Name: KEY

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

For grading:

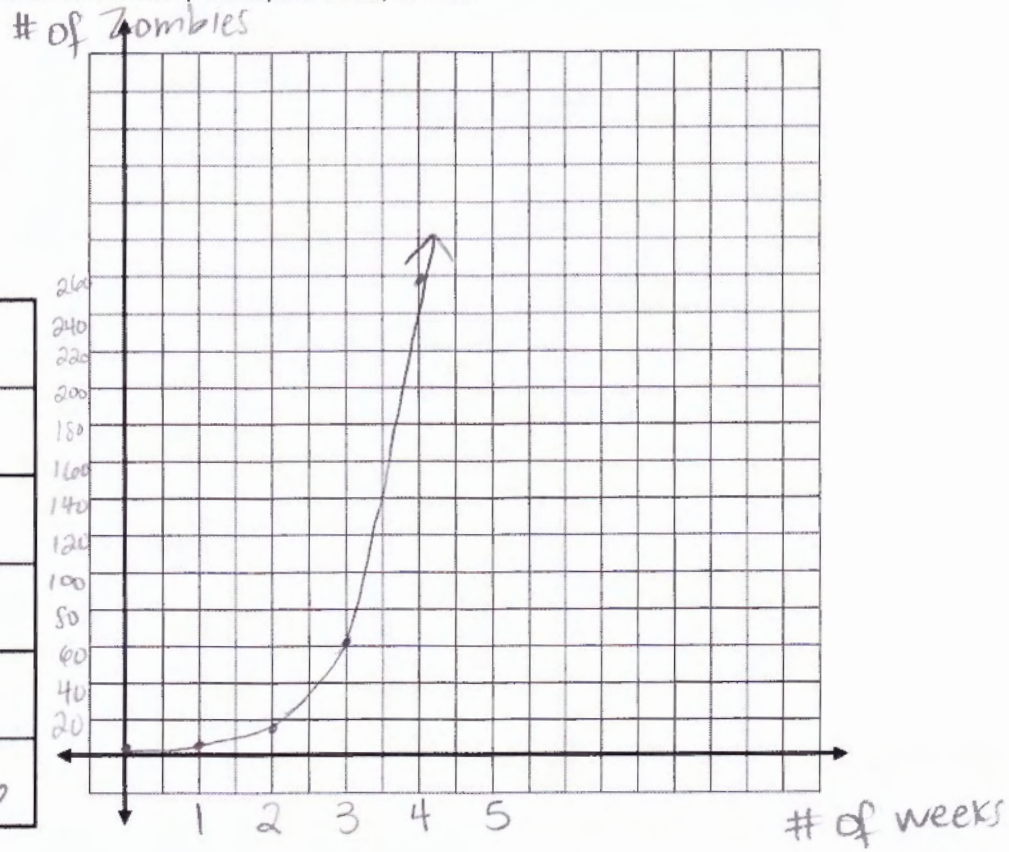
I am grading this assignment based mainly on completion, but I am looking for specific information for each problem. Student have been asked to include: a function rule, table of values, graph, show or state whether the situation is growth or decay, and to answer the accompanying situational questions. If the student has shown or stated all the required pieces for a problem then they get full credit on that problem. On the following key I will write down answers that would have been acceptable and showed mastery of using exponential functions to model real-life situations.

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.

$y = 1 \cdot 4^x$ or $y = 4^x$

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



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

$y = 4^{15}$ 1,073,741,824 Zombies

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?

$1{,}000{,}000 = 4^x$

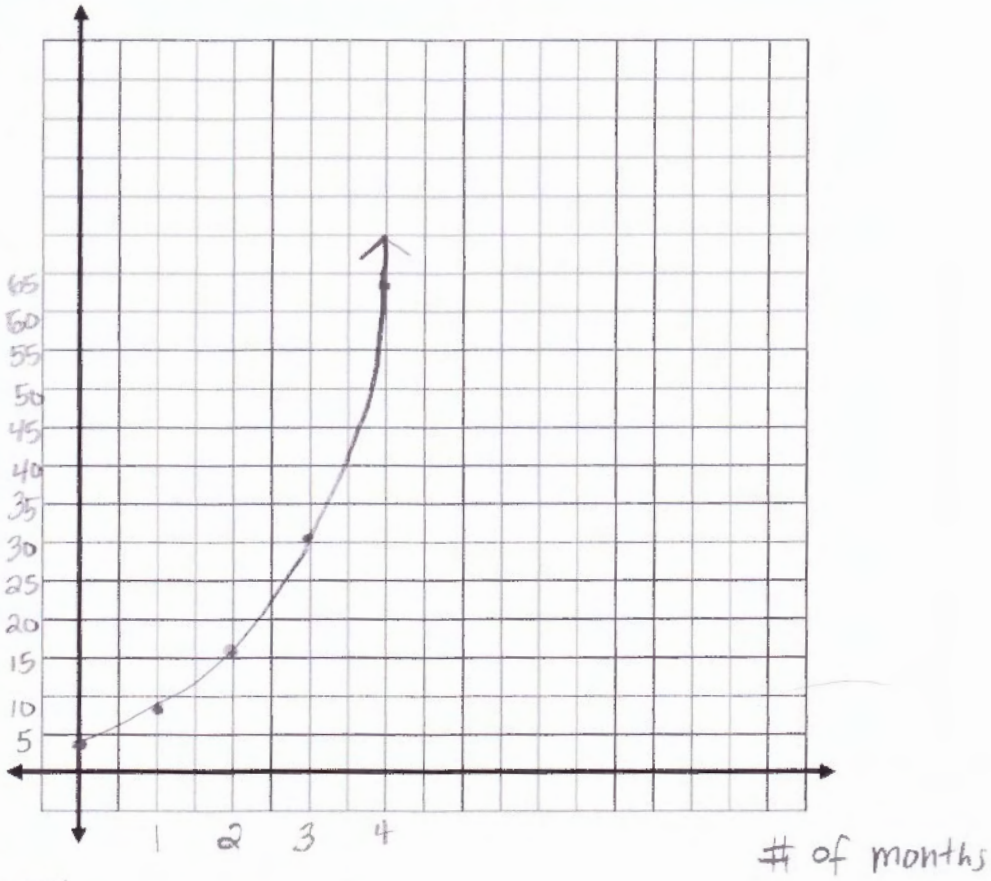
When $x = 9.96$ there are 1,000,000 Zombies

After 10 weeks

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
0	4
1	8
2	16
3	32
4	64



Function rule: $y = 4 \cdot 2^x$

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

$y = 4 \cdot 2^{10} =$ 4,096 deer

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?

$10{,}000 < 4 \cdot 2^x \Rightarrow 2{,}500 < 2^x$

The inequality holds true when $x = 12$.

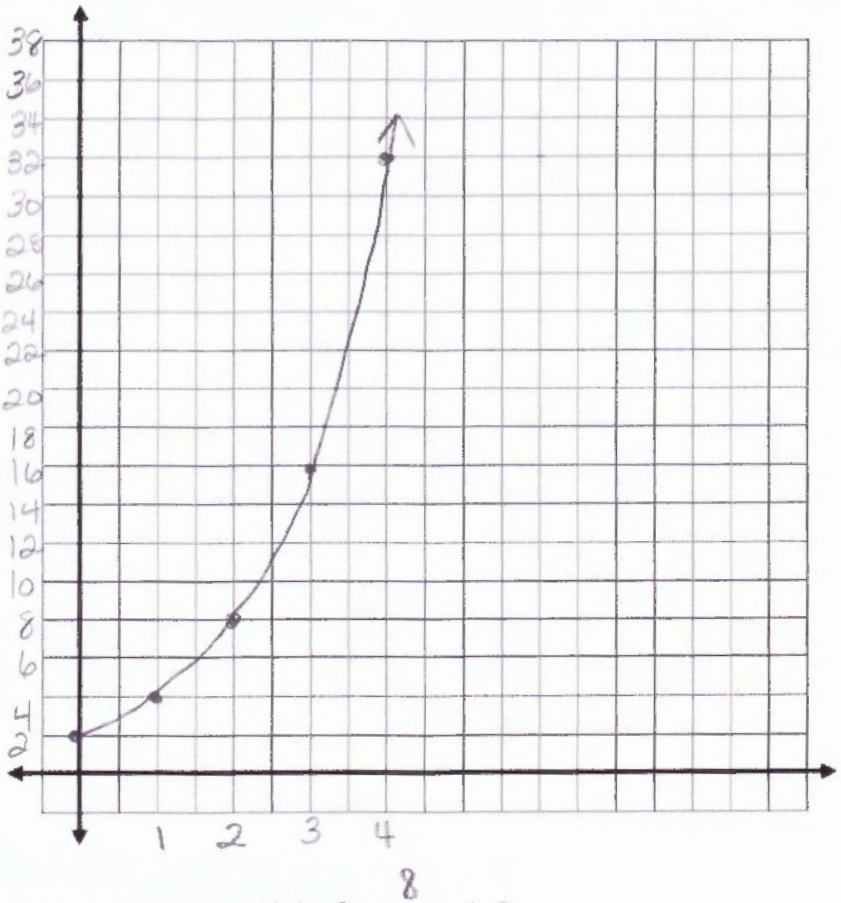
After 12 months.

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.

$y = 2 \cdot 2^x$

x	y
0	2
1	4
2	8
3	16
4	32



Question 1. How many students are in Guitar Club after 8 weeks?

$y = 2 \cdot 2^8 = 512$ students

Question 2. Once Mrs. Petrin has more than 40 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?

$40 < 2 \cdot 2^x \Rightarrow 20 < 2^x$

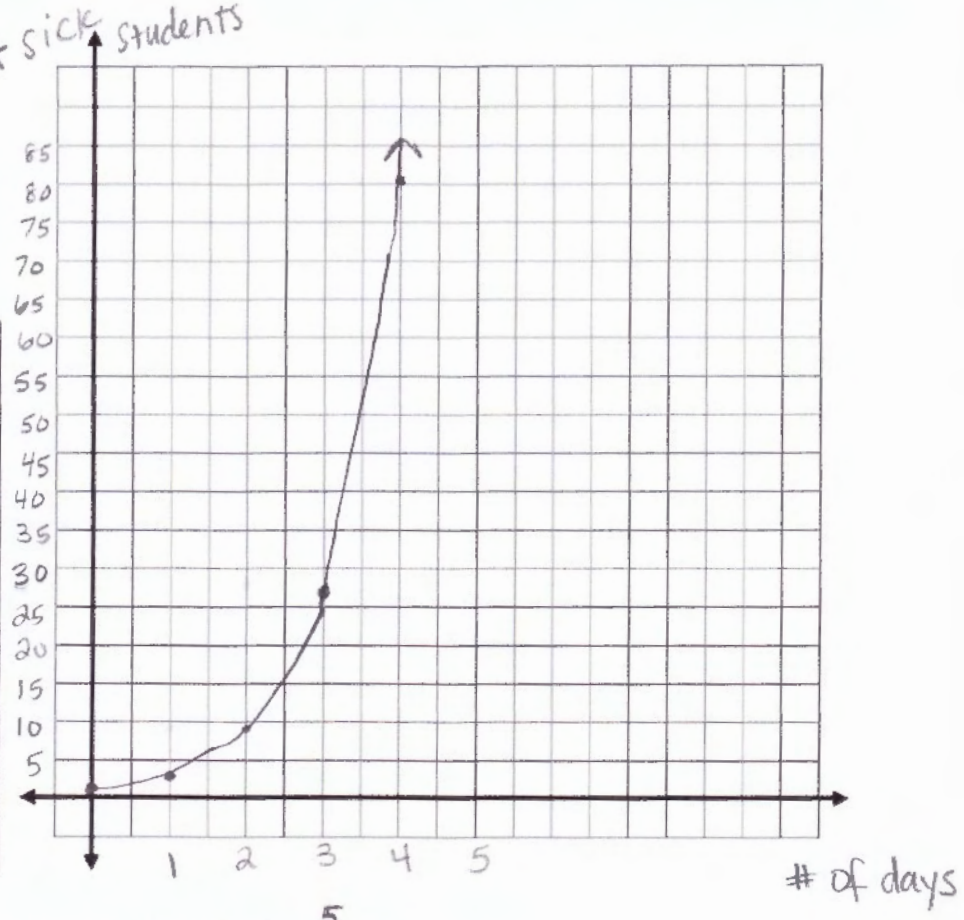
The inequality holds true for $x \geq 5$.

After 5 weeks

4. Sick Day

Ms. Wraley came [redacted] 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.

$y = 3 \cdot 3^x$



x	y
0	1
1	3
2	9
3	27
4	81

Question 1. How many students will be sick after 5 days?

$y = 3 \cdot 3^5$

729 students

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?

$1{,}630 = 3 \cdot 3^x \Rightarrow 543 = 3^x$

When $x = 5.73$ the equation holds.

After 6 days.