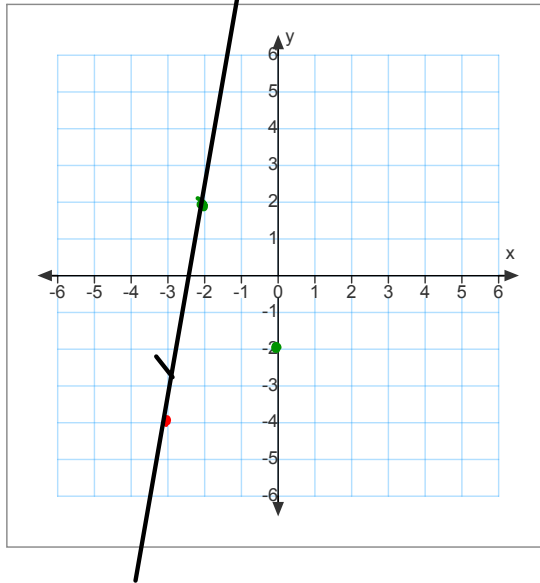Warm Up: $(-3, -4)$

Plot two points on a graph that would give a slope of 6.

$\dfrac{rise}{run}$

$\dfrac{6}{1} = 6$

Does your line represent partial or direct variation? Explain.

Unit 4
Modelling with Graphs
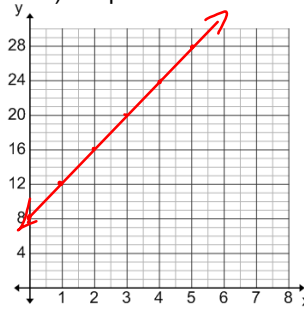(Chapter 5 in textbook!)

Day 5 - First Differences

Example 1: How can we use a table of values to determine if a relationship is linear or non-linear?

a) Copy and complete the table of values for the relation $y = 4x + 8$

$y = 4(4) + 8$

x	y	First Differences
0	8	
1	12	12-8 → 4
2	16	16-12 → 4
3	20	20-16 → 4
4	24	24-20 → 4

b) Graph the relation:

c) Classify the relationship as linear (straight) or non-linear (not-straight)?

Yes, - Straight
- y values go up by same amount

d) Describe the pattern in the x-values.

goes up by 1

e) Add a third column to your table to record the change in the y-values (We call this the FIRST DIFFERENCES.)

Example 2) Is $y = x^2$ linear or (non-linear?)

$y = x^2$

Step 1: Create a table of values:

$y = 1^2$ $y = 2^2$
   $= 1$ $= 4$

x	y	First Differences
0	0	1-0 = 1
1	1	4-1 = 3
2	4	9-4 = 5
3	9	16-9 = 7
4	16	

Step 2: Calculate the first differences:

Step 3: Conclusion:

non-linear because first Differences are not identical

Pull

Example 3: Does the table of values represent a linear
or non-linear relation?

x	y
0	-3
2	-1
4	3
6	9
8	17

First Diff

$-1-(-3)=2$
$3-(-1)=4$
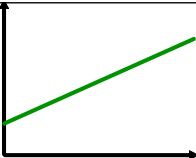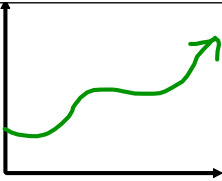$9-3=6$
$17-9=8$

i) Calculate the first differences:

ii) Conclusion:

This is a non-linear relationship because first differences are not the same

** Notice x values are going up
by a constant value (even
though it isn't by one!!!)

Summary:
How to tell if a relationship is Linear or Non-Linear

	Linear	Non-Linear
Graph	- straight line (hitting all points)	- NOT a straight line
Table of Values	First differences are the SAME (watch that x values are also increasing by a consistent amount)	First differences are DIFFERENT
Equation	Degree 1 (no exponent on x or y) ex. y = mx OR y = mx+b	Degree other than 1 ex. $y = x^2$ OR $y=2x^3 +4$

Todays Practice Questions
Pg 275 – 278 # 1, 2, 3, 5, 6, 9