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Exponential Functions

Unit 7 Lesson 6

EXPONENTIAL FUNCTIONS

Students will be able to:

Illustrate the property and draw the graph of exponential function

Key Vocabulary:

- Exponent
- Domain
- Range
- Function

EXPONENTIAL FUNCTIONS

Exponential Functions

An *exponential function* f is defined by the equation $y = (a)^x$ where $a > 0, a \neq 1$.

The domain of f is the set of all real numbers and the range of f is the set of positive numbers.

EXPONENTIAL FUNCTIONS

Properties of the Exponential Function in the form of $y = (a)^x$

- I. The domain of exponential function f is a set of all real numbers.
- II. The range of a function is a set of all positive real numbers.
- III. In the function $y = (a)^x$, if $a > 1$, then the graph is continuously increasing. If $0 < a < 1$, then the graph is continuously decreasing.
- IV. The function of $y = (a)^x$, does not have a zero. The graph of $y = (a)^x$ does not intersect the x -axis.
- V. The function $y = (a)^x$ always contains the point $(0, 1)$.

EXPONENTIAL FUNCTIONS

Sample Problem 1: Find $f(x)$ given the value of x below.

$$y = 0.2^x$$

1. $x = -2$

2. $x = 0$

3. $x = 2$

4. $x = 4$

EXPONENTIAL FUNCTIONS

Sample Problem 1: Find $f(x)$ given the value of x below.

$$y = 0.2^x$$

1. $x = -2$

$$y = 0.2^{-2}$$

$$= \left(\frac{1}{5}\right)^{-2}$$

$$= 5^2$$

$$= 25$$

2. $x = 0$

$$y = 0.2^0$$

$$= 1$$

EXPONENTIAL FUNCTIONS

Sample Problem 1: Find $f(x)$ given the value of x below.

$$y = 0.2^x$$

$$3. x = 2$$

$$y = 0.2^2$$

$$= \frac{1}{5^2}$$

$$= \frac{1}{25}$$

$$= 0.04$$

$$4. x = 4$$

$$y = 0.2^4$$

$$= \frac{1}{5^4}$$

$$= \frac{1}{625}$$

$$= 0.0016$$

EXPONENTIAL FUNCTIONS

Sample Problem 2: Draw the graph of the following function.

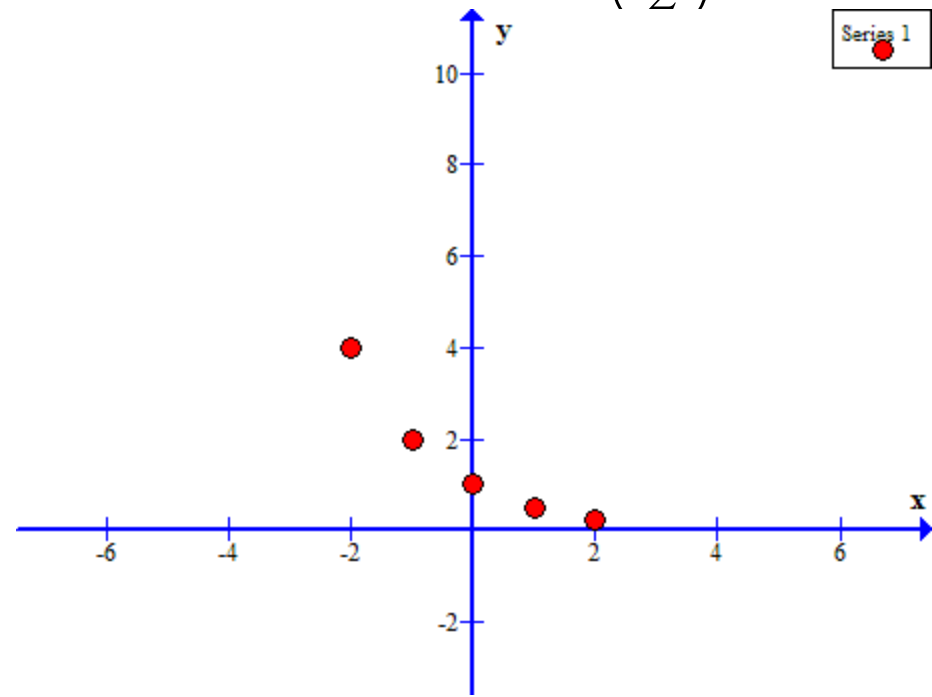
5. Graph the exponential function $y = \left(\frac{1}{2}\right)^x$

x	-2	-1	0	1	2
y	$y = (1 / 2)^{(-2)}$ $= 2^2$ $= 4$	$y = (1 / 2)^{(-1)}$ $= 2$	$y = (1 / 2)^0$ $= 1$	$y = (1 / 2)^1$ $= 1 / 2$	$y = (1 / 2)^2$ $= 1 / 4$

EXPONENTIAL FUNCTIONS

Sample Problem 2: Draw the graph of the following function.

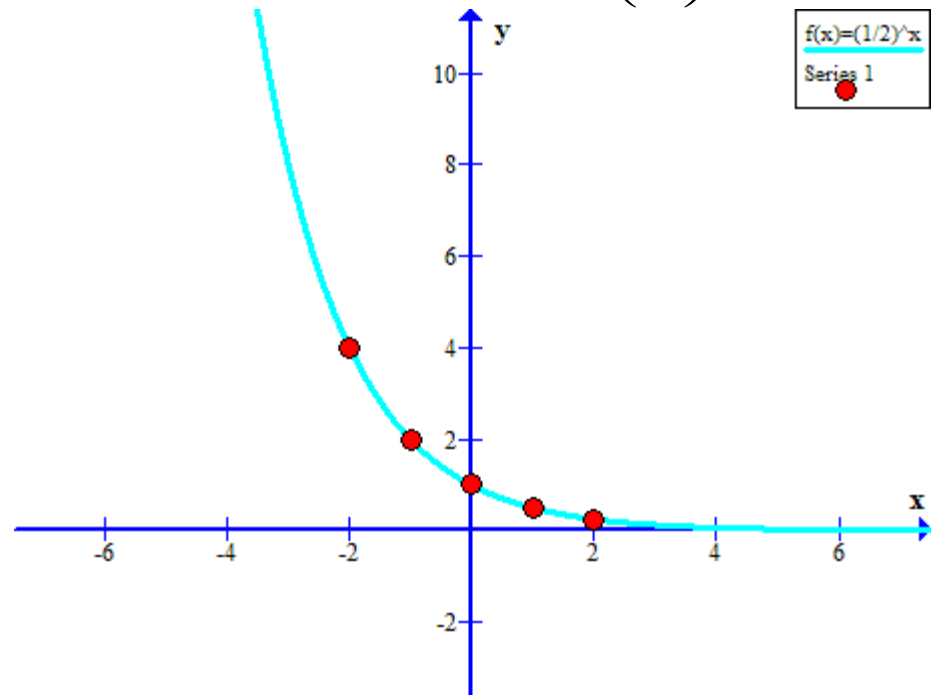
5. Graph the exponential function $y = \left(\frac{1}{2}\right)^x$



EXPONENTIAL FUNCTIONS

Sample Problem 2: Draw the graph of the following function.

5. Graph the exponential function $y = \left(\frac{1}{2}\right)^x$



EXPONENTIAL FUNCTIONS

Sample Problem 2: Draw the graph of the following function.

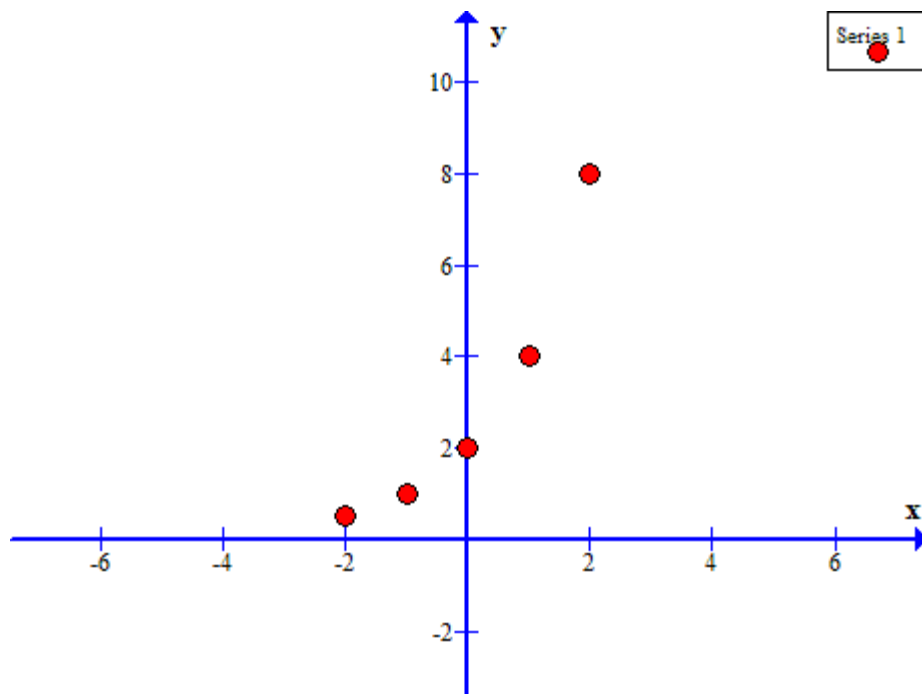
6. Graph the exponential function $y = 2^{x+1}$

x	-2	-1	0	1	2
y	$y = 2^{(-2+1)}$ $= 1/2$	$y = 2^{(-1+1)}$ $= 1$	$y = 2^{(0+1)}$ $= 2$	$y = 2^{(1+1)}$ $= 4$	$y = 2^{(2+1)}$ $= 8$

EXPONENTIAL FUNCTIONS

Sample Problem 2: Draw the graph of the following function.

6. Graph the exponential function $y = 2^{x+1}$



EXPONENTIAL FUNCTIONS

Sample Problem 2: Draw the graph of the following function.

6. Graph the exponential function $y = 2^{x+1}$

