Algebra I
Lesson 8-1

- I can multiply monomials.
- I can simplify expressions involving powers of monomials.

A monomial is a number, a variable, or a product of a number and one or more variables. Monomials that are real numbers are called constants.

An expression involving the division of variables is NOT a monomial.

$$\frac{S^2}{20} = \frac{1}{20}S^2$$

Is the expression a monomial?

Expression	Monomial?	Reason
-5	yes	it is a real number
$p + q$	no	it is addition of 2 variables
x	yes	it is a variable
$\frac{c}{d}$	no	it is division of 2 variables
$\frac{abc^8}{5}$	yes	it is multiplication of a number and 3 variables

$2^5 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$

$2^3 \cdot 2^4 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^7 = 128$

Product of Powers

To multiply two powers that have the same base, add the exponents

For any number a and all integers m and n, $a^m \cdot a^n = a^{m+n}$

Example: $a^4 \cdot a^{12} = a^{4+12} = a^{16}$

Practice:

$(5x^7)(x^6)$

$5 \cdot x^7 \cdot x^6$

$5x^{13}$

$(4ab^6)(-7a^2b^3)$

$(4)(-7) \cdot a \cdot a^2 \cdot b^6 \cdot b^3$

$-28a^3b^9$

Power of a Power

To find the power of a power, multiply the exponents

For any number a and all integers m and n, $(a^m)^n = a^{m \cdot n}$

Example: $(k^5)^9 = k^{5 \cdot 9} = k^{45}$

Practice: $[(3^2)^3]^2$

$[3^{2 \cdot 3}]^2$

$[3^6]^2$

$3^{6 \cdot 2} = 3^{12} = 531{,}441$

$(xy)^4 = xy \cdot xy \cdot xy \cdot xy = x^4 y^4$

Power of a Product

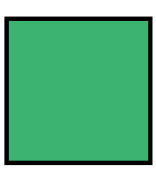
To find the power of a product, find the power of each factor and multiply

For ~~any~~ all numbers a and b and ~~all~~ any integers m ~~and n~~, $(ab)^m = a^m \cdot b^m$

Example: $(-2xy)^3 = (-2)^3 \cdot x^3 \cdot y^3 = -8x^3y^3$

Practice: Express the area of the square as a monomial.

4*ab*



4*ab*

$(4ab)^2 = 4^2 a^2 b^2 = 16a^2b^2$

Simplifying Monomial Expressions

To simplify an expression involving monomials, write an equivalent expression in which:

- each base appears exactly once,
- there are no powers of powers,

and

- all fractions are in simplest form

Simplify: $(\frac{1}{3}xy^4)^2[(-6y)^2]^3$

$(\frac{1}{3}xy^4)^2 \cdot [36y^2]^3$

$(\frac{1}{3}xy^4)^2 \cdot 46,656y^6$

$(\frac{1}{3})^2 \cdot x^2 \cdot y^8 \cdot 46,656y^6$

$\frac{1}{9}x^2y^8 \cdot 46,656 \cdot y^6 \leftarrow$

$\frac{1}{9} \cdot 46,656 \cdot x^2 \cdot y^8 \cdot y^6$

$5184x^2y^{14}$

Assignment:

Pg 413 #16-50 even, ~~61-69 odd~~