Warm Up

Notebook Check

Google Classroom

Properties of Exponents

Monomial

one number

Monomial is a term that is the product of numbers and variables.

multiplication

What is a term?

3 15 -40 x y

4x

$y = 3x + 4$

3 terms in this equation

Monomials

4x 7y 3w 25x 6y -5x

10a 12c 3xy 5y 12x 7q

20x 8tw z 7tyw

$25xy^2z$

$9xyz^2$

All these are single terms

What is this?

$3x + 5$ Binomial

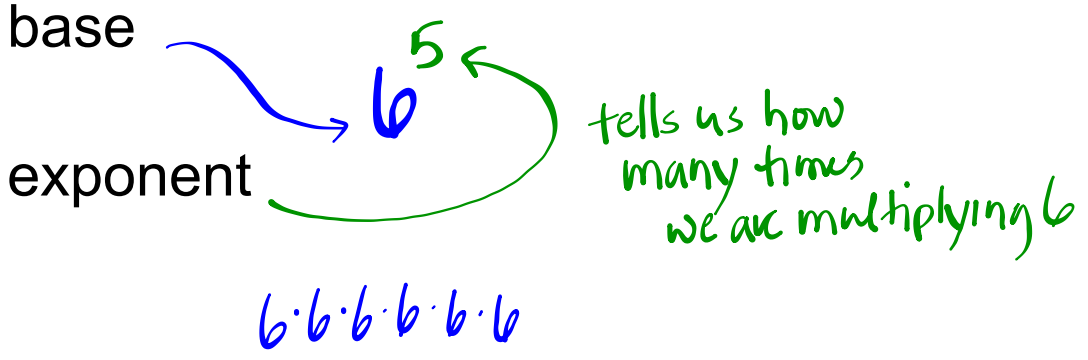
2 terms added or subtracted

Vocab:

factors — numbers that are multiplied together

factored form } $2^5 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

expanded form } $6x^4 = 6 \cdot x \cdot x \cdot x \cdot x$



Multiplying Exponential Expressions

Part A

Exponents allow you to rewrite some multiplication problems in a simpler form. Some exponent expressions can also be simplified. Copy and complete the table below in your notebook. Expand each expression into factored form and then rewrite it with new exponents as shown in the example.

Original Form	Factored Form	Simplified Exponent Form
$5^2 \cdot 5^5$	$(5 \cdot 5) \cdot (5 \cdot 5 \cdot 5 \cdot 5 \cdot 5)$	5^7
$2^2 \cdot 2^4$	$(2 \cdot 2)(2 \cdot 2 \cdot 2 \cdot 2)$	2^6
$3^7 \cdot 3^2$		
$x^3 \cdot x^5$		
$x^3y^2 \cdot x^2$	$x \cdot x \cdot x \cdot y \cdot y \cdot x \cdot y \cdot y$	x^4y^4
$7^2 \cdot x^3 \cdot 7 \cdot x^2$		
$2 \cdot x^4 \cdot 3 \cdot xy^2$	$2 \cdot x \cdot x \cdot x \cdot x \cdot 3 \cdot x \cdot y \cdot y$	

applied only to y

Things to keep in mind:

What part of the expression is being raised to a power?

What are the factors?

How can we rewrite the expression to have fewer terms?

1. Work with your group to compare the bases and exponents of the original form to the base and exponent of the simplified exponent form. **Write a statement to describe the relationship you see.**

2. Visualize how you would expand $20^{12} \cdot 20^{8}$ in your mind. What would this expression be in simplified exponent form? Describe your reasoning.

20^{20}

3. A group of students rewrote the expression $10^{3} \cdot 5^{4}$ as 50^{7}. Is their simplification correct? Explain your reasoning.

Let's apply the statements you made:

$x^2 \cdot x^3$

$7x^3 \cdot 3x^4$

$2x^3y^2 \cdot 3xy^5$

$6x^5y^2z^3 \cdot 2xy^3 \cdot 3x^2y^7z^4$

$6 \cdot 2 \cdot 3 \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x$

$\cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

$36x^8y^{12}2^7$

Classwork

NAME _____ DATE _____ PERIOD _____

8-1 Study Guide and Intervention

Multiplying Monomials

Multiply Monomials A **monomial** is a number, a variable, or a product of a number and one or more variables. An expression of the form x^n is called a **power** and represents the product you obtain when x is used as a factor n times. To multiply two powers that have the same base, add the exponents.

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

Example 1 **Simplify $(3x^6)(5x^2)$.**

$$\begin{aligned}(3x^6)(5x^2) &= (3)(5)(x^6 \cdot x^2) && \text{Associative Property}\\ &= (3 \cdot 5)(x^{6+2}) && \text{Product of Powers}\\ &= 15x^8 && \text{Simplify.}\end{aligned}$$

The product is $15x^8$.

Example 2 **Simplify $(-4a^3b)(3a^2b^5)$.**

$$\begin{aligned}(-4a^3b)(3a^2b^5) &= (-4)(3)(a^3 \cdot a^2)(b \cdot b^5)\\ &= -12(a^{3+2})(b^{1+5})\\ &= -12a^5b^6\end{aligned}$$

The product is $-12a^5b^6$.

Exercises

Simplify.

1. $y(y^5)$

2. $n^2 \cdot n^7$

3. $(-7x^2)(x^4)$

4. $x(x^2)(x^4)$

5. $m \cdot m^5$

6. $(-x^3)(-x^4)$

7. $(2a^2)(8a)$

8. $(rs)(rs^3)(s^2)$

9. $(x^2y)(4xy^3)$

10. $\frac{1}{3}(2a^3b)(6b^3)$

11. $(-4x^3)(-5x^7)$

12. $(-3j^2k^4)(2jk^6)$

13. $(5a^2bc^3)\left(\frac{1}{5}abc^4\right)$

14. $(-5xy)(4x^2)(y^4)$

15. $(10x^3yz^2)(-2xy^5z)$

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Skills Practice

Multiplying Monomials

Simplify.

7. $a^2(a^3)(a^6)$

8. $x(x^2)(x^7)$

9. $(y^2z)(yz^2)$

10. $(\ell^2k^2)(\ell^3k)$

11. $(e^2f^4)(e^2f^2)$

12. $(cd^2)(c^3d^2)$

13. $(2x^2)(3x^5)$

14. $(5a^7)(4a^2)$

15. $(4xy^3)(3x^3y^5)$

16. $(7a^5b^2)(a^2b^3)$

17. $(-5m^3)(3m^8)$

18. $(-2c^4d)(-4cd)$