

Concept Byte

Use With Lesson 7-3

ACTIVITY

Powers of Powers and Powers of Products

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Prepares for N-RN.A.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values . . .

MP 7

You can use patterns to find a shortcut for simplifying a power raised to a power or a product raised to a power.

Activity 1

Copy and complete each statement in Exercises 1–9.

1. $(4^5)^2 = 4^5 \cdot 4^5 = 4^{\square+\square} = 4^{5 \cdot \square} = 4^{\square}$

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

3. $(5^8)^4 = 5^8 \cdot 5^8 \cdot 5^8 \cdot 5^8 = 5^{\square+\square+\square+\square} = 5^{8 \cdot \square} = 5^{\square}$

4. $(4^{\frac{1}{3}})^3 = 4^{\frac{1}{3}} \cdot 4^{\frac{1}{3}} \cdot 4^{\frac{1}{3}} = 4^{\square+\square+\square} = 4^{\frac{1}{3} \cdot \square} = 4^{\square}$

5. $(5^{\frac{1}{2}})^4 = 5^{\frac{1}{2}} \cdot 5^{\frac{1}{2}} \cdot 5^{\frac{1}{2}} \cdot 5^{\frac{1}{2}} = 5^{\square+\square+\square+\square} = 5^{\frac{1}{2} \cdot \square} = 5^{\square}$

6. $(a^4)^2 = a^4 \cdot a^4 = a^{\square+\square} = a^{4 \cdot \square} = a^{\square}$

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

8. $(x^5)^4 = \square \cdot \square \cdot \square \cdot \square = x^{\square+\square+\square+\square} = x^{5 \cdot \square} = x^{\square}$

9. $(a^{\frac{1}{4}})^4 = \square \cdot \square \cdot \square \cdot \square = a^{\square+\square+\square+\square} = a^{\frac{1}{4} \cdot \square} = a^{\square}$

- © 10. a. **Look for a Pattern** What pattern do you see in your answers to Exercises 1–9?
b. **Predict** Use your pattern to simplify $(y^{11})^{33}$.

Activity 2

Copy and complete each statement in Exercises 11–15.

11. $(3n)^2 = 3n \cdot 3n = (3 \cdot 3)(n \cdot n) = 3^{\square} n^{\square}$

12. $(2x)^3 = 2x \cdot 2x \cdot 2x = (2 \cdot 2 \cdot 2)(x \cdot x \cdot x) = 2^{\square} x^{\square}$

13. $(ab)^2 = ab \cdot ab = (a \cdot a)(b \cdot b) = a^{\square} b^{\square}$

14. $(xy)^3 = xy \cdot xy \cdot xy = (\square \cdot \square \cdot \square)(\square \cdot \square \cdot \square) = x^{\square} y^{\square}$

15. $(pq)^4 = \square \cdot \square \cdot \square \cdot \square = (\square \cdot \square \cdot \square \cdot \square)(\square \cdot \square \cdot \square \cdot \square) = p^{\square} q^{\square}$

- © 16. a. **Look for a Pattern** What pattern do you see in your answers to Exercises 11–15?
b. **Predict** Use your pattern to simplify $(rs)^{20}$.