Name _____ Date _____ Class _____

TEKS 2A.11.F

LESSON 7-1

Algebra Lab

Examining Exponential Growth and Decay

Use with Lesson 7-1

Materials: paper and pencil

Activity

Examine the relationship that exists between exponential growth and decay.

Step 1 Fold a rectangular piece of paper in half. The fold divides the rectangular piece of paper into two regions, each of which is half the area of the paper.

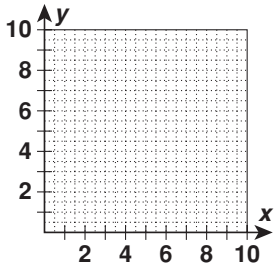
Step 2 Fold the paper in half again. How many regions are there now? ____

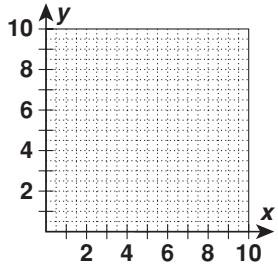
What fraction of the area does each region have? ____

Step 3 Continue to fold the paper until it is no longer possible to make any more folds. After each fold record the information in the given table: the number of the fold, number of regions formed, and area of each region.

Fold number	0	1	2	3	4	5	6
Number of regions							
Fraction area of each region							

Step 4 Make two scatter plots of the data in the table. The first will have ordered pairs of the form (fold number, number of regions) and the second will ordered pairs of the form (fold number, fractional area of the region).





Try This

Use the scatter plots above to answer each question.

1. The first scatter plot is an example of what type of growth? _____
2. Write an equation to model the growth in the first scatter plot. _____
3. Determine the number of regions there would be after 8 folds. _____
4. The second scatter plot is an example of what type of growth? _____
5. Write an equation to model the growth in the second scatter plot. _____
6. Determine the fractional area of a region after 8 folds. _____
7. Multiply the equations from Exercise 2 and Exercise 5. _____
   Explain why the product should be 1.

   _____

TECH LAB 5-8

Data Tables

Sample data; actual data may vary.

Vertex	
***x*-coordinate**	***y*-coordinate**
1.95	0.78

Parameters	Values calculated from vertex form	Values from regression
a	−4.8	−4.6
b	18.9	17.8
c	−19.2	−16.4

Try This

1. The graph we are using is vertical distance versus time, not vertical distance versus horizontal distance. That is, the horizontal axis is not horizontal distance, so the appearance of the graph has nothing to do with a sideways moving ball.
2. Possible answer: $y = -4.85\,(x - 1.95)^2 + 0.78$.
3. The parameters determined by the calculator regression and from the vertex form are similar.
4. The magnitude of *a* determines how narrow or wide the parabola is, while the sign of *a* determines whether the parabola opens upward (positive *a*) or downward (negative *a*).
5. Since the vertex of the new parabola would be to the right of the one originally used, the time value *h* would be larger. The *y*-coordinate of the vertex would be less than before, as the ball does not bounce as high each time.

TECH LAB 6-7

Try This

1. max (−0.471, 12.629); min (0.471, 11.371)
2. max (−0.816, 6.088); min (0.816, 3.911)

LAB 7-1

Activity

Step 2: 4, $\frac{1}{4}$

Fold number	0	1	2	3	4	5
Number of regions	1	2	4	8	16	32
Fraction area of each region	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{32}$

Step 3 and Step 4: Check students' table and graphs.

Try This

1. exponential growth
2. $y = 2^x$
3. 256
4. exponential decay
5. $y = \left(\frac{1}{2}\right)^x$
6. $\frac{1}{256}$
7. $2^x\left(\frac{1}{2}\right)^x = \left(\frac{2}{2}\right)^x = 1$; The original area of the paper is one, and after each fold the number of regions times the fractional area of each region must continue to equal one whole.

LAB 7-5

Try This

1. Exponential decay
2. No
3. Between 720–840 years.
4. 12 half-lives