Last class period we learned how to write a rule using a linear pattern. To write a rule we need the Slope and where we Start. This is also called writing an equation in Slope-intercept form. Which is y = mx + b. Where m represents the Slope and b represents the y-intercept or where we Start.

Slope intercept form is the most common form of a line but point – slope form is the most helpful form of a line.

The point-slope form of an equation is:

$y - y_1 = m(x - x_1)$ where m is Slope

slope

point

In our equation x_1 represents the x-coordinate of our points and y_1 represents the y-coordinate of our point. When using two points we can choose either point for our equation but we CANT use the x from one and the y from the other.

Ex. 1 *Write an equation in point-slope form of the line that passes through the given point and has the given slope.*

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

1. (-3, 1), m = 3

$y - 1 = 3(x - -3)$

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

2. (6, 2), m = ½

$y - 2 = \frac{1}{2}(x - 6)$

3. (1/2, 4), m = 9

$y - 4 = 9(x - \frac{1}{2})$

Ex. 2 *Write an equation in point-slope form of the line that passes through the given points*

1. (2, 3), (5,4)
(Hint: Solve for m first)

$m = \frac{1}{3}$ $\frac{(2,3)}{3,1}$

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

2. (3, -2), (-1, 4)

$\boxed{m=\frac{6}{-4}=\frac{3}{-2}}$ $\frac{(3,-2)}{-4,6}$

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

3. (1/2, 2/3), (3/4, 4/9)

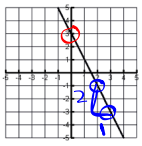
$\frac{4/9-6/9}{3/4-2/4}$ $\frac{-2/9}{1/4}$

$\frac{(2/4,6/9)}{1/4,-2/9}$

$\frac{-2}{9}\cdot\frac{4}{1}=\boxed{\frac{-8}{9}}$

$y-\frac{2}{3}=\frac{-8}{9}(x-\frac{1}{2}$

Ex. 4 Use the graph to write an equation



Points: $\boxed{(2,-1)}$; (3, -3)

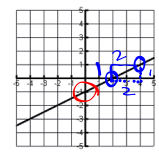
m = -2

b = 3

Slope-Intercept: $y=-2x+3$

Point-Slope: $y+1=-2(x-2)$

Standard Form: _____



Points: (2, 0); (4, 1)

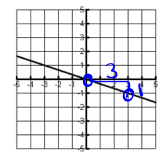
m = $\frac{1}{2}$

b = -1

Slope-Intercept: $y=\frac{1}{2}x-1$

Point - Slope: $y-0=\frac{1}{2}(x-2)$

Standard Form: _____



Points: (0, 0); (3, -1)

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

b = 0

Slope-intercept: $y=\frac{1}{3}x$

Point Slope: $y=-\frac{1}{3}(x-0)$

Standard Form: _____

We can use our writing rules skills to apply them to real world situations using rates of change. To do this we need to:

1. Determine the data points being used
2. Decide which is x and which is y
3. Calculate the slope
4. Next add the y-intercept
5. Finally write your equation

1) Lin is tracking the progress of her plant's growth. Today the plant is 5 cm high. The plant grows 1.5 cm per day.

a. Write a linear model that represents the height of the plant after d, days.

$h=1.5d+5$

b. What will the height of the plant be after 20 days?

$h=1.5(20)+5$

$=35$ cm

2) Mr. Thompson is on a diet. He currently weighs 260 pounds. He loses 4 pounds per month.

a. Write a linear model that represents Mr. Thompson's weight after m, months.

$W = -4m + 260$

b. After how many months will Mr. Thompson reach his goal weight of 220 pounds?

$220 = -4m + 260$
$-260 \qquad -260$
$\frac{-40}{-4} = \frac{-4m}{-4}$ $\boxed{m = 10}$

3.) Suppose that a certain strain of pea plant requires 14 days to reach a height of 6 inches, and 30 days to reach a height of 16 inches.

a.) Write a linear equation that models the height of the plant after x, days. Define your variables.

$(14,6)$ $(30,16)$ $\frac{10}{16} = \frac{5}{8}$
$\frac{(14,6)}{16,10}$

$y - 6 = \frac{5}{8}(x - 14)$

b.) About how many days would it take a plant of this strain to reach a height of 12 inches?

c.) What should the height of the plant be after 20 days?

$y - 6 = \frac{5}{8}(20 - 14$
$y - 6 = \frac{5}{8}(6)$ $y = 9.75$ inches

4) In 2000 gas cost an average of 1.70$ per gallon. This year gas has cost an average of 3.65 per gallon.

1. Suppose the rate of change was constant, how fast are gas prices changing each year?

2000, 1.70 2013, 3.65
$\frac{2000, 1.70}{13, 1.95} = \frac{1.95}{13} = .15$

2. If this rate continues what would gas prices be in 2030?

17 years .15 +2.55 $6.20
+ 3.65