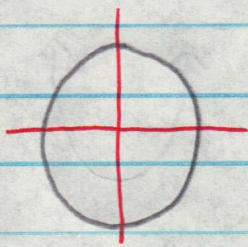


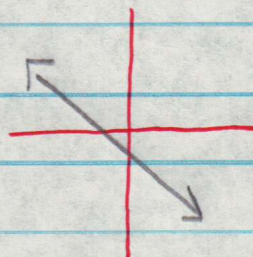
# Algebra I. Lesson 3.2 Linear Functions

Linear: Straight Line.

EX: Which Graph(s) are Linear? Which are Functions?



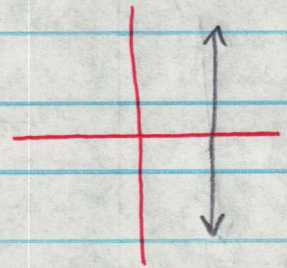
Non-Linear  
Not a Function



Linear  
Function

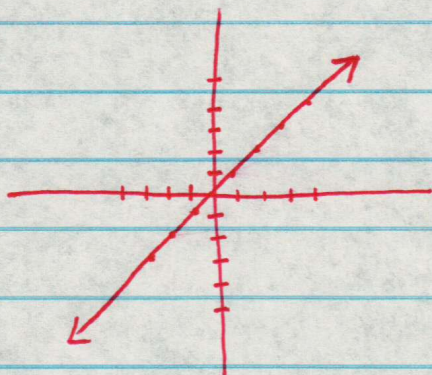


Non Linear  
Function



Linear  
NOT a Function

Examining a Linear Graph:



For Every increase in  $x$ , there should be a proportional increase in  $y$ .

|   |    |    |   |   |   |
|---|----|----|---|---|---|
| x | -2 | -1 | 0 | 1 | 2 |
| y | -2 | -1 | 0 | 1 | 2 |

$\underbrace{\quad\quad}_{+1}$     $\underbrace{\quad\quad}_{+1}$     $\underbrace{\quad\quad}_{+1}$     $\underbrace{\quad\quad}_{+1}$

For Every 1 increase in  $x$ , there is a 1 increase in  $y$ . Therefore this is Linear.

EX: Looking at the chart, is the Function Linear?

|   |   |   |    |    |
|---|---|---|----|----|
| x | 1 | 3 | 5  | 7  |
| y | 2 | 9 | 20 | 35 |

$\underbrace{\quad\quad}_{+7}$     $\underbrace{\quad\quad}_{+11}$     $\underbrace{\quad\quad}_{+15}$

This is NOT Linear because as  $x$  increases by 2,  $y$  is increasing by different Amounts.

Ex: is the table of values representing a Linear function?

|   |    |    |    |    |
|---|----|----|----|----|
| x | 2  | 3  | 5  | 8  |
| y | 10 | 15 | 25 | 40 |

$+1$   $+2$   $+3$   
 $+5$   $+10$   $+15$

This IS Linear. For every 1 increase in x, there is a 5 increase in y.

Ex: Is this table representing a Linear function?

|   |    |    |    |   |   |
|---|----|----|----|---|---|
| x | -4 | -2 | 0  | 2 | 4 |
| y | 24 | 18 | 12 | 6 | 0 |

$+2$   $+2$   $+2$   $+2$   
 $-6$   $-6$   $-6$   $-6$

This is Linear. For every increase of 2 for x, y decreases by 6.

What is the change in y for every 1 increase in x? -3

### Identifying Linear functions...

if, after simplifying, y is raised to the first power, and x is raised to the first power, it is a Linear Function. (This is a basic explanation with many exceptions)

All just basic  
 Addition  
 Subtraction of terms

- Ex of Linear Functions:
- $y = 2x - 7$  (1st power, 1st power)
  - $y + 3x = 15$  (Both 1st Power)
  - $3x + 4y = 11x + 12$

Exceptions:

- if x is multiplying with y. It is NOT Linear.  
 $y = 6x - 3xy$ . NOT Linear.

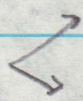
- if there is a y (to the first power with no x, it is Linear.  
 $y = -10$  is Linear

Ex: Which are linear?

$$y = 3.8$$

is Linear

These  
are  
both NOT  
just  $x$  to  
the 1st Power.



$$y = \sqrt{x}$$

NOT

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

NOT

$$y = 2x(x-4)$$

NOT

↑  
if you distribute you  
get  $y = 2x^2 - 8x$ .

2nd Power

HW: Pg 119-121 #s 5-14 (no explanation needed)

17-20

37 part A, 43 part A, 44 part A.