REVIEW: Product of Powers Property

Name ______________________________

Key Concept and Vocabulary

Product of Powers Property

To multiply powers with the same base, add their exponents.

Numbers: $2^3 \cdot 2^4 = 2^{3+4} = 2^7$

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

Visual Model

$$2^3 \cdot 2^4 = (2 \cdot 2 \cdot 2) \cdot (2 \cdot 2 \cdot 2 \cdot 2)$$
$$= 2^7$$

$$(-4)^2 \cdot (-4)^3 = [(-4) \cdot (-4)][(-4) \cdot (-4) \cdot (-4)]$$
$$= (-4)^5$$

Skill Examples

1. $5^2 \cdot 5^5 = 5^{2+5} = 5^7$

2. $(-3)^8 \cdot (-3)^2 = (-3)^{8+2} = (-3)^{10}$

3. $(7^2)^3 = 7^2 \cdot 7^2 \cdot 7^2 = 7^{2+2+2} = 7^6$

4. $(y^3)^4 = y^3 \cdot y^3 \cdot y^3 \cdot y^3 = y^{3+3+3+3} = y^{12}$

5. $(3x)^3 = 3x \cdot 3x \cdot 3x$

$= (3 \cdot 3 \cdot 3) \cdot (x \cdot x \cdot x)$

$= 3^{1+1+1} \cdot x^{1+1+1}$

$= 3^3 \cdot x^3$

$= 27x^3$

Application Example

6. A gigabyte of computer storage space is 2^{30} bytes. A computer has a total storage space of 128 gigabytes. How many bytes of total storage space does the computer have? Write your answer as a power.

Notice that 128 can be written as a power, 2^7.

Total number of bytes = Number of bytes in a gigabyte • Number of gigabytes

$= 2^{30} \cdot 2^7$

$= 2^{30+7}$

$= 2^{37}$

The computer has 2^{37} bytes of total storage space.

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Check your answers at BigIdeasMath.com.

Simplify the expression. Write your answer as a power.

7. $8^3 \cdot 8^6 =$ ________ **8.** $3^4 \cdot 3^2 =$ ________ **9.** $6^7 \cdot 6^5 =$ ________

10. $(-5)^3 \cdot (-5)^7 =$ ________ **11.** $(-10)^6 \cdot (-10)^2 =$ ________ **12.** $(-2)^4 \cdot (-2)^5 =$ ________

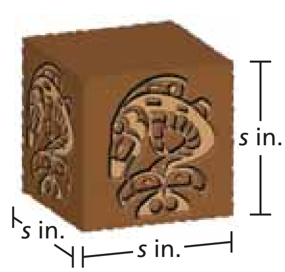
13. $(9^4)^3 =$ ________ **14.** $(4^5)^3 =$ ________ **15.** $(12^3)^2 =$ ________

16. $(z^3)^3 =$ ________ **17.** $(n^5)^2 =$ ________ **18.** $(w^2)^4 =$ ________

Simplify the expression.

19. $(9y)^2 =$ ________ **20.** $(3b)^4 =$ ________ **21.** $(2a)^5 =$ ________

22. **ARTIFACT** A display case for the artifact is in the shape of a cube. Each side of the display case is four times the side length of the artifact. Write and simplify an expression for the volume of the case. ________________



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