

Lesson 1.4 The Power of a Product and the Power of a Quotient (Day 3)

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.

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Simplify each expression. Write your answer in exponential notation.

Example 21

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

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

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Simplify each expression. Write your answer in exponential notation.

Example 21

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

Solution

$$\begin{aligned}\frac{4^5 \cdot 4^3}{2^2 \cdot 2^6} &= \frac{4^{5+3}}{2^{2+6}} \\ &= \frac{4^8}{2^8} \\ &= \left(\frac{4}{2}\right)^8 \\ &= 2^8\end{aligned}$$

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

Solution

$$\begin{aligned}\frac{5^5 \cdot 2^9 \cdot 5^4}{10^3} &= \frac{5^{5+4} \cdot 2^9}{10^3} \\ &= \frac{5^9 \cdot 2^9}{10^3} \\ &= \frac{(5 \cdot 2)^9}{10^3} \\ &= \frac{10^9}{10^3} \\ &= 10^{9-3} \\ &= 10^6\end{aligned}$$

Use the product of powers property.

Simplify.

Use the power of a product property.

Simplify.

Use the product of quotient property.

Simplify.

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Simplify each expression. Write your answer in exponential notation.

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

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Simplify each expression. Write your answer in exponential notation.

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

Solution

$$\begin{aligned}\frac{(7^2)^3 \cdot 4^6}{2^6} &= \frac{7^{2 \cdot 3} \cdot 4^6}{2^6} \\ &= \frac{7^6 \cdot 4^6}{2^6} \\ &= \frac{(7 \cdot 4)^6}{2^6} \\ &= \frac{28^6}{2^6} \\ &= \left(\frac{28}{2}\right)^6 \\ &= 14^6\end{aligned}$$

Use the power of a power property.

Simplify.

Use the power of a product property.

Simplify.

Use the power of a quotient property.

Simplify.

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Your Turn

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

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Your Turn

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

$$\begin{aligned} \frac{4^6 \cdot 3^8 \cdot 4^2}{12^5} &= \frac{?}{?} \frac{4^{6+2} \cdot 3^8}{12^5} \\ &= \frac{?}{?} \frac{4^8 \cdot 3^8}{12^5} \\ &= \frac{(4 \cdot 3)^8}{12^5} \\ &= \frac{?}{?} \frac{12^8}{12^5} \\ &= \frac{?}{?} 12^{8-5} \\ &= \frac{?}{?} 12^3 \end{aligned}$$

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Your Turn

$$\frac{(25^3)^2 \cdot 7^6}{5^6}$$

$$35^6$$

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Independent Practice #17-22

Name _____

Period _____

Practice 1.4

17 $(h^2k^5)^4$

19 $\frac{9^2 \cdot 9^7}{3^5 \cdot 3^4}$

21 $\frac{(5^4)^2 \cdot 6^8}{10^8}$

18 $\left(\frac{32m^6}{4n^4}\right)^2$

20 $\frac{6^5 \cdot 2^3 \cdot 6^4}{12^3}$

22 $\frac{(6^3)^3 \cdot 4^9}{8^9}$

Homework

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

Simplify each expression. Write your answer in exponential notation.

1. $7^3 \cdot 4^3$

2. $8 \cdot 3^5 \cdot 1.2^5$

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

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



Check #17 & 22 (can state the power of product and power of a quotient properties of exponents))

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.