Name: _____ **Precalculus Unit 8, Lesson 9**

Aim: How do we write equations of exponential functions given two points?

I. Do Now:

1. How long will it take for you to triple your $250 investment if it is placed in an account which pays interest at an annual rate of 1.5%, compounded continuously?

2. Write the equation of the line passing through the points (2, 192) and (5, 12288).

3. In 2011, eighty deer were reintroduced into a wildlife refuge area where the population had previously been hunted to elimination. By 2017, the population had grown to 180 deer. If this population is growing exponentially, find a formula for the function in the form $f(t) = ab^t$ (Round coefficients to four decimal places.)

II. Motivation:

4. In 2000, deer were reintroduced into another wildlife refuge area where the population had also been hunted to elimination. By 2002, the population had grown to 192 deer and by 2005, it had reached 12,288. Assume that the deer population is growing exponentially. Represent the deer population using an exponential function and use your equation to estimate the deer population in the year 2017. At what percent (to the nearest tenth) is the deer population growing per year?

II. Development:

Just as two points can determine the equation of a line, two points can determine an exponential equation in the form $y = ab^x$.

Example:

Write the equation of an exponential function that passes through the points (1, 12) and (3, 108).

To write an exponential equation given two points:

1. Substitute the coordinates of the two given points into the equation $y = ab^x$.
2.
3.

III. Applications:

5. Write the equation of an exponential function that passes through the given points:
   (a) (2, 36) and (5, 121.5) (b) $(-2, 128)$ and $\left(2, \frac{1}{2}\right)$

6. A bacterial colony is growing at an exponential rate. After 5 hours, its population is 12 bacteria and after 11 hours, its population is 15 bacteria.
   (a) Determine an equation for $B(t)$, the number of bacteria after t hours. Round coefficients to the nearest hundredth.
   (b) What is the population's hourly growth rate, to the nearest hundredth of a percent?
   (c) After how many hours will the population reach 1,000 bacteria?

HW16

Write an equation of the exponential function passing through the given points:
(a) (4, 3) and (6, 48) (b) (1, 192) and (5, 60.75) (c) (2, 14) and (7, 205) (round coefficients to nearest hundredth)