-intercept form.

a) The slope is 2. The line passes through the point (1, 4).

$$\begin{aligned} y &= mx + b \\ y &= 2x + b \\ 4 &= 2(1) + b \\ 4 &= 2 + b \quad b = 2 \\ 2 &= 2 \end{aligned}$$

$$y = 2x + 2$$

b) The y-intercept is -3. The line passes through the point (-2, 6).

$$\begin{aligned} m &= \frac{6 - (-3)}{-2 - 0} \\ &= \frac{9}{-2} \\ &= -\frac{9}{2} \end{aligned}$$

$$y = -\frac{9}{2}x - 3$$

c) The line passes through the points (0, 4) and (2, 6).

$$\begin{aligned} m &= \frac{6 - 4}{2 - 0} \\ &= \frac{2}{2} \\ m &= 1 \end{aligned}$$

$$y = x + 4$$

6. Rewrite each linear equation into general form?

a) $y = 5x - 3$

$$5x - y - 3 = 0$$

b) $y = \frac{2}{3}x + 1$

$$3y = 2x + 3$$

$$-2x + 3y - 3 = 0$$

7. Write the equation with given information in slope-point form.

a) $m = -2$; point $(3, 5)$

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

$$y - 5 = -2(x - 3)$$

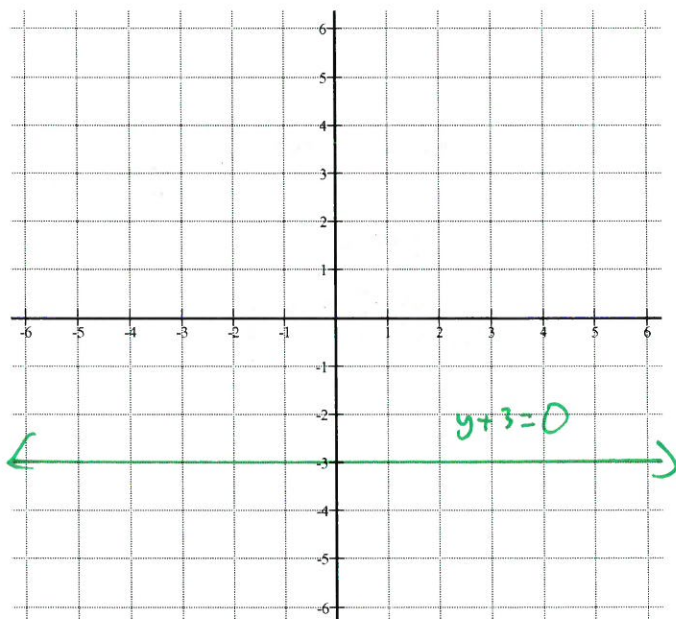
b) $m = \frac{3}{5}$; point $(1, -2)$

$$y + 2 = \frac{3}{5}(x - 1)$$

8. Sketch the graph of each line.

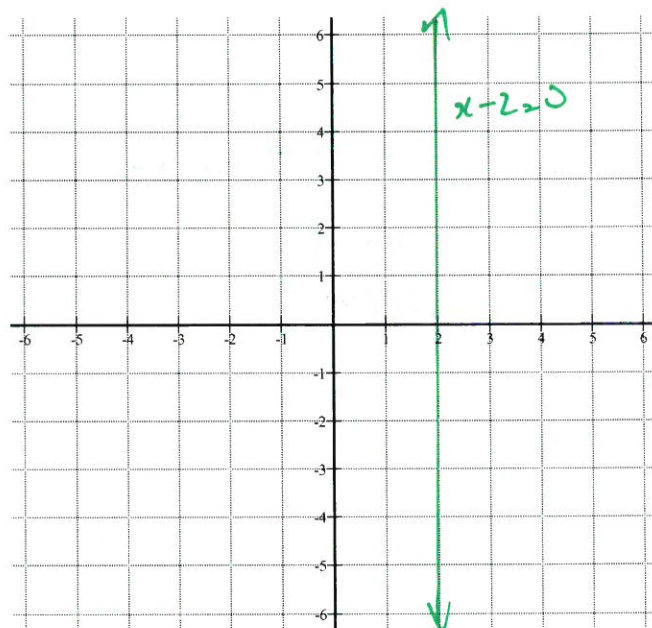
a) $y + 3 = 0$

$y = -3$ horizontal line



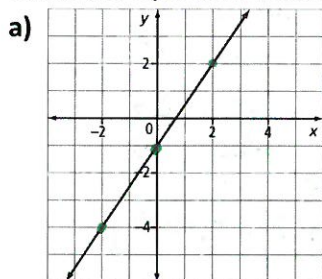
b) $x - 2 = 0$

$x = 2$ vertical line

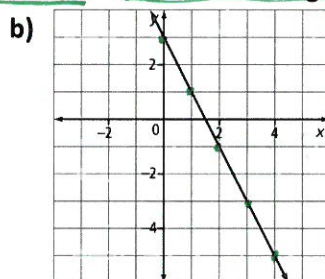


$$y - y_1 = m(x - x_1)$$

9. Write the equation of each line in the slope-point form. Then convert to general form.



$m = 3/2$
 points $(-2, -4)$
 or
 $(0, -1)$
 or
 $(2, 2)$



$m = -2$
 points $(0, 3)$
 $(1, 1)$
 $(2, -1)$
 $(3, -3)$
 $(4, -5)$

$$y + 4 = \frac{3}{2}(x + 2)$$

OR
 $y + 1 = \frac{3}{2}x \rightarrow 2(y + 1) = 3x$
 $2y + 2 = 3x$

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

$$3x - 2y - 2 = 0$$

$$y - 3 = -2x$$

$$y - 1 = -2(x - 1)$$

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

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

OR
 $y + 3 = -2(x - 4)$

$$2x + y - 3 = 0$$

10. Determine, algebraically, the x-intercept and y-intercept of each line.

a) $3x - 4y = 12$

let $y = 0$

let $x = 0$

b) $2x + 5y + 9 = 0$

$$3x - 4(0) = 12$$

$$x\text{-int} = 4$$

$$3(0) - 4y = 12$$

$$y\text{-int} = -3$$

$$2x + 5(0) + 9 = 0$$

$$2x = -9$$

$$x\text{-int} = -9/2$$

$$2(0) + 5y + 9 = 0$$

$$5y = -9$$

$$y\text{-int} = -9/5$$

11. Write an equation, in general form, for each line described.

a) a vertical line passing through the point $(-1, 5) \rightarrow x = \underline{\hspace{2cm}}$

$$x = -1$$

$$x + 1 = 0$$

b) a horizontal line passing through the point $(-4, 2) \rightarrow y = \underline{\hspace{2cm}}$

$$y = 2$$

$$y - 2 = 0$$

12. What is the equation of each line in slope-point form?

a) same x-intercept as the line $y = 3x - 4$ and through $(0, 5)$

$$\begin{aligned} \text{x-int} \\ 0 &= 3x - 4 \\ 4 &= 3x \\ x &= \frac{4}{3} \\ \text{x-int} &= \frac{4}{3} \\ (4/3, 0) \end{aligned}$$

$$\begin{aligned} m &= \frac{5 - 0}{0 - 4/3} \\ &= \frac{5}{-4/3} \\ &= 5 \times -\frac{3}{4} \\ &= -15/4 \end{aligned}$$

$$\begin{aligned} y - 5 &= -15/4(x - 0) \\ y - 5 &= -15/4 x \end{aligned}$$

b) x-intercept of -5 and y-intercept of 4

$$\begin{aligned} m &= \frac{4 - 0}{0 - (-5)} \\ &= \frac{4}{5} \end{aligned}$$

$$y = \frac{4}{5}(x + 5)$$

OR

$$y - 4 = \frac{4}{5}x$$

13. For each given slope of a line state the slope of a line parallel and a line perpendicular:

a) $m = 3$

$$m_{||} = 3 \quad m_{\perp} = -1/3$$

b) $m = -\frac{5}{4}$

$$m_{||} = -5/4 \quad m_{\perp} = 4/5$$

c) $m = 0$

$$m_{||} = 0 \quad m_{\perp} = \text{undefined}$$

14. Write the equation of each line in general form.

a) Parallel to $y = -2x - 6$ passing through $(3, -2)$

$$\begin{aligned} y &= mx + b \\ y &= -2x + b \\ -2 &= -2(3) + b \\ -2 &= -6 + b \\ +6 & \quad +6 \\ 4 &= b \end{aligned}$$

$$y = -2x + 4$$

$$2x + y - 4 = 0$$

b) Perpendicular to $3x + 2y - 6 = 0$ with the same y-intercept.

$$\begin{aligned} 3x + 2y - 6 &= 0 \\ 2y &= -3x + 6 \\ y &= -\frac{3}{2}x + 3 \quad \text{y-int} \\ m &= -3/2 \\ m_{\perp} &= 2/3 \end{aligned}$$

$$\begin{aligned} 3(y) &= 3(\frac{2}{3}x) + (3) \cdot 3 \\ 3y &= 2x + 9 \\ 2x - 3y + 9 &= 0 \end{aligned}$$

c) Perpendicular to $2x - 3y + 6 = 0$ and with the same x-intercept as $4x + 7y - 20 = 0$.

$$\begin{aligned} 2x - 3y + 6 &= 0 \\ 3y &= 2x + 6 \\ y &= \frac{2}{3}x + 2 \\ m &= 2/3 \\ m_{\perp} &= -3/2 \end{aligned}$$

$$4x + 7y - 20 = 0$$

$$4x = 20$$

$$x\text{-int} = 5$$

$$(5, 0)$$

$$y = -3/2x + b$$

$$0 = -3/2(5) + b$$

$$0 = -15/2 + b$$

$$b = 15/2$$

$$y = -3/2x + 15/2$$

$$2y = -3x + 15$$

$$3x + 2y - 15 = 0$$

