Exponential Functions & Equations
Bell Work Day 2

- 1. Jacob has $50 and wants to save $30 per week. Complete the table and write a function rule to model Jacob's savings.

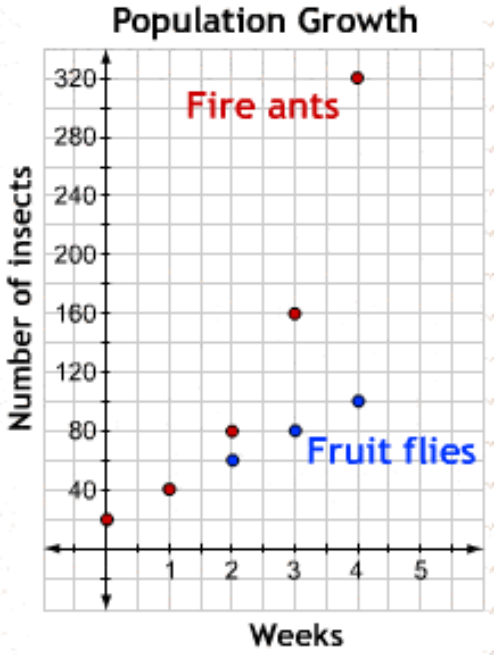
x	y
0	30

- 2. Complete the missing boxes in the table. Write a function rule to model the data.

x	0	1	2	3	4	5
y	5	15	45			

- 3. Simplify $(x^3y^5)^3(xy^{-2})$.

8. **REINFORCE** Assume the growth rates for the two populations remain the same as they were in Barry's and Red's original experiment.



   a. How would the graph of the population of fruit flies change if there were only 10 fruit flies at the beginning of the experiment?

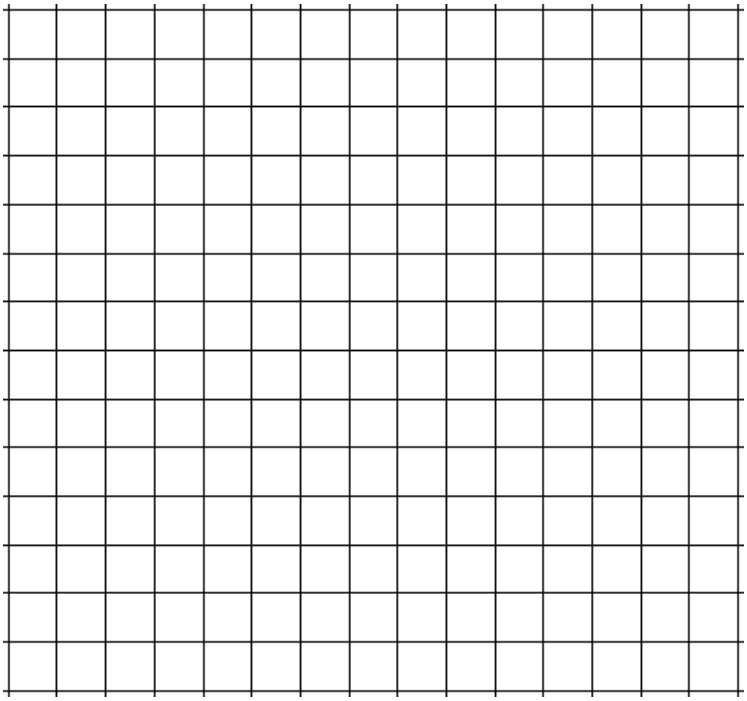
   b. How would the graph of the population of fire ants change if there were only 10 fire ants at the beginning of the experiment?

9. **REINFORCE** A certain bacteria population triples each minute. Suppose you begin with a single bacterium.

   a. Make a table of values to show the population of bacteria at the end of each minute for the first 5 minutes of growth.

Number of minutes	Number of bacteria
0	1

b. Graph the data from your table.



c. Write a function rule that relates the number of minutes that have passed, ***m***, to the number of bacteria in the population, ***b***(***m***).

10. **REINFORCE** Now consider another bacteria population. The number of these bacteria present after each hour is represented by the function rule $g(h) = 500 \cdot 4^h$, where ***g*** represents the number of bacteria present after ***h*** hours.

a. How many bacteria were there initially? How do you know?

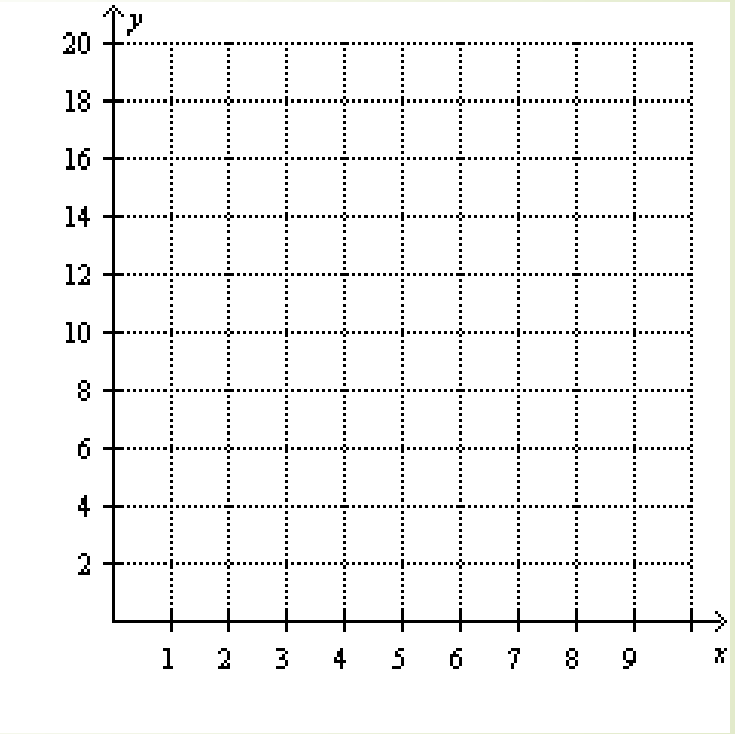
b. How are the bacteria growing each hour? How do you know?

Exponential Functions & Equations
Bell Work Day 3

- Complete the table and graph each function below.

x	$y = 3x + 2$

x	$y = 2(3)^x$



- Explain the differences in the rates of change of each function.

Student:_____ Class:_____ Date:_____

Exponential functions and equations

Student Activity Sheet 3; use with *Exploring* "Growth and decay"

1. Each time you fold a piece of paper, the number of layers of paper changes. Complete the table to show the number of layers for each fold.

Number of folds	Process	Number of layers of paper
0		
1		
2		
3		
4		
5		
6		

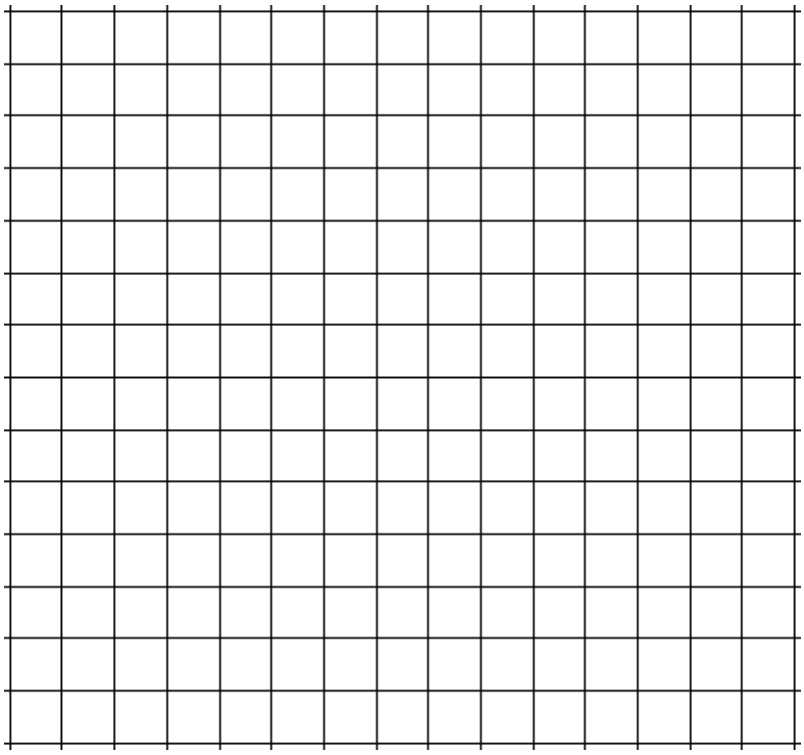
2. As the number of folds increases, what pattern do you notice in the number of layers of paper?

3. Write a function rule that represents the number of layers of paper, $\boldsymbol{p}(\boldsymbol{n})$, as a function of the number of paper folds, $\boldsymbol{n}$.

Exponential functions and equations

Student Activity Sheet 3; use with *Exploring* "Growth and decay"

4. Draw a scatterplot of the paper folding experiment.



5. Using the function rule you wrote for question 3, calculate how many layers a paper would have if you folded the paper 18 times.

6. How many folds would create 1024 layers of paper? Use your function rule and guess and check to find the answer.

Exponential functions and equations

Student Activity Sheet 3; use with *Exploring* "Growth and decay"

7. Complete the table to show the relationship between the number of folds in a sheet of paper and the area of the top layer.

Number of folds	Process	Area of top layer (sq. in.)
0		
1		
2		
3		
4		

8. Write a function rule to show the relationship between the area of the top layer, ***a***, and the number of times the paper is folded, ***n***.

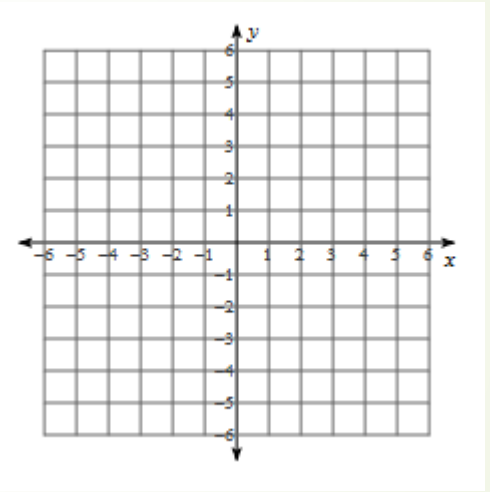
9. Use your function rule to find the area of the top layer when there are 10 folds.

Exponential Functions & Equations
Bell Work Day 4

1. Your math teacher tells you that next week's test is worth 100 points and has 38 questions. Each problem is worth 5-points or 2-points. How many of each value are there?

2. Graph the following system:

$$\begin{cases} -3x + 2y > -6 \\ y \leq -2x + 5 \end{cases}$$



3. Write the following numbers in scientific notation.

   a. 10,598,700

   b. 0.005409

Student:_____ Class:_____ Date:_____

Exponential functions and equations

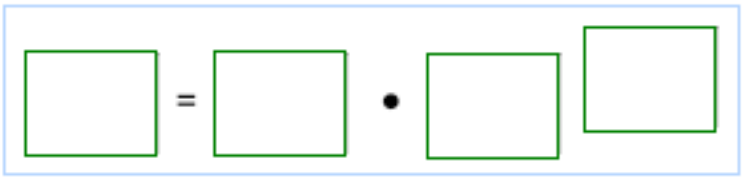
Student Activity Sheet 4; use with *Exploring* "Modeling exponential growth"

1. In 2008, Smart High School had 1000 students. The student population has grown by 1.5% every year since. And the school district administration predicts the same growth will continue until at least 2028. Model Smart High School's current and predicted population growth in a table. Let 0 represent the year 2008. Complete the table.

Year	Number of years since 2008	Process	Predicted enrollment
2008	0	1000	1000
2009	1	$1.015 \cdot 1000$	1015
2010	2	$1.015 \cdot (1.015 \cdot 1000) = 1.015^2 \cdot 1000$	1030
2011	3		
2012			
2013			
2018			
2028			

2. Let ***y*** represent the number of students in the school. Complete the puzzle to create a function rule that describes the enrollment at Smart High School.

x	***y***	1.015	1000



With space for student work

Name: _____

Period: _____ Date: _____

Modeling Exponential Growth

For each exponential story problem do the following:

- Writing a function rule
- Creating a table of values
- Graphing the data
- State whether the graph shows growth or decay
- Answerthe accompanying questions

Verbal Direction given to students through the class.

Each group is given a specific problem. Group 1 is problem 1, Group 2 is problem 2, Group 3 is problem 3, Group 4 is problem 4, and we will all do problem 5 together toward the end of class. Right now you all will have 10 minutes to complete their assigned problem, and become experts in their problem. After the ten minutes you will all have 1 minute to ask any clarifying questions to your group members.

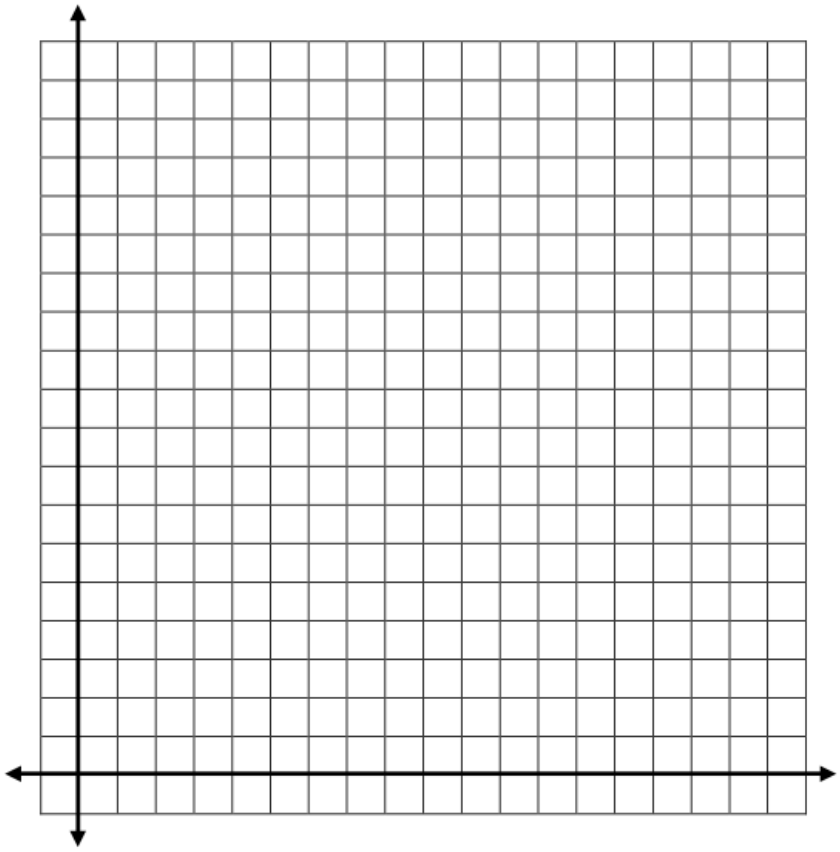
At the beginning of class you drew a penny, nickel, dime, quarter, or dollar bill. After your clarifying questions minute, you will move to a different part of the room with your coin group. This new group will be made up of people from different groups, and therefore they all have different problems solved. You will have 10 minutes to complete problems 1-4 using your experts from each older group. Each member of the new group will teach their problem to their new group members. After the 10 minutes I will offer you more time if necessary.

After everyone has finished the packet, we will come back together as a group and complete problem 5 together.

1. Zombie Apocalypse

A virus is turning people in Zombies! When the virus started spreading there was only one Zombie and the number of Zombies quadruples every week.

x	y



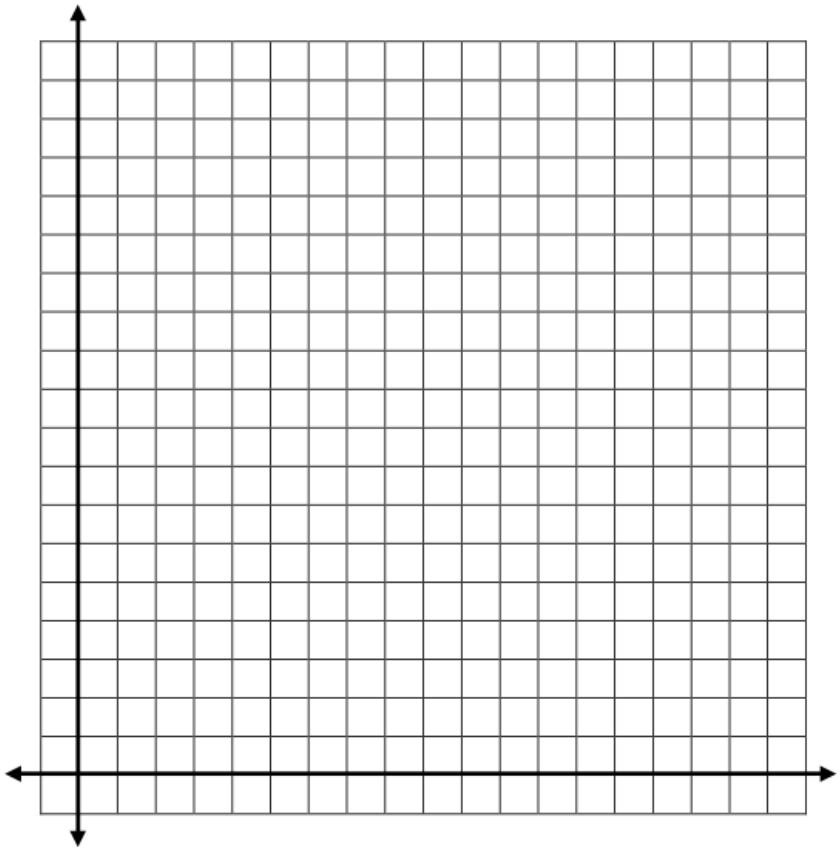
Question 1. How many Zombies will there be after 15 weeks?

Question 2. When there are 1,000,000 people who have turned into Zombies the World Health Organization (WHO) will call the virus a pandemic. After how many weeks will there be a pandemic?

2. Eagle Creek

At Eagle Creek Park there is a population of deer. When the deer first moved into Eagle Creek there were 4 deer and the number of deer doubles each month.

x	y



Function rule: _____

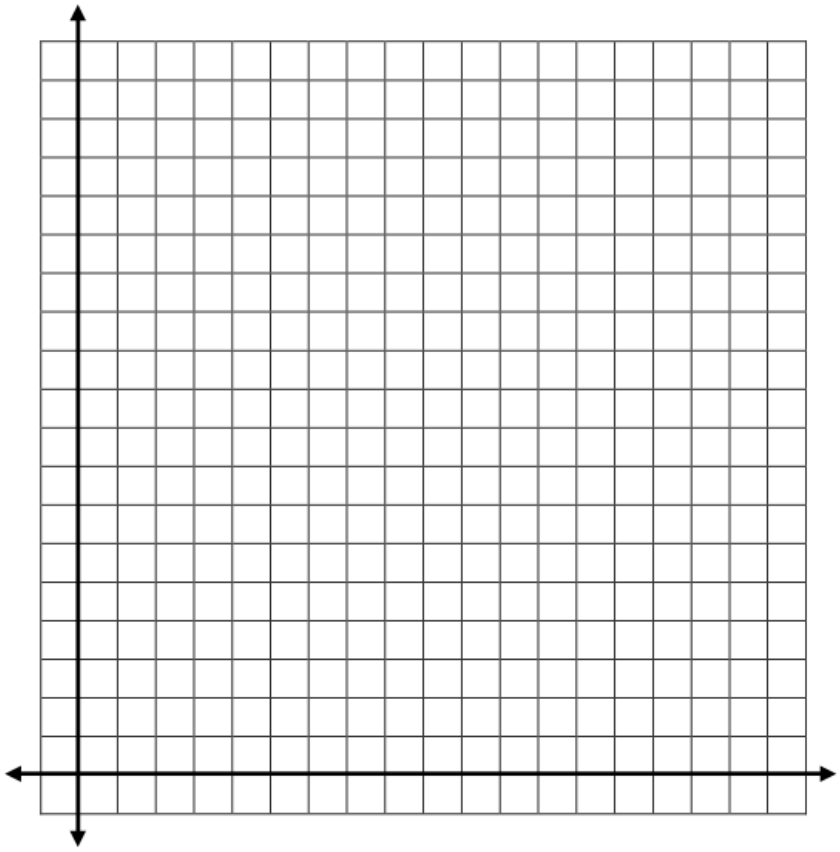
Question 1. How many deer will there be after 10 months?

Question 2. When there are more than 10,000 deer Eagle Creek will have to move the deer to other parks in the state. After how many months will deer have to be moved?

3. Guitar Club Membership

Mrs. Petrin is the sponsor for Guitar Club at Pike. During the first week of school she had 2 people join Guitar Club. The number of people joining Guitar Club doubles each week.

x	y



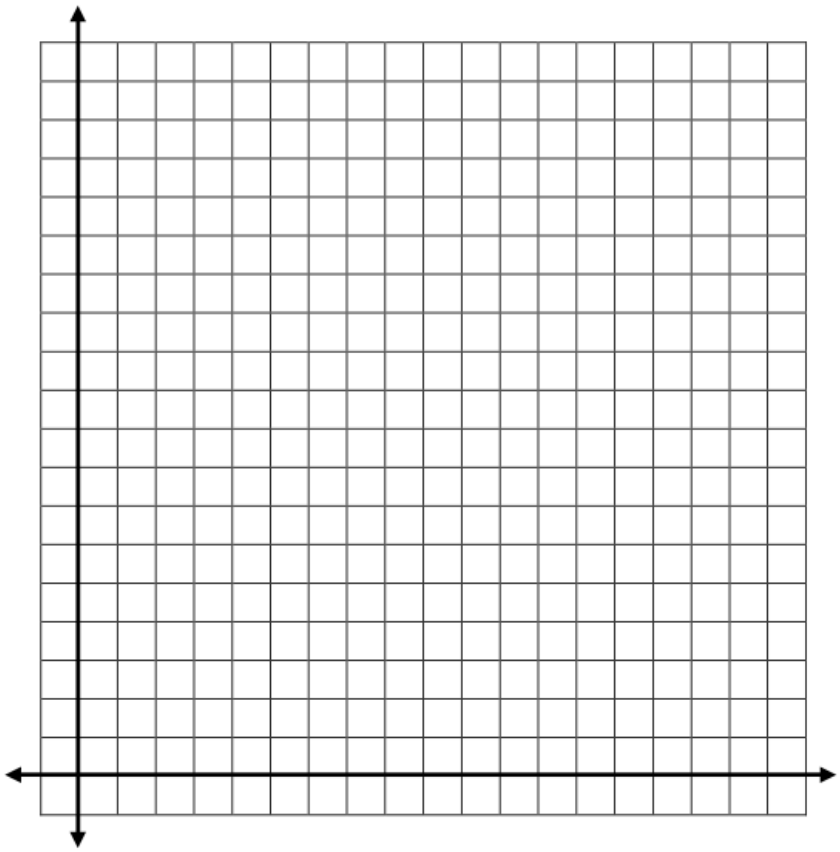
Question 1. How many students are in Guitar Club after 4 weeks?

Question 2. Once Mrs. Petrin has more than 30 students join Guitar Club she has to get a bigger room for Guitar Club. After how many weeks will Mrs. Petrin have to get a bigger room?

4. Sick Day

Ms. Wraley came to Pike sick one day and got 3 students sick. The next day the sick students came to school and got other people sick. The number of students who get sick triples every day.

x	y



Question 1. How many students will be sick after 6 days?

Question 2. After half of the students at Pike (1,630 students) are sick, Mr. Inman has to cancel school. After how many days will school have to be cancelled?

Exponential Functions & Equations
Bell Work Day 5

- 1) Austin is working on some research involving cells. He has observed that every 5 hours the cells quadruple. He started with 23 cells.

  a) State a function rule that describes this situation.

  b) How many cells will he have in 22 hours?

- 2) Write the function rule for each of the tables below.

x	f(x)
0	4
1	8
2	12
3	16

x	f(x)
0	4
1	8
2	16
3	32

Name: _____Period: _____ Date: _____

Topic 15 HW#5 – More Modeling Practice

1. An initial population of 750 endangered turtles triples each year for 5 years. Write a rule for the population and find the population after 5 years.

   Function Rule: _____

   Population after 5 years: _____

2. The population of Baconburg starts off at 20,000, and grows by 13% each year. Write an exponential growth model and find the population after 10 years.

   Function Rule: _____

   Population after 5 years: _____

3. The population of Henderson City was 3,381,000 in 1994, and is growing at an annual rate of 1.8%. what will the approximate population of Henderson City be in the year 2016?

   Function Rule: _____

   Population in 2016 (standard notation): _____

   Population in 2016 (scientific notation): _____

4. Write a function rule for the table. Create a scenario to show your understanding of what the data represents.

x	y
0	1
1	4
2	16
3	64
4	256

   a. Function Rule: _____
   b. Your Scenario:

   _____
   _____
   _____
   _____
   _____
   _____

5. Write a function rule for the table. Create a scenario to show your understanding of what the data represents.

x	y
0	6
1	12
2	24
3	38
4	96

   a. Function Rule: _____

   b. Your Scenario:
   _____
   _____
   _____
   _____
   _____

6. Johnny has 2 more quarters than dimes. He has a total of 38 quarters and dimes worth $6.80. How many quarters and dimes does Johnny have?

   Equation 1: _____ Equation 2: _____

   Number of Quarters: _____ Number of Dimes: _____

7. Adam is buying fish for his aquarium. He wants to buy blue fish and striped fish. The blue fish cost $15 and the striped fish are $18. The aquarium can hold 10 fish, and he spent $171. How many of each type of fish did Adam buy?

   Equation 1: _____ Equation 2: _____

   Number of blue fish: _____ Number of striped fish: _____

Name: _____Period: _____ Date: _____

Topic 15 Exponential Functions & Equations Test Review

	Linear Function	**Exponential Function**
General Form	$f(x) = mx + b$	$f(x) = a \cdot b^x$
	Starting value: _____ *Rate of change:* _____	*Starting value:* _____ *Constant Multiplier:* _____

1) Suppose the population of particular bacteria doubles every 2 hours. Write a function rule for the situation if there are 52 bacteria present in the culture. How many bacteria will there be after 4 hours?

Function rule: _____

Amount present after 4 hrs: _____

2) Determine if the data in the table represents a linear or exponential function. _____
Write a function rule that best fits the data. _____

x	1	2	3	4	5
$f(x)$	3	9	27	81	243

3) Determine if the data in the table represents a linear or exponential function. _____
Write a function rule that best fits the data. _____

x	0	1	2	3	4
$g(x)$	5	15	45	135	405

4) Determine if the data in the table represents a linear function or exponential function. _____
Write a function rule that best fits the data. _____

x	1	2	3	4	5
$f(x)$	-2	-6	-18	-54	-162

5) Determine if the data in the table represents a linear function or exponential function. _____
Write a function rule that best fits the data. _____

x	-3	-2	-1	0	1
$g(x)$	10	15	25	20	15

6) The number of fire ants triples every 5 hours and there are currently 60 fire ants.

a. Function Rule:_____

b. How many fire ants will there be in 24 hours?

7) You went to a Taylor Swift concert and had her sign your ticket. Now the ticket is worth $160 on eBay. If the value of the ticket increases 14% each year, then what will the value be after 6 years?

8) Supposed you deposit $3,000 in an account paying 4.5 % interest each year. Write an exponential function model that can be used to determine the amount in the account after ***t*** years.

Function Model: _____

Now use this model to determine the balance in the account after 10 years.

9) The foundation of your house has 1200 termites. The termites are growing at a rate of 2.4% per day.

a. Write a rule to show how the termites are growing? _____
b. How many days will it take for the termites to double? _____
