

Reasoning Powers Answer Key

1. Simplified: 5^6 / Sample explanation: Expanding gives two groups of 5s. Together there are six factors of 5, so the exponents are added.
2. Simplified: 8^4 / Sample explanation: Matching factors of 8 cancel when dividing. Four factors of 8 remain, so the exponents are subtracted.
3. Simplified: 4^6 / Sample explanation: There are two groups of 4^3 . Expanding shows six factors of 4, so the exponents are multiplied.
4. Simplified: $3^2 \times 9^2$ / Sample explanation: The exponent applies to both factors because the entire product is squared.
5. Simplified: $20^3 \div 5^3$ / Sample explanation: The exponent applies to both the numerator and the denominator because the entire quotient is cubed.
6. Simplified: 1 / Sample explanation: Any nonzero number raised to the zero power equals 1 because dividing a number by itself repeatedly leaves 1.
7. Simplified: $1/7^2$ or $1/49$ / Sample explanation: A negative exponent means take the reciprocal of the positive power.
8. Simplified: 2^6 / Sample explanation: All factors have the same base. Counting the repeated factors gives six 2s, so the exponents are added.

Teacher's Guide

- Model one example by expanding the expression before introducing the exponent law.
- Encourage students to use words such as "factors," "groups," "cancel," and "reciprocal" in their explanations.
- For students needing support, allow them to draw or write the repeated multiplication before writing their explanation.
- Have students compare explanations with a partner and discuss whether the reasoning is clear and mathematically accurate.
- Challenge advanced students to explain the same exponent law in two different ways, such as with repeated multiplication and with a general rule.
- Extend the activity by asking students to create an exponent expression, simplify it, and write their own explanation for why the law works.