Review:
From previous lessons, name 2 characteristics of an exponential function.

1. ________________________________________________________________________

2. ________________________________________________________________________

In this lesson, you will be able to:

1. ________________________________________________________________________

2. ________________________________________________________________________

Any quantity that grows or decays by a fixed percent at regular intervals is said to have **exponential growth** or **exponential decay**.

Exploring Exponential Growth and Decay Functions

Graph the following:

1. \[ y = 1(2)^x \]

2. \[ y = 2(3)^x \]

What do you notice about both graphs? _______________________________________
Exploring Growth and Decay Functions (continued)

Graph the following:

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

4. \( y = 2(0.4)^x \)

What do you notice about both graphs?  __________________________________________

Compare equations 1 & 2 with equations 3&4.  What did you discover????

___________________________________________________ ______________________

Exponential Growth Functions

\[ y = a(b)^x \]

When \_______________ \ and, \_______________ \ the graph will be increasing (growing).

Exponential Decay Functions

\[ y = a(b)^x \]

When \_______________ \ and, \_______________ \ the graph will be decreasing (Decaying).
EXAMPLES

Tell whether the following graphs represent an exponential growth or Decay.

a. ____________________ b. ____________________

Tell whether the following equations represent an exponential growth or Decay.

\[ y = 0.7 \left( \frac{3}{2} \right)^x \]  d. \[ y = 3(1.2)^x \]  e. \[ y = 2^x \]

\[ y = 4 \left( \frac{1}{4} \right)^x \]  g. \[ y = 0.5^x \]

Give two examples of each:

Exponential Growth
1. ____________________ 2. ____________________

Exponential Decay
1. ____________________ 2. ____________________
Parts of an Exponential Function

The general equation for an exponential GROWTH function is:

\[ y = a(b)^x \]

where,

- \( a \): ________________________________
- If \( b > 1 \): __________________________
- then \( b \): ____________________________
- and \( r \): ____________________________

The general equation for an exponential DECAY function is:

\[ y = a(b)^x \]

where,

- \( a \): ________________________________
- If \( b > 1 \): __________________________
- then \( b \): ____________________________
- and \( r \): ____________________________

EXAMPLES

Identify the initial value, the growth or decay factor, and the growth or decay rate of the exponential function.

1. \( y = 3(1.8)^x \)
   
   Growth or decay ______________________
   
   Initial value _________________________
   
   Growth or decay factor _____________
   
   Growth or decay rate ________________

2. \( y = 2.1(1.04)^x \)
   
   Growth or decay ______________________
   
   Initial value _________________________
   
   Growth or decay factor _____________
   
   Growth or decay rate ________________
Identify the initial value, the growth or decay factor, and the growth or decay rate of the exponential function.

3. \( y = 9(0.8)^x \)

Growth or decay ____________________
Initial value ____________________
Growth or decay factor ___________
Growth or decay rate _____________

4. \( y = 2(0.94)^x \)

Growth or decay ____________________
Initial value ____________________
Growth or decay factor ___________
Growth or decay rate _____________

5. \( y = 0.3^x \)

Growth or decay ____________________
Initial value ____________________
Growth or decay factor ___________
Growth or decay rate _____________

6. \( y = 3(2)^x \)

Growth or decay ____________________
Initial value ____________________
Growth or decay factor ___________
Growth or decay rate _____________

7. The Johnson Company calculates the value of its stock each year by using the function \( y = 120(0.98)^x \).

Growth or decay ____________________
Initial value ____________________
Growth or decay factor ___________
Growth or decay rate _____________

8. Selena’s starting salary for her new marketing management job is $32,000. She calculates her projected salary for the next 5 years by using the function \( y = 32,000(1.12)^x \).

Growth or decay ____________________
Initial value ____________________
Growth or decay factor ___________
Growth or decay rate _____________