Name _____ Date _____ Class _____

LESSON 7-1

Reading Strategies

Using Patterns

Studying the patterns that are found in expressions with exponents can help you remember the rules for evaluating expressions with integer exponents.

$3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$
$3^3 = 3 \cdot 3 \cdot 3 = 27$
$3^2 = 3 \cdot 3 = 9$
$3^1 = 3$

Positive exponents: The answer is the base multiplied by itself the number of times identified by the exponent.

$3^0 = 1$

Zero exponent: The answer is always 1 (if the base is not 0; 0^0 is undefined).

$3^{-1} = \frac{1}{3}$
$3^{-2} = \frac{1}{3 \cdot 3} = \frac{1}{9}$
$3^{-3} = \frac{1}{3 \cdot 3 \cdot 3} = \frac{1}{27}$
$3^{-4} = \frac{1}{3 \cdot 3 \cdot 3 \cdot 3} = \frac{1}{81}$

Negative exponents: The answer is the *reciprocal* of the same expression with a positive exponent.

Note that the rules are the same when the base is a variable:

$b^3 = b \cdot b \cdot b$ $\quad g^0 = 1$ $\quad k^{-5} = \frac{1}{k^5}$ $\quad \frac{1}{m^{-3}} = m^3$

Answer each question.

1. What is the base of the expression 6^{-4}? _____
2. What number can go in the box to make a true statement: $5^{\square} = 1$? _____
3. Write the expression $\frac{1}{8^3}$ with a negative exponent. _____
4. What is the *reciprocal* of b^7? _____

Simplify each expression.

5. 2^5 _____
6. 2^{-5} _____
7. 7^0 _____
8. 10^{-6} _____
9. $(-4)^3$ _____
10. $(-4)^{-3}$ _____
11. t^{-4} _____
12. c^2d^{-3} _____
13. $8x^{-5}$ _____
14. $12r^0$ _____