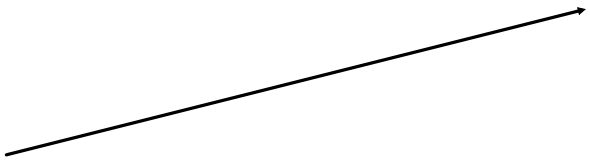
Video Lesson Suggestions

- take advantage of the "pause" feature
- too much text to read, hit pause
- example to work through, hit pause
- not understanding something, hit pause and rewind

Linear Relations - "The Straight and Narrow Path"

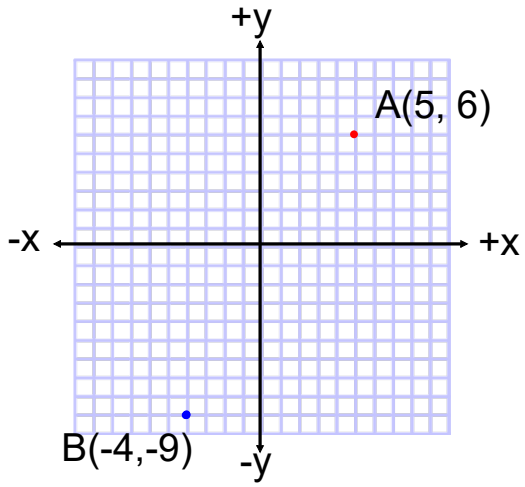


Learning Goal:

By the end of today I will be able to recognize and describe a linear relationship (graph, table of values, equation).

Remember:

- horizontal axis is the X-axis (independent variable)
- vertical axis is the Y-axis (dependent variable)
- both are just number lines with positive and negative sides
- a coordinate consists of an x and a y value (x,y)
-(0,0) is the origin and is where the two axis cross



When we investigate patterns in numbers, we sometimes find there is a predictable and consistent RELATIONSHIP.

When we use pictures (now called graphs) we can see the relationship in a different way.

For example, what are the next 5 terms....

2, 4, 6, 8, ...

1,3,5,7,.....

1,4,9,16,.....

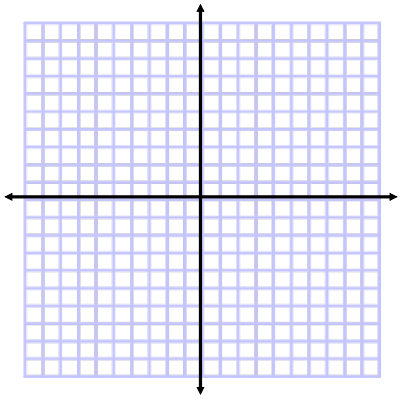
I need ANY two numbers that have a **difference** of three.

I need ANY two numbers (called x and y) that have a **difference** of three.

$y - x = 3$

x	y
0	3
1	4
2	5
3	6
4	7

First Difference



First difference is the difference between two consecutive y-values in a table in which the difference between the x-values is constant.

If the F.D. is CONSTANT then the relationship is linear.

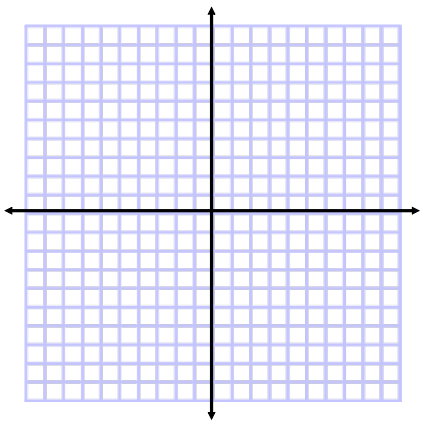
Draw the next three shapes for this pattern

Fig 1 Fig 2 Fig 3 Fig 4

Record the Fig number and the # of sticks in a TOV

Fig	Sticks
1	5
2	7
3	9
4	11
5	
6	
7	

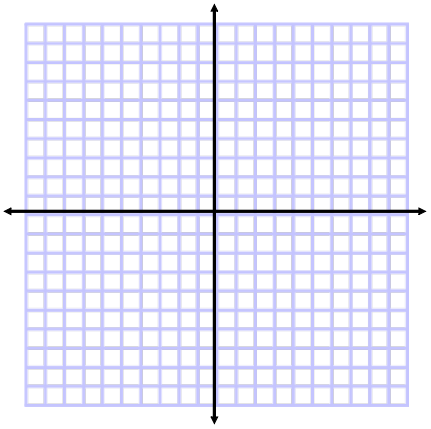
FD



Find pairs of numbers that satisfy the following relationship.
(you can read this as "**two** numbers that sum (add) for four")

$x + y = 4$

x	y	First Difference
-3		
-2		
-1		
0	4	
1	3	
2	2	
3	1	
4	0	



A relationship between two values that plots as a straight line is called a LINEAR Relationship.

A linear relationship can be identified:

(a) by its graph, which will be a straight line

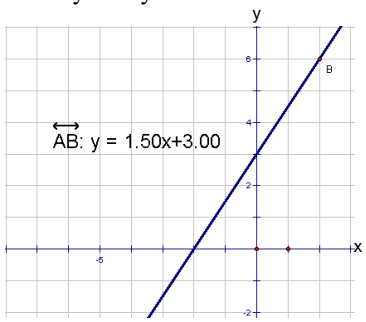
(b) by its First Differences; they will be a CONSTANT value

(c) by its equation (direct or partial variation) - first degree

Other important terms to know.

What is an "Y" intercept? and where do they always occur?

A y-intercept always has an x-value of zero.



What is an "X" intercept? and where do they always occur?

An x-intercept always has an y-value of zero.

A linear relationship can be described in pictures (called graphs), a table of values (n-chart, t-chart, TOV), an equation (ie, x + y = 6) or in words.

Describing a Linear Relationship in Words

A linear relationship that goes "UP" from "left to right" is described as INCREASING.

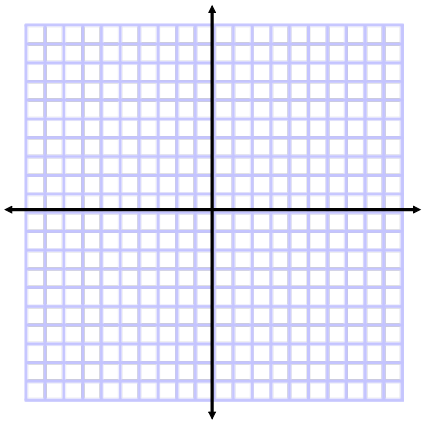
A linear relationship that goes "DOWN" from "left to right" is described as DECREASING.

It is important to use the names of the variables when describing a relationship, for example, "the **amount of money** Sam made *increased* as ***the number of hours*** she worked *increased*".

Is the following relationship linear?

x	y
1	-4
2	-2
	0
4	
	4
6	
7	
	10

F.D.



Write a sentence to describe how x and y are related?

As x increases by 1, y increases by 2, in a linear relationship.

Vocabulary

discrete: A set of data that cannot be broken into smaller parts ie. number of humans

continuous: A set of data that can be broken down into smaller and smaller parts and still have meaning ie. time, dollars

independent variable: In a relation, the variable whose values you choose; usually placed in the LEFT column in a table of values and on the horizontal axis in a graph

dependent variable: In a relation, the variable whose values you calculate; usually placed in the RIGHT column in a table of values and on the vertical axis in a graph

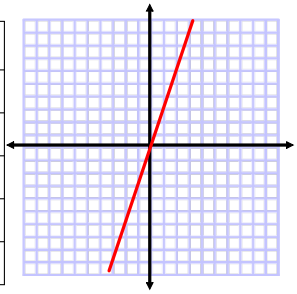
Consolidation Questions:
For the following

(i) DESCRIBE the relationship between the X and Y value,
(ii) create a table of values, using "x" values from -2 to 2,
(iii) then plot the following:

(a) $y = 3x$

The y value is three times the x value.

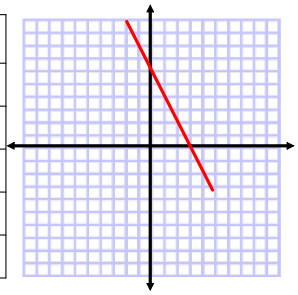
x	y
-2	-6
-1	-3
0	0
1	3
2	6



(b) $y = -2x + 6$

The y value is negative two times the x value plus six more.

x	y
-2	10
-1	8
0	6
1	4
2	2



Home Study Questions:

page 146 #3, 5, 6, 7, 14

Attachments

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