

Algebra 2 Honors- Week 17 Homework

Monday -**Zombie Apocalypse Exponential Models Assignment**

Write a scenario, either with zombies or your choice, for each function model.

1. $f(x) = 10(3)^x$ 2. $f(x) = 3(10)^x$ 3. $f(x) = 1,000,000 \left(\frac{1}{3}\right)^x$ 4. $f(x) = 1,000,000 \left(\frac{2}{3}\right)^x$

Graph the first four nights in each scenario on the coordinate plane. Use different colors or symbols for each scenario. (Your graph should have go from $[-5,5]$ on the x axis and $[-1, 260]$ on the y axis.)

5. $f(x) = 2^x$ 6. $f(x) = 3^x$ 7. $f(x) = 4^x$

8. Describe the similarities and differences of the graph of each function.

9. We are going to investigate changes to the graph if we extend it into negative x values. Complete the following charts for each function $f(x) = 2^x$, $f(x) = 3^x$, and $f(x) = 4^x$. Graph those points on your coordinate plane.

x	f(x)
0	
-1	
-2	
-3	
-4	

x	f(x)
0	
-1	
-2	
-3	
-4	

x	f(x)
0	
-1	
-2	
-3	
-4	

10. Write a function to describe this situation: 20 zombies invade your town. They each attack 9 people every night. How many will there be in 3 nights?

11. Write a chart to describe the number of zombies left in this situation: There are 100 zombies in your town. People have gotten smart and have learned to stay away from the zombies so are no longer being infected. The local militia starts killing 20% each night. How many will be left in 3 nights? (Extra Credit: Write a function to describe this situation.)

12. Write a chart to describe the number of zombies left in this situation: There are 100 zombies in your town. They each attack one person per night. The local militia decides to fight back and kills half of the zombies each night. How many will be left in 3 nights?

Tuesday-**Exponential Graphs Assignment****Describe the transformation. List the domain, range and asymptote.**

1. $f(x) = 3^x - 5$ 2. $f(x) = 3^{x-5}$ 3. $f(x) = \frac{1}{4}(3)^{x+2}$ 4. $f(x) = 2(3)^{x-4} + 2$

5. Describe how the asymptote relates to the domain and range of an exponential function.

Given the function, $(x) = 5^x$, write a new function with the given transformations

6.a vertical translation up 6 and a horizontal translation left 2

7. a horizontal translation right 3 and a stretch of 4

8. Graph the function $f(x) = \frac{1}{2}^x$ using the domain $\{-2, -1, 0, 1, 2\}$. With translations, graph $f(x) = \frac{1}{2}^{x+2}$, $f(x) = \frac{1}{2}^x - 3$, and $f(x) = 2 \cdot \frac{1}{2}^x$ on the same coordinate plane.9. Explain why the exponential function $f(x) = 2^x$ has a horizontal asymptote at $y = 0$.

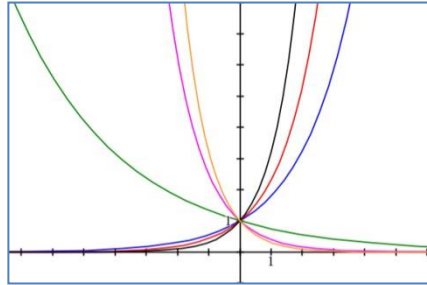
10. a) Predict what the function $f(x) = (-2)^x$ would look like. b) Make a chart given the domain $\{-2, -1, 0, 1, 2\}$. c) Do these points form your predicted graph? d) What is $f\left(\frac{3}{2}\right)$? Explain your answer.

Wednesday-

Exponential Graphs Day 2 Assignment

Using two points, sketch the graph each function.

- $f(x) = 7^x$
- $f(x) = 6^x$
- $f(x) = \left(\frac{1}{5}\right)^x$
- $f(x) = \left(\frac{2}{3}\right)^x$
- Using $f(x) = 7^x$, as a model, graph $f(x) = 7^{-x}$ and $f(x) = -(7^x)$. Write a description of each transformation.
- Six graphs of $f(x) = a^x$ are shown below where $a = 1.8, 2.3, 3.2, 0.4, 0.75$ and 0.31 . Label each graph with its function.



Sketch a graph of each side of the equation and estimate the solution.

- $2^x = 5$
 - $3^x = 12$
 - $2^x = -4$
10. Your town has an infestation of 10,000 zombies. Each night, you and your brave friends manage to eradicate 40% of them.
- Write a function to fit this scenario.
 - How many zombies will be left in 4 days?
 - How many days until there are less than 500 zombies?

Thursday-

Simplifying Logarithms Assignment

Rewrite using logarithms.

- $8^2 = 64$
- $\frac{1}{3}^{-3} = 27$
- $125^{-\frac{1}{3}} = 5$
- $16^{\frac{3}{4}} = 8$

Rewrite using exponents.

- $\log_5 1 = 0$
- $\log_2 32 = 5$
- $\log_{10} 0.01 = -2$
- $\log_9 27 = \frac{3}{2}$

Simplify the logarithm.

- $\log_{10} 1000$
- $\log_4 16$
- $\log_{16} 16$
- $\log_4 \frac{1}{64}$
- $\log_3 \sqrt{3}$
- $\log_9 \sqrt{3}$
- $\log_8 4$
- $\log_1 4$

- What is the answer to a logarithm?
- Solve: $\log_x 1000 = 3$

Friday-

Exponent and Logarithm Equations Assignment

Solve Each Equation.

- $3^x = \frac{1}{27}$
- $9^{x-3} = 27$
- $8^{2+x} = 2$
- $27^{2x-1} = 3$
- $\log_9 x = 2.5$
- $\log_4 x = -\frac{3}{2}$
- $\log_x 64 = 2$
- $\log_x 7 = -\frac{1}{2}$
- Solve: $\log_x 2 = 0$. Explain your solution.
- Simplify $\log_2 8$ and $\log_8 2$.
 - Simplify $\log_3 81$ and $\log_{81} 3$.
 - Explain the pattern and write a general formula for logarithms like these.

11. What about $\log_a 1 = 0$? Describe the answer to this equation.

12. Three zombies enter Chicago (population 207,700). Each zombie infects two people per night.

a) Write an function to fit this scenario.

b) How many zombies will there be in one week?

c) How long until the entire city become zombies?