Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Exponents & Exponentials: Current Collection | Algebra 1 | 14-Topic Bundle

14-topic bundle | 1,344 problems | Four activity formats

Included topics

The following pages list all 14 included resources in the suggested order, with a link to each product. Each resource retains its complete preview.

In every topic

Answer Bank Challenge	24 tasks
Grid Rounds	24 tasks
Match & Move	24 cards
Error Analysis & Strategy	24 tasks
Quick Answer Key and Full Worked Solutions	included
Teacher / Parent Use Guide and Terms of Use	included

Product previews

The following preview pages show the cover, all four activity formats, and worked examples for each included resource, in the listed order.

112 PDFs and 14 READMEs; 900 buyer PDF pages across the 14 products.

Preview pages are not included in the buyer page count. Check the list against resources you already own.

This is a fixed collection of the listed products. Purchase includes the existing individual resource files. To open a product's online preview, follow its title link and select View Preview.

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Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Included topics

14-topic bundle | 1,344 problems | Four activity formats

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01 **Product of Powers**

View individual product and its full preview

02 **Quotient of Powers**

View individual product and its full preview

03 **Zero Exponents**

View individual product and its full preview

04 **Negative Exponents**

View individual product and its full preview

05 **Operations with Scientific Notation**

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06 **Comparing Scientific Notation**

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07 **Identifying Geometric Sequences**

View individual product and its full preview

08 **Explicit Geometric Sequence Rules**

View individual product and its full preview

09 **Recursive Geometric Sequence Rules**

View individual product and its full preview

10 **Exponential Function Rules and Evaluation**

View individual product and its full preview

11 **Graphing Exponential Functions**

View individual product and its full preview

14 included resources | Complete resource previews follow this guide.

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Math Practice & Worked Solutions

Algebra 1

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12 **Exponential Growth Models**

View individual product and its full preview

13 **Exponential Decay Models**

View individual product and its full preview

14 **Linear vs Exponential Models**

View individual product and its full preview

14 included resources | Complete resource previews follow this guide.

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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

Product of Powers

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: _____

Algebra 1

Product of Powers

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

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.

Algebra 1

Product of Powers

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

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: _____

Algebra 1

Product of Powers

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

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.

Product of Powers

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.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Quotient of Powers

Quotient of Powers | A1-U07-P02

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for simplified expression, retained restriction, and exact justification.

8 PDFs and a README; 63 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

Quotient of Powers

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.

Assume $x \neq 0$. Simplify $\frac{x^2}{x^1}$ by displaying the cancellation count, then state the positive exponent left in the numerator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation. Bank label: _____	Assume $y \neq 0$. Simplify $\frac{y^3}{y^2}$ by displaying the cancellation count, then state the positive exponent left in the numerator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation. Bank label: _____
Assume $t \neq 0$. Simplify $\frac{t^4}{t^3}$ by displaying the cancellation count, then state the positive exponent left in the numerator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation. Bank label: _____	Assume $a \neq 0$. Simplify $\frac{a^5}{a^4}$ by displaying the cancellation count, then state the positive exponent left in the numerator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation. Bank label: _____
Assume $x \neq 2$. Simplify $\frac{(x-2)^7}{(x-2)^5}$ by displaying the cancellation count, then state the positive exponent left in the numerator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation. Bank label: _____	Assume $y \neq -3$. Simplify $\frac{(y+3)^8}{(y+3)^6}$ by displaying the cancellation count, then state the positive exponent left in the numerator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation. Bank label: _____
Assume $t \neq 2$. Simplify $\frac{(2t-4)^3}{(2t-4)^1}$ by displaying the cancellation count, then state the positive exponent left in the numerator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation. Bank label: _____	Assume $p \neq -2$. Simplify $\frac{(3p+6)^4}{(3p+6)^2}$ by displaying the cancellation count, then state the positive exponent left in the numerator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation. Bank label: _____

Algebra 1

Quotient of Powers

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

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.

The factor diagram has numerator labels $N1{:}x$, $N2{:}x$, $N3{:}x$ and denominator labels $D1{:}x$, $D2{:}x$. Use the diagram to match every denominator factor with one numerator factor. State the remaining factor count and the nonzero-base condition.

Numerator

N1	N2	N3
x	x	x

Denominator

D1	D2
x	x

The factor diagram has numerator labels $N1{:}(x-2)$, $N2{:}(x-2)$, $N3{:}(x-2)$, $N4{:}(x-2)$, $N5{:}(x-2)$ and denominator labels $D1{:}(x-2)$, $D2{:}(x-2)$, $D3{:}(x-2)$. Use the diagram to match every denominator factor with one numerator factor. State the remaining factor count and the nonzero-base condition.

Numerator

N1	N2	N3	N4	N5
$(x-2)$	$(x-2)$	$(x-2)$	$(x-2)$	$(x-2)$

Denominator

D1	D2	D3
$(x-2)$	$(x-2)$	$(x-2)$

The factor diagram has numerator labels $N1{:}2$, $N2{:}2$, $N3{:}2$, $N4{:}2$, $N5{:}2$, $N6{:}2$, $N7{:}2$ and denominator labels $D1{:}2$, $D2{:}2$, $D3{:}2$, $D4{:}2$. Use the diagram to match every denominator factor with one numerator factor. State the remaining factor count and the nonzero-base condition.

Numerator

N1	N2	N3	N4	N5	N6	N7
2	2	2	2	2	2	2

Denominator

D1	D2	D3	D4
2	2	2	2

The factor diagram has numerator labels $N1{:}(y+3)$, $N2{:}(y+3)$, $N3{:}(y+3)$, $N4{:}(y+3)$, $N5{:}(y+3)$, $N6{:}(y+3)$ and denominator labels $D1{:}(y+3)$, $D2{:}(y+3)$. Use the diagram to match every denominator factor with one numerator factor. State the remaining factor count and the nonzero-base condition.

Numerator

N1	N2	N3	N4	N5	N6
$(y+3)$	$(y+3)$	$(y+3)$	$(y+3)$	$(y+3)$	$(y+3)$

Denominator

D1	D2
$(y+3)$	$(y+3)$

Algebra 1

Quotient of Powers

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

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: $\frac{a^8(3p+6)^9}{a^3(3p+6)^5} = a^5(3p+6)^4$; original denominator conditions: $a \neq 0$ and $p \neq -2$.

Assume $p \neq -2$. Simplify $\frac{(3p+6)^{12}}{(3p+6)^6}$ by displaying the cancellation count, then state the positive exponent left in the numerator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation.

Your response: _____

Incoming: $\frac{(r+1)^8}{(r+1)^4} = (r+1)^4$; original condition: $r \neq -1$.

Simplify $\frac{(x-2)^8 \cdot 5^2 (y+3)^6}{(x-2)^4 (y+3)^3}$. Cancel and subtract exponents separately for each exact base, preserve any unmatched numerator factor, and list every restriction inherited from the original denominator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation.

Your response: _____

Incoming: $\frac{t^6 a^5}{t^3 a^2} = t^3 a^3$; original denominator conditions: $t \neq 0$ and $a \neq 0$.

Assume $r \neq -1$. Simplify $\frac{(r+1)^8}{(r+1)^4}$ by displaying the cancellation count, then state the positive exponent left in the numerator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation.

Your response: _____

Incoming: $\frac{m^9(r+1)^9}{m^4(r+1)^5} = m^5(r+1)^4$; original denominator conditions: $m \neq 0$ and $r \neq -1$.

Simplify $\frac{(y+3)^6 a^6 n^6}{(y+3)^1 n^2}$. Cancel and subtract exponents separately for each exact base, preserve any unmatched numerator factor, and list every restriction inherited from the original denominator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation.

Your response: _____

Incoming: $\frac{(3p+6)^{12}}{(3p+6)^6} = (3p+6)^6$; original condition: $p \neq -2$.

Simplify $\frac{m^9(r+1)^9}{m^4(r+1)^5}$. Cancel and subtract exponents separately for each exact base, preserve any unmatched numerator factor, and list every restriction inherited from the original denominator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation.

Your response: _____

Incoming: $\frac{a^7}{a^2} = a^5$; original condition: $a \neq 0$.

Simplify $\frac{2^8 \cdot 3^7}{2^4 \cdot 3^4}$. Cancel and subtract exponents separately for each exact base, preserve any unmatched numerator factor, and list every restriction inherited from the original denominator. For the matching response, record both the requested final power/product or exponent and all original denominator restrictions. Also complete the original explanation.

Your response: _____

Algebra 1

Quotient of Powers

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

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 $\frac{x^2t^2y^3}{x^1y^2}$. Preserve any unmatched numerator factor and list every restriction inherited from the original denominator. Choose between matching numerator and denominator factors by identical whole base, or matching factors merely because their exponents agree. Justify which strategy applies to this quotient, then use it to complete the original simplification and domain requirements.

Simplify $\frac{t^3a^3}{t^2a^2}$. Preserve any unmatched numerator factor and list every restriction inherited from the original denominator. Choose between matching numerator and denominator factors by identical whole base, or matching factors merely because their exponents agree. Justify which strategy applies to this quotient, then use it to complete the original simplification and domain requirements.

Simplify $\frac{(x-2)^4(y+3)^3}{(x-2)^3(y+3)^2}$. Preserve any unmatched numerator factor and list every restriction inherited from the original denominator. Choose between matching numerator and denominator factors by identical whole base, or matching factors merely because their exponents agree. Justify which strategy applies to this quotient, then use it to complete the original simplification and domain requirements.

Simplify $\frac{(2t-4)^5a^5m^4}{(2t-4)^4m^3}$. Preserve any unmatched numerator factor and list every restriction inherited from the original denominator. Choose between matching numerator and denominator factors by identical whole base, or matching factors merely because their exponents agree. Justify which strategy applies to this quotient, then use it to complete the original simplification and domain requirements.

Quotient of Powers

Full Worked Solutions - excerpt

Worked example

Problem. Audit the worked simplification: $\frac{3^8}{3^3} = 3^{11}$. Identify the first quotient-rule or domain error, repair it, and use the supplied structure or a counterexample to justify the verdict.

Answer. The work is invalid: a quotient subtracts exponent counts: the repair is 3^5.

Explanation and check.

Check exact base equality, then subtract denominator exponent from numerator exponent, and finally retain every original denominator exclusion. A quotient subtracts exponent counts: the repair is 3^5. The numerator has only five uncanceled copies.

Worked example

Problem. Audit the worked simplification: $\frac{(x-1)^7}{(x-1)^3} = (x-1)^4$ for every real x. Identify the first quotient-rule or domain error, repair it, and use the supplied structure or a counterexample to justify the verdict.

Answer. The work is invalid: the power is correct, but the domain must keep $x \neq 1$.

Explanation and check.

Check exact base equality, then subtract denominator exponent from numerator exponent, and finally retain every original denominator exclusion. The power is correct, but the domain must keep $x \neq 1$. At $x = 1$, the original denominator is zero.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Zero Exponents

Zero Exponents | A1-U07-P04

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for exact value, condition, or boundary-aware conclusion with justification.

8 PDFs and a README; 50 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

Zero Exponents

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.

Evaluate $(4-11)^0$. First compute the expression that forms the base; then decide whether the zero power is defined. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions. Bank label: _____	Evaluate $((3)(6)-18)^0$ under the real-number zero-exponent convention used in this course. Explain the boundary case. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions. Bank label: _____
Evaluate $-(-5)^0$. State which operations are outside the exponent's scope. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions. Bank label: _____	Evaluate 3^0+11^0. Replace only each defined zero-powered group by 1 and retain every operation outside that group. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions. Bank label: _____
Evaluate $6^0-(-4)^0$. Replace only each defined zero-powered group by 1 and retain every operation outside that group. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions. Bank label: _____	Evaluate $\frac{8}{5^0}$. Replace only each defined zero-powered group by 1 and retain every operation outside that group. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions. Bank label: _____
Evaluate $(2\cdot 5)^0+3$. Replace only each defined zero-powered group by 1 and retain every operation outside that group. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions. Bank label: _____	Find the exact real domain of $((2x+3)(x-4))^0$. Account for every way the complete base can be zero or undefined. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions. Bank label: _____

Algebra 1

Zero Exponents

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

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.

Evaluate $((-3)^2 + 1)^0$. First compute the expression that forms the base; then decide whether the zero power is defined.	Evaluate $((\frac{14}{7}) - 5)^0$. First compute the expression that forms the base; then decide whether the zero power is defined.
Evaluate $2^0 \cdot 9^0$. Replace only each defined zero-powered group by 1 and retain every operation outside that group.	Evaluate $4(6^0 + 10^0)$. Replace only each defined zero-powered group by 1 and retain every operation outside that group.
Evaluate $2(3 + 4)^0$. Replace only each defined zero-powered group by 1 and retain every operation outside that group.	Evaluate $3 - 2(-7)^0$. Replace only each defined zero-powered group by 1 and retain every operation outside that group.

Algebra 1

Zero Exponents

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

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: undefined

For which real x is $(x-3)^0$ defined? Give the restriction before simplifying the power. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions.

Your response: _____

Incoming: $-\frac{1}{2}$

Determine whether $0(4-4)^0$ is defined. Do not let an outside factor or operation hide a zero base. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions.

Your response: _____

Incoming: -1

Evaluate $4 \cdot 3^0$. State which operations are outside the exponent's scope. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions.

Your response: _____

Incoming: 5

Evaluate $\frac{3^0}{7}$. Replace only each defined zero-powered group by 1 and retain every operation outside that group. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions.

Your response: _____

START

Evaluate $((2^3)-3)^0$. First compute the expression that forms the base; then decide whether the zero power is defined. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions.

Your response: _____

Incoming: all real x except x = 7

Find the exact real domain of $((x-2)(x+5))^0$. Account for every way the complete base can be zero or undefined. Use the complete requested value, domain, or coefficient conditions as the matching response and retain the original explanation and restrictions.

Your response: _____

Algebra 1

Zero Exponents

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

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.

Evaluate 2^0. Identify the entire base before applying the zero-exponent rule. Choose a justified first step: apply the nonzero-base rule directly if its condition is already established, or first evaluate/check the entire base to establish whether the rule applies. Explain your choice for this expression, then give its value or explain why it is undefined.

Evaluate $(-2)^0$. Identify the entire base before applying the zero-exponent rule. Choose a justified first step: apply the nonzero-base rule directly if its condition is already established, or first evaluate/check the entire base to establish whether the rule applies. Explain your choice for this expression, then give its value or explain why it is undefined.

Evaluate $(\frac{1}{2})^0$. Identify the entire base before applying the zero-exponent rule. Choose a justified first step: apply the nonzero-base rule directly if its condition is already established, or first evaluate/check the entire base to establish whether the rule applies. Explain your choice for this expression, then give its value or explain why it is undefined.

Evaluate $(-\frac{3}{4})^0$. Identify the entire base before applying the zero-exponent rule. Choose a justified first step: apply the nonzero-base rule directly if its condition is already established, or first evaluate/check the entire base to establish whether the rule applies. Explain your choice for this expression, then give its value or explain why it is undefined.

Zero Exponents

Full Worked Solutions - excerpt

Worked example

Problem. Determine whether $5 + 0(9 - 9)^0$ is defined. Do not let an outside factor or operation hide a zero base.

Answer. undefined

Explanation and check.

The powered base is zero, so the product term is undefined before the outside zero can act; hence the whole sum is undefined.

Worked example

Problem. Determine whether $-2((3 \cdot 3 - 9)^0) + 7$ is defined. Do not let an outside factor or operation hide a zero base.

Answer. undefined

Explanation and check.

The grouped base $3 \cdot 3 - 9$ equals zero. External multiplication and addition cannot make that zero power defined.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Negative Exponents

Negative Exponents | A1-U07-P05

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for exact positive-exponent form, integer exponent, ordering, or domain-aware correction.

8 PDFs and a README; 52 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.

Published by Tusils LLC.

Algebra 1

Negative Exponents

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.

Rewrite $(-3)^{-2}$ using a positive exponent, then give its exact value. Invert the complete base rather than changing its sign. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption. Bank label: _____	Rewrite x^{-2} using only positive exponents and state the original real-domain condition. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption. Bank label: _____
Rewrite y^{-5} using only positive exponents and state the original real-domain condition. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption. Bank label: _____	Rewrite $(-m)^{-3}$ using only positive exponents and state the original real-domain condition. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption. Bank label: _____
Rewrite $(2a)^{-2}$ using only positive exponents and state the original real-domain condition. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption. Bank label: _____	Rewrite $(-3b)^{-3}$ using only positive exponents and state the original real-domain condition. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption. Bank label: _____
Rewrite $(uv)^{-2}$ using only positive exponents and state the original real-domain condition. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption. Bank label: _____	Rewrite $(-rs)^{-3}$ using only positive exponents and state the original real-domain condition. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption. Bank label: _____

Algebra 1

Negative Exponents

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

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.

Rewrite $(x-4)^{-2}$ using only positive exponents and state the original real-domain condition.	Rewrite $(t+7)^{-3}$ using only positive exponents and state the original real-domain condition.
Rewrite $(2p-5)^{-1}$ using only positive exponents and state the original real-domain condition.	Rewrite $(3q+1)^{-4}$ using only positive exponents and state the original real-domain condition.
Rewrite $((k+2)(k-1))^{-2}$ using only positive exponents and state the original real-domain condition.	Rewrite $(z^2+1)^{-3}$ using only positive exponents and state the original real-domain condition.

Algebra 1

Negative Exponents

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

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: $\frac{1}{4^2} = \frac{1}{16}$

Rewrite 5^{-3} using a positive exponent, then give its exact value. Invert the complete base rather than changing its sign. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption.

Your response: _____

START

Rewrite 2^{-1} using a positive exponent, then give its exact value. Invert the complete base rather than changing its sign. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption.

Your response: _____

Incoming: $(\frac{7}{4})^2 = \frac{49}{16}$

Rewrite $(\frac{5}{2})^{-2}$ with a positive exponent and evaluate exactly. Preserve the sign as part of the reciprocal base. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption.

Your response: _____

Incoming: $\frac{1}{10^1} = \frac{1}{10}$

Rewrite 10^{-3} using a positive exponent, then give its exact value. Invert the complete base rather than changing its sign. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption.

Your response: _____

Incoming: $\frac{1}{6^2} = \frac{1}{36}$

Rewrite 10^{-1} using a positive exponent, then give its exact value. Invert the complete base rather than changing its sign. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption.

Your response: _____

Incoming: $(\frac{4}{3})^2 = \frac{16}{9}$

Rewrite $(\frac{3}{5})^{-3}$ with a positive exponent and evaluate exactly. Preserve the sign as part of the reciprocal base. Use the requested exact positive-exponent expression/value as the matching response, complete the original explanation, and retain every stated nonzero assumption.

Your response: _____

Algebra 1

Negative Exponents

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

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.

Assume x and y are nonzero. Rewrite $x^{-2}y^{3}$ using only positive exponents. Explain which factor crosses the fraction bar. Choose a route: replace each negative-powered factor by its reciprocal before combining, or first combine signed exponents of identical bases and then rewrite the result with positive exponents. Explain why your chosen route fits this expression, use it, and retain all original nonzero assumptions.

Assume x and y are nonzero. Rewrite $\frac{x^{2}}{y^{-3}}$ using only positive exponents. Explain which factor crosses the fraction bar. Choose a route: replace each negative-powered factor by its reciprocal before combining, or first combine signed exponents of identical bases and then rewrite the result with positive exponents. Explain why your chosen route fits this expression, use it, and retain all original nonzero assumptions.

Assume x and y are nonzero. Rewrite $\frac{x^{-2}}{y^{3}}$ using only positive exponents. Explain which factor crosses the fraction bar. Choose a route: replace each negative-powered factor by its reciprocal before combining, or first combine signed exponents of identical bases and then rewrite the result with positive exponents. Explain why your chosen route fits this expression, use it, and retain all original nonzero assumptions.

Assume x and y are nonzero. Rewrite $\frac{x^{-2}}{y^{-3}}$ using only positive exponents. Explain which factor crosses the fraction bar. Choose a route: replace each negative-powered factor by its reciprocal before combining, or first combine signed exponents of identical bases and then rewrite the result with positive exponents. Explain why your chosen route fits this expression, use it, and retain all original nonzero assumptions.

Negative Exponents

Full Worked Solutions - excerpt

Worked example

Problem. Compare 3^{-4} and 3^{-2} using <, =, or > without relying on decimal approximations. Explain the reciprocal order or negative-base parity that decides the result.

Answer. $3^{-4} < 3^{-2}$

Explanation and check.

Because $3^4 > 3^2 > 0$, their reciprocals satisfy $3^{-4} < 3^{-2}$.

Worked example

Problem. A student rewrites $(2x)^{-2}$ as $\frac{1}{2x^2}$. Identify the first structural error, then give the corrected expression and every original-domain restriction.

Answer. $(2x)^{-2} = \frac{1}{4x^2}$, with $x \neq 0$.

Explanation and check.

The exponent applies to the entire product, so both 2 and x must be squared after inversion.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Operations with Scientific Notation

Operations with Scientific Notation | A1-U07-P07

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for exact normalized scientific notation with any required units or explicit final rounding, decision with exact calculation and justification, missing normalized quotient with a substitution check, exact quotient and order-of-magnitude confirmation, sign justification and normalized quotient and exact normalized quotient and power-of-ten scale check.

8 PDFs and a README; 52 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

Operations with Scientific Notation

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

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Multiply $-1.2 \cdot 10^{3}$ by $-8.3 \cdot 10^{2}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____	Multiply $-7.7 \cdot 10^{8}$ by $-1.3 \cdot 10^{0}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____
Multiply $2.01 \cdot 10^{-4}$ by $3.02 \cdot 10^{-5}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____	Multiply $3.125 \cdot 10^{3}$ by $3.2 \cdot 10^{2}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____
Multiply $-2.005 \cdot 10^{8}$ by $4.9 \cdot 10^{0}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____	Multiply $9.999 \cdot 10^{12}$ by $9.999 \cdot 10^{-12}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____
Multiply $9.05 \cdot 10^{-6}$ by $-1.12 \cdot 10^{9}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____	Multiply $-3.333 \cdot 10^{7}$ by $3.003 \cdot 10^{-7}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____

Algebra 1

Operations with Scientific Notation

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

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Divide $9 \cdot 10^{-2}$ by $3 \cdot 10^{-5}$. Keep any nonterminating coefficient as an exact fraction, subtract the denominator exponent, and normalize.	Divide $4.8 \cdot 10^{4}$ by $-1.2 \cdot 10^{0}$. Keep any nonterminating coefficient as an exact fraction, subtract the denominator exponent, and normalize.
For $\frac{-6.3 \cdot 10^{7}}{-3.5 \cdot 10^{-3}}$, determine the sign before doing any magnitude arithmetic. Then calculate the exact quotient.	Evaluate $\frac{-9.05 \cdot 10^{10}}{2.5 \cdot 10^{-7}}$. Track the sign independently from the exponent subtraction so neither is lost.
The direct coefficient in $\frac{1.02 \cdot 10^{-8}}{-5.1 \cdot 10^{6}}$ is -0.2. Carry the negative sign through the normalization step and state the final result.	In $\frac{2.02 \cdot 10^{-2}}{4.04 \cdot 10^{3}}$, the denominator coefficient is twice the numerator coefficient. Use that relation to get the coefficient quotient, then handle the powers.

Algebra 1

Operations with Scientific Notation

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

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: $1.2 \cdot 10^{6}$ grams

Evaluate $\frac{9.996 \cdot 10^{3}}{1.0001 \cdot 10^{7}}$ exactly, then round the final normalized result to 3 significant digits. If the coefficient rounds to 10, renormalize and change the exponent.

Your response: _____

Incoming: $3.6 \cdot 10^{-3}$

Compute $\frac{[0.000505(8 \cdot 10^{9})]}{2 \cdot 10^{4}}$ exactly. Convert the decimal only as preparation, respect the product-then-quotient dependency, and normalize once at the end.

Your response: _____

Incoming: X = $1.6 \cdot 10^{7}$

In the relationship $\frac{9.01 \cdot 10^{-2}}{X} = R$, let $R = (\frac{901}{300}) \cdot 10^{-7}$. Recover the missing normalized quantity X using the correct inverse operation, then verify it by substitution.

Your response: _____

Incoming: $6 \cdot 10^{6}$

Multiply $1.5 \cdot 10^{3}$ by $4 \cdot 10^{2}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient.

Your response: _____

Incoming: $3 \cdot 10^{-8}$

Compute $0.000505(2 \cdot 10^{9})$ exactly. First interpret the decimal input, then perform the stated operation and give a normalized scientific-notation result.

Your response: _____

Incoming: $3.9 \cdot 10^{5}$ meters

A rectangular panel is $3.2 \cdot 10^{4}$ centimeters by $2.5 \cdot 10^{3}$ centimeters. A coating uses $1.5 \cdot 10^{-2}$ grams per square centimeter. Determine the requested total or per-unit quantity in normalized scientific notation. Let the units decide whether to multiply or divide, and retain the resulting unit.

Your response: _____

Algebra 1

Operations with Scientific Notation

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

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 proposed quotient for $\frac{9.1\cdot10^{-2}}{1.3\cdot10^{3}}$ is $7\cdot10^{-5}$. Verify it by multiplication and report the exact result.

Compare converting 0.0042 to scientific notation first with multiplying the decimals first. Choose a valid exact route for $0.0042(3.5\cdot10^{6})$, explain why it works, and normalize the result.

A device reports $(-3.5\cdot10^{6})$. To divide this by $-7\cdot10^{2}$, should you interpret $E6$ as times 10^{6} or as times 6? Choose, justify the sign and exponent operations, and compute exactly.

For $\frac{[1250000(1.6\cdot10^{-5})]}{4\cdot10^{2}}$, choose between grouping the numerator product before dividing and multiplying all three quantities. Explain which respects the expression and compute exactly.

Operations with Scientific Notation

Full Worked Solutions - excerpt

Worked example

Problem. Multiply $2 \cdot 10^{2}$ by $3 \cdot 10^{4}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient.

Answer. $6 \cdot 10^{6}$

Explanation and check.

Multiply coefficients to get 6 and add exponents to get 6. Thus the direct product is $6 \cdot 10^{6}$; normalizing it gives $6 \cdot 10^{6}$.

Worked example

Problem. Multiply $1.5 \cdot 10^{3}$ by $4 \cdot 10^{2}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient.

Answer. $6 \cdot 10^{5}$

Explanation and check.

Multiply coefficients to get 6 and add exponents to get 5. Thus the direct product is $6 \cdot 10^{5}$; normalizing it gives $6 \cdot 10^{5}$.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Comparing Scientific Notation

Comparing Scientific Notation | A1-U07-P08

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for assigned power, selected decade label, selected power and threshold comparison, selected power, area interval and boundary-crossing conclusion and inclusive total interval and decade conclusion.

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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Algebra 1

Comparing Scientific Notation

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

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Find the multiplicative factor that compares 2.7×10^{-4} to 9×10^{-3}; that is, evaluate the first quantity divided by the second. Interpret a result below 1. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____	Sample A has 1.2×10^{7} particles and sample B has 8×10^{5} particles. A student says A has about 100 times as many because the exponents differ by 2. Compute the actual factor and explain why 100 is misleading. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____
Estimate $\frac{7.8\times10^{9}}{2.1\times10^{6}}$ to one significant digit. Is $1,000$ or $4,000$ the better description of the scale factor? Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____	An oak is 2.4×10^{1} m tall and a seedling is 6×10^{-1} m tall. How many times as tall is the oak as the seedling? Then state the seedling's height as a multiplicative fraction of the oak's. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____
A table shows a quantity changing from 2.4×10^{-6} moles to 9.6×10^{-4} moles. By what multiplicative factor did it increase? Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____	The value 0.000001 is an exact power-of-ten boundary. Express it as a power of ten, then give the next larger adjacent power. Do not claim it is strictly between them. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____
A component is 38 mm long. Using $1,000$ mm = 1 m, convert the length to meters and bracket it between adjacent powers of ten measured in meters. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____	For $M = 2.6 \times 10^{7}$, $N = 4.1 \times 10^{-2}$, and $P = 10^{3}$, give the adjacent power-of-ten bounds for each. For the exact boundary P, state equality rather than using two strict inequalities. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____

Algebra 1

Comparing Scientific Notation

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

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

A student orders three concentrations as $Y < X < Z$, where $X = 7.9 \times 10^{-6}$, $Y = 1.2 \times 10^{-5}$, and $Z = 6.4 \times 10^{-7}$. Correct the order and explain the student's likely exponent mistake.	Panel A has area $3.2 m^2$ and panel B has area $3.1 \times 10^{4} cm^2$. Given $1 m^2 = 10^{4} cm^2$, which panel has greater area? Write the comparison in square centimeters.
Event A lasts $0.0042 s$, B lasts $3,900$ microseconds, and C lasts $4.5 ms$. With $1 s = 1,000 ms$ and $1 ms = 1,000$ microseconds, order the events from shortest duration to longest.	File A is 0.84 MB and file B is 8.6×10^{5} bytes. Using 1 MB = 10^{6} bytes, determine which file is larger and the size difference in bytes.
A stone has mass 0.0062 kg, a bead has mass $5,900 mg$, and a clip has mass 6.05 g. Convert to grams and order them from greatest mass to least.	Order 2.03×10^{-2}, 9.7×10^{-4}, 1.99×10^{-2}, and 3.1×10^{-3} from least to greatest. Explain how the exponents organize the comparison.

Algebra 1

Comparing Scientific Notation

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

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: 1.5 Reading A is 8.4×10^{-5} and reading B is 1.2×10^{-7}. Is A70,700, or 7,000 times B? Use the coefficient ratio as well as the exponent gap. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Your response: _____	**Incoming:** 15 Locate 6.7×10^{4} between two adjacent powers of ten. Write a complete inequality. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Your response: _____
Incoming: $10^{4} < 6.7 \times 10^{4} < 10^{5}$ Without rounding the value, place 0.00082 between adjacent powers of ten and explain how its decimal position determines the bounds. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Your response: _____	**Incoming:** $7.2cm^{3}$, so $10^{0}cm^{3} < 7.2cm^{3} < 10^{1}cm^{3}$ The arithmetic midpoint between 10^{4} and 10^{5} is 5.5×10^{4}. If a midpoint tie is assigned to the upper power, what is the nearest-power estimate of 5.5×10^{4}? Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Your response: _____
START About how many times as large is 6.4×10^{8} as 1.6×10^{6}? Separate the coefficient ratio from the power-of-ten ratio. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Your response: _____	**Incoming:** 4 Mass A is 1.35×10^{-3} g and mass B is 4.5×10^{-5} g. Which statement is defensible: A is 3 times, 30 times, or 300 times B? Justify using both coefficients and exponents. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Your response: _____

Algebra 1

Comparing Scientific Notation

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

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 positive factor A is between 2×10^3 and 3×10^3, inclusive, while B is between 4×10^2 and 5×10^2, inclusive. Bound AB using endpoints. Do the bounds force AB to stay in one decade? Choose the endpoint method appropriate to the displayed operation: pair lower with lower and upper with upper for a product of positive factors, or pair a lower numerator with an upper denominator and vice versa for a positive quotient. Explain which method applies here, then use it to answer the original bound and decade questions.

Let $6 \times 10^7 \le N \le 8 \times 10^7$ and $2 \le D \le 4$, with both positive. Find the tight endpoint bounds for $\frac{N}{D}$. Is its decade determined by these data? Choose the endpoint method appropriate to the displayed operation: pair lower with lower and upper with upper for a product of positive factors, or pair a lower numerator with an upper denominator and vice versa for a positive quotient. Explain which method applies here, then use it to answer the original bound and decade questions.

A report compares 3.2 km with 480 m and says, “The longer distance is about 0.0067 times the shorter distance.” Using 1 km $= 1,000$ m, identify the scale error and give a defensible factor.

A data rate stays between 3×10^4 and 4×10^4 bytes per second for a duration between 2×10^2 and 2.5×10^2 seconds. Bound the total bytes using positive endpoints. Does every possible total lie strictly in the 10^6 decade? Choose the endpoint method appropriate to the displayed operation: pair lower with lower and upper with upper for a product of positive factors, or pair a lower numerator with an upper denominator and vice versa for a positive quotient. Explain which method applies here, then use it to answer the original bound and decade questions.

Comparing Scientific Notation

Full Worked Solutions - excerpt

Worked example

Problem. Which is larger, 8.7×10^6 or 1.02×10^7? Rewrite one value so the coefficient comparison is direct.

Answer. 1.02×10^7 is larger.

Explanation and check.

Rewrite 1.02×10^7 as 10.2×10^6. Since $10.2 > 8.7$, the second quantity is larger.

Worked example

Problem. Estimate $\frac{6.2 \times 10^{-7}}{1.7 \times 10^{-9}}$ to one significant digit. Show why the answer is closer to 400 than to 100.

Answer. About 4×10^2, or 400

Explanation and check.

The power ratio is 10^2 and $\frac{6.2}{1.7}$ is about 3.65. The product is about 3.65×10^2, which rounds to 4×10^2.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Identifying Geometric Sequences

Identifying Geometric Sequences | A1-U07-P09

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for compatible ratio set, set of compatible ratios, ratio in exact form, common ratio, geometric decision and ratio and three indexed terms.

8 PDFs and a README; 59 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

Identifying Geometric Sequences

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.

For $n = 1, 2, 3, 4$, a sequence has terms $2, 6, 18, 54$. Is the displayed sequence geometric? If so, give the common ratio. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Index n	Given term
1	2
2	6
3	18
4	54

Bank label: _____

Determine whether $80, 40, 20, 10$ has a constant multiplicative step. State that step as a common ratio. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Bank label: _____

Does the finite sequence $7, -7, 7, -7, 7$ have one common ratio? Explain the alternating signs. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Bank label: _____

At indices 3 through 6, the terms are $-4, 8, -16, 32$. Decide whether these consecutive terms are geometric and identify r. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Index n	Given term
3	-4
4	8
5	-16
6	32

Bank label: _____

Algebra 1

Identifying Geometric Sequences

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

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.

A table gives $a_0 = -5$, $a_1 = -15$, $a_2 = -45$, and $a_3 = -135$. Test every transition for a common ratio.

Index n	Given term
0	-5
1	-15
2	-45
3	-135

The first four terms in a table are $-81, -27, -9, -3$. Are they geometric, and why do the terms remain negative?

Index n	Given term
1	-81
2	-27
3	-9
4	-3

A table lists $3, 12, 48, 193$ at consecutive indices. Test the geometric claim and identify the first transition that fails.

Index n	Given term
1	3
2	12
3	48
4	193

A table starts at $n = 4$ with $a_4 = 9$, $a_5 = 27$, $a_6 = 81$, and $a_7 = 243$. Does the nonunit starting index affect the common-ratio test?

Index n	Given term
4	9
5	27
6	81
7	243

Observed terms at $n = 1$ through 4 are $4, 12, 36, 108$. State the common ratio supported by these data, then explain what the finite table does not prove about later terms.

At four consecutive indices the terms are $2, -4, 8, -15.5$. Test the proposed geometric pattern, locate the failure, and state the term that would preserve the earlier ratio.

Index n	Given term
5	2
6	-4
7	8
8	-15.5

Algebra 1

Identifying Geometric Sequences

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

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.

START

The entries $\frac{5}{2}$, $\frac{5}{4}$, $\frac{5}{8}$, and $\frac{5}{16}$ are consecutive terms. Verify or reject the claim that they form a geometric sequence. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Your response: _____

Incoming: The common ratio is $-\frac{2}{3}$.

Assume $4, 12$ begin a geometric sequence. Find the next term. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Your response: _____

Incoming: Yes; $r = 2$.

A table row reads $243, 81, 27, 9$ at consecutive indices. Determine its common ratio. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Your response: _____

Incoming: $48, -6$

A geometric sequence has $a_2 = 1.2$ and $a_3 = 6$. Determine a_4 from the ratio in the table. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Index n	Given term
2	1.2
3	6

Your response: _____

Incoming: The sequence is geometric with $r = -\frac{1}{2}$.

A geometric sequence has $a_1 = 3$ and $a_2 = 6$. Find a_3 and a_4. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Index n	Given term
1	3
2	6

Your response: _____

Incoming: $r = \frac{1}{5}$

Use exact fraction arithmetic to test $\frac{3}{2}, -1, \frac{2}{3}, -\frac{4}{9}$ for one common ratio. Use the complete originally requested ratio or ordered list of terms as the matching response, keeping each requested position and the original geometric-assumption scope. Provide the original verification.

Your response: _____

Algebra 1

Identifying Geometric Sequences

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

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.

The geometric sequence $5, 15, \_\_\_\_, 135$ has one missing term. Recover it and verify both neighboring transitions. Choose a recovery method justified by the given positions: use a quotient of known adjacent nonzero terms, or use the multiplicative relation across an index gap. Explain which information supports your choice, apply it, and check every possible ratio or missing term against the original sign and geometric conditions.

A real geometric sequence has consecutive terms $64, x, 16$. Find every possible x and the corresponding common ratio. Choose a recovery method justified by the given positions: use a quotient of known adjacent nonzero terms, or use the multiplicative relation across an index gap. Explain which information supports your choice, apply it, and check every possible ratio or missing term against the original sign and geometric conditions.

Identifying Geometric Sequences

Full Worked Solutions - excerpt

Worked example

Problem. Starting with $a_9 = 125$, apply $r = \frac{1}{5}$ to complete a_{10} and a_{11}.

Answer. $a_{10} = 25$ and $a_{11} = 5$.

Explanation and check.

Successive division by 5 produces 25 and 5.

Worked example

Problem. Given $a_3 = 1$ and $r = -4$, supply the next two entries.

Answer. $a_4 = -4$ and $a_5 = 16$.

Explanation and check.

Multiply by -4 twice: 1 becomes -4, then 16.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Explicit Geometric Sequence Rules

Explicit Geometric Sequence Rules | A1-U07-P10

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Explicit Geometric Sequence Rules.

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

Explicit Geometric Sequence Rules

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.

Term 0 of a geometric sequence is 7. Every step doubles the preceding term. Give an explicit formula valid for whole-number indices. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____	The fifth term is 9 and the common ratio is 1. Give an anchor-form rule for all positive indices. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____
A two-sided integer-indexed geometric sequence satisfies $a_3 = -11$ and $r = 1$. State an anchor rule and its simplest equivalent form. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____	A finite geometric sequence is indexed from 1 through 14, has $a_{10} = 1024$, and uses $r = \frac{1}{2}$. Give a single explicit expression on precisely that domain. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____
The value at $n = 5$ is -32 in a geometric sequence with ratio -2. State a formula and explicitly retain the whole-number index domain. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____	*Abi*-infinite geometric sequence is indexed by all integers, has $a_{-2} = 5$, and uses $r = 3$. Build the explicit rule from that negative-index anchor. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____
State a_n for integer $n \geq 6$ if $a_8 = \frac{1}{16}$ and the sequence advances by a factor of -2. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____	For indices 1 through 9, build an anchor rule from $a_5 = \frac{3}{32}$ and $r = \frac{1}{2}$, then give an equivalent expression anchored at index 1. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements. Bank label: _____

Algebra 1

Explicit Geometric Sequence Rules

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

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.

Let m be a real number. A geometric sequence begins its stated domain at $n = 2$ with $a_2 = m$ and ratio 5. Give a formula that retains m as a parameter.	Let q be a nonzero real number. An integer-indexed geometric sequence has $a_0 = 8$ and ratio q. Give its explicit rule for every integer index.
For real parameter c, write the positive-index geometric sequence satisfying $a_4 = c$ and $r = -3$.	A positive-index geometric sequence has first term 8 and common ratio 0. Give an explicit rule that is valid at $n = 1$ without relying on 0^0.
At time index 0 a discrete state is -3; every later state is obtained by multiplying the current state by 0. State its explicit value for all nonnegative indices, handling the initial index explicitly.	A sequence begins with $a_1 = 5$ and has common ratio 0; the observed $a_4 = 0$ is consistent with that rule. Write a complete explicit description rather than substituting into $5(0)^{n-1}$ at $n = 1$.

Algebra 1

Explicit Geometric Sequence Rules

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

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: $a_n = -81(-\frac{1}{3})^{n-6}, n \geq 1$.

For nonnegative integer n, describe the geometric sequence anchored by $a_0 = \frac{5}{2}$ with common ratio 6. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements.

Your response: _____

Incoming: $A_n = 50(4)^{n-3}, n \geq 1$.

Indices 2 through 8 form a finite geometric list. Its index-3 entry is -7 and its ratio is -4. Give a rule only for those listed indices. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements.

Your response: _____

Incoming: $R_n = 15(2)^{n-7}, n \geq 1$.

After discount round 2, a modeled price is 72 dollars. Every additional round retains $\frac{4}{5}$ of the preceding price, and rounds begin at 0. Write the round-n sequence. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements.

Your response: _____

Incoming: $a_n = 48(-\frac{1}{2})^{n-4}, n \geq 1$.

On the index domain $n \geq 4$, a geometric sequence has $a_7 = 2$ and $r = 3$. Write a rule whose exponent visibly counts from index 7. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements.

Your response: _____

Incoming: $a_n = 160(\frac{3}{4})^{n-3}, n \geq 0$.

Form the nth-term expression for a geometric sequence with $a_6 = -81$ and $r = -\frac{1}{3}$. Its index set is $1, 2, 3, \ldots$. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements.

Your response: _____

Incoming: $a_n = 6(5)^{n-4}, n \geq 1$.

A sequence indexed by $n = 0, 1, 2, \ldots$ has $a_2 = 12$ and common ratio -2. Express a_n using the supplied anchor. Use the full requested explicit formula with its index domain, or the requested exact term value, as the matching response. Keep the original indexing and verification requirements.

Your response: _____

Algebra 1

Explicit Geometric Sequence Rules

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

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 geometric table begins with $(n,\ a_n) = (1, 3)$ and $(2, 6)$. Recover its explicit nth-term rule. Choose an explicit-rule construction method: anchor the formula at a supplied indexed term, or first recover the term at the stated starting index and anchor there. Explain which is more direct for these givens, use that method, and verify all supplied indexed terms and any sign restrictions. Retain every admissible rule if the data do not select one.

Index n	Given value
1	3
2	6

The entries at indices 0 and 1 are 5 and 15 in a geometric sequence. Find r and express a_n for every nonnegative integer n. Choose an explicit-rule construction method: anchor the formula at a supplied indexed term, or first recover the term at the stated starting index and anchor there. Explain which is more direct for these givens, use that method, and verify all supplied indexed terms and any sign restrictions. Retain every admissible rule if the data do not select one.

Explicit Geometric Sequence Rules

Full Worked Solutions - excerpt

Worked example

Problem. Decide whether $a_n = 2(-1)^{n-1}$ and $b_n = -2(-1)^n$ produce the same alternating values at matching positive indices.

Answer. Yes, they are identical on $n \geq 1$.

Explanation and check.

Multiplying $(-1)^n$ by -1 is the same as lowering the exponent by one: $-2(-1)^n = 2(-1)^{n-1}$.

Worked example

Problem. Construct the positive-index rule satisfying $a_3 = -4$, $a_5 = -16$, and $r > 0$.

Answer. $a_n = -4(2)^{n-3}, n \geq 1$.

Explanation and check.

The two-step relation yields $r^2 = 4$, with real candidates ± 2. The stated positive ratio selects 2.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Recursive Geometric Sequence Rules

Recursive Geometric Sequence Rules | A1-U07-P11

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Recursive Geometric Sequence Rules.

8 PDFs and a README; 61 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

Recursive Geometric Sequence Rules

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.

A discrete state is -2 at time 0 and is quadrupled at every tick. Give its initial condition and one-step recurrence. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Bank label: _____

State a recurrence for a sequence whose first declared term is $a_5 = 9$ and whose common ratio is 2. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_5	9

Bank label: _____

Convert the table values $\frac{1}{3}, \frac{2}{3}, \frac{4}{3}$ at consecutive positive indices into a recursive definition. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given index	Given value
1	$\frac{1}{3}$
2	$\frac{2}{3}$
3	$\frac{4}{3}$

Bank label: _____

Write a complete recurrence for the positive-index terms $64, -16, 4$, preserving the exact signed factor. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given index	Given value
1	64
2	-16
3	4

Bank label: _____

Algebra 1

Recursive Geometric Sequence Rules

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

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.

Let c be real. Define recursively the positive-index geometric sequence with first value c and multiplier 4.

Given indexed term	Value
a_1	c

For real parameter q, write the zero-indexed recurrence having $a_0 = 7$ and common multiplier q.

Given indexed term	Value
a_0	7

Only $a_1 = 2$ and $a_3 = 18$ are known. Write every real geometric recurrence compatible with those observations, including each initial condition and update range.

Given indexed term	Value
a_1	2
a_3	18

The table shows 0 at indices 1, 2, and 3. Give two different complete geometric recurrences that extend this table and explain why the displayed values do not identify one multiplier.

Given index	Given value
1	0
2	0
3	0

A nonzero sequence value at index 5 is x. Moving one index left multiplies a value by 3. Write the forward recurrence and choose a valid initial condition at index 5 for the domain $n \geq 5$.

Given indexed term	Value
a_5	x

Starting at $a_{-2} = 3$ and multiplying the immediately prior term by -2, fill a_{-1}, a_0, a_1, and a_2.

Given indexed term	Value
a_{-2}	3

Algebra 1

Recursive Geometric Sequence Rules

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

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: $a_2 = 7$ and $a_3 = 7$.

For $a_0 = 8$ and $a_n = 0a_{n-1}$, find a_1 and a_2. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_0	8

Your response: _____

Incoming: $a_1 = -10, a_2 = -20$, and $a_3 = -40$.

A table has 64 at index 4 and uses the multiplier $-\frac{1}{2}$. Determine the entries at indices 5, 6, and 7. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_4	64

Your response: _____

Incoming: $a_2 = 27, a_3 = 9$, and $a_4 = 3$.

A recurrence is anchored by $a_4 = \frac{1}{5}$ and multiplies by 5. Find a_5 through a_7. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_4	$\frac{1}{5}$

Your response: _____

Incoming: $a_3 = 10, a_4 = 20, a_5 = 40$, and $a_6 = 80$.

A geometric update starts from $a_5 = -2$ and multiplies by 4. Determine a_6, a_7, and a_8. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_5	-2

Your response: _____

Incoming: $a_2 = 6$ and $a_3 = -12$.

Given $a_3 = 4$ and $a_n = 5a_{n-1}$, evaluate a_4 and a_5. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_3	4

Your response: _____

Incoming: $a_3 = 2, a_4 = -\frac{2}{3}$, and $a_5 = \frac{2}{9}$.

Use the index-7 initial condition 10 and multiplier 3 to determine the next two indexed terms. Use the full requested recursive definition (initial indexed value, update and valid range), or the complete ordered list of requested term values, as the matching response. Retain the original verification.

Given indexed term	Value
a_7	10

Your response: _____

Algebra 1

Recursive Geometric Sequence Rules

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

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.

The first three terms are $2, 6, 18$ at indices $1, 2, 3$. Write a recursive definition that includes its starting value and valid update range. Choose how to establish the update multiplier from these givens: infer it from an available adjacent nonzero pair, or translate/use the supplied per-step multiplier or description. Explain which evidence supports your route, then give the complete recursive specification in the originally requested index form and range.

Given index	Given value
1	2
2	6
3	18

A table starts at $n = 0$ with values $5, 10, 20$. State its geometric recurrence using the zero-index convention. Choose how to establish the update multiplier from these givens: infer it from an available adjacent nonzero pair, or translate/use the supplied per-step multiplier or description. Explain which evidence supports your route, then give the complete recursive specification in the originally requested index form and range.

Given index	Given value
0	5
1	10
2	20

Recursive Geometric Sequence Rules

Full Worked Solutions - excerpt

Worked example

Problem. The recurrence $a_1 = 4, a_n = a_{n-1} + 3$ is attached to the geometric table $4, 12, 36$. Repair the update operation.

Answer. $a_1 = 4$; $a_n = 3a_{n-1}$ for $n \geq 2$.

Explanation and check.

The values triple rather than increase by 3, so the recurrence must multiply the preceding term by 3.

Worked example

Problem. Audit $a_0 = 7, a_n = 2a_{n-1}$ for $n \geq 0$. Repair the range so the initial condition is not also forced to reference an undefined a_{-1}.

Answer. $a_0 = 7$; $a_n = 2a_{n-1}$ for $n \geq 1$.

Explanation and check.

Index 0 is supplied directly, so the first recurrence output is index 1.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Exponential Function Rules and Evaluation

Exponential Function Rules and Evaluation | A1-U07-P12

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Exponential Function Rules and Evaluation.

8 PDFs and a README; 57 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

Exponential Function Rules and Evaluation

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.

What output does $f(x) = 4(5)^x$ assign to the origin input $x = 0$? Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____	Find $q(2)$ for $q(x) = (\frac{3}{4})4^x$, applying the coefficient after the power. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____
Evaluate $z(2)$ for $z(x) = 25(\frac{1}{5})^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____	Find $F(-1)$ for $F(x) = 7(\frac{1}{7})^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____
Evaluate $G(-3)$ under $G(x) = -16(\frac{1}{2})^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____	Compute $J(-1)$ for $J(x) = 10(\frac{1}{10})^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____
Evaluate $K(-4)$ exactly if $K(x) = -3(2)^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____	Evaluate $M(-2)$ for $M(x) = -2(3)^x$, and explain why combining -2 and 3 into a base -6 changes the rule. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions. Bank label: _____

Algebra 1

Exponential Function Rules and Evaluation

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

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.

Under the convention $f(x) = ab^x$ with $a \neq 0, b > 0$, and $b \neq 1$, classify $f(x) = 3(2)^x$.	Is $g(x) = x^3$ an exponential function of x under the stated constant-base convention? Explain the structural reason.
Classify $h(x) = 5x + 2$ as exponential or nonexponential and give one decisive feature.	Does $p(x) = 7(\frac{1}{2})^x$ qualify as a nonconstant exponential function on the real numbers?
Classify $q(x) = -4(3)^x$. Does the negative coefficient prevent exponential structure?	A model is $F(t) = 12(3)^t$, where t is years after 2018 and F is measured in colonies. Interpret 12 and 3.

Algebra 1

Exponential Function Rules and Evaluation

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

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: $D(0) = -9$.

Find $h(\frac{1}{2})$ for $h(x) = 18(\frac{1}{36})^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions.

Your response: _____

Incoming: $A(3) = -32$.

Evaluate $C(-2)$ for $C(x) = 3(\frac{1}{3})^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions.

Your response: _____

Incoming: $j(3) = 56$; equal input step 3; output ratio 8.

The displayed table for $k(x) = 3(4)^x$ begins at $x = 1$. Supply the missing middle value. For the match, record all missing values in table order together with the equal input step and its output ratio, and complete the original verification.

Rule: $k(x) = 3(4)^x$

x	k(x)
1	12
2	_____
3	192

Your response: _____

START

Evaluate $f(2)$ for $f(x) = 3(2)^x$. Use the full requested exact result as the matching response and complete the original explanation. Retain all supplied root facts, units and input conditions.

Your response: _____

Algebra 1

Exponential Function Rules and Evaluation

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

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.

Complete the missing entry in the table for $f(x) = 3(2)^x$, then verify the equal-step ratios. Choose how to fill the missing entries: substitute the missing inputs directly into the given rule, or use a known table output with the multiplier for the actual input step. Explain why your chosen route applies, use it, and complete the original ratio verification.

Rule: $f(x) = 3(2)^x$

x	f(x)
0	3
1	_____
2	12

For $g(x) = 20(\frac{1}{2})^x$, fill the $x = 1$ row and use it to check the listed value at $x = 3$. Choose how to fill the missing entries: substitute the missing inputs directly into the given rule, or use a known table output with the multiplier for the actual input step. Explain why your chosen route applies, use it, and complete the original ratio verification.

Rule: $g(x) = 20(\frac{1}{2})^x$

x	g(x)
0	20
1	_____
3	$\frac{5}{2}$

Exponential Function Rules and Evaluation

Full Worked Solutions - excerpt

Worked example

Problem. Compare $A(x) = 6(2)^x$ and $B(x) = 3(2)^{x+1}$ for an arbitrary real x.

Answer. $A(x) = B(x)$ for every real x.

Explanation and check.

$B(x) = 3(2)(2^x) = 6(2^x)$, which is exactly $A(x)$.

Worked example

Problem. Without separately evaluating both powers, compare $f(3)$ and $f(4)$ for $f(x) = 3(2)^x$.

Answer. $f(4) > f(3)$, and $f(4) = 2f(3)$.

Explanation and check.

The inputs differ by one, so the later output contains one additional factor of the base 2.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Graphing Exponential Functions

Graphing Exponential Functions | A1-U07-P14

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Graphing Exponential Functions.

8 PDFs and a README; 152 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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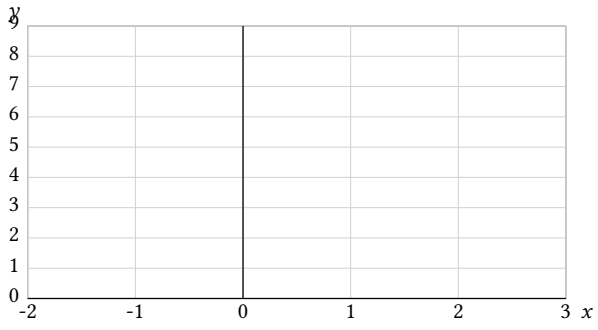
Algebra 1

Graphing Exponential Functions

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

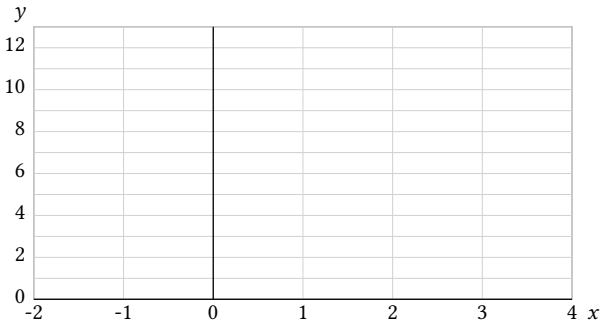
Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

On the stated grid, graph $f(x) = 2^x$. Label three exact points, the y-intercept, and the horizontal asymptote, then indicate the direction of growth. For matching, use the complete constructed graph with the original required anchors, boundary points, asymptote, scale and labels. The graphing work remains required; a formula-only response does not replace it.



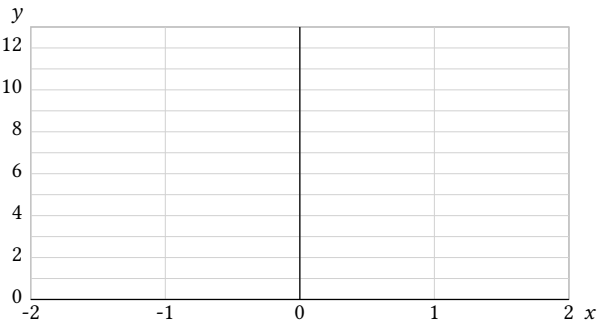
Bank label: _____

Construct the graph of $g(x) = 3(\frac{1}{2})^x$ in the given window. Supply three consecutive-input points and identify the line the curve approaches. For matching, use the complete constructed graph with the original required anchors, boundary points, asymptote, scale and labels. The graphing work remains required; a formula-only response does not replace it.



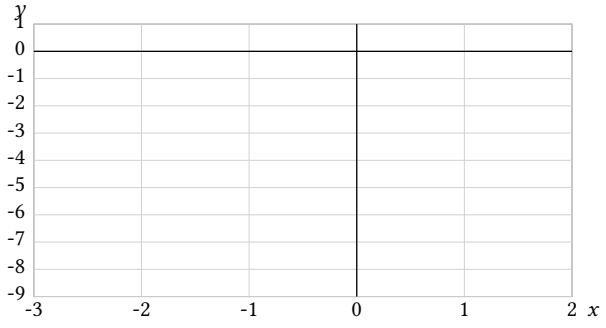
Bank label: _____

Plot $h(x) = 4(3)^x$ using the required inputs $-1, 0$, and 1. State the intercept and asymptote that complete the sketch. For matching, use the complete constructed graph with the original required anchors, boundary points, asymptote, scale and labels. The graphing work remains required; a formula-only response does not replace it.



Bank label: _____

Graph $p(x) = -2(2)^x$ on the unit grid. Label its y-intercept, two neighboring points, and describe its rightward behavior. For matching, use the complete constructed graph with the original required anchors, boundary points, asymptote, scale and labels. The graphing work remains required; a formula-only response does not replace it.



Bank label: _____

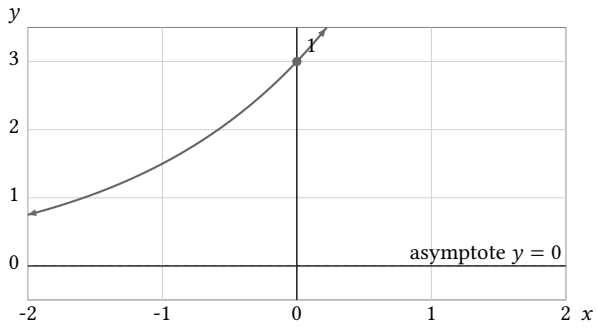
Algebra 1

Graphing Exponential Functions

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

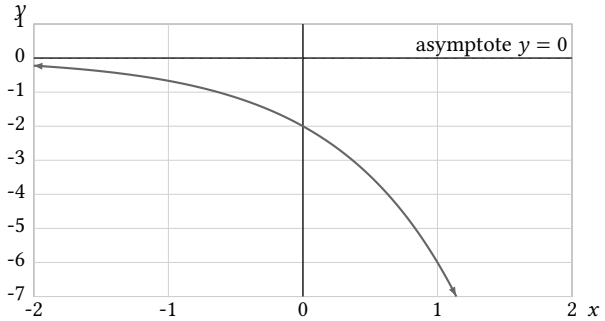
Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

A displayed continuous exponential curve is labeled $y = 3(2)^x$, passes through $(0, 3)$, and approaches $y = 0$ from above. State its domain, range, and y-intercept.

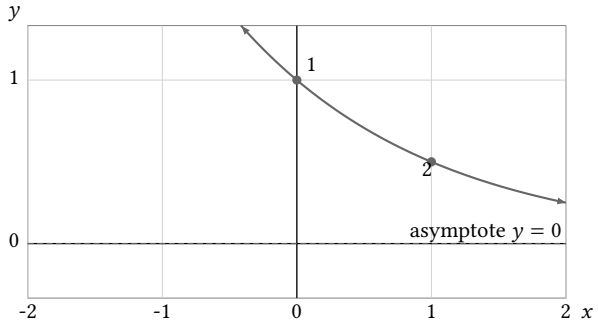


Marker	Exact coordinate	Boundary status
1	$(0, 3)$	included

The graph is the full curve $y = -2(3)^x$ with horizontal asymptote $y = 0$. Give its domain, range, and y-intercept.

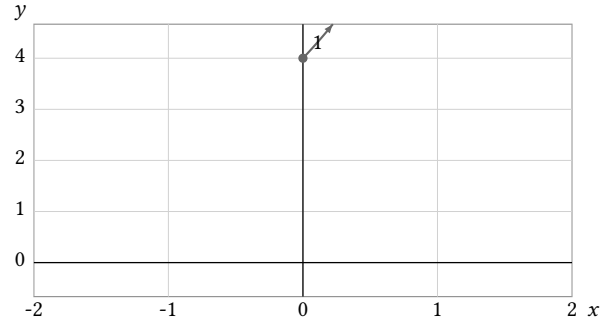


A continuous curve passes through $(0, 1)$ and $(1, \frac{1}{2})$, is labeled $y = (\frac{1}{2})^x$, and approaches $y = 0$. Name the y-intercept and tell whether it increases or decreases.



Marker	Exact coordinate	Boundary status
1	$(0, 1)$	included
2	$(1, \frac{1}{2})$	included

The displayed branch $y = 4(2)^x$ begins with a closed point at $(0, 4)$ and continues right. State the restricted domain and range.



Marker	Exact coordinate	Boundary status
1	$(0, 4)$	included

Algebra 1

Graphing Exponential Functions

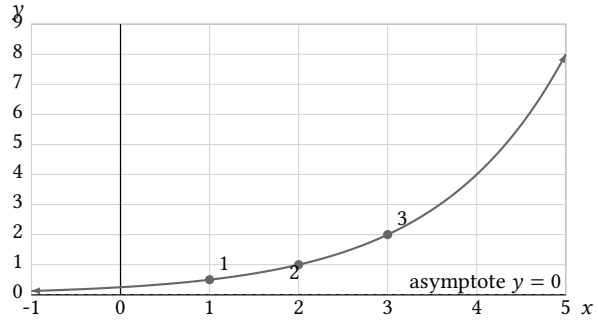
Name: _____ **Date:** _____ **Class:** _____

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: The anchors become $(1, \frac{1}{2}), (2, 1)$, and $(3, 2)$; the graph is shifted 2 units right and retains asymptote $y = 0$.

Using the reference points for $y = 3^x$, graph $y = 3^{x+1}$. Where do the three points move? For matching, use the complete constructed graph with the original required anchors, boundary points, asymptote, scale and labels. The graphing work remains required; a formula-only response does not replace it.Graph for the incoming match

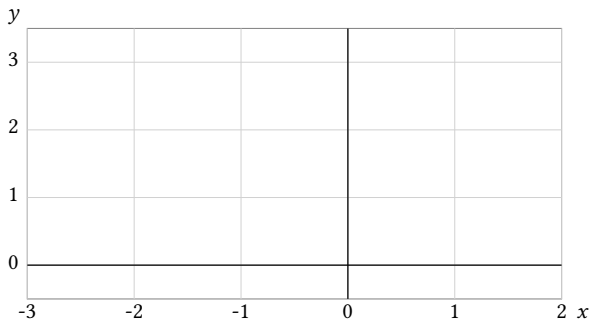
Window x: $[-1, 5]$, y: $[0, 9]$. Tick intervals: $x1$, $y1$.



Marker	Exact coordinate	Boundary status
1	$(1, \frac{1}{2})$	included
2	$(2, 1)$	included
3	$(3, 2)$	included

Graphing grid

Window x: $[-3, 2]$, y: $[-\frac{1}{2}, \frac{7}{2}]$. Tick intervals: $x1$, $y1$.



First value / input	Second value / output
-1	$\frac{1}{3}$
0	1
1	3

Your response: _____

Algebra 1

Graphing Exponential Functions

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

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.

Which window shows all required anchors of $y = 3(2)^x$ at $x = 0, 1, 2$, and 3? Justify using the largest output.

A

Axis	Window interval
x	$[-1, 4]$
y	$[0, 30]$

B

Axis	Window interval
x	$[-1, 4]$
y	$[0, 10]$

Select a window that displays both the initial value and decay through $x = 6$ for $y = 64(\frac{1}{2})^x$.

A

Axis	Window interval
x	$[0, 6]$
y	$[0, 70]$

B

Axis	Window interval
x	$[0, 6]$
y	$[0, 5]$

Graphing Exponential Functions

Full Worked Solutions - excerpt

Worked example

Problem. The graphs $f(x) = 2^x$ and $g(x) = 3^x$ share $(0, 1)$. Which is higher for positive x, and which is higher for negative x?

Answer. For $x > 0$, g is higher; for $x < 0$, f is higher. They are equal at $x = 0$.

Explanation and check.

The larger base grows faster to the right but has smaller reciprocal powers to the left.

Worked example

Problem. For the reflected growth graphs u and v, which curve lies lower? Describe the relationship between their outputs. Compare $U(x) = -2(2)^x$ and $V(x) = -6(2)^x$ with asymptote $y = 0$.

Answer. v lies lower for every real x, and $v(x) = 3u(x)$. Both decrease and approach $y = 0$ from below on the left.

Explanation and check.

Multiplying a negative output by 3 makes it more negative, so the larger coefficient magnitude places the curve lower.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Exponential Growth Models

Exponential Growth Models | A1-U07-P15

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Exponential Growth Models.

8 PDFs and a README; 62 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

Exponential Growth Models

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.

Write the culture size $C(t)$ after t hours, assuming the percent update applies once per hour. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Initial: 200 Origin: $t = 0$ at observation Given rate: 20% per hour Bank label: _____	Build $F(t)$ when the known value 90 occurs at $t = -1$. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Input: cycle-time coordinate t Given rate: 10% per cycle Value at t minus1: 90 Bank label: _____
The clock labels the observation time as $t = -2$. Write a rule valid across $t = 0$. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Input: signed hour t Given rate: 10% per hour Value at t minus2: 300 Bank label: _____	Build a model that uses $n = 0$ before the first update and matches the observed value 120 at $n = 1$. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Domain: n nonnegative integers Input: n intervals from pre-update time Given rate: 20% per interval Value after interval1: 120 Bank label: _____

Algebra 1

Exponential Growth Models

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

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.

Find the multiplier for each statement and explain why the phrases are not equivalent. Given statements: A: next value is 18% of current B: next value is 18% more than current	A trial's output increases by 140% after each launch. Determine the factor and interpret it as a percent of the preceding output. Given rate: 140% increase per launch
Give the quarterly factor for 2.5% growth as both a decimal and a fraction. Given rate: 2.5% per quarter	A quantity grows by 200% each interval. Is its factor 2 or 3? Justify. Given rate: 200% increase per interval
Find the multiplier, and state the implied percent increase. Given statement: the next count is 120% of the current count	Find the final amount after the two successive growth intervals. Initial: 100 Rates: 10%, 20%

Algebra 1

Exponential Growth Models

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

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.

START

A quantity increases by 5% each interval. What multiplier represents one interval of growth? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Given rate: 5% per interval

Your response: _____

Incoming: 1.05

Membership grows 12% per month. Give the monthly growth factor. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Given rate: 12% per month

Your response: _____

Incoming: 100

Determine the cycle-0 quantity. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Cycles: 2

Later: 675

Given rate: 50% per cycle

Your response: _____

Incoming: $A(t) = 500(1.20)^{t-3}$.

Under the continuous interval model, find $F(\frac{1}{2})$. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Model: $F(t) = 180(1.44)^t$ for real $t \geq 0$

Time: $\frac{1}{2}$ interval

Your response: _____

Incoming: 1.0004

What multiplier implements the stated update after one round? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Given statement: add 30% of the current amount after each round

Your response: _____

Incoming: 1.75

A measurement increases 0.1% each hour. What hourly multiplier should be used? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Given rate: 0.1% per hour

Your response: _____

Algebra 1

Exponential Growth Models

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

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.

Find the modeled amount after two periods. Choose a calculation route: substitute the elapsed update count directly into the model, or track successive interval multiplications when the stated time and domain permit complete updates. Explain why the selected route fits these givens, use it, and preserve the original time origin and rounding instruction.

Model: $A(n) = 100(1.10)^n$

Time: 2

What is the modeled quantity after three complete cycles? Choose a calculation route: substitute the elapsed update count directly into the model, or track successive interval multiplications when the stated time and domain permit complete updates. Explain why the selected route fits these givens, use it, and preserve the original time origin and rounding instruction.

Cycles: 3

Initial: 80

Given rate: 50% per cycle

Exponential Growth Models

Full Worked Solutions - excerpt

Worked example

Problem. Find the multiplier for each statement and explain why the phrases are not equivalent.

Given statements: A: next value is 18% of current B: next value is 18% more than current

Answer. A uses 0.18; B uses 1.18.

Explanation and check.

Percent of names the entire next amount, while percent more names an addition to the retained original.

Worked example

Problem. A quantity grows by 200% each interval. Is its factor 2 or 3? Justify.

Given rate: 200% increase per interval

Answer. The factor is 3.

Explanation and check.

The increase is two copies of the current amount; adding the retained copy makes three copies total.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Exponential Decay Models

Exponential Decay Models | A1-U07-P16

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Exponential Decay Models.

8 PDFs and a README; 59 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

Exponential Decay Models

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.

After one 20% loss, 80 remains. What amount was present immediately before the loss? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____	A quantity is 45 just after it is halved. Find its value just before that event. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____
What input amount gives 306 after multiplication by the retention factor 0.85? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____	If 72 is 60% of the amount that existed before a loss, what was that earlier amount? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____
A modeled amount is 240 after one 4% decrease. Find the amount one interval earlier. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____	Find the amount two decay steps before 128 when each step retains 80%. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____
After three successive halvings, a quantity is 18. What was it before any halving? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____	An amount is 81 after four steps that each retain 75%. Find its value before the four steps. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation. Bank label: _____

Algebra 1

Exponential Decay Models

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

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.

For this fictional mathematical model, write $V(y)$. The initial amount is 15000 and loses 12% per year. Let y be the elapsed years.	Construct $I(w)$ for w weeks after the reference count. The amount is 1200 at week 0 and loses 8% per week.
Model the amount after n completed filter passes and state the domain. The initial amount is 250 and loses 12% per pass. Let n be a nonnegative integer.	Write the model in hours without turning the rate into an hourly rate. The initial amount is 40 and loses 5% every 2 hours. Let t be elapsed hours.
Construct the model in years. The initial amount is 900 and loses 3% per half-year. Let y be elapsed years.	Construct the decay rule in elapsed days. The initial amount is 240 and loses 9% every 3 days. Let d be elapsed days.

Algebra 1

Exponential Decay Models

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

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: 12.5% per step.

A constant retention factor acts twice. Determine the exact fraction lost on each action.

The amount changes from 144 to 100 after two steps.

Your response: _____

Incoming: 36% per step.

What percent is lost during each of the four equal periods? Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

period	**0**	**4**
quantity	256	16

Your response: _____

Incoming: 13%.

Solve for q, then state the percent loss for the update. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Use $250q = 232.5$, where q is the retention factor.

Your response: _____

Incoming: 40% per period.

Determine the constant loss percentage for each of the two equal time intervals. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

time	**0**	**2**
value	400	225

Your response: _____

Incoming: 25% per interval.

Solve for the admissible q and express the corresponding percent loss. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Use $1000q^3 = 729$ with $0 < q < 1$.

Your response: _____

Incoming: $\frac{1}{3}$ is lost per period.

For the positive decay factor q, state the percent lost per step. Use the complete requested model, rate with its interval, or amount with its units and required precision as the matching response. Retain the original time definition and explanation.

Use $250q^2 = 40$.

Your response: _____

Algebra 1

Exponential Decay Models

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

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.

Choose the correct factor and state the loss represented by each rejected choice.

The amount loses 0.08% per hour. Choose among 0.92, 0.992, and 0.9992.

Audit the claimed pair and correctly interpret factor 0.23.

A student pairs $a23\%$ loss with a factor of 0.23.

Determine Q_0 and verify it by a forward substitution.

Use $Q(n) = Q_0(0.9)^n$ with the observation $Q(2) = 243$.

Exponential Decay Models

Full Worked Solutions - excerpt

Worked example

Problem. Solve $X(0)(0.8)^3 = 64$ for $X(0)$.

Answer. $X(0) = 125$.

Explanation and check.

Because $(0.8)^3 = 0.512, X(0) = \frac{64}{0.512} = 125$.

Worked example

Problem. A sequence has constant ratio 0.9 and $A_7 = 196.83$. Find A_4.

Answer. $A_4 = 270$.

Explanation and check.

There are three forward factors from index 4 to 7, so $A_4 = \frac{196.83}{(0.9)^3} = 270$.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Linear vs Exponential Models

Linear vs Exponential Models | A1-U07-P17

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Linear vs Exponential Models.

8 PDFs and a README; 70 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

Linear vs Exponential Models

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

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Use the equal-step behavior to classify this table, including its one-unit factor. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Precision of given values: exact

x	y
−2	1
−1	3
0	9

Bank label: _____

Classify the relationship and quantify its unit change. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Precision of given values: exact

x	y
−1	6
0	4
1	2

Bank label: _____

Determine the relationship class and distinguish its ratios from its differences. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Precision of given values: exact

n	A
0	100
1	90
2	81
3	72.9

Bank label: _____

Classify the table and report the rate per one x-unit. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Precision of given values: exact

x	y
0	2
3	14
6	26

Bank label: _____

Algebra 1

Linear vs Exponential Models

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

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Account for the unequal x-gaps and classify the relationship.

Precision of given values: exact

x	y
0	2
1	4
3	16

Use change per x-unit, not raw y-differences, to classify the table.

Precision of given values: exact

x	y
0	4
2	10
5	19

A student notices the first ratio is 2. Decide whether the whole table supports an exponential model.

Precision of given values: exact

x	y
0	10
1	20
3	50

State why these rows alone do not select uniquely between the two model classes.

Precision of given values: exact

x	y
0	2.5
2	2.5
5	2.5
9	2.5

Do not decide from the first pair alone. Classify using all intervals.

Precision of given values: exact

x	y
0	50
1	45
2	39
3	32

Can the table alone establish a global linear or exponential mechanism? Explain.

Model assumption: none

x	y
0	5
1	10

Algebra 1

Linear vs Exponential Models

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

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: Exponential decay with unit factor $\frac{1}{9}$.

Rewrite with one exponential base, then classify the change. Rule: $e(x) = 6\frac{2^x}{3^x}$

Your response: _____

Incoming: The linear rule $L(x) = 5x$ predicts 15; the exponential rule $E(x) = 2.5(2)^x$ predicts 20.

Build decreasing linear and exponential candidates through the rows and compare the missing middle value. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Target x: 1

x	y
0	16
2	4

Your response: _____

Incoming: $L(x) = 100 + 10.5x$ gives 110.5; $E(x) = 100(1.1)^x$ gives 110, a difference of 0.5.

Build the models and evaluate both one unit after $x = 0$. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Target x: 1

Input	Given output
0	8
3	64

Your response: _____

Incoming: $L(x) = 6x + 10$ gives 10; $E(x) = 8(2)^x$ gives 8 at $x = 0$.

Build linear and exponential candidates and fill the missing middle value. Use the complete requested model pair and predictions, or the classification with its decisive numerical change/factor, as the matching response. Retain all original assumptions, units and evidence qualifications.

Target x: -1

x	y
-2	9
0	1

Your response: _____

Algebra 1

Linear vs Exponential Models

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

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.

Classify the relationship as linear, exponential, neither, or ambiguous, and give the decisive equal-step pattern. Choose a first diagnostic test: compare output differences for equal input steps, or compare output ratios where division is defined. Explain why that test is useful for these exact rows, use it, and complete the original classification. If the first test is inconclusive, state what further check or model assumption is needed.

Precision of given values: exact

x	y
0	3
1	7
2	11

Determine the model class supported by all consecutive entries. Choose a first diagnostic test: compare output differences for equal input steps, or compare output ratios where division is defined. Explain why that test is useful for these exact rows, use it, and complete the original classification. If the first test is inconclusive, state what further check or model assumption is needed.

Precision of given values: exact

x	y
0	2
1	6
2	18
3	54

Linear vs Exponential Models

Full Worked Solutions - excerpt

Worked example

Problem. Rewrite q in coefficient-times-power form, then classify it. Rule: $q(x) = 2^{x+1}$

Answer. $q(x) = 2(2)^x$ is exponential with unit ratio 2.

Explanation and check.

The exponent rule $2^{x+1} = 2^x$ times 2 exposes the constant multiplicative factor.

Worked example

Problem. Simplify the formula and use a change calculation to classify it. Rule: $m(x) = 9\frac{x}{3} + 5$

Answer. $m(x) = 3x + 5$ is linear, and $m(x+1) - m(x) = 3$.

Explanation and check.

Dividing the x-term by 3 gives a constant coefficient of 3.