CW#_____

Math 3

Name: _____

Date: _____

Period: A1 A2 A3 B1 B2 B3

Practice:

Exponentials

Unit 7

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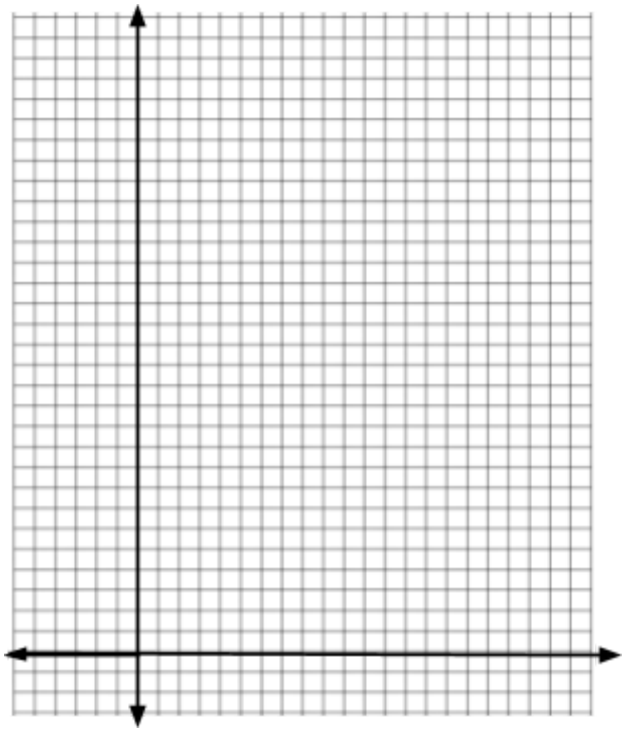
1. (NEW) Tasha only has $3 saved but has a goal of doubling the total amount of money she has saved every month.

   Let x represent time (in months, starting now).

   Let y represent the total amount of money saved (in dollars)

a. Create multiple representations of this situation. First, make a table. Then write an equation of the form $y = ab^x$. Last, draw a graph.

x	y



b. (EXTENSION) Tasha's brother Clifton is going to copy Tasha's savings plan exactly, but because he wants to always have more money than her, so he has $10 saved and hiding in his dresser. Make a table and write an equation for the total amount of money Clifton has saved after x months. Then add his model to the graph above.

x	y

c. Each graph has an asymptote. Draw the asymptotes with a dashed line. What do they represent for each equation?

2. (REVIEW) Given $f(x) = 4000(1.05)^x$, use a calculator to evaluate the following:

a. f(4) = b. f(-3) = c. f(0.5) = d. x when f(x) = 4000

3. (NEW) Below are four situations that can be described using exponential functions. They represent a small sample of the situations where quantities grow or decay by a constant percentage over equal periods of time. For each situation:

   i. What is an appropriate unit of time (such as days, weeks, years)?
   ii. What is the multiplier that should be used?
   iii. What is the initial value?
   iv. Write the equation of an exponential function that represents the situation.

a. A house purchased for $120,000 has an annual appreciation of 6%.

   Time: Multiplier: Initial Value: Equation:

b. The number of bacteria present in a colony is 180 at noon, and it increases at a rate of 22% per hour.

   Time: Multiplier: Initial Value: Equation:

c. The value of a car with an initial purchase price of $12,250 depreciates by 11% per year.

   Time: Multiplier: Initial Value: Equation:

d. An investment of $1000 earns 6% annual interest, compounded monthly.

   Time: Multiplier: Initial Value: Equation:

4. (NEW) The cost of a movie ticket now averages $11.50. The average cost of a movie ticket over time is modeled by the following expression. Interpret the meaning of the expression. What does the number 1.083 represent? What does *t* represent?

   $11.50(1.083)^t$.

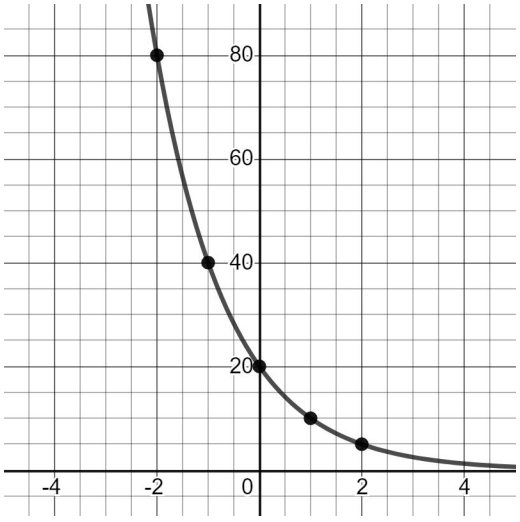
5. (NEW) Martina is a scientist who studies island ecosystems. She wants to write an equation to model the population of an invasive species (rats!) on Dorado Island. In 2017 the rat population was estimated to be 9,000. She wasn't able to collect data in 2018 or 2019, but in 2020, the estimate is 6,561 rats. Their population is decreasing!

a. Use this information to write a mathematical model (an equation) to represent the rat population.

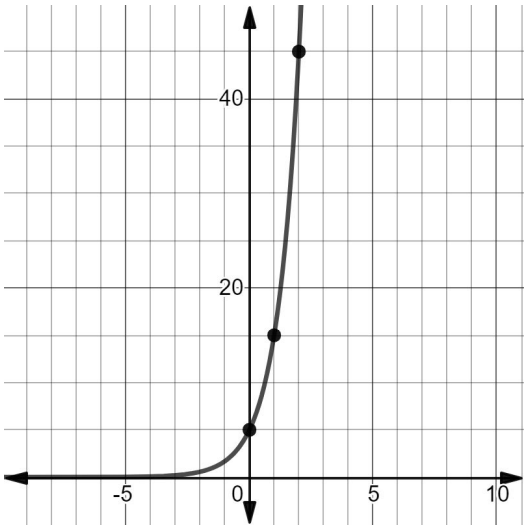
b. According to this model, how many rats will there be in 2030?

6. (NEW) Write an equation to represent each exponential function. It may help to first make a table so you can determine the initial value and multiplier.

a.



b.



7. (EXPLORE) A regular tetrahedron is a triangular-based pyramid in which every face is an equilateral triangle. Is it possible to slice a regular tetrahedron and get a cross-section that is *not* an equilateral triangle? Justify your response, explaining completely.

8. (REVIEW) Quinten and his sister Kelsey always make a habit of undoing each other's work. If Kelsey folds the laundry, Quinten unfolds it. If Quinten rakes the leaves in the yard, Kelsey "unrakes" them! While working on her math homework, Kelsey wrote the following equations. Help Quinten undo these functions by writing their inverse functions.

   a. $y = 3x - 2$

   b. $y = \frac{x+1}{4}$

   c. $y = x^3 + 1$

9. (REVIEW) Write the equation in graphing form of each circle described below.

   a. A circle with radius 12 centered at the point (–2,13).

   b. A circle with center (–1,–4) and radius 1.

   c. A circle with equation $x^2 + y^2 - 6x + 16y + 57=0$. (Hint: Complete the square for both x and y.