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

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.

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

Simplify each expression. Write your answer in exponential notation.

a) $3^4 \cdot 7^4$

b) $\left(-\frac{1}{3}\right)^5 \cdot \left(-\frac{2}{5}\right)^5$

c) $(-2.4)^3 \cdot (0.5)^3$

a) $a^4 \cdot b^4$

b) $(2r)^5 \cdot (7s)^5$

c) $\left(\frac{1}{4x}\right)^7 (-20x^2)^7$

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

Simplify each expression. Write your answer in exponential notation.

a) $3^4 \cdot 7^4$

Solution

$$3^4 \cdot 7^4 = (3 \cdot 7)^4$$
$$= 21^4$$

b) $\left(-\frac{1}{3}\right)^5 \cdot \left(-\frac{2}{5}\right)^5$

Solution

$$\left(-\frac{1}{3}\right)^5 \cdot \left(-\frac{2}{5}\right)^5 = \left[\left(-\frac{1}{3}\right) \cdot \left(-\frac{2}{5}\right)\right]^5$$
$$= \left(\frac{2}{15}\right)^5$$

c) $(-2.4)^3 \cdot (0.5)^3$

Solution

$$(-2.4)^3 \cdot (0.5)^3 = [(-2.4) \cdot (0.5)]^3$$
$$= (-1.2)^3$$
$$= -1.2^3$$

a) $a^4 \cdot b^4$

Solution

$$a^4 \cdot b^4 = (a \cdot b)^4$$
$$= (ab)^4$$

b) $(2r)^5 \cdot (7s)^5$

Solution

$$(2r)^5 \cdot (7s)^5 = (2r \cdot 7s)^5$$
$$= (14rs)^5$$

c) $\left(\frac{1}{4x}\right)^7 (-20x^2)^7$

Solution

$$\left(\frac{1}{4x}\right)^7 (-20x^2)^7 = \left[\left(\frac{1}{4x}\right)(-20x^2)\right]^7$$
$$= \left[\left(\frac{1}{4}\right) \cdot (-20) \cdot \left(\frac{1}{x}\right) \cdot (x^2)\right]^7$$
$$= \left[\left(\frac{1}{4}\right) \cdot (-20) \cdot \left(\frac{x^2}{x}\right)\right]^7$$
$$= [(-5) \cdot (x^{2-1})]^7$$
$$= (-5x)^7$$
$$= -(5x)^7$$

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

Your Turn

$(1.8)^2 \cdot (0.75)^2$

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Your Turn

$(1.8)^2 \cdot (0.75)^2$ $[(1.8) \cdot (0.75)]^2$; product

$(1.35)^2$

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

Your Turn

$$(-3y^2)^3 \cdot \left(\frac{1}{12y}\right)^3$$

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

Your Turn

$$(-3y^2)^3 \cdot \left(\frac{1}{12y}\right)^3$$

$$-\left(\frac{y}{4}\right)^3$$

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

Independent Practice #1-7 and 25

Challenge #23-24 and 26

Practice 1.4

Simplify each expression. Write your answer in exponential notation.

1. $5^4 \cdot 6^4$
2. $5.4^3 \cdot 4.5^3$
3. $2^5 \cdot 10^5$
4. $a^3 \cdot b^3$
5. $(2x)^5 \cdot (3y)^5$
6. $(2.5a)^6 \cdot (1.6b)^6$
7. $\left(-\frac{1}{3}\right)^4 \cdot \left(-\frac{2}{5}\right)^4$
8. $9^2 \div 3^2$

25 *Math Journal* Charles thinks that $a^3 \cdot b^3 = ab^6$. Is he correct? Why?

Homework

Lesson 1.3 The Power of a Power

Simplify each expression. Write your answer in exponential notation.

1. $(6^5)^3$
2. $(9^6)^4$
3. $(34^8)^2$
4. $(18^6)^7$
5. $(p^5)^4$
6. $\left[\left(\frac{6}{7}\right)^6\right]^3$
7. $[(4b)^4]^4$
8. $[(28x)^7]^2$

Lesson Check 1 & 7

(can use the power of product property to simplify expressions)

Lesson 1.3 Powers of Powers

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.