Name: __________________________ Date: ____________________

Learning Goal 7.1	Applying one or more transformations to an exponential function, including translations, stretches and reflections.

More Questions – Solutions

1. A culture of bacteria triples every 25 hours. The initial count of a sample shows 1000 bacteria.
   a. Write an exponential function that models the given conditions.

$$y = Ab^x$$
$$y = 1000(3)^{\frac{x}{25}}$$

$y =$ the number of bacteria after x hours
$A =$ the initial population
$b =$ the growth rate
$x =$ the amount of time passed, in hours

   b. Approximate how many bacteria will be there in 4 days?

$$4 \times 24 = 96 \text{ hours}$$

$$y = 1000(3)^{\frac{96}{25}}$$
$$y \approx 67943.14 \text{ (calculator)}$$

There will be 67 943 bacteria after 4 days.

   c. How long does it take for the population to double?

$$y = 2000$$

$$2000 = 1000(3)^{\frac{x}{25}}$$
$$2 = (3)^{\frac{x}{25}}$$

(what power can you raise 3 to and get an answer of 2? Guess and check … and we'll come back to this in the next chapter!)

$$x \approx 16$$

It will take about 16 hours for the population to double.

2. An investment of \$500 is earning an interest at 6% annually, compounded monthly.
   a. Write as an exponential function

General Formula for Compound Interest
$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

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$$A = 500\left(1 + \frac{0.06}{12}\right)^{12t}$$

$A =$ the full amount of the investment
$P =$ the principle (initial investment)
$r =$ the interest rate (as a decimal)
$n =$ the compounding period (how many times a year the interest is calculated)
$t =$ the term (length of the investment, in years)

b. Graph the function. Determine the value of the investment after 5 years.

$A \approx \$675$

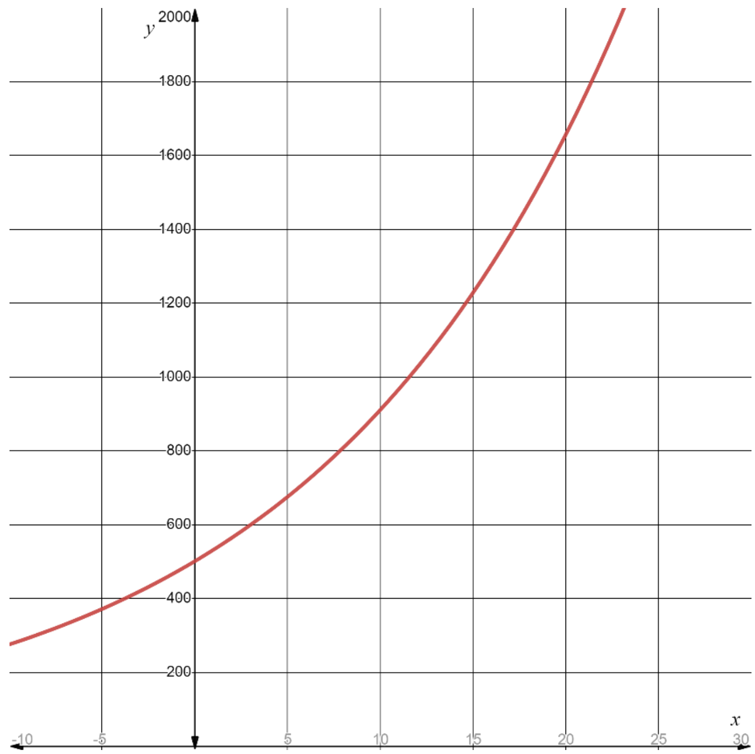
c. Determine how long it would take for the investment to double.

$t \approx 11.5$ years

d. How long would it take for the investment to double if the interest rate is raised to 10%?

Change the r value to 0.10 and re-graph

$t \approx 7$ years



3. The population of BC is approx. 4.16 million in 2004. It is growing at a rate of 2.2% a year
   a. Write an equation expressing the population of BC and the number of years.

$$y = Ab^x$$
$$y = (4.16)(1.022)^x$$

$y =$ the population after x years
$A =$ the initial population
$b =$ the growth rate (don't forget the original!)
$x =$ the amount of time passed, in years

b. Determine when the population will become 5.5 million.

$x \approx 12.5$ years