4.4 -A- Linear Functions

- Linear Functions have degree 1

- The rule: **y = ax + b**

   or   **f(x) = ax + b**

Case 1: if b = 0 → <u>Direct Variation</u> Linear function
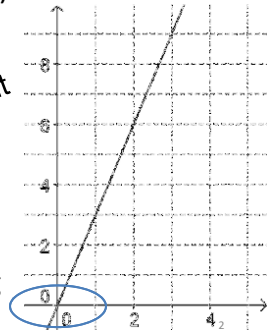Case 2: if b ≠ 0 → <u>Partial Variation</u> Linear function

1

Case 1: if b=0 Direct Variation Linear function

Properties:
1. Every y-value is a direct multiple of the x-value
2. The rule: y = ax   or f(x) = ax
3. Table of values:

x	y	1st Difference	
0	0		
1	3	3	Constant ROC
2	6	3	
3	9	3	

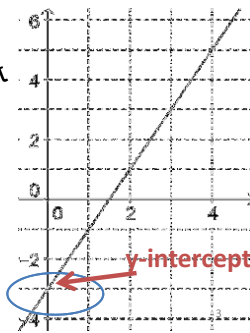4. Graph: a Diagonal line passing through origin (0,0)

Case 2: if b≠0 Partial Variation Linear function

Properties:
1. y-values are not direct multiples of the x-values
2. The rule: y = ax + b   or f(x) = ax + b
3. Table of values:

x	y	1st Difference	
0	-3		
1	-1	2	Constant ROC
2	1	2	
3	3	2	

y-intercept

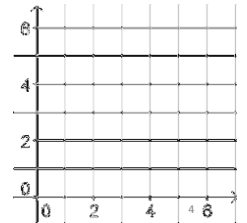4. Graph: a Diagonal line passing through y-axis at point (0,b)

Constant Functions

Properties:
1. The ROC = 0 (∴ aka: zero variation function)
2. The rule: y = b   or   f(x) = b
3. Table of values:

x	y	1st Difference
0	5	
1	5	0
2	5	0

4. Graph: Horizontal line passing through the y-axis at b.

Ex 1: The movie ticket costs $9 for all ages.

If x is the age and y is the cost of ticket

- Table of values:

- ROC:

- The rule is :

- The graph:

Now try activity 2 Page 107

5

Determine the **degree** of each function.

f(x)= 2x+3 ___**1**___   f(x)= 5 ____**0**____

f(x)= 3x^2 -2x + 1 __**2**__   f(x)= 2x^3 + 3x ___**3**___

f(x)= -4x+1 ___**1**___   f(x)= $\frac{1}{x}$ ___**none**___

The degree of a function determines the type of function
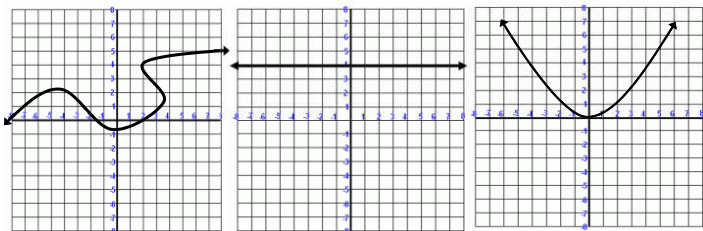
Degree	Type of function
0	Constant
1	Linear
2	Quadratic

Direct Linear function

Partial Linear function

6

Ex 1: is it **C**onstant, **D**irect **L**inear, **P**artial **L**inear or **O**ther

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Ex 1: is it **C**onstant, **D**irect **L**inear, **P**artial **L**inear or **O**ther

x	y
1	3
2	5
3	7
4	9

x	y
10	20
9	18
8	16
7	14

x	y
0	5
20	25
40	45

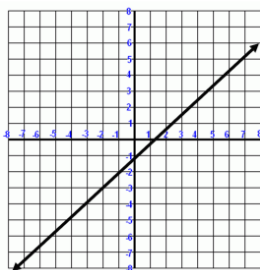Ex 1: is it **C**onstant, **D**irect **L**inear, **P**artial **L**inear or **O**ther

$y = 4x + 1$

$y = x^2$

$y = \sqrt{x}$

$f(x) = 3x$

$f(x) = 5$

Practice:
Day 1: Page 112 # 1-4

Tips for graphing a linear function:

1) Make a Table of Values (min 3 points)

2) Choose <u>easy</u> x-values like <u>0, 1 or 2</u>.

If your slope is a fraction, pick multiples of the value for the **run (denominator).**

    - ie if slope $= \dfrac{3}{4}$ pick x =0, 4, 8.

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1. Graph and label these equations

$y = 3x$ $y = -3x + 2$ $y = \dfrac{1}{3}x$ $y = -\dfrac{1}{3}x - 3$

$y = 3x$

$y = \dfrac{1}{3}x$

$y = -3x + 2$

$y = -\dfrac{1}{3}x - 3$

1. Graph and label these equations

$y = 3x$ $y = -3x + 2$ $y = \dfrac{1}{3}x$ $y = -\dfrac{1}{3}x - 3$

$y = 3x$

a = $\dfrac{3}{1}$ = $\dfrac{rise}{run}$

b = 0

$y = -3x + 2$

a = $\dfrac{-3}{1}$

b = 2
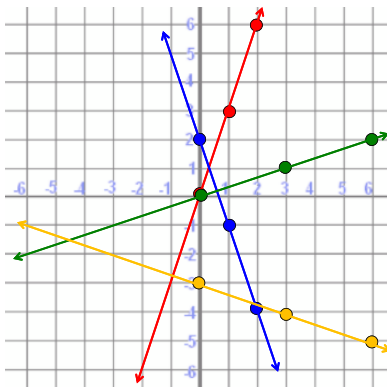
$y = \dfrac{1}{3}x$

a = $\dfrac{1}{3}$

b = 0

$y = -\dfrac{1}{3}x - 3$

a = $\dfrac{-1}{3}$

b = -3

13

Practice:
Day 2: Page 113 # 5-7
Day 3: Page 116 # 8-12

14