Name _____ Class _____ Date _____

Reteaching 8-1

Exploring Exponential Models

OBJECTIVE: Modeling exponential growth and decay

MATERIALS: None

- The general form of an exponential function is $y = ab^x$. This can model either growth or decay. When the value of b is greater than 1, the function models growth. When the value of b is between zero and 1, the function models decay.
- When you see words like *increase* or *appreciation*, think growth. When you see words like *decrease* and *depreciation*, think decay.

Example

Carl's weight at 12 yr is 82 lb. Assume that his weight increases at a rate of 16% each year. Write an exponential function to model the increase. Calculate his weight after 5 yr.

Step 1: Find a and b.

$a = 82$ ← **a is the original amount.**

$b = 1 + 0.16$ ← **b is the growth or decay factor. If you are modeling growth, b equals 1 plus the percent. If you are modeling decay, b equals 1 minus the percent. Carl's weight increases, so add.**

$= 1.16$

Step 2: Write the exponential function.

$y = ab^x$ ← **Use the formula.**

$y = 82(1.16)^x$ ← **Substitute.**

Step 3: Calculate.

$y = 82(1.16)^5$ ← **Substitute 5 for x.**

$y = 172.228$ ← **Use a calculator.**

If the model is correct, Carl will weigh about 172 lb in 5 yr.

Exercises

Write an exponential function to model each situation. Find each amount after the specified time.

1. A tree 3 ft tall grows 8% each year. How tall will the tree be at the end of 14 yr? Round the answer to the nearest hundredth.
2. The price of a new home is $126,000. The value of the home appreciates 2% each year. How much will the home be worth in 10 yr?
3. A motorcycle purchased for $9000 today will be worth 6% less each year. For what can you expect to sell the motorcycle at the end of 5 yr?