

Lesson Summary

EXPONENTIAL NOTATION FOR WHOLE NUMBER EXPONENTS: Let m be a nonzero whole number. For any number a , the expression a^m is the product of m factors of a , i.e.,

$$a^m = \underbrace{a \cdot a \cdot \cdots \cdot a}_{m \text{ times}}$$

The number a is called the *base*, and m is called the *exponent* or *power* of a .

When m is 1, “the product of one factor of a ” just means a (i.e., $a^1 = a$). Raising any nonzero number a to the power of 0 is defined to be 1 (i.e., $a^0 = 1$ for all $a \neq 0$).

Problem Set

- Complete the table by filling in the blank cells. Use a calculator when needed.

Exponential Form	Expanded Form	Standard Form
3^5		
	$4 \times 4 \times 4$	
$(1.9)^2$		
$\left(\frac{1}{2}\right)^5$		

- Why do whole numbers raised to an exponent get greater, while fractions raised to an exponent get smaller?
- The powers of 2 that are in the range 2 through 1,000 are 2, 4, 8, 16, 32, 64, 128, 256, and 512. Find all the powers of 3 that are in the range 3 through 1,000.
- Find all the powers of 4 in the range 4 through 1,000.
- Write an equivalent expression for $n \times a$ using only addition.
- Write an equivalent expression for w^b using only multiplication.
 - Explain what w is in this new expression.
 - Explain what b is in this new expression.
- What is the advantage of using exponential notation?
- What is the difference between $4x$ and x^4 ? Evaluate both of these expressions when $x = 2$.