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) sketch an ***exponential relation***
b) calculate the "**y-ratios**", and give a conclusion.

MBF 3CI

7.3 Investigate Exponential Relationships

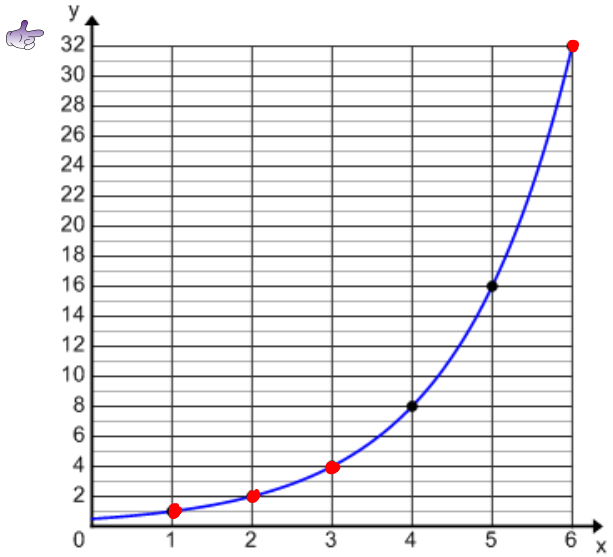
Date: NOV. 29/16

Read p. 377 #3 "The King's Chessboard"

$1=2^0$	$2=2^1$	$4=2^2$	$8=2^3$	$16=2^4$	$32=2^5$	$2^6=64$	2^7
2^8							2^{15}
							2^{63}

6 days

What would the graph of the first six days look like?



a)

x	y
Day	Grains of Rice
1	1
2	2
3	4
4	8
5	16
6	32
7	64

b) Use the graph before continuing:

On any given day, the number of grains of rice is: 2^{x-1}

c) On day 16, the number of grains of rice is: 2^{16-1}

$=2^{15}$

$=32\ 768$

d) On day 64, the number of grains of rice is: 2^{64-1}

$=2^{63}$

=

(see next page for grain calculations ⇒)

c)

Day	Number of Grains of Rice		Day	Number of Grains of Rice
1	1		33	4294967296
2	2		34	8589934592
3	4		35	17179869184
4	8		36	34359738368
5	16		37	68719476736
6	32		38	137438953472
7	64		39	274877906944
8	128		40	549755813888
9	256		41	**1,099,511,627,776**
10	512		42	2199023255552
11	1024		43	4398046511104
12	2048		44	8796093022208
13	4096		45	17592186044416
14	8192		46	35184372088832
15	16384		47	70368744177664
16	32768		48	140737488355328
17	65536		49	281474976710656
18	131072		50	562949953421312
19	262144		51	1125899906842620
20	524288		52	2251799813685250
21	1048576		53	4503599627370500
22	2097152		54	9007199254740990
23	4194304		55	18014398509482000
24	8388608		56	36028797018964000
25	16777216		57	72057594037927900
26	33554432		58	144115188075856000
27	67108864		59	288230376151712000
28	134217728		60	576460752303423000
29	268435456		61	1152921504606850000
30	536870912		62	2305843009213690000
31	1073741824		63	4611686018427390000
32	2,147,483,648		64	**9,223,372,036,854,780,000**

Note: This is 9.2 quintillion

Ex. 1 We can check to see if a table represents an exponential relationship using a ratio of the "y" values.
Does each table represent an exponential relationship? Explain.

a)

x	y
1	6
2	18
3	54
4	162

$\frac{18}{6} = 3$

$\frac{54}{18} = 3$

$\frac{162}{54} = 3$

the *y*-ratios are constant

the table represents an exponential relation

b) *(data from an experiment)*

x	y
1	12.90
2	55.47
3	238.52
4	1025.64

$\frac{55.47}{12.9} = 4.3$

$\frac{238.52}{55.47} \div 4.299 \div 4.3$

$\frac{1025.64}{238.52} \div 4.3001 \div 4.3$

the *y*-ratios are constant

the table represents an exponential relation

Study for tomorrow's Exponent Law Quiz

(see examples next page)

Entertainment

p. 377 # 3 (as a class)

pp. 377-380 #1 (find the ratio of the *y*'s),
7 (graph paper!), 10

Simplify:

$3^2 \times 3^8$

$= 3^{2+8}$

$= 3^{10}$

$3^{18} \div 3^6$

$= 3^{18-6}$

$= 3^{12}$

$(4^{10})^2$

$= 4^{10 \times 2}$

$= 4^{20}$

Simplify, then evaluate:

$5^8 \div 5^{10}$

$= 5^{8-10}$

$= 5^{-2}$

$= \left(\frac{1}{5}\right)^2$

$= \frac{1^2}{5^2}$

$= \frac{1}{25}$

$\left(\frac{3}{2}\right)^{-4}$

$= \left(\frac{2}{3}\right)^4$ ✓

$= \frac{2^4}{3^4}$

$= \frac{16}{81}$ ✓

p.370 #12

a $60\,dB \rightarrow \frac{60}{10} = 6$

b $0\,dB \rightarrow \frac{0}{10} = 0$

Street $= 70\,dB \Rightarrow 7$

concert $= 110\,dB \Rightarrow 11$

$\therefore \frac{10^{11}}{10^{7}}$

$= 10^{11-7}$

$= 10^{4}$

$= 10\,000$

$\frac{10^{a}}{10^{b}}$

$= \frac{10^{6}}{10^{0}}$

$= 10^{6-0}$

$= 10^{6}$

$= 1\,000\,000$

c) $-5\,dB \Rightarrow -0.5$

$0\,dB \Rightarrow 0$

$\frac{10^{0}}{10^{-0.5}}$

$= 10^{0-(0.5)}$

$= 10^{0.5}$