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

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

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Simplify each expression. Write your answer in exponential notation.

Example 21

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

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

Solution

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

$$= \dfrac{4^8}{2^8}$$

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

$$= 2^8$$

Solution

$$\dfrac{5^5 \cdot 2^9 \cdot 5^4}{10^3} = \dfrac{5^{5+4} \cdot 2^9}{10^3}$$ Use the product of powers property.

$$= \dfrac{5^9 \cdot 2^9}{10^3}$$ Simplify.

$$= \dfrac{(5 \cdot 2)^9}{10^3}$$ Use the power of a product property.

$$= \dfrac{10^9}{10^3}$$ Simplify.

$$= 10^{9-3}$$ Use the product of quotient property.

$$= 10^6$$ Simplify.

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Simplify each expression. Write your answer in exponential notation.

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

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Simplify each expression. Write your answer in exponential notation.

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

Solution

$$\dfrac{(7^2)^3 \cdot 4^6}{2^6} = \dfrac{7^{2 \cdot 3} \cdot 4^6}{2^6}$$ Use the power of a power property.

$$= \dfrac{7^6 \cdot 4^6}{2^6}$$ Simplify.

$$= \dfrac{(7 \cdot 4)^6}{2^6}$$ Use the power of a product property.

$$= \dfrac{28^6}{2^6}$$ Simplify.

$$= \left(\dfrac{28}{2}\right)^6$$ Use the power of a quotient property.

$$= 14^6$$ Simplify.

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Your Turn

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

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Your Turn

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

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

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

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

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

$$= \underline{\quad ? \quad} \quad 12^{8-5}$$

$$= \underline{\quad ? \quad} \quad 12^3$$

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Your Turn

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

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Your Turn

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

35^6

Independent Practice #17-22

Name_____   Period_____

Practice 1.4

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

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

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

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

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

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

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. $8.3^5 \cdot 1.2^5$

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

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

✓ 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

EXIT

Ticket Out the Door

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