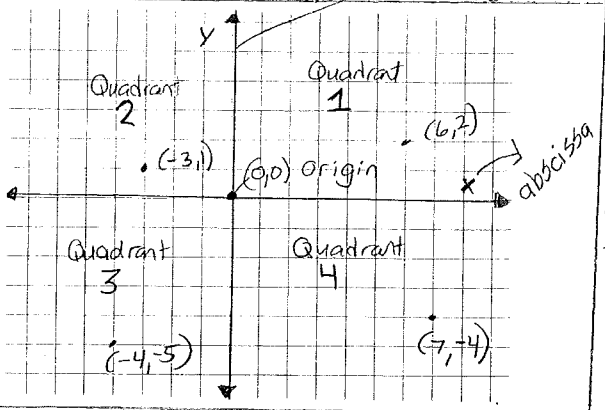
Modes of Representation

The Cartesian Plane



How to figure out the variable

i.e. Find the relation between th number of tvs sold and the total

2 ways:

First: visualize where you would grap each variable. The independent is graph on the x axis and dependent on the Yc

Second: Fill in this sentence!

_____ depends on _____

Y dependent variable — X independent variable

Non-Linear Relations

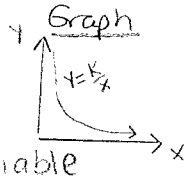
Inversely Proportional

As x increases, y decreases at a different rate.

Rule

$$y = \frac{K}{x}$$

Graph



y = dependent variable
K = constant
x = independent variable

Linear Relations

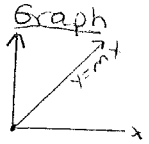
Directly proportional

As x increases, y increases at the same rate. Graph always goes through (0,0)

Rule

$y = mx$

Graph



y = dependent variable
m = slope or rate of change
x = independent variable

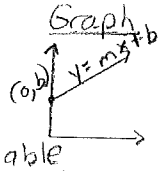
Indirectly proportiona

From the point (0,b), as increases, y increases at the same rate.

Rule

$y = mx + b$

Graph



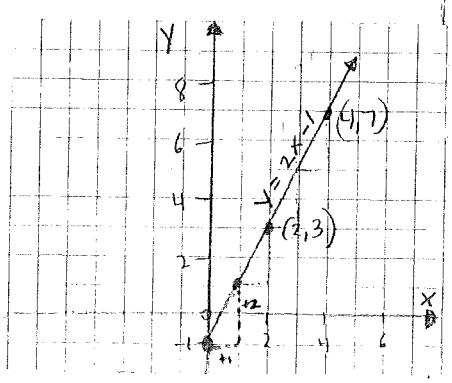
y = dependent variable
m = slope or rate of change
x = independent variable
b = initial value or y intercept

Making a Graph:

From a table of values

coordinate to graph

x	y	
0	-1	→ (0,-1)
2	3	→ (2,3)
4	7	→ (4,7)



From a Rule

$y = 2x - 1$

m b

- start by plotting the initial value (b). (0,-1)
- from the initial value, move over 1 to the right, then move up or down according to the slope.

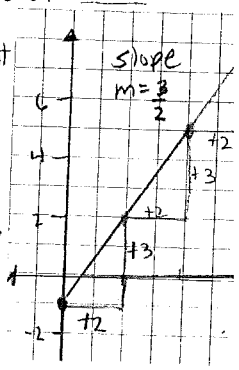
up = + slope
down = - slope

Here it is +2. So move up 2. Continue until you have at least 3 points to make a line

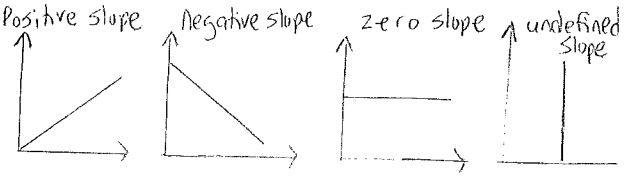
Slope

Represents the rate of change between the variables. We calculate slope (m) by calculating the ratio of rise.

Slope determines the amount that y changes for every change in x. For example $m = \frac{+3}{2}$ means that the slope rises 3 everytime it goes to the right twice



Types of slope:



From a Table of values

use any 2 points from a table of values or 2 given points.

i.e.

x	y
1 (x_1)	8 (y_1)
3	18
10 (x_2)	53 (y_2)
15	78

step 1: Find slope (m)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$x_1 = 1$, $x_2 = 10$, $y_1 = 8$, $y_2 = 53$

$$= \frac{53 - 8}{10 - 1}$$

$$= \frac{45}{9}$$

$$m = 5$$

step 2: Find b (Y intercept)

use point $(3, 18)$ and substitute it in.

$$y = mx + b$$
$$18 = 5 \cdot 3 + b$$
$$18 = 15 + b$$
$$-15 \quad -15$$
$$3 = b$$

$y = 18$, $m = 5$, $x = 3$, $b = b$ (Find by solving equation)

step 3: write the Rule

$y = mx + b$ ∴

$y = 5x + 3$

From a Graph

There are 2 ways to determine a rule from a graph:

1- Use any 2 points from the graph and follow the steps as from a table of values. OR

2- Use information from the graph.

- The "b" will be where the line touches the y axis, the point $(0, b)$
- The (m) or slope can be found by counting the rise (change in y) and the run (change in x). Once you have $\left(\frac{\text{rise}}{\text{run}}\right)$ then divide.
- Write the rule in the form $y = mx + b$

making a Table of values:

From a Rule

i.e $y = 2x - 1$

use the rule to create a table of values by substituting in values of x into the equation.

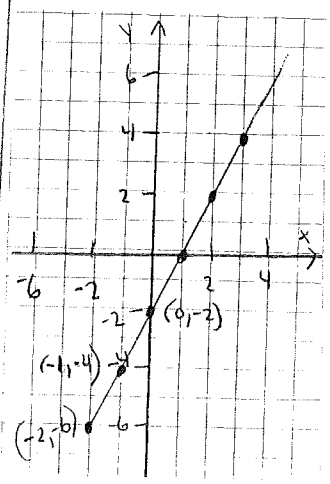
x	y
0	-1
2	3
4	7

if $x = 0$: $y = 2x - 1$; $y = 2(0) - 1$; $y = 0 - 1$; $y = -1$

if $x = 2$: $y = 2x - 1$; $y = 2(2) - 1$; $y = 4 - 1$; $y = 3$

if $x = 4$: $y = 2x - 1$; $y = 2(4) - 1$; $y = 8 - 1$; $y = 7$

From a graph



Write the coordinates from the graph into a table of values

x	y
-2	-6
-1	-4
0	-2
1	0
2	2
3	4