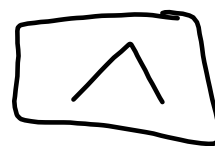


Write in Expanded form & Evaluate

$$2^3 = 2 \cdot 2 \cdot 2 = 8$$



$$3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$$

$$2^{10} = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \\ = 1024$$

Homework Questions

8.1 Multiplication Properties of Exponents

Goals:

- Use multiplication properties of exponents.

EQ:

Write an example when you **Add** the exponents, then when you would **Multiply** the exponents.

The Unit Organizer

NAME _____
DATE _____ Mo/Date/Year

④ BIGGER PICTURE Algebra 1.5 Concepts

② LAST UNIT/Experience Systems	① CURRENT UNIT Exponents & Exponential Functions	③ NEXT UNIT/Experience Quadratics
⑧ Student Activities or Assignments 8.1 8.2 8.3 8.4 8.5 8.6 8.7	⑤ UNIT MAP 	⑥ UNIT RELATIONSHIPS Simplify Graph Apply Represent
⑦ UNIT SELF-TEST QUESTIONS 1. What properties can be used to simplify & evaluate exponential expressions? 2. What do exponential graphs look like? 3. Can you write numbers in both decimal form and in scientific notation? 4. How can exponential growth and decay equations be used to represent and solve real world problems?		

Diagram illustrating the components of a power:

- Base: 2 (circled in blue)
- Exponent: 5 (circled in green)
- Expanded form: $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$
- Base: X (circled in blue)
- Exponent: 4 (circled in green)
- Expanded form: $X^4 = X \cdot X \cdot X \cdot X$

MULTIPLICATION PROPERTIES OF EXPONENTS

Let a and b be numbers and let m and n be positive integers.

* **Product of Powers Property**

To multiply powers having the same base, Add Exponents

$$a^m \cdot a^n = a^{m+n}$$

Example: $3^2 \cdot 3^7 = 3^9$

* **Power of a Power Property**

To find a power of a power, Multiply Exponent

$$(a^m)^n = a^{m \cdot n}$$

Example: $(5^2)^4 = 5^8$

* **Power of a Product Property**

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

$$(a \cdot b)^m = a^m \cdot b^m$$

Example: $(2 \cdot 3)^6 = 2^6 \cdot 3^6$

Example 1: Use the Product of Powers PropertyWrite the expression as a single power of the base.

a) $4^3 \cdot 4^5 = 4^8$

b) $y^4 \cdot y^5 \cdot y^6 = y^{15}$

c) $6^2 \cdot 6^1 = 6^3$

d) $(-3)(-3)^7 = (-3)^8$ ~~$-3^8 = -1 \cdot 3^8$~~

Example 2: Use the Power of a Power Property

Write the expression as a single power of the base.

a) $(7^3)^5 = 7^{15}$

b) $(x^2)^5 = x^{10}$

c) $[(-2)^4]^3 = (-2)^{12}$

d) $[(x-1)^6]^4 = (x-1)^{24}$

Example 3: Using the Power of a Product Property

$$a) (2 \cdot 3)^3 = 2^3 \cdot 3^3 = 8 \cdot 27 = 216$$

$$b) (9xy)^2 = (9 \cdot x \cdot y)^2 = 9^2 x^2 y^2 = 81x^2y^2$$

$$c) (-3z)^4 = (-3)^4 z^4 = 81z^4$$

$$d) -(4w)^3 = -1 \cdot (4 \cdot w)^3 = -1 \cdot 4^3 w^3 = -64w^3$$

Example 4: Use All Three PropertiesSimplify $(7w^2z^3)^2 \cdot z^4$.

$$(7w^2z^3)^2 \cdot z^4 = 7^2 w^4 z^6 z^4 = 49w^4z^{10}$$

Try It Simplify the expression.

$$1) (-4)^3 \cdot (-4)^6 = (-4)^9 \quad 2) w^{10} \cdot w = w^{11}$$

$$= -262144$$

$$3) (d^4)^5 = d^{20}$$

$$4) (6p)^2 = 6^2 p^2$$

$$= 36p^2$$

$$5) (-2xy)^4 =$$

$$(-2)^4 x^4 y^4 = 16x^4 y^4$$

$$6) (2wz^2)^5 (wz)^2 =$$

$$2^5 w^5 z^{10} w^2 z^2$$

$$= 32w^7 z^{12}$$

Summary

EQ:

Write an example when you **Add** the exponents, then when you would **Multiply** the exponents.

$$2^3 \cdot 2^2 = 2^5$$

$$(2^3)^2 = 2^6$$

8.1 Homework

Raising Exponents to a Power
& Multiplying Exponents
WKST