Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Powers of Powers, Products, and Quotients

Powers of Powers, Products, and Quotients | A1-U07-P03

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for exact equivalent form or validity conclusion with scope justification.

8 PDFs and a README; 55 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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Name: _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

Treat this as a formal identity in base y. Solve $(y^n)^3 = y^6$ for a positive-integer n, or prove divisibility makes that impossible. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses. Bank label: _____	Simplify $(-3p^4b^2)^2$. Apply the outer exponent to every multiplicative factor inside its parentheses, including the coefficient, while leaving any outside factor unchanged. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses. Bank label: _____
The fixed base 3 is positive and not 1. Solve $(3^n)^5 = 3^{15}$ for a positive-integer n, or prove divisibility makes that impossible. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses. Bank label: _____	Treat this as a formal identity in base a. Solve $(a^n)^3 = a^{12}$ for a positive-integer n, or prove divisibility makes that impossible. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses. Bank label: _____
Simplify $(-2m^4q^3)^3$. Apply the outer exponent to every multiplicative factor inside its parentheses, including the coefficient, while leaving any outside factor unchanged. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses. Bank label: _____	Treat this as a formal identity in base m. Solve $(m^n)^5 = m^{25}$ for a positive-integer n, or prove divisibility makes that impossible. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses. Bank label: _____
Simplify $(-3r^2s^4)^3$. Apply the outer exponent to every multiplicative factor inside its parentheses, including the coefficient, while leaving any outside factor unchanged. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses. Bank label: _____	Simplify $(4x^3y^4)^4$. Apply the outer exponent to every multiplicative factor inside its parentheses, including the coefficient, while leaving any outside factor unchanged. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses. Bank label: _____

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Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

Assume $y \neq 0$. Simplify $(\frac{2x^{1}}{3y^{1}})^{2}$ by applying the outer power to the entire numerator and entire denominator. Preserve the original denominator restriction.	Determine whether $8x^{6}y^{9}$ can be written as a single $3rd$ power using an integer coefficient and integer inner exponents under outer exponent 3. If possible, construct the powered form and verify coefficient sign, integer root, and every exponent; otherwise prove the first incompatibility.
Determine whether $16a^{8}b^{6}$ can be written as a single $2nd$ power using an integer coefficient and integer inner exponents under outer exponent 2. If possible, construct the powered form and verify coefficient sign, integer root, and every exponent; otherwise prove the first incompatibility.	Assume $n \neq 0$. Simplify $(\frac{m^{3}}{n^{2}})^{2}$ by applying the outer power to the entire numerator and entire denominator. Preserve the original denominator restriction.
Determine whether $-27m^{6}n^{12}$ can be written as a single $3rd$ power using an integer coefficient and integer inner exponents under outer exponent 3. If possible, construct the powered form and verify coefficient sign, integer root, and every exponent; otherwise prove the first incompatibility.	Determine whether $-16p^{6}q^{8}$ can be written as a single $2nd$ power using an integer coefficient and integer inner exponents under outer exponent 2. If possible, construct the powered form and verify coefficient sign, integer root, and every exponent; otherwise prove the first incompatibility.

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Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

Incoming: $(-2a^2y)^2 = 4a^4y^2$.

Simplify $(t^4)^2$ as one power. Trace each nesting layer and explain why the exponent counts multiply rather than add. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses.

Your response: _____

Incoming: $(a^5)^2 = a^{10}$.

Simplify $(b^6)^3$ as one power. Trace each nesting layer and explain why the exponent counts multiply rather than add. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses.

Your response: _____

Incoming: $(2xy)^2 = 4x^2y^2$.

Treat this as a formal identity in base x. Solve $(x^n)^2 = x^4$ for a positive-integer n, or prove divisibility makes that impossible. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses.

Your response: _____

Incoming: $(b^6)^3 = b^{18}$.

Simplify $(4rn^2)^2$. Apply the outer exponent to every multiplicative factor inside its parentheses, including the coefficient, while leaving any outside factor unchanged. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses.

Your response: _____

Incoming: $(3m^3b)^2 = 9m^6b^2$.

The fixed base 2 is positive and not 1. Solve $(2^n)^4 = 2^{12}$ for a positive-integer n, or prove divisibility makes that impossible. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses.

Your response: _____

Incoming: $((-2)^7)^4 = (-2)^{28}$.

Simplify $((-3)^8)^4$ as one power. Trace each nesting layer and explain why the exponent counts multiply rather than add. Use the original requested final expression or positive integer exponent as the matching response, and complete the original scope explanation. Preserve any factor outside the powered parentheses.

Your response: _____

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Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

Simplify $(x^2)^2$ as one power. Trace each nesting layer and explain why the exponent counts multiply rather than add. Compare tracing repeated groups layer by layer with adding all exponent labels. Which gives a valid general factor-count explanation of this nesting? Justify using the original base and layers, without expanding a binomial.

Simplify $(x^1)^2(x^1)^2y^2$. Keep all resulting exponents positive and state any denominator restriction. For the first step, choose between applying the power-of-a-power rule within each parenthesized group and immediately adding all visible exponent labels across groups. Justify your choice from the nesting structure, then complete the original simplification.

Audit $(2x^3)^2 = 4x^6$. Trace the exact scope of every exponent and parenthesis. Decide validity; if invalid, repair the first structural error and justify with a counterexample without expanding a binomial. Compare the structures on the two sides of the claim. Explain why they are equivalent, explicitly tracking the full base, each exponent scope, any outside sign, and any denominator condition; do not expand a binomial.

Simplify $(y^3)^2$ as one power. Trace each nesting layer and explain why the exponent counts multiply rather than add. Compare tracing repeated groups layer by layer with adding all exponent labels. Which gives a valid general factor-count explanation of this nesting? Justify using the original base and layers, without expanding a binomial.

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Full Worked Solutions - excerpt

Worked example

Problem. Audit $-((x^2)^2) = (-x^2)^2$. Trace the exact scope of every exponent and parenthesis. Decide validity; if invalid, repair the first structural error and justify with a counterexample without expanding a binomial.

Answer. The claim is invalid: the left side is $-x^4$ while the right side is x^4.

Explanation and check.

Read parentheses before applying any rule. The left side is $-x^4$ while the right side is x^4. At $x = 1$, the sides are -1 and 1.

Worked example

Problem. Audit $(3x^2)^2 = 3x^4$. Trace the exact scope of every exponent and parenthesis. Decide validity; if invalid, repair the first structural error and justify with a counterexample without expanding a binomial.

Answer. The claim is invalid: the coefficient is inside the parentheses; repair it to $9x^4$.

Explanation and check.

Read parentheses before applying any rule. The coefficient is inside the parentheses; repair it to $9x^4$. At $x = 1$, the sides are 9 and 3.