

What's Going On?

Checking In

Minds on

What's the Difference?

Action!

Investigation

Consolidation

Desmos

Learning Goal - I will understand the role of b in $f(x) = a \times b^x$.

Minds on

What's the difference?

		First Differences	Second Differences	Third Differences
x	y			
-2	-7	4	0	0
-1	-3	4	0	0
0	1	4	0	0
1	5	4	0	0
2	9	4	0	0
3	13	4		

Minds on

What's the difference?

		First Differences	Second Differences	Third Differences
x	y			
-2	2	-3	+2	0
-1	-1	-1	+2	0
0	-2	+1	+2	0
1	-1	+3	+2	0
2	2	+5	+2	
3	7			

Minds on

What's the difference?

	First Differences	Second Differences	Third Differences
x			
-2			
-1	0.1875	0.5625	1.6875
0	0.75	2.25	6.75
1	3	9	27
2	12	36	
3	48		

Minds on

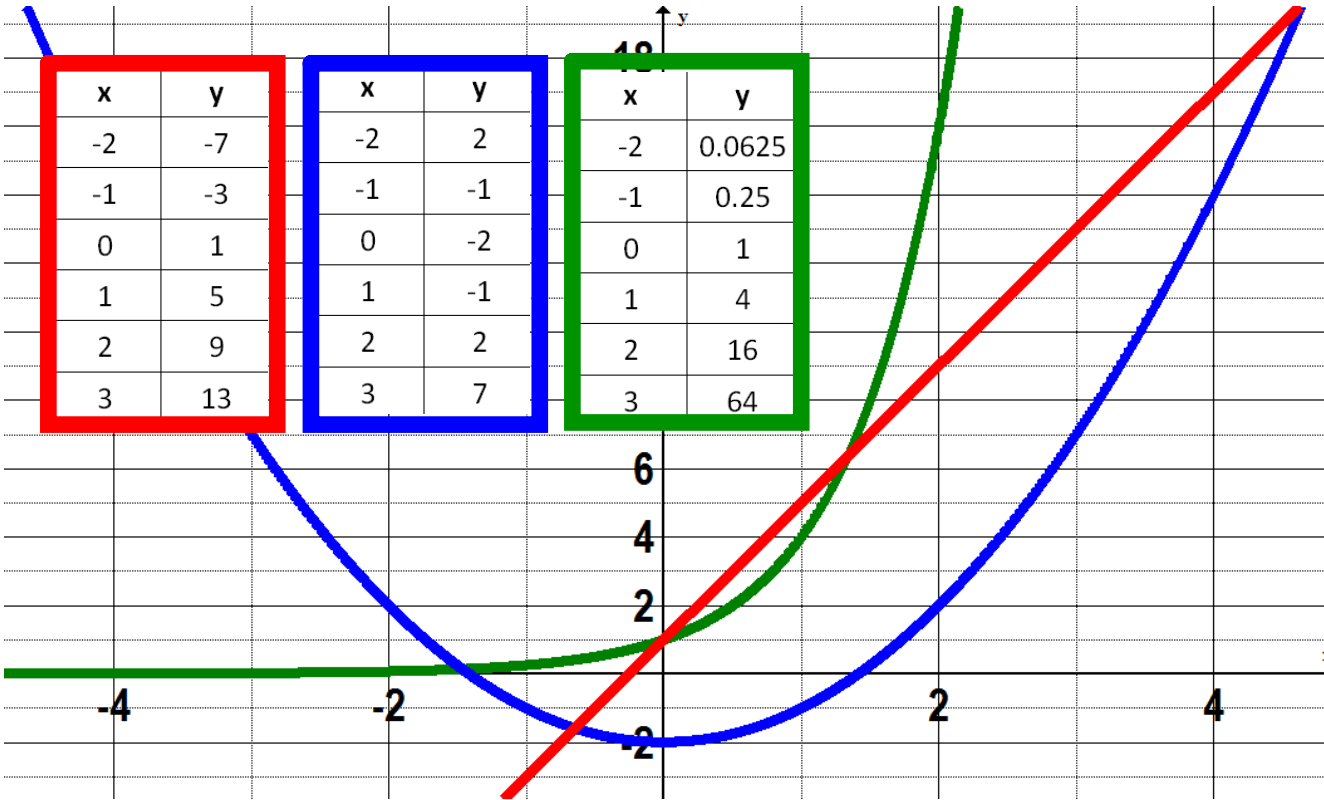
What's the difference?

x	y
-2	0.0625
-1	0.25
0	1
1	4
2	16
3	64

First Differences	Second Differences	Third Differences

4
4
4
4
4

Minds on



Minds on

What's the difference?

Differences

- **Linear functions** have constant first differences
- **Quadratic functions** have first differences that are related by addition. Their second differences are constant
- **Exponential functions** have first differences that are related by multiplication. When you divide consecutive values, the results are all the same.

Action!

Investigation

Today we are going to investigate the properties of exponential functions.

We will focus on those in the form

$$y = a \times b^x$$

with an a-value of 1.

$$y = b^x$$

Action!

Investigation

1. Choose a partner.
2. Come see me to get your equations.
3. Work through the investigation.

1. What did you notice for $b > 1$?

- Graphs increased to the right.
- Graphs approached zero to the left
(Did they ever get there?)
- All graphs went through $(0, 1)$
- Larger values of b increased faster.

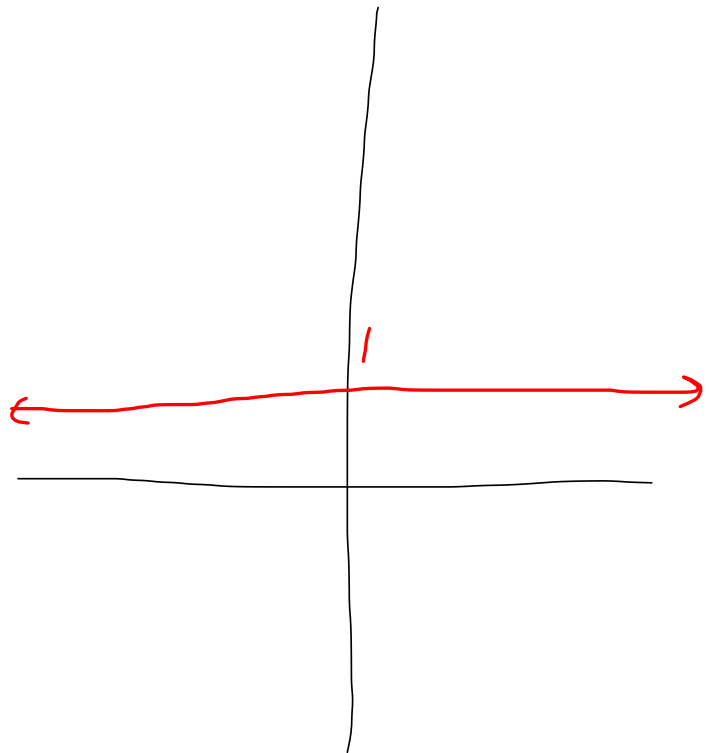
2. What did you notice for $0 < b < 1$?

- The graphs decreased to the right.
- Increased to the left.
- Approached zero to the right
- As b got closer to zero, the graphs got steeper
- All went through $(0, 1)$

3. What do you think would happen if you graphed $b = 1$?

$$y = b^x$$

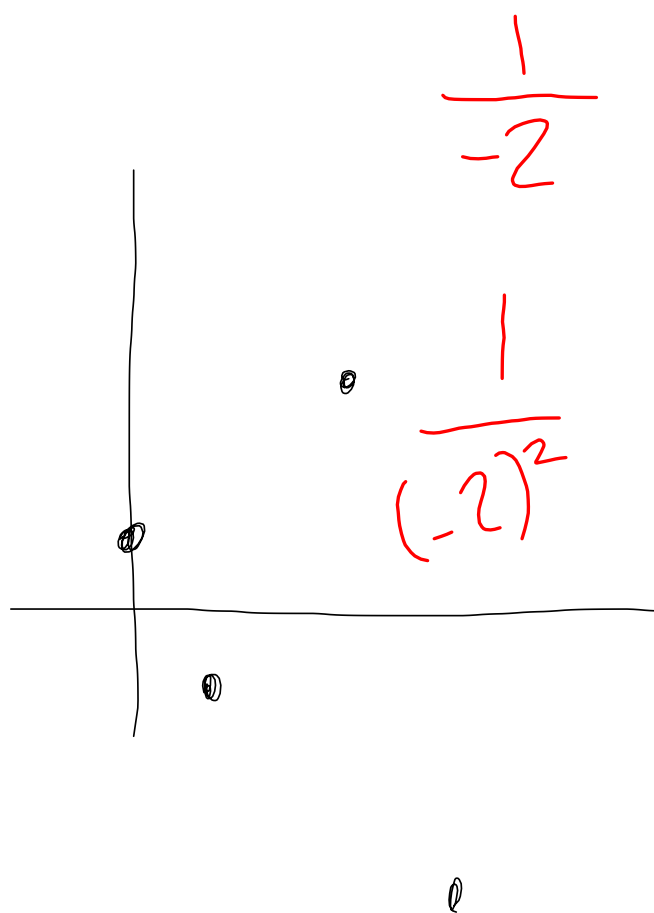
$$y = 1^x$$



4. What do you think would happen if you graphed $b < 0$?

Let's think about graphing $y = (-2)^x$

x	y
-3	
-2	0.25
-1	-0.5
0	1
1	-2
2	4
3	-8

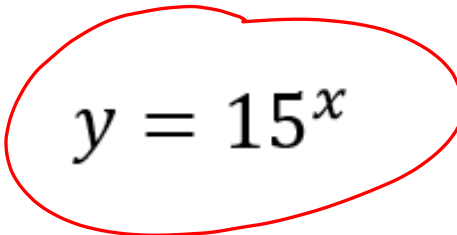


5. Circle the steepest graph:

$$y = 2^x$$

$$y = 5^x$$

$$y = 10^x$$

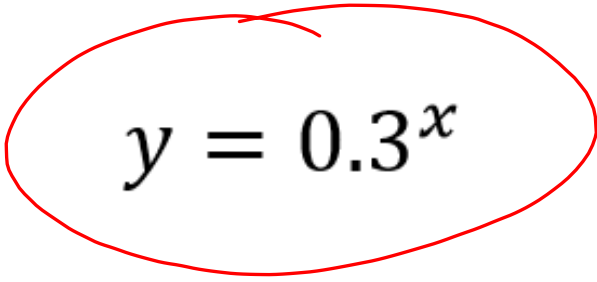

$$y = 15^x$$

6. Circle the steepest graph:

$$y = 0.6^x$$

$$y = 0.5^x$$

$$y = 0.4^x$$


$$y = 0.3^x$$

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

x	y
-3	8
-2	4
-1	2
0	1
1	0.5
2	0.25
3	0.125

$$y = \underline{2}^x$$

x	y
-3	0.125
-2	0.25
-1	0.5
0	1
1	2
2	4
3	8

Consolidation

Exploring $y = b^x$



Consolidation

Exploring $y = a \times b^x$

