Exponential Functions

Objectives: Introduce the idea of Exponential relationships
SWBAT Identify a linear, quadratic, or exponential function

Language Objectives:
SWBAT identify a linear, quadratic and exponential function by labeling the respective graphs
SWBAT estimate the effects of real world exponential scenarios and verbally rationalize their estimates in a "Think, Pair, Share" activity.

Agenda

1) **DO NOW:** - Calculate one
   - Graph five
2) **Experiment** with Folding Paper in Half
3) **Experiment** with Money
   a) Table
   b) Formula
4) Domino Estimates (if time)
5) **Exit Ticket**

HW: NONE

Exponential Functions

Sketch the following equations. Your y- intercepts should be clearly marked. Appropriately label each graph as linear, quadratic, or exponential.

$y = 2x$ $y = x^2$ $y = 2^x$ $y=5^x$ $y = (½)^x$

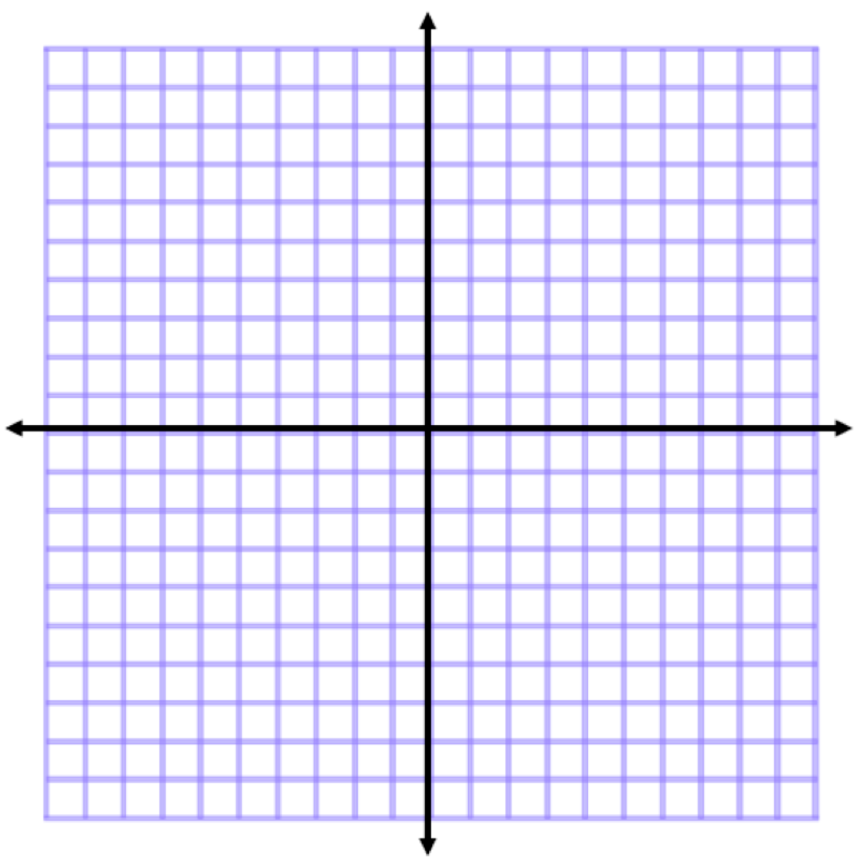
x	y
-3	
-2	
-1	
0	
1	
2	
3	

x	y
-3	
-2	
-1	
0	
1	
2	
3	

x	y
-3	
-2	
-1	
0	
1	
2	
3	

x	y
-3	
-2	
-1	
0	
1	
2	
3	

x	y
-3	
-2	
-1	
0	
1	
2	
3	



The POWER of Powers!

Things to think about...

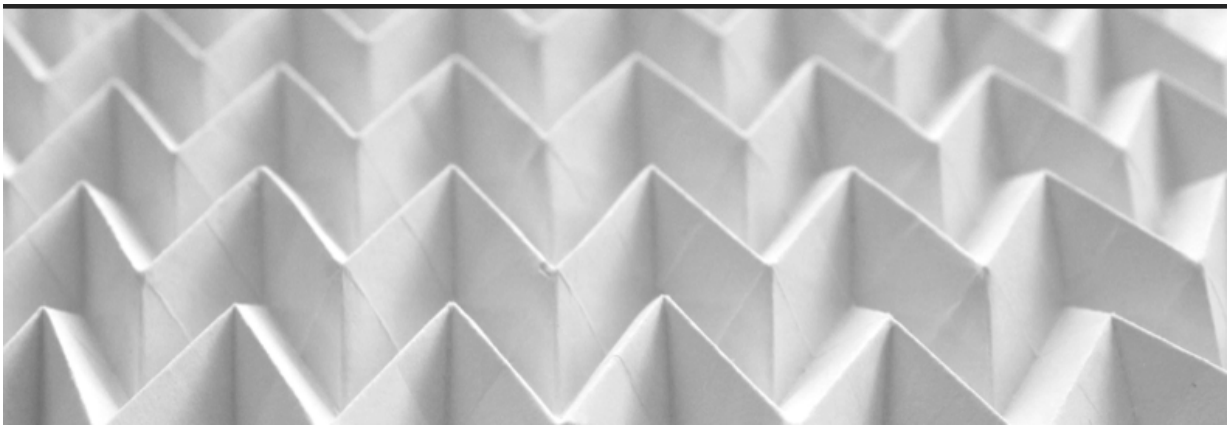
1) How many times can you fold a piece of paper in half?

2) Which will earn you more money? 1 penny doubled every day for 30 days, or 1 million dollars?

3)Can a domino 5mm tall 1mm thick knock over a 100lb domino? What about a domino as tall as the Empire State building?

Think...Pair...Share...

How many times do you think you can **fold** a piece of paper in **half**???



Estimates

tissue printer paper card stock

Folding Paper Video:

n	2**n	km (0.1*10**-6 * 2**n)	Comment
0	1	0.1 x 10**-6	
1	2	0.2 x 10**-6	
2	4	0.4 x 10**-6	
3	8	0.8 x 10**-6	finger nail thickness
4	16	1.6 x 10**-6	
5	32	3.2 x 10**-6	
6	64	6.4 x 10**-6	
7	128	12.8 x 10**-6	thickness of a notebook
8	256	25.6 x 10**-6	
9	512	51.2 x 10**-6	
10	1024	0.1 x 10**-3	width of a hand (incl. thumb)
11	2048	0.2 x 10**-3	
12	4096	0.4 x 10**-3	0.4m height of a stool
13	8192	0.8 x 10**-3	
14	16384	1.6 x 10**-3	1.6m: an average person's height (yeah, a short guy)
15	32768	3.3 x 10**-3	
16	65536	6.6 x 10**-3	
17	131072	13.1 x 10**-3	13m height of a two story house

Which will earn you more money? 1 penny doubled every day for 30 days, or $1,000,000?

Which will earn you more money? 1 penny doubled every day for 30 days, or $1,000,000?

1 Penny

1 Million Dollars

Day	Penny ($0.01)	$1,000,000
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
...		
20		
...		
30		
n		

Given the original investment of $0.01, can we come up with a formula for the amount of money (y) given any (n) number of days?

y = _____

Big difference between $1 million and $5.3 million, huh?

Day 1: $.01
Day 2: $.02
Day 3: $.04
Day 4: $.08
Day 5: $.16
Day 6: $.32
Day 7: $.64
Day 8: $1.28
Day 9: $2.56
Day 10: $5.12
Day 11: $10.24
Day 12: $20.48
Day 13: $40.96
Day 14: $81.92
Day 15: $163.84
Day 16: $327.68
Day 17: $655.36
Day 18: $1,310.72
Day 19: $2,621.44
Day 20: $5,242.88
Day 21: $10,485.76
Day 22: $20,971.52
Day 23: $41,943.04
Day 24: $83,386.08
Day 25: $167,772.16
Day 26: $335,544.32
Day 27: $671,088.64
Day 28: $1,342,177.28
Day 29: $2,684,354.56
Day 30: $5,368,709.12

Compound Interest Video

How many dominoes can generate enough momentum to cause the Empire State Building to Fall?!?!

Estimates

Minimum Average Maximum

Domino Video

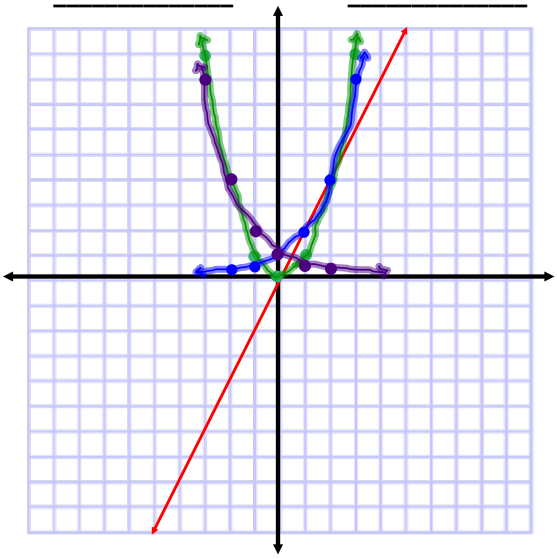
Score: ____/ Name _____

Exit Ticket

Appropriately label each graph as **linear**, **quadratic**, or **exponential**.

$y = x^2$ $y = 2^x$ $y = 2x$ $y = (½)^x$

_____ _____ _____ _____



Score: ____/ Name _____

Exit Ticket

Appropriately label each graph as **linear**, **quadratic**, or **exponential**.

$y = (½)^x$ $y = x^2$ $y = 2^x$ $y = 2x$

_____ _____ _____ _____