Write the equation of the line graphed.

b=4

m=-2

y= mx + b
y= -2x+4

x=2

y=-3
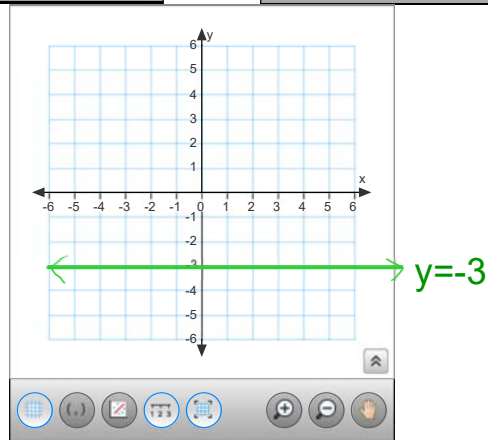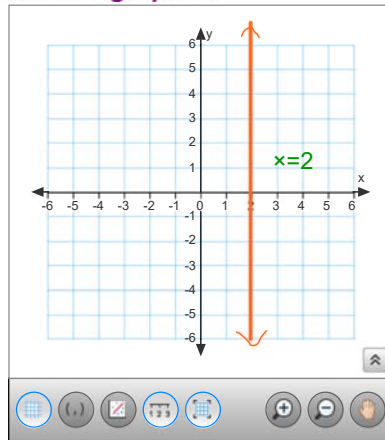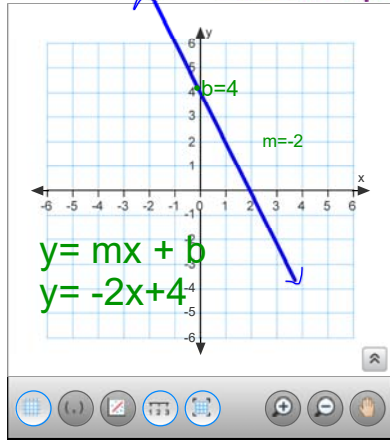
Different Forms of an Equation of a Line

The first step to each form is to calculate the slope if it is not given to you.

Slope formula: m= $\dfrac{y_2-y_1}{x_2-x_1}$

Let's write an equation of a line passing through (1,-3) and (4,5) in three different forms.

First calculate the slope using these two points. m= $\dfrac{5+3}{4-1}=\dfrac{8}{3}$

Slope-intercept form

$y=mx+b$

$(\overset{x}{4},\overset{y}{5})$

1. Substitute the slope for m and a point for x and y.

$(5)=(\frac{8}{3})(\frac{4}{1})+b$

2. Solve for b. This is the y-intercept.

$5 = \frac{32}{3} + b$

$\frac{3 \cdot 5}{3} - \frac{32}{3} = b$

$b = \frac{15}{3} - \frac{32}{3} = -17/3$

3. Use your slope and y-intercept to write the equation.

$y = (\frac{8}{3})x + (\frac{-17}{3})$

$y = \frac{8}{3}x - \frac{17}{3}$

Point-slope form

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

1. Substitute the slope for m and a point for x_1 and y_1

$y - 5 = \frac{8}{3}(x-4)$

You're done!

<u>Standard Form</u>

$Ax + By = C$

A, B, and C are <u>integers</u>. (no fractions or decimals!) "A" must be positive.

1. Use either slope-intercept or point-slope form to write an equation of the line. Then, use your algebra skills to change it to standard form. To do this:

a) Distribute the slope.

$$y - 5 - \frac{8}{3}(x-4)$$
$$y - 5 = \frac{8}{3}x - \frac{32}{3}$$

b)Eliminate the fractions by multiplying each term by the common denominator.

$$3\left(y - 5 = \frac{8}{3}x - \frac{32}{3}\right)$$
$$3y - 15 = 8x - 32$$
$$+15 + 15$$

c) Get the x and y terms on the left side of the equation and the constant on the right side.

$$-8x + 3y = -17$$

d) If necessary, multiply each term by -1 to make "A" positive.

$$\boxed{8x - 3y = 17}$$

Three Forms of an Equation: Point-Slope, Slope-Intercept, and Standard Forms

<u>Directions:</u> Write an equation (in the stated form) of a line passing through the given point. Show all work.

1. (3,-2) and (-1,5)

$$m = \frac{5 - -2}{-1 - 3} = \frac{7}{-4} = -\frac{7}{4}$$

<u>Point-slope</u>   <u>Slope-intercept</u> $y = mx + b$ Standard $Ax + By = C$

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

$$\boxed{y + 2 = -\frac{7}{4}(x - 3)}$$

or

$$y - 5 = -\frac{7}{4}(x + 1)$$

$$y + 2 = -\frac{7}{4}x - 3$$

$$y + 2 = -\frac{7}{4}x + \frac{21}{4}$$
$$-2 \phantom{= -\frac{7}{4}x} -2 = \frac{-8}{4}$$

$$\boxed{y = -\frac{7}{4}x + \frac{13}{4}}$$

$$4\left(y = -\frac{7}{4}x + \frac{13}{4}\right)$$

$$4y = -7x + 13$$

$$\boxed{7x + 4y = 13}$$

2. (5,-2) and (4,2) $m = \dfrac{2--2}{4-5} = \dfrac{4}{-1} = -4$

Point-slope   Slope-intercept   Standard $Ax + By = C$

$y - y_1 = m(x - x_1)$ $y - 2 = -4(x-4)$ $y = -4x + 18$

$\boxed{y - 2 = -4(x - 4)}$

$y - 2 = -4x + 16$
$+2 \qquad\qquad +2$

$\boxed{y = -4x + 18}$ $\boxed{4x + y = 18}$

$\downarrow y\text{-int}$

3. (0,-3) and (5,5) $m = \dfrac{5--3}{5-0} = \dfrac{8}{5}$

Point-slope   Slope-intercept   Standard $Ax + By = C$

$y - 5 = \dfrac{8}{5}(x - 5)$

or

$y + 3 = \dfrac{8}{5}(x - 0)$

$y + 3 = \dfrac{8}{5}x$
$-3 \qquad -3$

$\boxed{y = \dfrac{8}{5}x - 3}$

$5\left(y = \dfrac{8}{5}x - 3\right)$

$5y = 8x - 15$

$-8x + 5y = -15$

$\boxed{8x - 5y = 15}$

You do...

4. (9,2) and (3,-5) $m = \dfrac{7}{6}$

Point-slope   Slope-intercept   Standard

$y - 2 = \dfrac{7}{6}(x - 9)$

$y = \dfrac{7}{6}x - \dfrac{17}{2}$

$7x - 6y = 51$