Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Product of Powers

Product of Powers | A1-U07-P01

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for exact expression or conclusion with exponent-rule justification.

8 PDFs and a README; 54 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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Algebra 1

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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 the equation as a formal power identity in the displayed base y. Assume n must be a positive integer. Solve $y^6y^n = y^8$ for n, or explain why no admissible value exists. Use the requested final expression or admissible exponent as the matching response; also complete the original justification. Bank label: _____	The fixed numerical base (-2) has absolute value greater than 1. Assume n must be a positive integer. Solve $(-2)^7(-2)^n = (-2)^{10}$ for n, or explain why no admissible value exists. Use the requested final expression or admissible exponent as the matching response; also complete the original justification. Bank label: _____
The fixed numerical base 2 has absolute value greater than 1. Assume n must be a positive integer. Solve $2^n \cdot 2^n \cdot 2^3 = 2^{11}$ for n, or explain why no admissible value exists. Use the requested final expression or admissible exponent as the matching response; also complete the original justification. Bank label: _____	The fixed numerical base 7 has absolute value greater than 1. Assume n must be a positive integer. Solve $7^n \cdot 7^n \cdot 7^n \cdot 7^4 = 7^{19}$ for n, or explain why no admissible value exists. Use the requested final expression or admissible exponent as the matching response; also complete the original justification. Bank label: _____
Treat the equation as a formal power identity in the displayed base m. Assume n must be a positive integer. Solve $m^nm^nm^5 = m^{17}$ for n, or explain why no admissible value exists. Use the requested final expression or admissible exponent as the matching response; also complete the original justification. Bank label: _____	The fixed numerical base 3 has absolute value greater than 1. Assume n must be a positive integer. Solve $3^n \cdot 3^n \cdot 3^3 = 3^8$ for n, or explain why no admissible value exists. Use the requested final expression or admissible exponent as the matching response; also complete the original justification. Bank label: _____
Rewrite $(x+1)^2(x+1)^3$ as one power. Identify the common base and justify the exponent in the result by counting repeated factors. Use the requested final expression or admissible exponent as the matching response; also complete the original justification. Bank label: _____	Rewrite $(y-2)^3(y-2)^3$ as one power. Identify the common base and justify the exponent in the result by counting repeated factors. Use the requested final expression or admissible exponent as the matching response; also complete the original justification. 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.

Treat the equation as a formal power identity in the displayed base a. Assume n must be a positive integer. Solve $a^n a^n a^1 = a^5$ for n, or explain why no admissible value exists.	Treat the equation as a formal power identity in the displayed base b. Assume n must be a positive integer. Solve $b^n b^n b^n b^2 = b^{11}$ for n, or explain why no admissible value exists.
Design a same-base product equal to s^{11} using two even positive exponents. All exponents must be positive integers. Give one product and verify every condition, or prove the restrictions incompatible.	Design a same-base product equal to $(u-3)^{12}$ using three distinct exponents, each at least 3. All exponents must be positive integers. Give one product and verify every condition, or prove the restrictions incompatible.
Treat the equation as a formal power identity in the displayed base x. Assume n must be a positive integer. Solve $x^n x^n x^2 = x^8$ for n, or explain why no admissible value exists.	Design a same-base product equal to v^9 using two distinct exponents, each greater than 4. All exponents must be positive integers. Give one product and verify every condition, or prove the restrictions incompatible.

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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: $w^3w^6 = w^9$.

Simplify $x^5y^3x^2$ by combining only powers whose bases are identical. State which factors must remain in separate base groups. Use the requested final expression or admissible exponent as the matching response; also complete the original justification.

Your response: _____

Incoming: $p^5q^4p^2 = p^7q^4$.

Rewrite x^2x^4 as one power. Identify the common base and justify the exponent in the result by counting repeated factors. Use the requested final expression or admissible exponent as the matching response; also complete the original justification.

Your response: _____

Incoming: $p^5p^4 = p^9$.

Rewrite q^2q^5 as one power. Identify the common base and justify the exponent in the result by counting repeated factors. Use the requested final expression or admissible exponent as the matching response; also complete the original justification.

Your response: _____

Incoming: $r^3r^5 = r^8$.

Rewrite u^5u^5 as one power. Identify the common base and justify the exponent in the result by counting repeated factors. Use the requested final expression or admissible exponent as the matching response; also complete the original justification.

Your response: _____

Incoming: $x^5y^3x^2 = x^7y^3$.

Rewrite $(-2)^4(-2)^6$ as one power. Identify the common base and justify the exponent in the result by counting repeated factors. Use the requested final expression or admissible exponent as the matching response; also complete the original justification.

Your response: _____

Incoming: $v^2v^6 = v^8$.

Rewrite w^3w^6 as one power. Identify the common base and justify the exponent in the result by counting repeated factors. Use the requested final expression or admissible exponent as the matching response; also complete the original justification.

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.

A first group contains 2 copies of the base 4, and a second group contains 3 more copies of that identical base. Without evaluating the base, explain why multiplying the groups gives 4^5. Compare two proposed explanations: concatenate the two factor lists and add their lengths, or multiply the two list lengths. Which gives a valid general justification? Explain using the original groups; do not evaluate the base.

Audit the claim $x^3x^5 = x^8$. Decide whether it is valid under the product rule. If it is invalid, identify the first structural error and give a repair or a numerical counterexample. A learner justifies this by saying: "Any two powers can be combined by adding their exponents, even when their bases differ." Evaluate the equality and this justification separately. Identify and repair the missing condition in the justification.

A first group contains 3 copies of the base x, and a second group contains 4 more copies of that identical base. Without evaluating the base, explain why multiplying the groups gives x^7. Compare two proposed explanations: concatenate the two factor lists and add their lengths, or multiply the two list lengths. Which gives a valid general justification? Explain using the original groups; do not evaluate the base.

Audit the claim $y^3y^4 = y^{12}$. Decide whether it is valid under the product rule. If it is invalid, identify the first structural error and give a repair or a numerical counterexample.

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Full Worked Solutions - excerpt

Worked example

Problem. Audit the claim $a^2b^5 = a^7$. Decide whether it is valid under the product rule. If it is invalid, identify the first structural error and give a repair or a numerical counterexample.

Answer. The claim is invalid: the bases a and b are not identical; the product stays a^2b^5.

Explanation and check.

First check the operation and the exact bases before touching exponents. The bases a and b are not identical; the product stays a^2b^5. At $a = 2$ and $b = 3$, the claimed sides are 972 and 128.

Worked example

Problem. Audit the claim $t^2 + t^3 = t^5$. Decide whether it is valid under the product rule. If it is invalid, identify the first structural error and give a repair or a numerical counterexample.

Answer. The claim is invalid: the product rule does not apply across addition.

Explanation and check.

First check the operation and the exact bases before touching exponents. The product rule does not apply across addition. At $t = 2$, the sides are 12 and 32.