

Algebra 1 7.1

Multiply monomials using the properties of exponents

Simplify expressions using properties of exponents

monomial

7

a

$3x^2$

constant

linear

nonlinear

$n + 3$

$\frac{3}{n}$

exponent

base

activity: triangle puzzles (if time)

5 in a row

Determine whether each expression is a monomial. Write *yes* or *no*. Explain your reasoning.

21. 122

22. $3a^4$

23. $2c + 2$

$$(4x^2y^3)^2 = (4x \times y \times y \times y)(4x \times y \times y \times y)$$
$$16x^4y^6$$

Simplify each expression.

27. $(q^2)(2q^4)$

$$\begin{array}{c} \downarrow \quad \downarrow \\ 1 \cdot q \cdot q \quad 2 \cdot q \cdot q \cdot q \cdot q \\ 2q^6 \end{array}$$

28. $(-2u^2)(6u^6)$

$$\begin{array}{l} -2uu \cdot 6uuuuuu \\ -12u^8 \end{array}$$

$$\begin{array}{l} (-x^2y)(x^3) \\ -1 \cdot x \cdot x \cdot y \cdot x \cdot x \cdot x \\ -1x^5y \end{array}$$

29. $(9w^2x^8)(w^6x^4)$

$$\begin{array}{c} (9) \cdot w \cdot w \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot (1) \cdot w \cdot w \cdot w \cdot w \cdot w \cdot w \cdot x \cdot x \cdot x \cdot x \end{array}$$

$$\begin{array}{c} \boxed{9w^8x^{12}} \\ \hline 9w^8x^{12} \end{array}$$

5 in a row

$$(-1w^2x^3)^2 = (-1wxx)(-1wxx)$$

$$1w^4x^6 = w^4x^6$$

KeyConcept Power of a Power

Words To find the power of a power, multiply the exponents.

Symbols For any real number a and any integers m and p , $(a^m)^p = a^{m \cdot p}$.

Examples $(b^3)^5 = b^{3 \cdot 5}$ or b^{15} $(g^6)^7 = g^{6 \cdot 7}$ or g^{42}

$$\begin{array}{c} \text{11} \\ \rightarrow (b b b)(b b b)(b b b)(b b b)(b b b) \\ 32b^{15} \end{array}$$

$$33. (j^5 k^7)^4$$

$$j^{20} k^{28}$$

$$34. (3n^3 p)^4 = (3n^3 p)(3n^3 p)(3n^3 p)(3n^3 p)$$

$$81 n^{12} p^4$$

Simplify $[(2^3)^2]^4$.

$$[(2^3)^2]^4 = [(\cancel{222})(\cancel{22})] \cdot [(\cancel{22})(\cancel{22})] \cdot [(\cancel{22})(\cancel{22})] \cdot [(\cancel{222})(\cancel{222})]$$

$$= \overset{24}{2} \quad \text{"}$$

$$24^2$$

$$576$$

$$16,777,216 \quad \text{"}$$

KeyConcept Simplify Expressions

To simplify a monomial expression, write an equivalent expression in which:

- each variable base appears exactly once,
- there are no powers of powers, and
- all fractions are in simplest form.

$$((2)^3)^3$$

$$3y \cdot y = 3y^2$$

$$3y \cdot 2y = 6y^2$$

Example 5 Simplify Expressions

Simplify $(3xy^4)^2[(-2y)^2]^3$.

Triangle puzzles

4B. Express the area of a triangle with height $4a$ and base $5ab^2$ as a monomial.

Order of operations...

Guided Practice

5. Simplify $\left(\frac{1}{2}a^2b^2\right)^3[(-4b)^2]^2$.