3.5 *Write & Graph Equations of Lines*
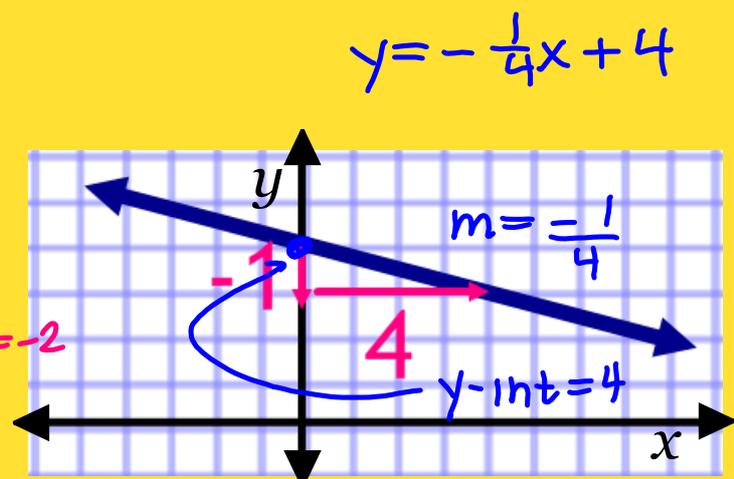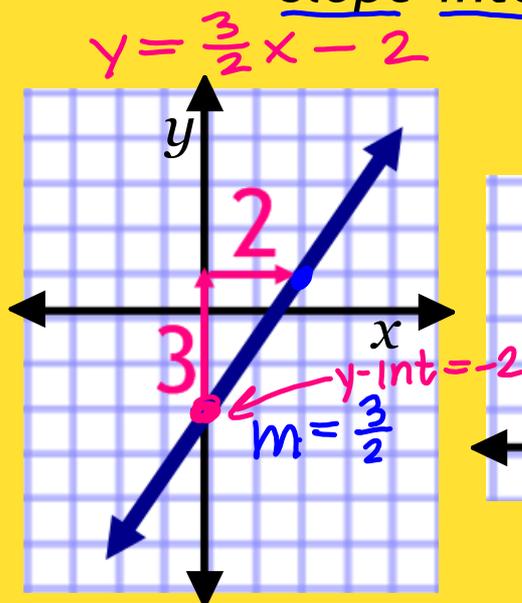
slope-intercept form
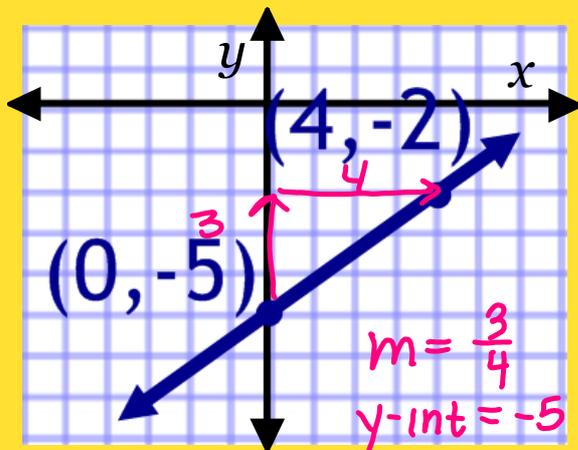$$y = mx + b$$

slope   y-intercept
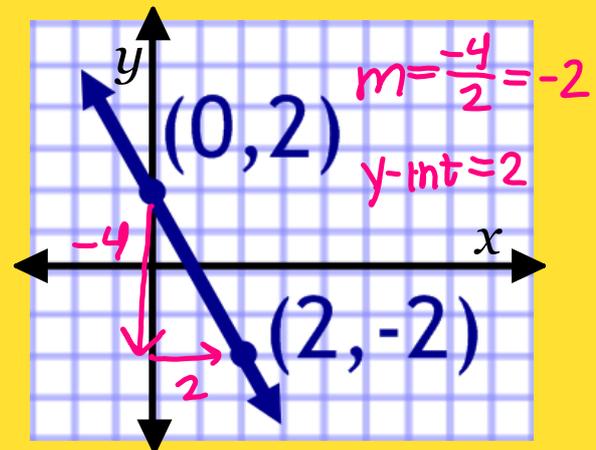

Write the equation of the line in *slope-intercept form.*

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

$y = -\frac{1}{4}x + 4$

y-int = -2

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

$m = -\frac{1}{4}$

y-int = 4

Write the equation of the line in *slope-intercept form.*

$(4,-2)$
$(0,-5)$
$m = \frac{3}{4}$
y-int $= -5$

$$y = \frac{3}{4}x - 5$$

$(0,2)$
$m = \frac{-4}{2} = -2$
y-int $= 2$
$(2,-2)$
-4
2

$$y = -2x + 2$$

Write the equation of the line in *slope-intercept form.*
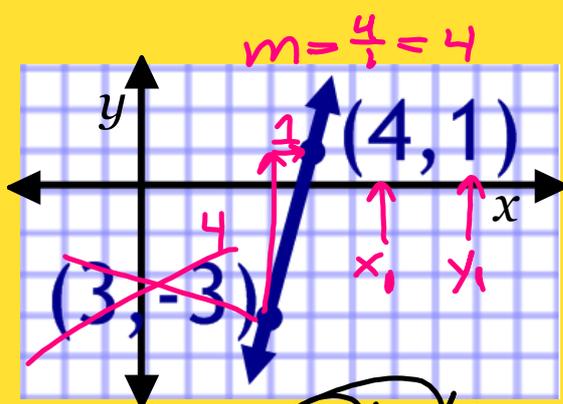
point - slope form
$$y - y_1 = m(x - x_1)$$

$m = \frac{4}{1} = 4$
$(4,1)$
$(3,-3)$
1
4
$x_1 \quad y_1$

$$y - 1 = 4(x - 4)$$
$$y - 1 = 4x - 16$$
$$\underline{ +1 \qquad\qquad +1}$$
$$\boxed{y = 4x - 15}$$

$(-3,2)$
$(1,0)$
$x_1 \quad y_1$
-2
4
$m = -\frac{2}{4} = -\frac{1}{2}$
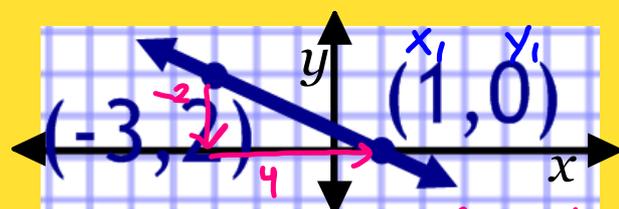
$$y - 0 = -\frac{1}{2}(x - 1)$$
$$\boxed{y = -\frac{1}{2}x + \frac{1}{2}}$$

Write an equation of the line passing through the points (-2,5) and (1,2).

$x_1 \; y_1$

$$m = \frac{2-5}{1+2} = \frac{-3}{3} = -1$$

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

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

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

$$\underline{+2 \qquad\qquad +2}$$

$$\boxed{y = -x + 3}$$

Write an equation of the line passing through the point (2,-3) that is (parallel) to the line with the equation y = 6x + 4.

$x_1 \; y_1$

$$m = 6$$

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

$$y - -3 = 6(x - 2)$$

$$y + 3 = 6x - 12$$

$$\underline{-3 \qquad\qquad -3}$$

$$\boxed{y = 6x - 15}$$

Write an equation of the line passing through the point (3,-4) that is ~~perpendicular~~ to the line with the equation y = -2x - 5.

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

$m_{\perp} = \frac{1}{2}$

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

$$y - -4 = \frac{1}{2}(x - 3)$$

$$y + 4 = \frac{1}{2}x - \frac{3}{2}$$

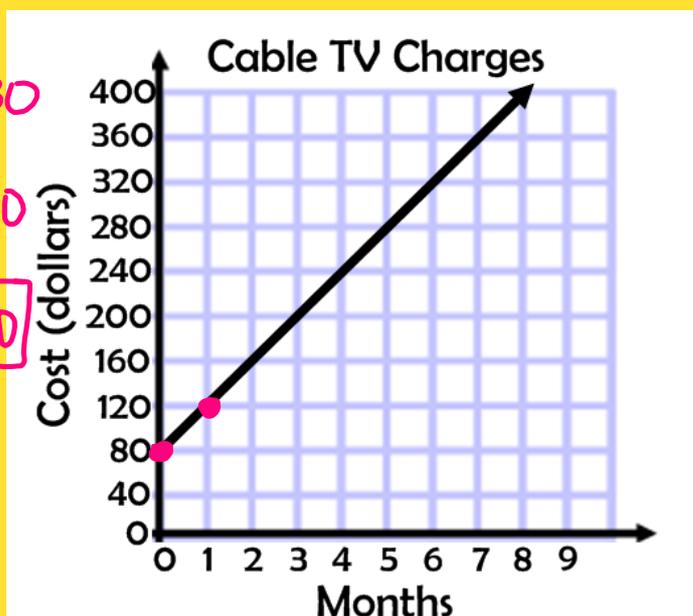$$-4 \qquad -4 - \frac{8}{2}$$

$$\boxed{y = \frac{1}{2}x - \frac{11}{2}}$$

The graph shows the cost of having cable television installed in your home. Write an equation of the line. Explain the meaning of the slope and the y-intercept of the line.

y-int = 80

$m = \frac{40}{1} = 40$

$\boxed{y = 40x + 80}$

Cable TV Charges

Cost (dollars): 400, 360, 320, 280, 240, 200, 160, 120, 80, 40, 0

Months: 0 1 2 3 4 5 6 7 8 9

m = 40
$40/month

y-int = 80
$80 starting cost

standard form

A, B, C

$Ax + By = C$

$\downarrow$ integers

set $y=0$ & solve for x set $x=0$ & solve for y

Find the x-intercept and the y-intercept. Graph the equation.

$2x + 4y = -8$

x-int

$2x + 4(0) = -8$

$\dfrac{2x}{2} = \dfrac{-8}{2}$

$x = -4$

$(-4, 0)$
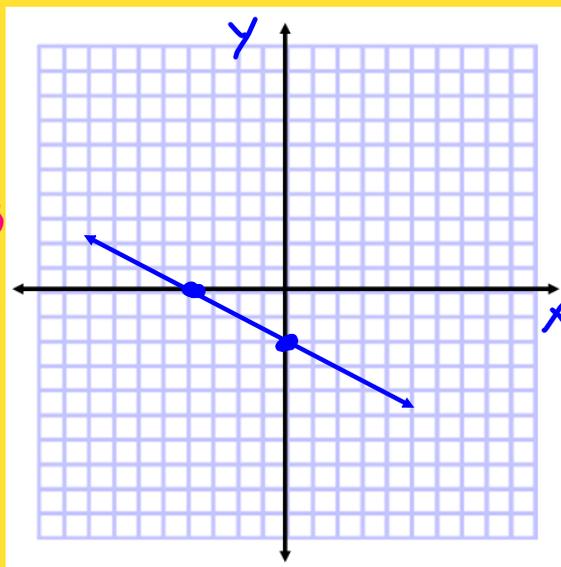
y-int

$2(0) + 4y = -8$

$\dfrac{4y}{4} = \dfrac{-8}{4}$

$y = -2$

$(0, -2)$

Find the x-intercept and the y-intercept. Graph the equation.

$-3x + 6y = 9$

x-int

$-3x + 6(0) = 9$
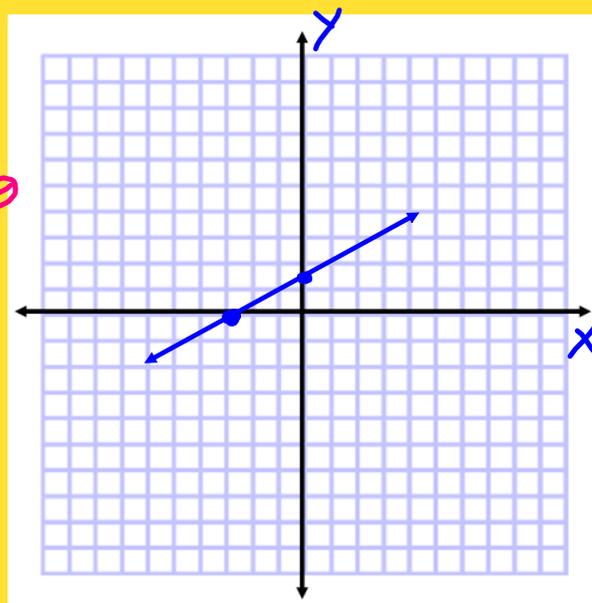
$\dfrac{-3x}{-3} = \dfrac{9}{-3}$

$x = -3$

$(-3, 0)$

y-int

$-3(0) + 6y = 9$
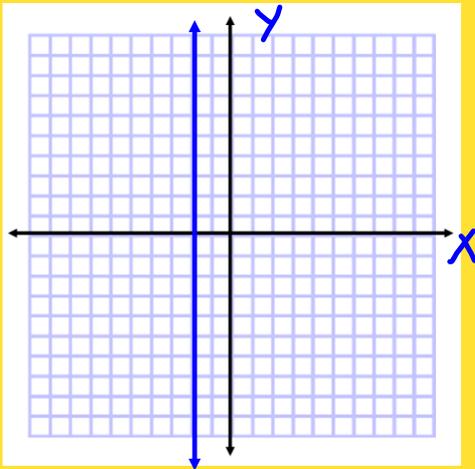
$\dfrac{6y}{6} = \dfrac{9}{6}$

$y = \dfrac{3}{2}$

$\left(0, \dfrac{3}{2}\right)$

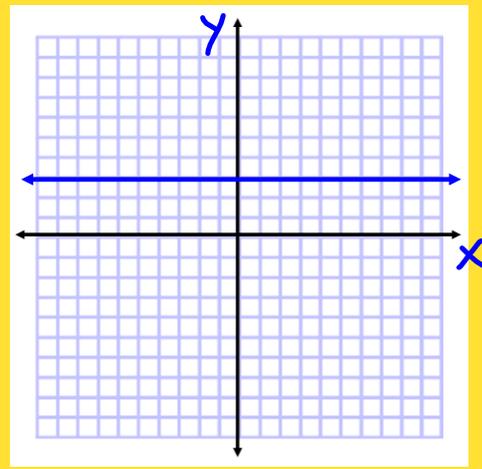## Graph the equation.

$$x = -2 \quad \text{x=\#}$$
vert. line

Graph the equation.

$$y = 3 \quad \text{y=\#}$$
hor. line

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slope
One bank charges $1.50 for each use of its debit card. Another bank charges $10 per month for an unlimited number of debit card uses. How many times would you need to use your debit card to make the bank that charges a flat rate the better choice?

blue
$$y = 1.50x = \frac{3}{2}x$$ pink

$$y = 10$$

7 times