

# Graphing exponentials

## agenda

Warm-Up

Notes (p. 115)

HW Practice  
(#1-8)

Turn in bathroom  
passes!!

## Reminders

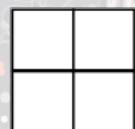
Quiz Friday

HW 5.7 Due  
Friday

## Warm-Up (Thursday)

You need a calculator today!!!

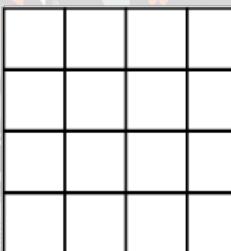
1. Complete the table below based on the pattern.



Stage 1



Stage 2



Stage 3

$x$	$y$
0	2
1	4
2	8
3	16
4	32

How many blocks would be needed for the 5<sup>th</sup> stage?

64 blocks

# Graphing exponentials

Fold notes in half, glue blank side on page 115.

1. Complete the table of values below for the function  $f(x) = 3^x$ .

To make exponent  $\wedge$

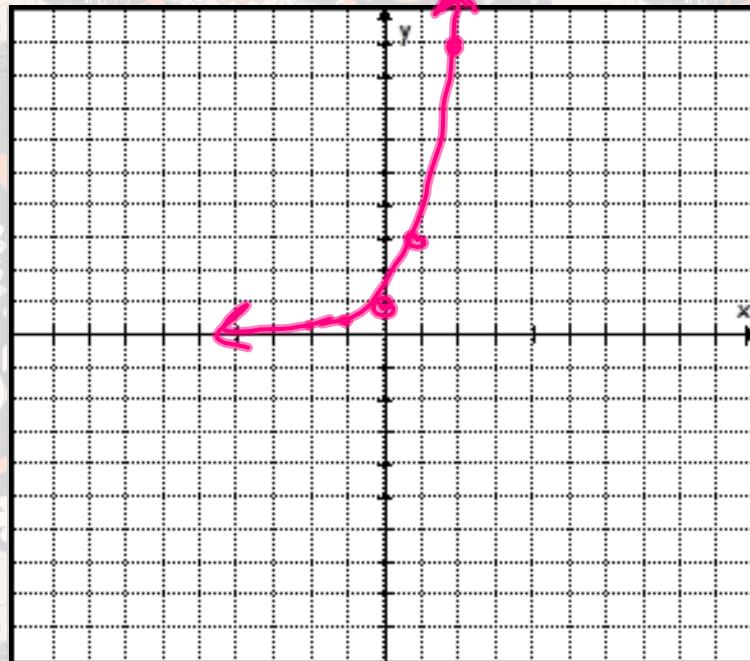
$x$	Process $3^x$	$f(x)$	$(x, y)$
-3	$3^{-3} = \frac{1}{3^3}$	$\frac{1}{27}$	$(-3, .04)$
-2	$3^{-2}$		
-1	$3^{-1}$		
0	$3^0$		
1	$3^1$		
2	$3^2$		
3	$3^3$		

# Graphing exponentials

Graph the function.

$$f(x) = 3^x$$

$$f(x) = 1 \cdot 3^x \quad a: 1 \quad b: 3$$



$x$	Process $3^x$	$f(x)$	$(x, y)$
-3	$3^{-3} = \frac{1}{3^3}$	$\frac{1}{27}$	$(-3, \frac{1}{27})$
-2	$3^{-2} = \frac{1}{3^2}$	$\frac{1}{9}$	$(-2, \frac{1}{9})$
-1	$3^{-1} = \frac{1}{3^1}$	$\frac{1}{3}$	$(-1, \frac{1}{3})$
0	$3^0$	1	$(0, 1)$
1	$3^1$	3	$(1, 3)$
2	$3^2$	9	$(2, 9)$
3	$3^3$	27	$(3, 27)$

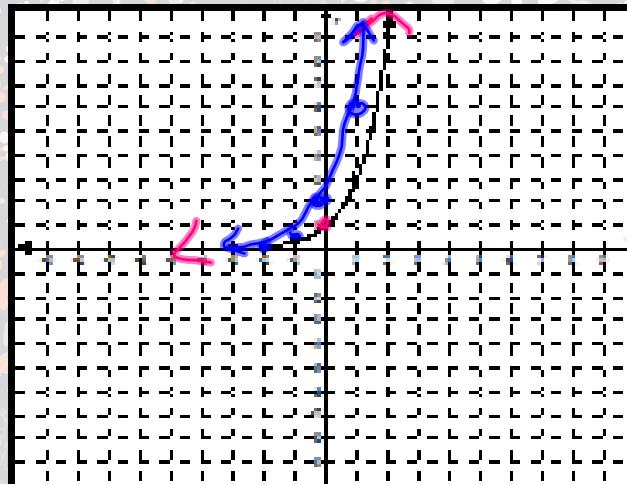
Exponential Function:

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

scale factor  
y-intercept

base  
multiplier

# Graphing exponentials



	$f(x) = 3^x$	$f(x) = 2 \cdot 3^x$
Is $f(x)$ an increasing or decreasing function	increasing (0, 1)	increasing (0, 2)
$y$ -intercept	D. N. E.	D. N. E.
value of $x$ where $f(x) = 0$	$y=0$	
Domain of the function	R	R
Range of the Function	$y > 0$	$y > 0$

3. Predict what would happen if you graphed the function:

$$f(x) = 2 \cdot 3^x$$

4.

A) Graph  $f(x) = 2 \cdot 3^x$  on the coordinate plane in #2 and complete the chart.

B) How is the new graph different from the old graph?

- $y$ -intercept bigger
- Narrow

# Graphing exponentials

Complete the table below.

Equation	Graph	Value of $b$	Value of $a$	Inc/Dec	$y$ -intercept	Domain	Range
$y = 4^x$ skinny		4	1	inc	(0,1)	$\mathbb{R}$	$y > 0$
$y = \frac{1}{2} \cdot 4^x$ fat		4	$\frac{1}{2}$	inc. slower WIDE	$(0, \frac{1}{2})$	$\mathbb{R}$	$y > 0$

6. Predict what would happen if you graphed the function:  $y = -3^x$

- Reflected over  $x$ -axis
- Decreasing
- $y < 0$

Hint: How did graphing  $y = -x^2$  compare to the original graph?

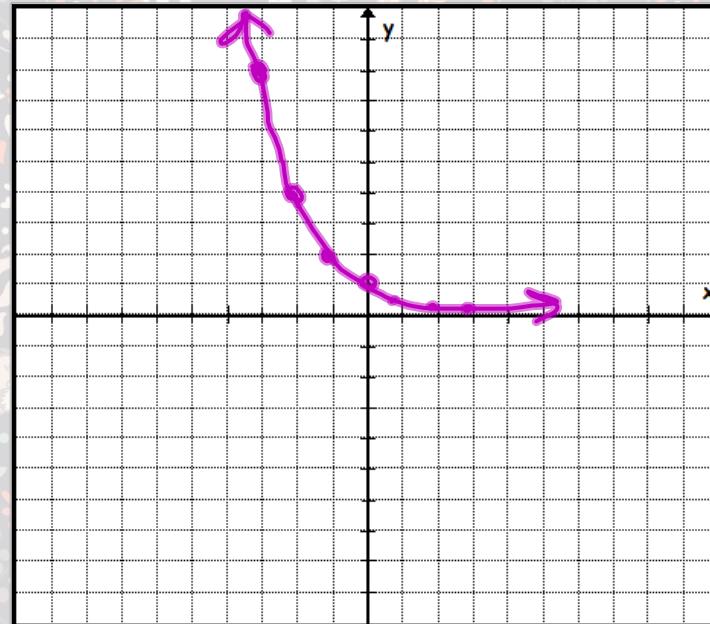
# Graphing exponentials

7. Complete the table of values below for the function  $f(x) = \left(\frac{1}{2}\right)^x$ .

$x$	$f(x)$	$(x, f(x))$
-3	8	
-2	4	
-1	2	
0	1	
1	$\frac{1}{2}$	
2	$\frac{1}{4}$	
3	$\frac{1}{8}$	

a:  $f$

b:  $\frac{1}{2}$



- a) Determine the y-intercept of your graph. (0, 1)
- b) Find the value of  $x$  where  $f(x) = 0$ ? D.N.E.
- c) Is  $f(x)$  an increasing or decreasing function? decreasing
- d) What is the domain of the function?  $R$
- e) What is the range of the function?  $y > 0$

# Graphing exponentials

Summary (outside of notes)

y-intercept

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

multiplier

FRACTION

$0 < b < 1$

$b > 1$

decreasing

increasing

negative

**b**

**Increasing/Decreasing**

**a**

**How does it compare**

**to  $b^x$  ?**

$0 < a < 1$

$a > 1$

$a < 0$

increases  
slower  
WIDE

increases  
faster  
NARROW

Reflects  
(decreasing)

(FAT FRACTION)

NO EXPONENTIAL PARENT FUNCTION

## Algebra I - Unit 10: Topic 1 – Graphs of Exponential Functions

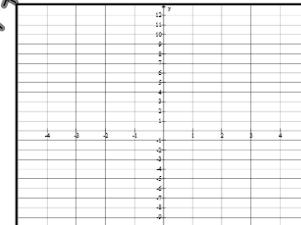
## Practice – Graphs of Exponential Functions

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

pp 772-778

1.  $y = 3 \cdot 2^x$

x	y
-3	
-2	
-1	
0	
1	
2	



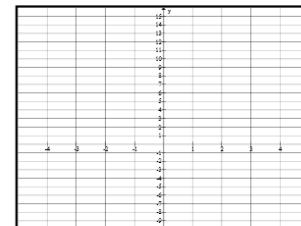
Increasing/Decreasing \_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

2.  $f(x) = 4 \cdot \left(\frac{1}{2}\right)^x$

x	y
-2	
-1	
0	
1	
2	
3	



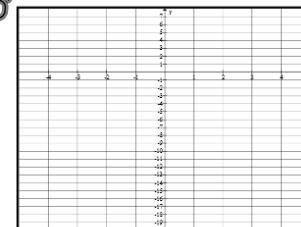
Increasing/Decreasing \_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

3.  $y = -2 \cdot 3^x$

x	y
-2	
-1	
0	
1	
2	



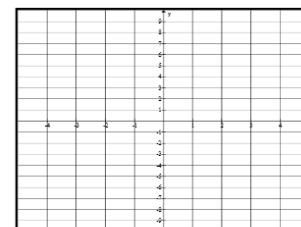
Increasing/Decreasing \_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

4.  $y = -2(0.25)^x$

x	y
-2	
-1	
0	
1	
2	



Increasing/Decreasing \_\_\_\_\_

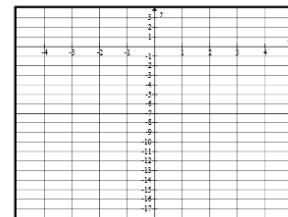
Domain: \_\_\_\_\_

Range: \_\_\_\_\_

Algebra I - Unit 10: Topic 1 – Graphs of Exponential Functions

5.  $f(x) = -\left(\frac{1}{4}\right)^x$

$x$	$y$
-2	
-1	
0	
1	
2	



Increasing/Decreasing
_____
Domain: _____
Range: _____

6. Given the equation  ~~$f(x) = a \cdot b^x$~~ , what value(s) of  $a$  will make the graph increase at a slower rate? **summary!**

7. Which function is not decreasing?

A  $y = -(3)^x$

B  $y = 2\left(\frac{1}{6}\right)^x$

C  $y = \left(\frac{1}{4}\right)(2)^x$

D  $y = \left(\frac{2}{3}\right)\left(\frac{1}{6}\right)^x$

8. Which of the following is the exponential parent function?

A  $f(x) = x$

B  $f(x) = x^2$

C  $f(x) = 2^x$

D Does Not Exist

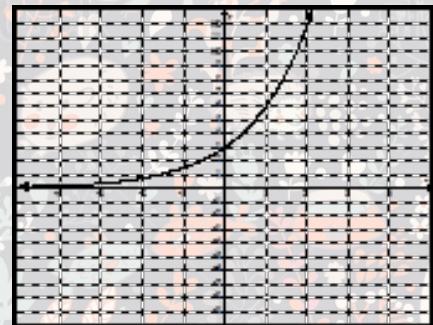
# Graphing exponentials

## Homework Help!

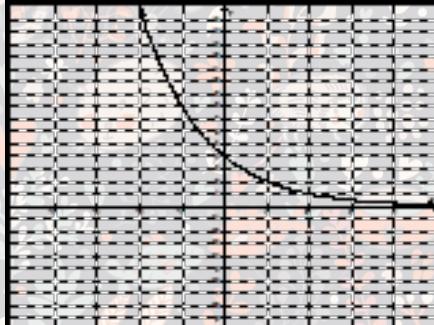
Remember: A g means the multiplication dot... sorry!

Here are what each of your graphs should look like. Imagine I will be grading these with a transparency - would your graph match up EXACTLY? Answer the questions based on each graph.

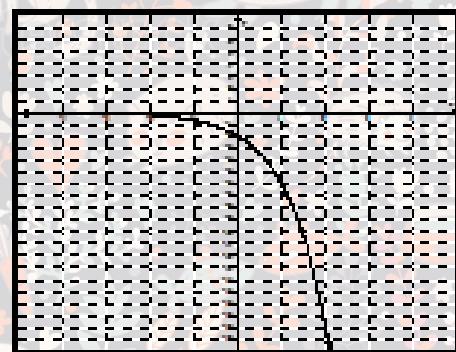
1.



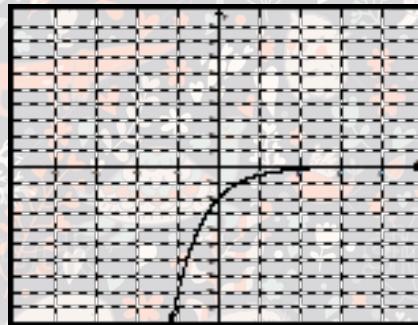
2.



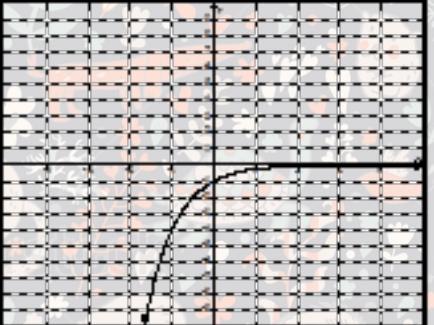
3.



4.



5.



6. Any fraction ( $0 < a < 1$ ) will make the graph increase more slowly.

7. Key word...NOT!

8. There is no exponential parent function!

