

NAME _____

Module 11 Simplifying Algebraic Expressions
with Polynomials

Lesson 1 Applying Rules of Exponents

guided
notes

Lesson Objectives

- Apply the *multiplication rule for exponents*.
- Apply the *division rule for exponents*.
- Apply the *definition of negative exponents*.
- Apply the *power-of-a-power rule*.
- Apply the *power-of-a-product rule*.
- Apply the *power-of-a-quotient rule*.

The rules for exponents are used to **simplify** _____ exponential expressions.

Multiplication rule for exponents:

$$a^m \cdot a^n = \underline{a^{m+n}}$$

$$a \neq 0$$

To use the *multiplication rule for exponents* the bases must be the same. If not, the expression **cannot be simplified** _____.

Division rule for exponents:

$$\frac{a^m}{a^n} = \underline{a^{m-n}}$$

$$a \neq 0$$

Definition of negative exponents:

For a nonzero number a and a positive integer n , $a^{-n} = \underline{\frac{1}{a^n}}$.

1 Simplify: $4^3 \cdot 4$

256

2 Simplify: $\frac{6^2}{6^5}$

$\frac{1}{216}$

Power-of-a-power rule:

$$(a^m)^n = \underline{a^{mn}}$$

$$a \neq 0$$

Power-of-a-product rule:

$$(ab)^m = \underline{a^m b^m}$$

$$a \neq 0, b \neq 0$$

Power-of-a-quotient rule:

$$\left(\frac{a}{b}\right)^m = \underline{\frac{a^m}{b^m}}$$

$$a \neq 0, b \neq 0$$

3 Simplify: $(4^3)^0$

1

4 Simplify: $(3y^3)^2$

$9y^6$

5 Simplify: $\left(\frac{4}{x}\right)^3$

$\frac{64}{x^3}$