Algebra 1
Lesson 8.6A
Write and Graph Exponential Decay Functions

Warm-Up

You deposit $125 in a savings account that earns 5% annual interest compounded yearly. Find the balance in the account after each amount of time.

(a) 1 year   (b) 2 years   (c) 5 years   (d) 20 years

$$y = 1 \cdot \left(\tfrac{1}{3}\right)^x$$

$a = 1$

$b = \dfrac{1}{3}$ CONSTANT MULTIPLIER

Example 1. Graph of an Exponential Function

(a) For the function $y = (1/3)^x$ fill in the table at the right.

(b) Use your table to graph $y = (1/3)^x$.

(c) Name the domain and range of $y = (1/3)^x$.

Domain = $\mathbb{R}$

Range = $y > 0$

x	$(1/3)^x$
-2	9
-1	3
0	1
1	$\frac{1}{3}$
2	$\frac{1}{9}$

×3 ×3 ×$\frac{1}{3}$ ×$\frac{1}{3}$

Example 2. Comparing Graphs of Exponential Functions

(a) For the function $y = 2 \cdot (1/3)^x$ fill in the table below.

VERTICAL STRETCH

x	$2 \cdot (1/3)^x$
-2	18
-1	6
0	2
1	$\frac{2}{3}$
2	$\frac{2}{9}$

$$y = 1 \cdot \left(\tfrac{1}{3}\right)^x$$

$$y = 2\left(\tfrac{1}{3}\right)^x$$

$$y = -\tfrac{1}{2}\left(\tfrac{1}{3}\right)^x$$

(b) For the function $y = -\frac{1}{2} \cdot (1/3)^x$ fill in the table below.

x	$-\frac{1}{2} \cdot (1/3)^x$
-2	$-\frac{9}{2}$
-1	$-\frac{3}{2}$
0	$-\frac{1}{2}$
1	$-\frac{1}{6}$
2	$-\frac{1}{18}$

VERTICAL SHRINK AND REFLECTION OVER X-AXIS

(c) Use both tables to graph the functions on the same set of axes as **Example 1**.

Example 3. Graph of an Exponential Function

(a) For the function $y = (\frac{1}{4})^x$ fill in the table at the right.

(b) Use your table to graph $y = (\frac{1}{4})^x$. This will be helpful in the assignment #20, 22, 26, 28.

(c) Name the domain and range of $y = (\frac{1}{4})^x$.

Domain = $\mathbb{R}$

Range = $y > 0$

x	$(\frac{1}{4})^x$
-2	16
-1	4
0	1
1	$\frac{1}{4}$
2	$\frac{1}{16}$

$x \cdot \frac{1}{4}$

$x \cdot \frac{1}{4}$
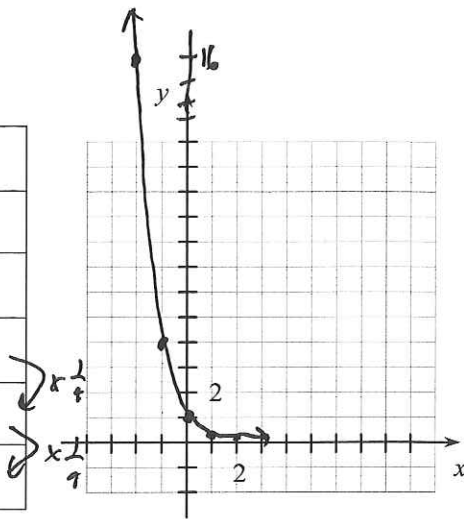
$y = -3(\frac{1}{3})^x$

Try It!

(a) For the function $y = -3 \cdot (\frac{1}{3})^x$ fill in the table at the right.

(b) Use your table to graph $y = -3 \cdot (\frac{1}{3})^x$.

(c) Name the domain and range of $y = -3 \cdot (\frac{1}{3})^x$.

Domain = $\mathbb{R}$

Range = $y < 0$

x	$-3 \cdot (\frac{1}{3})^x$
-2	-27
-1	-9
0	-3
1	-1
2	$-\frac{1}{3}$

$\times 3$

$\times 3$

$\times \frac{1}{3}$

$\times \frac{1}{3}$
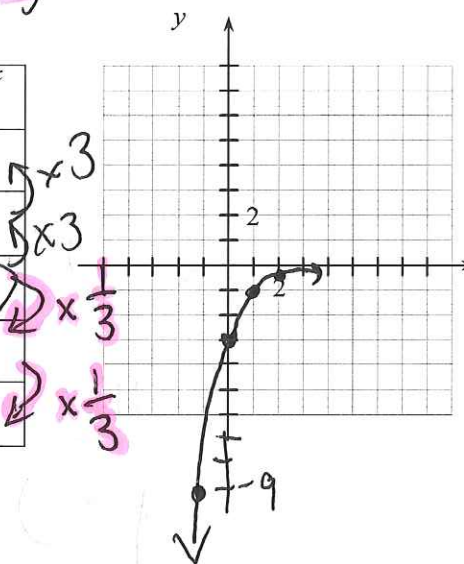
Assignment

New: Pg. 535 #5,6,7,9, 20, 22, 26, 28

Review:

Simplify. Write each answer in scientific notation.

1. $(3.2 \times 10^4)(5.7 \times 10^{-11})$

2. $(2.1 \times 10^3)^4$

3. $\dfrac{2.4 \times 10^{-3}}{8.0 \times 10^8}$