Lesson 3

Multiply and Divide Monomials *(Monomials have only one variable, but it might have different exponents)*

> The **Product of Powers** rule states that to multiply powers with the same base, add their exponents.

Example 1
Simplify. Express using exponents.

a. $2^3 \cdot 2^2$ The common base is 2

$2^3 \cdot 2^2 = 2^{3+2}$ Add the exponents.

$\qquad = 2^5$

1. $5^2 \cdot 5^6$ **2.** $e^2 \cdot e^7$

If the bases have coefficients, multiply those.

$$2s^6(7s^7)$$

$2s^6(7s^7) = (2 \cdot 7)(s^6 \cdot s^7)$ Commutative and Associative Properties

$\qquad = 14(s^{6+7})$ The common base is s.

$\qquad = 14s^{13}$ Add the exponents.

Example 2: $3a^2 \cdot 2a$ NOTE: $a = a^1$

3. $2a^5 \cdot 6a$ **4.** $4c^3 \cdot 3c^5$ **5.** $4x^2 \cdot (-5x^6)$

The **Quotient of Powers** rule states that to divide powers with the same base, subtract their exponents.

Quotient – answer to a division problem. When terms are written with a fraction bar, that tells you that the operation is division.

$$\frac{k^8}{k} =$$

Example 3

Simplify $\frac{k^8}{k}$. **Express using exponents.**

$\frac{k^8}{k^1} = k^{8-1}$ The common base   is k.

$\quad = k^7$ Subtract the exponents.

5. $\frac{7^9}{7^3}$

6. $\frac{v^{14}}{v^6}$

When the dividend and the divisor have coefficients, divide them and then write the variable, and subtract the exponents.

Example 4 $\frac{15w^7}{5w^2} = \frac{15}{5} \cdot \frac{w^7}{w^2} = 5 \cdot w^{(7-2)} = 5 \cdot w^5$

7. $\frac{15w^7}{5w^2}$

8. $\frac{10m^8}{2m}$

9. $\frac{8x^3}{4x^2}$