8.1 Apply Exponent Properties Involving Products

Goal • Use properties of exponents involving products.

Your Notes

VOCABULARY

Order of magnitude

PRODUCT OF POWERS PROPERTY

Let a be a real number, and let m and n be positive integers.

Words: To multiply powers having the same base, _____ _____.

Algebra: $a^m \cdot a^n = a$_____

Example: $5^6 \cdot 5^3 = 5$_____ $= 5$__

Example 1   *Use the product of powers property*

Simplify the expression.

a. $2^2 \cdot 2^3 = 2$_____

   $\quad\quad = 2$__

b. $w^9 \cdot w^2 \cdot w^7 = w$_____

   $\quad\quad\quad\quad = w$__

> When simplifying powers with numerical bases only, write your answers using exponents.

c. $4^4 \cdot 4 = 4^4 \cdot 4$__

   $\quad\quad = 4$_____

   $\quad\quad = 4$__

d. $(-6)(-6)^6 = (-6)$__ $\cdot (-6)^6$

   $\quad\quad\quad = (-6)$_____

   $\quad\quad\quad = (-6)$__

POWER OF A POWER PROPERTY

Let a be a real number, and let m and n be positive integers.

Words: To find a power of a power, _____.

Algebra: $(a^m)^n = a$____

Example: $(3^4)^2 = 3$_____ $= 3$___

Example 2   *Use the power of a power property*

Simplify the expression.

a. $(5^2)^3 = 5$_____ $= 5$___

b. $(n^7)^2 = n$_____ $= n$___

c. $[(-3)^5]^3 = (-3)$_____

$= (-3)$___

d. $[(z-4)^2]^5 = (z-4)$_____

$= (z-4)$___

POWER OF A PRODUCT PROPERTY

Let a and b be real numbers, and let m be a positive integer.

Words: To find a power of a product, find the _____

_____.

Algebra: $(ab)^m =$ _____

Example: $(23 \cdot 17)^5 =$ _____

Example 3   *Use the power of a product property*

Simplify the expression.

a. $(4 \cdot 16)^7 =$ _____

When simplifying powers with numerical and variable bases, evaluate the numerical power.

b. $(-3rs)^2 = ($_____$)^2 = ($___$)^2 \cdot$ ___$^2 \cdot$ ___^{2}

$=$ _____

c. $-(3rs)^2 = -($_____$)^2 = -($___$^2 \cdot$ ___$^2 \cdot$ ___$^2)$

$=$ _____

✔ *Checkpoint* **Simplify the expression.**

1. $(-7)^8(-7)^5$	**2.** $k^3 \cdot k \cdot k^2$	**3.** $(p^3)^4$
4. $[(q + 8)^2]^6$	**5.** $(8cd)^2$	**6.** $-(5z)^3$

Example 4 *Use all three properties*

Simplify $x^2 \cdot (3x^3y)^3$.

Solution

$x^2 \cdot (3x^3y)^3 =$ _____   _____

_____ **property**

$= $ _____   _____

_____ **property**

$= $ _____   _____

_____ **property**

✔ *Checkpoint* **Simplify the expression.**

7. $(2x^5)^4$	**8.** $(3y^3)^4 \cdot y^5$

Homework