### Objective

- \*Understand the power of a product property
- \*Understand the power of quotient property
- \*Use properties of exponents to simplify expressions

- Common Core State Standards 8.EE.1
- Mathematical Practices 4. Model mathematics. 5. Use tools strategically. 6. Attend to precision.

Simplify each expression. Write your answer in exponential notation.

### Example 21

a) 
$$\frac{4^{1} \cdot 4^{1}}{2^{2} \cdot 2^{6}}$$

**b)** 
$$\frac{5^3 \cdot 2^7 \cdot 5^7}{10^3}$$

Simplify each expression. Write your answer in exponential notation.

### Example 21

a)

$$\frac{4^5 \cdot 4^3}{2^2 \cdot 2^6}$$

b

$$\frac{5^5 \cdot 2^9 \cdot 5^4}{10^3}$$

#### Solution

$$\frac{4^5 \cdot 4^3}{2^2 \cdot 2^6} = \frac{4^{5+3}}{2^{2+6}}$$
$$= \frac{4^8}{2^8}$$

$$=\left(\frac{4}{2}\right)^8$$

$$= 2^{8}$$

#### Solution

$$-\frac{5^5 \cdot 2^9 \cdot 5^4}{10^3} = \frac{5^{5+4} \cdot 2^9}{10^3}$$
$$= \frac{5^9 \cdot 2^9}{10^3}$$

$$=\frac{(5\cdot 2)^9}{10^3}$$

$$=\frac{10^9}{10^3}$$

$$= 10^{9-3}$$

$$= 10^{6}$$

Use the product of powers property.

Simplify.

Use the power of a product property.

Simplify.

Use the product of quotient property. Simplify.

Simplify each expression. Write your answer in exponential notation.

c) 
$$\frac{(7^2)^3 \cdot 4^6}{2^6}$$

Simplify each expression. Write your answer in exponential notation.

c) 
$$\frac{(7^2)^3 \cdot 4^6}{2^6}$$

#### Solution

$$\frac{(7^{2})^{3} \cdot 4^{6}}{2^{6}} = \frac{7^{2 \cdot 3} \cdot 4^{6}}{2^{6}}$$
$$= \frac{7^{6} \cdot 4^{6}}{2^{6}}$$
$$= \frac{(7 \cdot 4)^{6}}{2^{6}}$$

$$=\frac{28^6}{2^6}$$

$$=\left(\frac{28}{2}\right)^6$$

$$= 14^{\circ}$$

Use the power of a power property.

Simplify.

Use the power of a product property.

Simplify.

Use the power of a quotient property.

Simplify.

Your Turn

$$\frac{4^6 \cdot 3^8 \cdot 4^2}{12^5}$$

### Your Turn

$$\frac{4^{6} \cdot 3^{8} \cdot 4^{2}}{12^{5}} = \frac{?}{?} \frac{4^{6+2} \cdot 3^{8}}{12^{5}}$$

$$= \frac{?}{?} \frac{4^{8} \cdot 3^{8}}{12^{5}}$$

$$= \frac{?}{?} \frac{12^{5}}{12^{5}}$$

$$= \frac{?}{?} \frac{12^{8}}{12^{5}}$$

Your Turn

Your Turn

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### Independent Practice #17-22

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#### **Practice 1.4**

#### $(h^2k^5)^4$

$$\frac{9^2 \cdot 9^7}{3^5 \cdot 3^4}$$

$$\frac{(5^4)^2 \cdot 6^8}{10^8}$$

### Homework

$$\frac{(32m^2)^2}{4n^4}$$
 Lesson 1.4 The Power of a Product and the Power of a Quotient

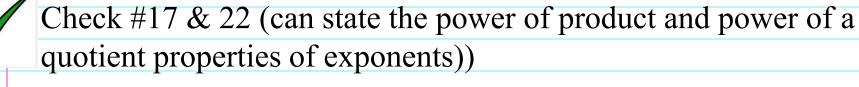
$$\frac{6^5 \cdot 2^3 \cdot 6^4}{12^3}$$

Simplify each expression. Write your answer in exponential notation.

$$\frac{(6^3)^3 \cdot 4^9}{8^9}$$

3. 
$$\left(\frac{3}{7}\right)^4 \cdot \left(\frac{1}{2}\right)^4$$

**4.** 
$$\left(-\frac{4}{5}\right)^6 \cdot \left(-\frac{2}{3}\right)^6$$



### Lesson 1.4

## Understanding of Learning

Lesson 1.4 The Power of a Product and the Power of a Quotient



### Ticket Out the Door

Using algebraic notation, state the power of a product property and the power of a quotient property.