


Modeling Activity

(Use with Lesson 11-5)

Modeling Exponential Decay

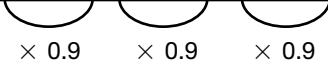
Materials: base-10 blocks 

You can use base-10 blocks to help write an exponential decay model.

Activity: Find an exponential decay model for repeatedly reducing a quantity by 10%.

- Begin with a thousands cube. Remove 10% of the blocks. Record the number of remaining blocks.
- Again, remove 10% of the blocks and record the number of remaining blocks. Repeat a third time.
- Study the table below to find a relationship. The domain values are at regular intervals of 1. The range values have a common factor of 0.9. The data seem to follow an exponential model. The function is $y = 1000(0.9)^n$.

| n^{th} removal | 0 | 1 | 2 | 3 |
|-------------------------|------|-----|-----|-----|
| Number of blocks, y | 1000 | 900 | 810 | 729 |



- Check the function with the numbers in the table.
 $y = 1000(0.9)^n$
 $n = 0: y = 1000(0.9)^0 = 1000(1)$ or 1000
 $n = 1: y = 1000(0.9)^1 = 1000(0.9)$ or 900
 $n = 2: y = 1000(0.9)^2 = 1000(0.81)$ or 810
 $n = 3: y = 1000(0.9)^3 = 1000(0.729)$ or 729

MODEL

Use base-10 blocks to find an exponential decay model for each situation. In each case, begin with a thousands cube.

1. Remove 50% of blocks repeatedly.
2. Remove 60% of blocks repeatedly.

WRITE

3. Explain how to use an exponential decay model to find the quantity remaining after the 7th removal. Demonstrate with the base-10 blocks model found in the activity.