GUIDED PRACTICE for Examples 2 and 3

Simplify the expression.

5. $\left(\frac{a}{b}\right)^2$

6. $\left(-\frac{5}{y}\right)^3$

7. $\left(\frac{x^2}{4y}\right)^2$

8. $\left(\frac{2s}{3t}\right)^3 \cdot \left(\frac{t^5}{16}\right)$

TAKS

EXAMPLE 4 TAKS REASONING: Multi-Step Problem

FRACTAL TREE To construct what is known as a *fractal tree*, begin with a single segment (the trunk) that is 1 unit long, as in Step 0. Add three shorter segments that are $\frac{1}{2}$ unit long to form the first set of branches, as in Step 1. Then continue adding sets of successively shorter branches so that each new set of branches is half the length of the previous set, as in Steps 2 and 3.

Step 0 **Step 1** **Step 2** **Step 3**

a. Make a table showing the number of new branches at each step for Steps 1–4. Write the number of new branches as a power of 3.

b. How many times greater is the number of new branches added at Step 5 than the number of new branches added at Step 2?

Solution

a.

Step	Number of new branches
1	$3 = 3^1$
2	$9 = 3^2$
3	$27 = 3^3$
4	$81 = 3^4$

b. The number of new branches added at Step 5 is 3^5. The number of new branches added at Step 2 is 3^2. So, the number of new branches added at Step 5 is $\frac{3^5}{3^2} = 3^3 = 27$ times the number of new branches added at Step 2.

GUIDED PRACTICE for Example 4

9. FRACTAL TREE In Example 4, add a column to the table for the length of the new branches at each step. Write the lengths of the new branches as powers of $\frac{1}{2}$. What is the length of a new branch added at Step 9?