5.9 Exponential Growth and Decay

SWBAT use the formula for exponential growth and decay to predict future values in real-life situations.

Exponential Growth	
Exponential Decay	

Exponential growth is given by the equation:

y = _____

a = _____

b = _____

x = _____

Graph:

Practice Problems: Pg. 459

Example 1: Since 2005, the amount of money spent at restaurants in the United States has increased about 7% each year. In 2005, about $360 billion was spent at restaurants. If the trend continues, about how much will be spent at restaurants in 2015?

Example 2: Suppose the population of a town was 25,000 people in 2000. If the population grows about 1.5% each year, what will the approximate population be in 2025?

Example 3: In 1971, there were 294,105 females participating in high school sports. Since then, that number has increased an average of 8.5% per year.

a) Write an equation to represent the number of females participating in sports since 1971.

b) How many females participated in high school sports in 2008?

Example 4: The population of Johnson City in 1995 was 25,000. Since then, the population has grown at an average rate of 3.2% each year.

    a) Write an equation to represent the population of Johnson City since 1995.

    b) According to the equation, what will the population of Johnson City be in the year 2020?

Compound Interest:

    A = _____

    P = _____

    r = _____

    n = _____

    t = _____

Practice Problems:

Example 1: Suppose that when your friend was born, your friend's parents deposited $200 in an account paying 4.5% interest compounded quarterly. What will the account balance be after 18 yr?

Example 2: Suppose that when your friend was born, your friend's parents deposited $200 in an account paying 4.5% interest compounded monthly. What will the account balance be after 18 yr?

Example 3: Mr. Smith bought a house for $96,000 in 1993. The real estate broker indicated that houses in his area are appreciating (increasing in value) at an average annual rate of 4%. What will be the value of Mr. Smith's house in 2009?

Exponential decay is given by the equation:

y = _____

a = _____

b = _____

x= _____

Graph:

Example 1; The kilopascal is a unit of measure for atmospheric pressure. The atmospheric pressure at sea level is about 101 kilopascals. For every 1000-m increase in altitude, the pressure decreases about 11.5%. What is the approximate pressure at an altitude of 3000 m?

Example 2: The kilopascal is a unit of measure for atmospheric pressure. The atmospheric pressure at sea level is about 101 kilopascals. For every 1000-m increase in altitude, the pressure decreases about 11.5%. What is the approximate pressure at an altitude of 5000 m?

Example 3: The original price of a tractor was $45,000. The value of the tractor depreciates (decreases in value) at a steady rate of 12% per year.

a) Write an equation to represent the value of the tractor since it was purchased.

b) What is the value of the tractor in 5 years?

Example 4: A new Honda Civic costs $18,000 in 2009. It is expected to depreciate in value by 12% each year. How much will the car be worth in 2015?

Example 5: The population of Detroit was 1,849,568 in 1950. The population has been decreasing by 1.5% every year. Find the population of Detroit in 2009.

Determining Growth or Decay
To determine exponential growth or decay, you must look at the "b" value.

a) Does the function $y=295(1.35)^t$ represent exponential growth or decay? What is the rate of growth or decay?

b) Does the function $y=3(0.72)^t$ represent exponential growth or decay? What is the rate of growth or decay?