Sets & Steps
Math Practice & Worked Solutions

Precalculus

Logarithmic Inverse Models & Transformations | 2-Topic Precalculus Bundle

2-topic bundle | 192 problems | Four activity formats

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.

16 PDFs and 2 READMEs; 144 buyer PDF pages across the 2 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

AP Precalculus

Exponential and Logarithmic Inverse Models

Exponential and Logarithmic Inverse Models | APPC-U02-P18

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for adjusted inverse change, baseline-adjusted inverse change, baseline-adjusted inverse rule, inverse change, inverse multiplicative-additive rule and inverse rule.

8 PDFs and a README; 73 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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AP Precalculus

Exponential and Logarithmic Inverse 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.

Recover cycle number from remaining carbon and retain the discrete operating condition.

Your complete response must include inverse and physical inputs.

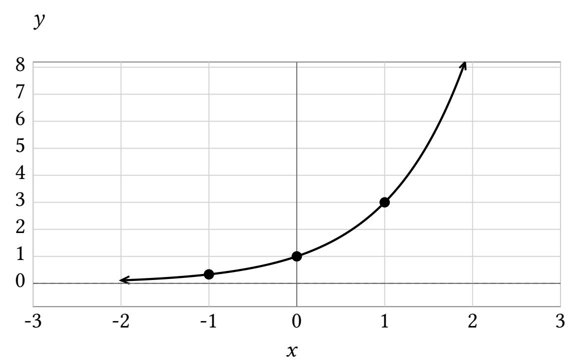
Use the condition whole-number cycles 0 through 10.

Use the model $Q(n) = 100(0.75)^n$.

Use cycles and grams as the stated units.

Bank label: ______

Reflect the marked graph across $y = x$.



-1	$\frac{1}{3}$
0	1
1	3

Bank label: ______

Undo the logarithm and both shifts.

Your complete response must include inverse.

Use the condition $x > -2$.

Consider the statement $g(x) = \log_5(x + 2) - 4$.

Bank label: ______

Recover treatment number from concentration and retain physical attainability.

Your complete response must include inverse and discrete condition.

Use the condition whole-number treatments 0 through 8.

Use the model $C(n) = 60(0.7)^n$.

Use treatments and milligrams per liter as the stated units.

Bank label: ______

AP Precalculus

Exponential and Logarithmic Inverse Models

Name: ____________ **Date:** ____________ **Class:** ____________

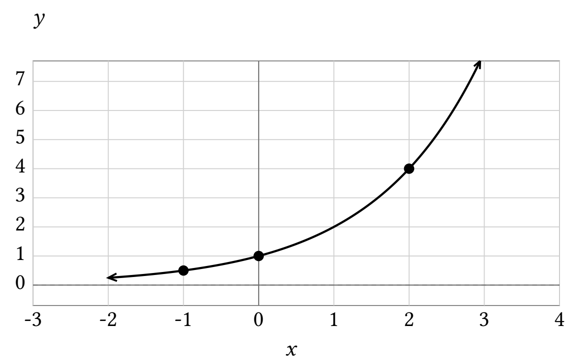
Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Swap the coordinates to construct the inverse logarithm table and name its rule.

Given domain/context: exact table from $y = 2^x$

-1	0.5
0	1
1	2

Reflect the marked graph features across $y = x$.



-1	0.5
0	1
2	4

Undo the output shift and scale before taking a logarithm.

Your complete response must include inverse formula and domain.

Use the condition all real inputs.

Consider the statement $f(x) = 2 \cdot 3^x + 1$.

Construct the exponential inverse and state its range.

Your complete response must include inverse formula and exchanged sets.

Use the condition $x > 1$.

Consider the statement $g(x) = \log_2(x - 1) + 3$.

AP Precalculus

Exponential and Logarithmic Inverse 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: Inverse points $(6,0), (3,1)$, and $(\frac{9}{4}, 2)$, with vertical asymptote $x = 2$ and domain $x > 2$.

Recover the scale coordinate from intensity and transfer both operating endpoints.

Your complete response must include inverse and attainable interval.

Use the condition $-2 \leq s \leq 3$ scale units.

Use the model $I(s) = 5 \cdot 10^s$.

Use scale units and watts as the stated units.

Your response: ______________

Incoming: $s(I) = \log_{10}(\frac{I}{5})$, for $0.05 \leq I \leq 5000$ watts.

Translate the forward multiplier into the inverse relation.

Your complete response must include inverse change.

Use the condition exact base-4 process.

The forward rule states that input +1 multiplies output by 4.

Your response: ______________

Incoming: $t(A) = 2\log_4(\frac{A}{20})$, for $20 \leq A \leq 1280$ square centimeters.

Recover hours from mold area during the finite observation window.

Your complete response must include inverse and domain.

Use the condition $0 \leq h \leq 15$ hours.

Use the model $A(h) = 4 \cdot 2^{\frac{h}{3}}$.

Use hours and square centimeters as the stated units.

Your response: ______________

Incoming: $f^{-1}(x) = -2 + \log_3(\frac{8-x}{7})$, defined for $x < 8$.

Normalize above the baseline before taking a logarithm.

Your complete response must include inverse and domain.

Use the condition all real inputs.

Consider the statement $f(x) = 2 \cdot 6^x + 4$.

Your response: ______________

Incoming: $t(M) = 2\log_3(\frac{M}{25})$, for $25 \leq M \leq 2025$ microbes.

Recover elapsed time from the covered area.

Your complete response must include inverse and attainable domain.

Use the condition $0 \leq t \leq 6$ hours.

Use the model $A(t) = 20 \cdot 4^{\frac{t}{2}}$.

Use hours and square centimeters as the stated units.

Your response: ______________

Incoming: $g^{-1}(x) = 5 + 2^{4-x}$, with range $x > 5$.

Recover time from a count over the stated experiment.

Your complete response must include inverse and interval.

Use the condition $0 \leq t \leq 8$ hours.

Use the model $M(t) = 25 \cdot 3^{\frac{t}{2}}$.

Use hours and microbes as the stated units.

Your response: ______________

AP Precalculus

Exponential and Logarithmic Inverse 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.

Test the proposed inverse and repair the shift. Identify the wrong shift in the proposed inverse and repair it. Verify your correction by composition.

Your complete response must include correction.

Use the condition real exponential inputs.

Let $f(x) = 2^{x+3}$.

The proposed inverse is $\log_2(x) + 3$.

Assess the formulas and the claimed inverse domain separately. Diagnose the claimed inverse domain separately from the two formulas.

Your complete response must include domain repair.

Use the condition real exponential inputs.

Evaluate the claim g has domain $x > 0$.

Let $f(x) = 2^x + 1$.

Let $g(x) = \log_2(x - 1)$.

Exponential and Logarithmic Inverse Models

Full Worked Solutions - excerpt

Worked example

Problem. Translate the forward multiplier into the inverse relation.

Your complete response must include inverse change.

Use the condition exact base-4 process.

The forward rule states that input $+1$ multiplies output by 4.

Answer. Multiplying an inverse input by 4 increases its recovered output by 1.

Explanation and check.

The former output ratio becomes the inverse input ratio.

Worked example

Problem. Normalize above the baseline before taking a logarithm.

Your complete response must include inverse and domain.

Use the condition all real inputs.

Consider the statement $f(x) = 2 \cdot 6^x + 4$.

Answer. $f^{-1}(x) = \log_6(\frac{x-4}{2})$, for $x > 4$.

Explanation and check.

Subtract 4 and divide by 2 to expose the positive power.

Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

Logarithmic Transformations and Applications

Logarithmic Transformations and Applications | APPC-U02-P20

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for asymptotes and formulas, formulas and asymptotes, ordered results, resulting rules and relation, two expressions and offset and two formulas and asymptotes.

8 PDFs and a README; 71 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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AP Precalculus

Logarithmic Transformations and Applications

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.

Describe the two vertical transformations and the unchanged asymptote. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value.

Given: $x > 0$

Parent: $f(x) = \log_3(x)$; Rule: $g(x) = -\log_3(x) + 2$

Bank label: ______

Evaluate the model at the given trial count and classify the prediction. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value.

Given: $2 \le n \le 40$ trials

Input: 27; Model: $R(n) = 15 + 6 \cdot \log_3(n)$; Output units: successful responses

Bank label: ______

Identify the row that prevents fitting the requested logarithmic regression to the full table. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value.

Context/domain: raw predictor must be positive

0	3.1
1	4.0
3	5.2
9	6.4

Bank label: ______

Map the three points and state what happens to the asymptote. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value.

Given: $x > 0$

Axes: unit linear scales; Map: $(x, y) \to (x, 2y + 1)$; Parent asymptote: $x = 0$

Context/domain: $x > 0$

1	0
2	1
4	2

Bank label: ______

AP Precalculus

Logarithmic Transformations and Applications

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.

Describe the transformation from f to g and locate the new vertical asymptote.

Given: $x > 3$

Parent: $f(x) = \log_2(x)$; Rule: $g(x) = \log_2(x-3)+4$

Use the documented logarithmic fit to predict the held-out score and compute observed minus predicted.

Given: $x > 0$ hours

Documented fit: $y = 2 + 1.5 \cdot \ln(x)$; Held out row: $(4, 4.2)$; Output units: score points; Rounding: nearest hundredth

Context/domain: $x > 0$ hours

1	2.1
2	3.0
3	3.7
6	4.6

Construct a model that is zero at $x = 2$ and gains 3 whenever input doubles.

Map the three anchors and the vertical asymptote.

Given: $x > 2$

Axes: unit linear scales; Map: $(x, y) \to (x+2, y-1)$; Parent asymptote: $x = 0$

Context/domain: $x > 2$

1	0
2	1
0.5	-1

AP Precalculus

Logarithmic Transformations and Applications

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

Determine whether the model supplies the requested prediction. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Given: $q > 10$ minutes, calibrated for $12 \le q \le 50$

Input: 10; Model: $W(q) = 7{+}\ln(q - 10)$; Output units: watts

Your response: ______________________

Incoming: A gives $\log_3(3(x - 6))$ with asymptote 6; B gives $\log_3(3x - 6)$ with asymptote 2.

Map the full defining set to the translated graph. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Given: $x > 4$

Axes: unit linear scales; Map: $(x, y) \to (x + 4, y - 2)$; Parent asymptote: $x = 0$

Context/domain: $x > 4$

1	0
3	1
$\frac{1}{3}$	-1

Your response: ______________________

Incoming: k = 6 and $a = -4$, so $g(x) = -4 \cdot \log_2(-x - 3) + 6$; the branch increases.

Predict the held-out mass and report its residual with units. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Given: $x > 0$ days

Documented fit: $y = 12 + 2.5\ln(x)$; Held out row: $(3, 14.5)$; Output units: grams; Rounding: nearest tenth

Context/domain: $x > 0$ days

1	12.1
2	13.8
5	15.9
9	17.4

Your response: ______________________

Incoming: Prediction about $5.8g$; residual about $0.3g$, so the model underpredicts.

Write a logarithmic rule satisfying the zero and fivefold-change conditions. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Given: $x > 0$

Input ratio: 5; Normalization: use base 5; Output increment: 2; Zero input: 3

Your response: ______________________

AP Precalculus

Logarithmic Transformations and Applications

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.

Decide whether the requested prediction exists and explain why. Student work: No real prediction exists at $x = 10$ because the logarithm argument is 0; the model requires $x \geq 10$. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

error hunt

Given: $x > 10$ seconds, calibrated for $12 \leq x \leq 100$

Input: 10; Model: $V(x) = 8 + 3 \cdot \log_2 (x - 10)$; Output units: meters per second

Decide whether a fitted residual can be computed for the held-out row. Student work/claim: The displayed fitted equation is an exact identity for every input, including values outside the observed data window. Locate the unsupported exact-fit/extrapolation step, then state the properly qualified model and justify the qualification from the displayed data.

error hunt

Given: $x > 0$ hours

Documented fit: $y = 6 + 1.4 \ln(x)$; Held out row: $(0, 5.5)$; Output units: points

Context/domain: $x > 0$ hours

1	6.1
2	7.0
5	8.3

Logarithmic Transformations and Applications

Full Worked Solutions - excerpt

Worked example

Problem. Build a log curve through $(6, 0)$ whose output drops 4 whenever input triples.

Answer. A suitable rule is y = $-4 \cdot \log_3\left(\frac{x}{6}\right)$.

Explanation and check.

The normalized argument is 1 at $x = 6$; tripling x raises the logarithm by 1, so scale -4 creates the stated drop.

Worked example

Problem. Construct a model that is zero at $x = 2$ and gains 3 whenever input doubles.

Answer. One normalized model is y = $3 \cdot \log_2\left(\frac{x}{2}\right)$.

Explanation and check.

The ratio $\frac{x}{2}$ anchors the zero, and $\log_2$ gains 1 per doubling, so the output scale is 3.