Introduction to Exponential Functions

Agenda

Warm-Up (Set up Unit 10)

Activity

HW (2 pages)

Reminders

Quiz Friday

6.1 Due Friday

Set up Unit 10 in your notebook. Page 116 is blank. Put your "10" tab on p. 117.

UNIT 10   TITLE: p. 117

Exponential Functions

Page #	Page Title
118	WWK

Right hand side

p. 118

Unit 10 Words Worth Knowing

Unit 10 - Exponentials

- ☐ Exponential Function
- ☐ Base
- ☐ Multiplier
- ☐ Exponential Growth
- ☐ Exponential Decay
- ☐ Increasing/Decreasing
- ☐ Linear
- ☐ Quadratic
- ☐ Direct Variation
- ☐ Inverse Variation
- ☐ Constant of Proportionality

Left hand side

5th six weeks wrap-up

	2nd	3rd	4th	5th	7th
A's	8	6	6	9	8
B's	8	6	7	4	5
C's	4	6	7	4	2
F's	5	5	9	5	14

Detentions for unserved 4th six weeks mandatory tutoring must be served by Friday (or else Saturday School)

Mandatory tutoring (blue sheets)

If you were absent Friday - please schedule a time to makeup the unit 9 test (before Friday!!)

Introduction to Exponential Functions

Read the green sheet at your table.

In the next ten thousand years, the star which earthlings have named WOH G64 will explode as a supernova. (Use the internet to research WOH G64.) This planet was inhabited by creatures who were very similar to those in the book Flatland; however, on this planet, the creatures were all rectangles of various dimensions. To locate a planet capable of sustaining life for their people, a spaceship from a planet orbiting WOH G64 traveled 160,000 light years to reach our solar system. One alien was left behind on each of our solar system's eight planets, and two of our dwarf planets, Ceres and Pluto.

The alien who was left behind on Earth noticed rectangular shaped objects mounted on poles along the roads. One stated "Free concert in the park Saturday." Another stated "Garage Sale." In order to be inconspicuous, she took on the shape of a similar rectangle 18 units wide by 24 units long. At first, this planet seemed perfect, but exposure to Earth's atmosphere caused something very strange to happen. After exactly one hour, the alien split in half. Now there were two aliens, each one half as big as the original alien. After another hour, each of those two aliens split in half. Now there were four smaller aliens. After each hour, each alien split in half again.

You are to model what happened to the number of aliens and the size of each alien by repeatedly cutting each of your aliens in half. Complete the table as you make each set of cuts. Use this table for the two graphs on the following pages. The first graph will show the number of aliens with respect to time. The second graph will show the size of the aliens with respect to time.

Introduction to Exponential Functions

What do you think these Earth-invading aliens look like?? With your shoulder partner, design the alien on the grid paper. You have until the timer goes off.

00:00 00

Introduction to Exponential Functions

Now use your alien to model the situation. Cut each new alien in half to simulate the alien growth. **each 2×2 square is one square unit**

What happens to the <u>number</u> of aliens as you half each one? multiply by ②

What happens to the <u>size (area)</u> of each alien? dividing by 2

Time since alien landing (in hours)	Number of aliens	Number of aliens in exponential form	Area of each alien (square units)
0	1	2^0	432
1	2	2^1	216
2	4	2^2	108
3	8	2^3	54
4	16	2^4	27
5	32	2^5	13.5
6	64	2^6	6.75
n		2^n	

$$f(n) = 2^n$$

00:00 00

Introduction to Exponential Functions

Use your alien and table to answer the questions on the first two pages of your HW packet. What you do not complete in class is homework!
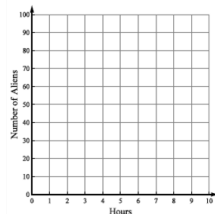
NUMBER

SIZE

Number of aliens as a function of time   Name: _____

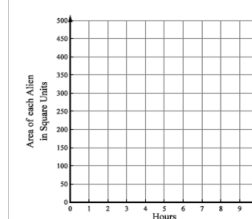Complete the table on the previous page and use it to answer the following questions:

1. After how many hours will the alien population be 512? Explain how you determined your answer.

2. How large will the alien population be after 12 hours? After 24 hours? Explain how you determined your answers.

3. Is the alien population growing at a constant rate? Explain your answer.

4. On the grid, plot the number of aliens with respect to time.

5. Should the points on the graph be connected with a smooth curve? If not, why should they remain unconnected? Provide at least one reason to explain your answer.

6. If the equation representing the number of aliens is f(n) = _____ (see your table), find the following values.

   a. f(-2) = _____   b. f(14) = _____   c. Find x if y = 262144.   d. Find x if y = $\frac{1}{16}$

Area of each alien as a function of time.

7. On the grid, plot the size (area) of each alien, in square units, with respect to time.

8. Describe what is happening to the size of an individual alien.

9. The graph of the alien's size with respect to time is an example of "exponential decay". Based on the table and the second graph, create a definition for exponential decay.

10. Will the aliens eventually disappear? Justify your answer.

11. What is the sum of the areas of all the aliens at any point in time?

12. Will the aliens be able to take over planet Earth? Write a paragraph explaining what will happen to the alien invasion force.
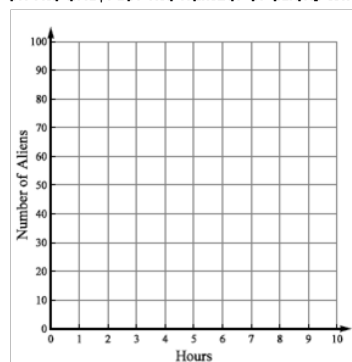
Number of aliens as a function of time   Name: _____

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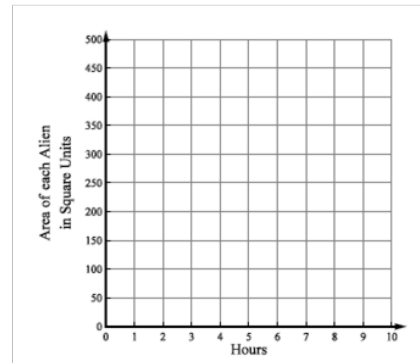3. Is the alien population growing at a constant rate? Explain your answer.

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