Before we begin, are there any questions from last day's work?

Today's Learning Goal(s):

By the end of the class, I will be able to:

a) analyse a table of values to decide if it represents a relation which is: linear, quadratic, exponential, or "unknown"

MBF 3CI **Graph-fest!** Date: Nov.30/16

INVESTIGATION:

1. Create a table of values for the following three relations.
Complete the first differences (FD), second differences (SD) and y-ratio columns too.
(The first few rows are done for you.)

$y = 2x$; $y = 2(\ \ )$

x	y	FD	SD	y-ratio
0	0			
1	2	2		undefined
2	4	2	0	2
3	6	2	0	1.5
4	8	8-6=2	0	$\frac{8}{6}$ =1.33
5	10	10-8=2	0	$\frac{10}{8}$=1.25
6	12	12-10=2	0	1.2
7	14	2	0	1.17
8	16	2	0	1.14

$y = 2x^2$; $y = 2(\ \ )^2$

x	y	FD	SD	y-ratio
0	0			
1	2	2		undefined
2	8	6	4	4
3	18	10	4	2.25
4	32	32-18=14	4	$\frac{32}{18}$ =1.78
5	50	50-32=18	4	$\frac{50}{32}$=1.56
6	72	22	4	1.44
7	98	26	4	1.36
8	128	30	4	1.31

$y = 2^x$; $y = 2(\ \ )$

x	y	FD	SD	y-ratio
0	1			
1	2	1		2
2	4	2	1	2
3	8	4	2	2
4	16	8	4	$\frac{16}{8}$ =2
5	32	16	8	$\frac{32}{16}$ =2
6	64	32	16	$\frac{64}{32}$ =2
7	128	64	32	$\frac{128}{64}$=2
8	256	128	64	$\frac{256}{128}$=2

2. Classify each relation above as either quadratic, linear, exponential, or "unknown". Explain.

linear — first differences are constant

quadratic — second differences are constant

exponential — y-ratios are constant

3. Determine the y-coordinates for each relation when $x = 0.5$ and when $x = 1.5$ too!
Include these below:

$y = 2x$

x	y
0.5	1
1.5	3

$y = 2x^2$

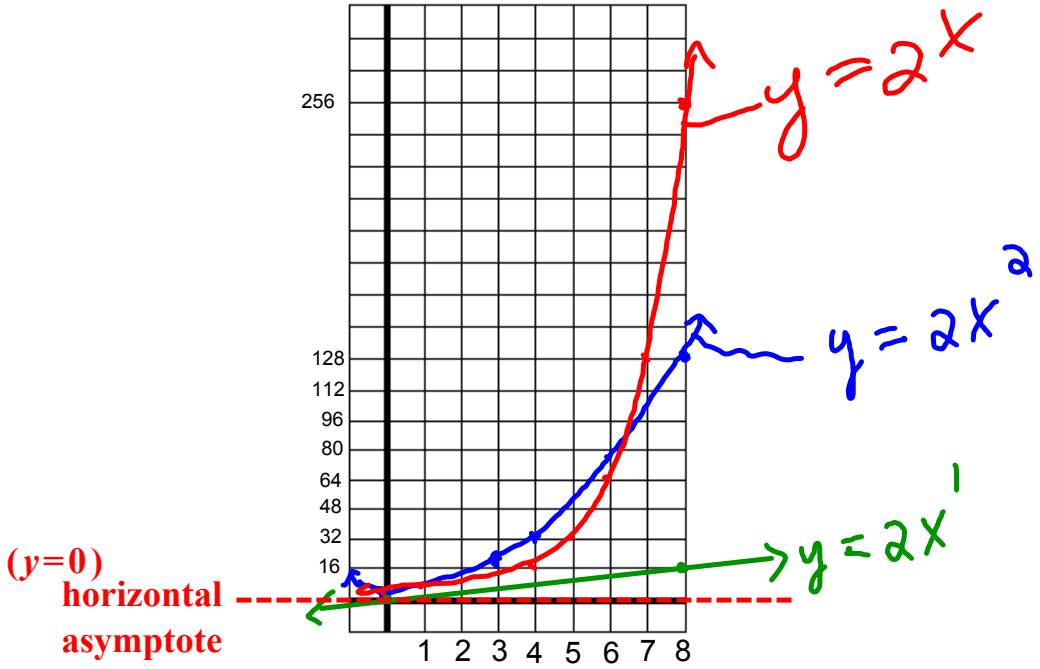
x	y
0.5	0.5
1.5	4.5

$y = 2^x$

x	y
0.5	1.41
1.5	2.82

4. On the grid below, graph all three relations using the table of values from Question 1 and Question 3! Label them too. **Use pencil only**.

Use the scales: **x-axis:** **1 block = 1 unit**
y-axis: **1 block = 16 units**



CONCLUSIONS:

1. Which relation represents the slowest growth? Why? Which represents the fastest growth? Why?

slowest growth: $y=2x$ fastest growth: $y=2^x$

EXAMPLE

A vase that cost $800 today is expected to increase in value by 7% each year for 5 years. Without graphing, is the growth linear, quadratic, exponential, or "unknown"? Explain.

1 800 x 1.07 = 856

2 856 x 1.07 = 915.92

Year x	Value y	FD	SD
0	800	56	
1	856		3.92
2	915.92	59.92	
3	980.03	64.11	4.19
4	1048.63		
5	1122.03		

y-ratios

$\frac{856}{800} = 1.07$

$\frac{915.92}{856} = 1.07$

the y ratios are constant

the value of the vase is increasing **exponentially**

This homework is also on the bottom of the back of the handout.

Entertainment: *Relations* **NO GRAPHING IS REQUIRED.**

1. Do: p. 377 # 2

2. For each relationship, without graphing, is it linear, quadratic, exponential, or "unknown"? Hint: for help use the **EXAMPLE** above.

   a) James stacks cans for a grocery store display. The top row has 1 can, the second row has 2 cans, the third row has 3 cans, etc……

   b) A soccer ball is kicked. At 1 sec., its height is 20.6m. At 2 sec., its height is 30.4 m. At 3 sec., its height is again at 30.4m. At 4 sec., the height is 20.6m. At 5 sec., the height is 1m etc……

   c) A $600 investment is worth $618 after 1 year, $636 after 2 years, $654 after 3 years, $672 after 4 years, etc……