

LINEAR EQUATIONS

-A linear equation is the rule from: a table OR a graph OR 2 coordinates OR a word problem

GENERAL FORMAT:

$$y = \overset{\text{ROC}}{\underset{\text{a}}{a}}(x) \overset{\text{INITIAL VALUE aka "Y" INTERCEPT}}{\underset{\text{aka WHERE THE LINE CROSSES THE Y-AXIS}}{\pm b}}$$

3 MAIN TYPES:

DIRECT: $y = a(x) \pm \bigcirc$

PARTIAL: $y = a(x) \pm b$

INVERSE: $y = \frac{\#}{x}$

!!! $y = 2x + 10 = f(x) = 2x + 10$!!!

Finding a linear equation from a table / graph / word problem

- 1) Make a table of values with the sets of #'s
- 2) Get the ROC and substitute it with the "x" value .

(2 THINGS WILL OCCUR)

You get the "y" coordinate,
which means you are done..

it's a **DIRECT RELATION**

ex:

x	y
2	30
4	60

+2 +30

ROC = $\frac{15}{1}$

The rule is $y = 15x$

because $2 \times 15 = 30$
and $4 \times 15 = 60$

You don't get the "y" coord
which means its a **PARTIAL RELATION** there is a # you
have to \pm at the end and
substitute and solve to find
it...It's the "b"

x	y
3	19
8	34

+5 +15

ROC = $\frac{3}{1}$

BUT!!! $3 \times 3 \neq 19$

$8 \times 3 \neq 34$

SOO... substitution!

$19 = 3(3) + ?$

$19 = 9 + ?$

$19 - 9 = ?$

$10 = ?$

The rule is $y = 3x + 10$

PARAMETERS

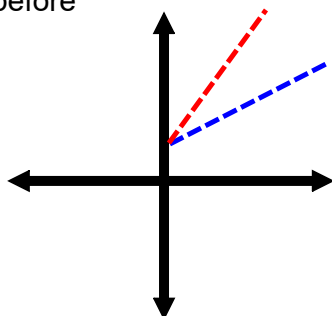
-Limits in a line that control steepness and where it crosses the y-axis

ROC(a) and the INITIAL VALUE (b) have each their own parameters

WHEN YOU CHANGE PARAMETERS:

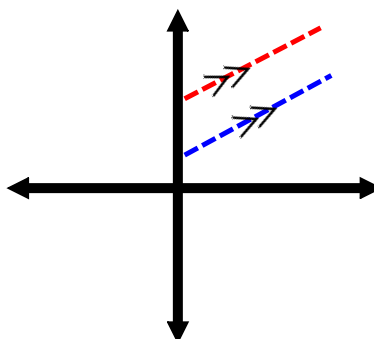
ROC/SLOPE (a)

If you ONLY change this, the line will cross at the same y-intercept BUT...it will be steeper OR flatter than before



Y-intercept/ initial value (b)

If you ONLY change this, the line will be PARALLEL to the original line BUT... it will cross the y-axis higher or lower than before



LINEAR SYSTEMS of EQUATIONS

-Where 2 lines cross on a graph OR where 2 different situations have IDENTICAL (x,y) values.

HOW TO FIND IT?

1) Graph both lines & see at what coordinates they cross (x, y)

(not the best if the point is a decimal!)

2) Calculate using the COMPARISON METHOD:

Using algebra, solve for "x", substitute twice to get "y"

ex: Line 1

$$y = 5x$$

$$5x = 3x + 10$$

Line 2

$$y = 3x + 10$$

$$5x - 3x = 10$$

$$\frac{2x}{2} = \frac{10}{2}$$

$$x = 5$$

You are 1/2 done! You have to substitute the X value into BOTH linear equations to see if you get the same "y" coordinate

FINAL CONCLUSION: These 2 lines will cross @ (5, 25) on a graph

SUBSTITUTION:

$$y = 5(5) = 25$$

$$y = 3(5) + 10 = 25$$

