Expressions and Equivalence

Lesson 2 Powers and Their Values

Standards 6.EE.A.1

Learning target I can write repeated multiplication using a whole-number exponent.

Materials Algebra tiles or rectangle models, pencils, expression cards.

Lesson Flow 50 Minutes

0–5 Activate prior knowledge. Read the learning target. Ask students what they already know about powers and their values. Use a quick model or estimate to make their starting ideas visible.

5–17 Teach and model. The base is the repeated factor and the exponent tells how many copies to multiply. For a positive exponent, 4^3 = 4 × 4 × 4, not 4 × 3. Parentheses show when a whole product is the base. Work through the two examples on the attached instruction page. Have students name the first step before showing it.

17–22 Guided practice. Revisit worked Example 2 with its solution covered. Students propose the next step and explain why it is valid; uncover and compare with the worked solution.

22–45 Independent classwork. Assign the attached 10 questions in order. Check items 1–3 for entry-level understanding, 4–6 for connected procedures, 7–8 for representation and explanation, and 9–10 for application or justification. Ask students to use the instruction-page notes area or extra grids for longer work.

45–50 Check understanding. Use classwork question 10 as an exit discussion: Write 7^4 as repeated multiplication and evaluate. Explain why it differs from 7 × 4. Compare the result with the answer key and ask a student to defend the method.

Support and Extension

Support Model item 1 together with the listed tools, then have students attempt item 2 independently. Watch exponents versus multiplication, operation order, and distributing to every term.

Extension Ask students to solve a final item another way, draw a second representation, or create a related problem with a checked answer.

Next step Record which students can explain the target independently. Begin the next teaching session with a brief correction for any recurring error.

Name _____ Date _____

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Learning target I can write repeated multiplication using a whole-number exponent.

Learn and Discuss

The base is the repeated factor and the exponent tells how many copies to multiply. For a positive exponent, 4^3 = 4 × 4 × 4, not 4 × 3. Parentheses show when a whole product is the base.

Example 1 Write 2^4 as repeated multiplication and evaluate.
Solution 2 × 2 × 2 × 2 = 16. The exponent counts 4 factors of 2; multiply all factors.
Example 2 Write 2^2 as repeated multiplication and evaluate. Explain why it differs from 2 × 2.
Solution 2 × 2 = 4; 2 × 2 = 4. The exponent counts 2 factors of 2; multiply all factors.

Classwork Show Your Work

Complete the 10 problems on the following page. Refer to the examples, draw models, and check your results.

My Notes or Second Method

Lesson 2 Powers and Their Values

Name _____ Show calculations, models, and units.

1. Write 2^2 as repeated multiplication and evaluate.

2. Write 3^3 as repeated multiplication and evaluate.

3. Write 4^3 as repeated multiplication and evaluate.

4. Write 8^2 as repeated multiplication and evaluate.

5. Write 7^3 as repeated multiplication and evaluate.

6. Write 4^2 as repeated multiplication and evaluate.

7. Write 6^4 as repeated multiplication and evaluate. Explain why it differs from 6 × 4.

8. Write 3^2 as repeated multiplication and evaluate. Explain why it differs from 3 × 2.

9. Write 3^4 as repeated multiplication and evaluate. Explain why it differs from 3 × 4.

10. Write 7^4 as repeated multiplication and evaluate. Explain why it differs from 7 × 4.

Powers and Their Values

Expressions and Equivalence

1. 2 × 2 = 4
Reasoning The exponent counts 2 factors of 2; multiply all factors.

2. 3 × 3 × 3 = 27
Reasoning The exponent counts 3 factors of 3; multiply all factors.

3. 4 × 4 × 4 = 64
Reasoning The exponent counts 3 factors of 4; multiply all factors.

4. 8 × 8 = 64
Reasoning The exponent counts 2 factors of 8; multiply all factors.

5. 7 × 7 × 7 = 343
Reasoning The exponent counts 3 factors of 7; multiply all factors.

6. 4 × 4 = 16
Reasoning The exponent counts 2 factors of 4; multiply all factors.

7. 6 × 6 × 6 × 6 = 1296; 6 × 4 = 24
Reasoning The exponent counts 4 factors of 6; multiply all factors.

8. 3 × 3 = 9; 3 × 2 = 6
Reasoning The exponent counts 2 factors of 3; multiply all factors.

9. 3 × 3 × 3 × 3 = 81; 3 × 4 = 12
Reasoning The exponent counts 4 factors of 3; multiply all factors.

10. 7 × 7 × 7 × 7 = 2401; 7 × 4 = 28
Reasoning The exponent counts 4 factors of 7; multiply all factors.