Algebra 1

Lesson 8.5A

Write and Graph Exponential Growth Functions

Warm-Up

Simplify. Write without using negative exponents.

(a) $\dfrac{6a^5b^2c}{14a^2c^3}$ (b) $\dfrac{2}{5x^3}\cdot\left(\dfrac{5x^3}{4y^2}\right)^2$ (c) $(4pq)(5p^2q^5)$ (d) $(2x^5y^{-2})^3$

Y-INTERCEPT $(0,a)$

Exponential Function

An exponential function is a function of the form $y = ab^x$

Exponential functions are *nonlinear*.

$y = a \cdot b^x$ ← CONSTANT MULTIPLIER

$y = 1 \cdot 2^x$

Example 1. Graph of an Exponential Function

(*a*) For the function $y = 2^x$ fill in the table at the right.

(*b*) Use your table to graph $y = 2^x$

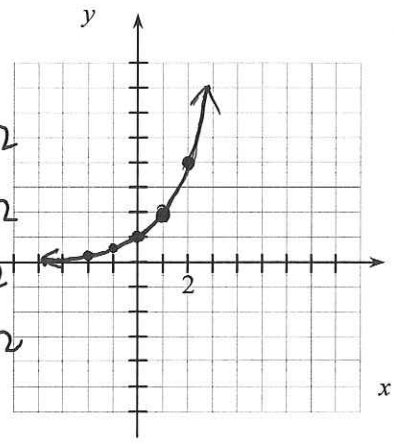
(*c*) Name the domain and range of $y = 2^x$.

Domain = ALL REAL NUMBERS $\mathbb{R}$

Range = $y > 0$

x	$y = 2^x$
-2	$2^{-2} = \frac{1}{4}$
-1	$2^{-1} = \frac{1}{2}$
0	$2^0 = 1$
1	$2^1 = 2$
2	$2^2 = 4$

$(-2, \frac{1}{4})$ → ×2 ×2 ×2 ×2



Example 2. Comparing Graphs of Exponential Functions

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

x	$3 \cdot 2^x$
-2	$\frac{3}{4}$
-1	$\frac{3}{2}$
0	3
1	6
2	12

VERTICAL STRETCH

$y = 1 \cdot 2^x$

$* \; y = 3 \cdot 2^x$

$y = -3 \cdot 2^x$

(*b*) For the function $y = -3 \cdot 2^x$ fill in the table below.

x	$-3 \cdot 2^x$
-2	$-\frac{3}{4}$
-1	$-\frac{3}{2}$
0	-3
1	-6
2	-12

VERTICAL STRETCH AND REFLECTION OVER X-AXIS

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

$|a| > 1$ VERTICAL STRETCH ; $a < 0$ REFLECTION OVER X-AXIS

$0 < |a| < 1$ VERTICAL SHRINK

Example 3. Graph of an Exponential Function

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

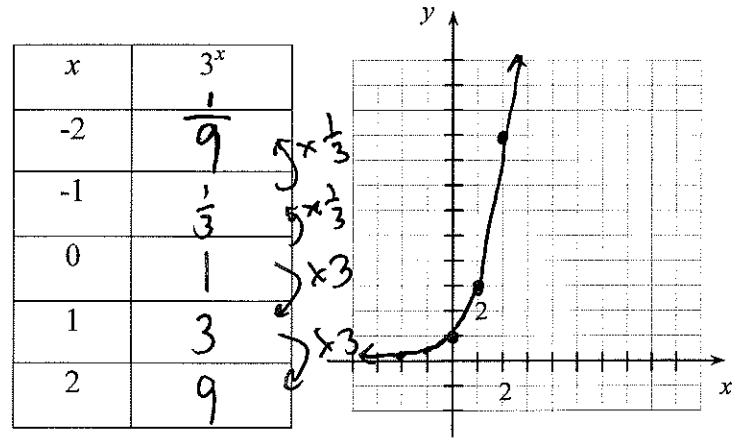
(*b*) Use your table to graph $y = 3^x$. This will be helpful in the assignment #22, 24, 28, 30.

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

Domain = $\mathbb{R}$

Range = $y > 0$

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



Try It!

(*a*) For the function $y = \frac{1}{2} \cdot 2^x$ fill in the table at the right.

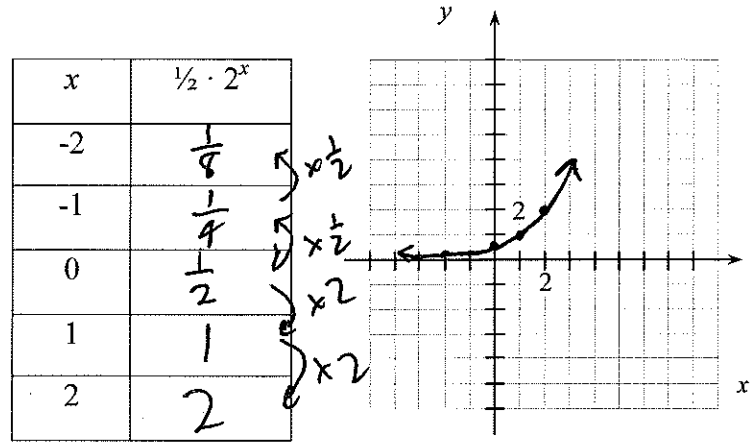
(*b*) Use your table to graph $y = \frac{1}{2} \cdot 2^x$

(*c*) Name the domain and range of $y = \frac{1}{2} \cdot 2^x$.

Domain = $\mathbb{R}$

Range = $y > 0$

x	$\frac{1}{2} \cdot 2^x$
-2	$\frac{1}{8}$
-1	$\frac{1}{4}$
0	$\frac{1}{2}$
1	1
2	2



Assignment

New: Pg. 524 #4-7, 9, 17, 22, 24, 28, 30

Review:

Write each in scientific notation.

1. 9, 230, 000, 000

2. 0.0000568

3. 92.3×10^4

4. 0.0032×10^8

5. $(3.1 \times 10^4)(1.2 \times 10^8)$

6. $(4.8 \times 10^{12})(3.2 \times 10^{-3})$

7. $\dfrac{4.8 \times 10^{18}}{2.4 \times 10^{-2}}$

8. $\dfrac{1.2 \times 10^{-4}}{7.2 \times 10^{-8}}$