Sets & Steps
Math Practice & Worked Solutions

Precalculus

Logarithm Meaning, Values & Features | 3-Topic Precalculus Bundle

3-topic bundle | 288 problems | Four activity formats

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01 Converting Logarithmic and Exponential Forms

View individual product and its full preview

02 Evaluating Logarithms and Domains

View individual product and its full preview

03 Logarithmic Function Features

View individual product and its full 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.

24 PDFs and 3 READMEs; 178 buyer PDF pages across the 3 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

Converting Logarithmic and Exponential Forms

Converting Logarithmic and Exponential Forms | APPC-U02-P16

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for base role and equivalent equation, base role, role and appropriate representation, role and operation, role of N and role of y and corresponding operation.

8 PDFs and a README; 49 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

Converting Logarithmic and Exponential Forms

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.

Recover the positive value represented by coordinate -3.

Given: domain: base-10 logarithmic scale; payload: axis: $u = \log_{10}(x)$; coordinate: -3

Bank label: _____

Determine the sign from the position of x relative to 1.

Given: domain: $x > 1$; payload: expression: logarithm base 2 of x

Bank label: _____

Record the exponent using logarithmic notation.

Given: domain: base 3; payload: statement: $3^4 = 81$

Bank label: _____

Find the multiplicative factor from A's original value to B's.

Context/domain: base-2 logarithmic coordinate

A	-2
B	1

Bank label: _____

Describe the logarithmic coordinate of the smaller amount.

Given: domain: relative multiplicative position; payload: factor per interval: 4; output ratio: $\frac{1}{4}$

Bank label: _____

Identify k's role and express it without evaluation.

Given: domain: known positive R; payload: relationship: $3^k = R$

Bank label: _____

Determine which side of exponent zero produces z.

Given: domain: $z > 1$; payload: argument: z; base: e

Bank label: _____

Convert the marked coordinates to exact original-scale values.

Context/domain: base-5 logarithmic scale

P	-0.5
Q	0
R	1.5

Bank label: _____

AP Precalculus

Converting Logarithmic and Exponential Forms

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.

Represent and explain the number of multiplicative intervals. Given: domain: successive equal intervals; payload: factor per interval: 3; output ratio: 27	Describe the unknown without evaluating it. Given: domain: positive quantities; payload: question: In $\log_5(18)$, what quantity is being requested?
Interpret the logarithm of the ratio, including why its sign is allowed. Given: domain: relative to a present amount; payload: earlier to present ratio: $\frac{1}{25}$; growth factor: 5	State which part of an exponential relationship is unknown. Given: domain: positive quantities; payload: question: How many factors of 6 turn 1 into 50?
Express what the exponent counts in this growth situation. Given: domain: equal growth intervals; payload: factor per interval: 2; final to initial ratio: 8	Identify the unknown role and express it without evaluating. Given: domain: positive quantities; payload: relationship: $7^x = 30$

AP Precalculus

Converting Logarithmic and Exponential Forms

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

Rewrite the exponential fact using common logarithm notation.

Given: domain: common logarithm notation; payload: statement: $10^{-2} = 0.01$

Your response: _____

Incoming: The result equals zero.

Rewrite the relationship so the exponent is the subject.

Given: domain: valid base b and positive r; payload: statement: $b^m = r$

Your response: _____

Incoming: u = ln(5).

Describe the logarithmic interval count represented by the ratio.

Given: domain: continuous growth assumption; payload: factor per interval: 2; output ratio: $\sqrt{2}$

Your response: _____

Incoming: $(\frac{1}{3})^{-3} = 27$.

Describe what N and p represent in the equivalent exponential relationship.

Given: domain: $N > 0$; payload: statement: $\log_2(N) = p$

Your response: _____

Incoming: The original quantity is multiplied by 49.

Decide whether a logarithm or exponentiation directly answers the stated question.

Given: domain: positive N; payload: relationship: $2^5 = N$

Your response: _____

Incoming: $\log_5(\frac{1}{5}) = -1$.

Display the exponent-zero relationship explicitly.

Given: domain: base 7; payload: statement: $\log_7(1) = 0$

Your response: _____

AP Precalculus

Converting Logarithmic and Exponential Forms

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.

Diagnose the sign error and repair the statement.

Given: domain: real logarithms; payload: student claim: $\log_2(-8) = 3$ because $2^3 = 8$

Explain why $\log_3(20)$ would answer the wrong question.

Given: domain: positive b; payload: relationship: $b^3 = 20$

Explain why no real logarithm value can satisfy the claim and give a nearby valid example.

Given: domain: real logarithms; payload: student claim: $\log_1(5)$ is some large exponent

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Explain why the student's logarithm does not represent the unknown.

Given: domain: positive b; payload: relationship: $b^3 = 12$; student expression: $\log_{12}(3)$

Converting Logarithmic and Exponential Forms

Full Worked Solutions - excerpt

Worked example

Problem. Identify the exponent that produces argument 1. Choose between using the base behavior and the argument position relative to 1, or approximating a decimal first. Determine the sign by the exact structural method.

Answer. The value is 0.

Explanation and check.

Any nonzero valid base raised to exponent 0 equals 1.

Worked example

Problem. Identify the original value located at coordinate $u = 2$.

Given: domain: base-10 logarithmic scale; payload: axis: $u = \log_{10}(x)$; coordinate: 2

Answer. x = 100.

Explanation and check.

Coordinate 2 means $10^2 = x$.

Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

Evaluating Logarithms and Domains

Evaluating Logarithms and Domains | APPC-U02-P17

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for domain, admissible x-values, corrected evaluation and verification, corrected exact value, corrected value with verification and correction.

8 PDFs and a README; 49 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

Evaluating Logarithms and Domains

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.

State the domain using the strict positivity of the argument. Given: domain: real x; payload: statement: $\ln(x+5)$ Bank label: _____	Find the exact logarithm by rewriting the argument as a power of the base. Given: domain: real logarithm; payload: statement: $\log_4(2)$ Bank label: _____
Determine whether the value is available exactly and explain the common-base comparison. Given: domain: real logarithm; payload: statement: $\log_{16}(8)$ Bank label: _____	Intersect the base and argument restrictions and remove the forbidden base value. Given: domain: real x; payload: statement: log base $(5\text{-}x)$ of $(x+1)$ Bank label: _____
Compare exponents after expressing both quantities as powers of 3. Given: domain: real logarithm; payload: statement: log base $(\frac{1}{3})$ of $\sqrt{27}$ Bank label: _____	Decide whether a rational exponent is available exactly and state it. Given: domain: real logarithm; payload: statement: $\log_{81}(3)$ Bank label: _____
Solve the strict positivity condition for the decreasing argument. Given: domain: real x; payload: statement: $\log(9-3x)$ Bank label: _____	Intersect the base restrictions with the sign condition on the quadratic argument. Given: domain: real x; payload: statement: log base $(-x)$ of (x^2-4) Bank label: _____

AP Precalculus

Evaluating Logarithms and Domains

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.

Determine the real domain, keeping the logarithm's boundary strict. Given: domain: real x; payload: statement: $\log(2x - 6)$	Use a sign chart for the entire logarithm argument. Given: domain: real x; payload: statement: ln((5-x)/(x+2))
Evaluate and verify with one exponential equation. Given: domain: real logarithm; payload: statement: $\log_5(125)$	Determine where the rational argument is strictly positive, noting its repeated zero. Given: domain: real x; payload: statement: $\log(\frac{(x-2)^2}{x+1})$
Build a sign chart and retain only intervals with a positive argument. Given: domain: real x; payload: statement: $\ln(\frac{(x+3)(x-1)}{x-4})$	Combine the linear base and argument constraints, including the base-one exclusion. Given: domain: real x; payload: statement: log base $(2x + 1)$ of $(5\text{-}x)$

AP Precalculus

Evaluating Logarithms and Domains

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: -3, since $\frac{1}{27} = 3^{-3}$.

Evaluate using the implied base of the common logarithm.

Given: domain: real logarithm; payload: statement: log(10000)

Your response: _____

Incoming: $x > 2$ with x not equal to 3

Intersect the split domain of the quadratic argument with the upper bound from the second logarithm.

Given: domain: real x; payload: statement: ln(x^2-4)+log(5-x)

Your response: _____

Incoming: The value is exactly 2 because the inputs are declared exact and $2.5^2 = 6.25$.

Find the parameter values that make the displayed base valid.

Given: domain: real x; payload: statement: log base $(x + 4)$ of 2

Your response: _____

Incoming: $\frac{1}{2}$ because $49^{\frac{1}{2}} = 7$.

Use the quadratic base's minimum and its two base-one points inside the argument interval.

Given: domain: real x; payload: statement: log base $(x^2 + x + 1)$ of $(4\text{-}x^2)$

Your response: _____

Incoming: No approximation is needed; the exact value is $\frac{2}{3}$.

Apply both validity conditions to the decreasing variable base.

Given: domain: real x; payload: statement: log base $(7\text{-}x)$ of 4

Your response: _____

Incoming: $(-4, -1)$ union (2,infinity)

Use the repeated factor without treating its zero as a sign change.

Given: domain: real x; payload: statement: $\log((x-4)^2(x+2))$

Your response: _____

AP Precalculus

Evaluating Logarithms and Domains

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.

Diagnose the claim before doing any power calculation.

Given: domain: real logarithm; payload: claim: $\log_3(-9) = 2$

A student reports the logarithm as exactly $\frac{3}{2}$. Decide what the table actually supports.

Given: domain: rounded positive measurements; payload: argument measurement: 27.0; argument precision: nearest tenth; base measurement: 9.0; base precision: nearest hundredth

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Repair the exponent after accounting for the reciprocal in the argument.

Given: domain: real logarithm; payload: claim: $\log_5(\frac{1}{25}) = 2$ because $5^2 = 25$

Identify both the sign mismatch in the cited power and the real-logarithm restriction that settles the claim.

Given: domain: real logarithm; payload: claim: log base -2 of $8 = 3$ because $(-2)^3 = -8$

Evaluating Logarithms and Domains

Full Worked Solutions - excerpt

Worked example

Problem. Combine the argument inequality with the value that makes the logarithmic denominator zero.

Given: domain: real x; payload: statement: 1/log_3(2-x)

Answer. $x < 2$ with x not equal to 1

Explanation and check.

The argument requires 2-x>0, while log_3(2-x)=0 at 2-x=1, so x=1 is excluded.

Worked example

Problem. Require both logarithms to exist and neither denominator factor to be zero.

Given: domain: real x; payload: statement: 1/(ln(x+2) ln(5-x))

Answer. $-2 < x < 5$, excluding $x = -1$ and $x = 4$

Explanation and check.

Argument positivity gives -2<x<5; ln(x+2)=0 at -1 and ln(5-x)=0 at 4.

Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

Logarithmic Function Features

Logarithmic Function Features | APPC-U02-P19

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for boundary and domain, domain and asymptote, domain and boundary side, domain and branch location, domain and graph boundary and domain and side.

8 PDFs and a README; 80 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 Function Features

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.

Use the strict positivity of the affine argument to identify the boundary side. The input condition is real x. Report domain and asymptote. Use rule $y = \log_7(9 - 3x)$.

Bank label: _____

Identify where the real logarithmic branch begins. The input condition is real x. Report boundary and domain. Use rule $y = \log_5(x + 6)$.

Bank label: _____

Locate the excluded boundary and the graph's allowed side. The input condition is real x. Report domain and asymptote. Use rule $y = \log_3(x - 8)$.

Bank label: _____

Determine the vertical scale from the table's ratio-to-difference pattern.

Given model family: $y = a\log_5(x)$

x	y
1	0
5	2
25	4

Bank label: _____

AP Precalculus

Logarithmic Function Features

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.

State which quantities have the constant ratio and why the outputs are equally spaced.

Given model: $y = \log_5(x - 2)$

x	y
3	0
7	1
27	2

Specify three exact anchor points and the boundary needed for a structured sketch. The input condition is $x > 0$. Report anchors, asymptote, and shape. Use axes unit linear scales. Use rule $y = \log_2(x)$.

Find both attained output extrema on the restricted interval. The input condition is $1 \le x \le 8$. Report attained extrema. Use rule $y = \log_2(x)$.

State the multiplicative input change paired with each unit output change.

Given model: $y = \log_{10}(x)$

x	y
0.1	-1
1	0
10	1

Use argument values $1, 3$, and $\frac{1}{3}$ to specify a structured sketch. The input condition is $x > 1$. Report exact graph features. Use axes unit linear scales. Use rule $y = 2\log_3(x - 1) + 4$.

Solve the argument inequality and identify the graph's side of the boundary. The input condition is real x. Report domain, asymptote, and side. Use rule y=ln(5-x).

AP Precalculus

Logarithmic Function Features

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

State both limiting outputs and note whether the vertical shift changes them. The input condition is $x < 3$. Report end behavior. Use rule $y = \log_2(3 - x) + 4$.

Your response: _____

Incoming: As x approaches 3 from the left, y approaches -infinity; as x heads to -infinity, y approaches infinity.

Use reciprocal e-based inputs to organize a precise sketch. The input condition is $x > 0$. Report exact points and shape. Use axes unit linear scales. Use rule $y = -\ln(x)$.

Your response: _____

Incoming: Plot $(\frac{1}{e}, 1), (1, 0)$, and $(e, -1)$; asymptote $x = 0$; the graph decreases and is concave up.

Track the outer negative sign at both ends of the domain. The input condition is $x > -3$. Report signed limiting behavior. Use rule $y = -\log$ base $\frac{1}{2}$ of $(x + 3)$.

Your response: _____

Incoming: The output tends to -infinity near -3 from the right and to infinity as x grows without bound.

Give the signs of unbounded behavior for a base below one. The input condition is $x > 1$. Report both end limits. Use rule $y = \log$ base $\frac{1}{4}$ of $(x - 1)$.

Your response: _____

Incoming: At x = 1 from the right, y tends to infinity; as x tends to infinity, y tends to -infinity.

Solve the argument inequality containing a fractional coefficient. The input condition is real x. Report domain and boundary. Use rule $y = \log_7(3 - \frac{x}{2})$.

Your response: _____

Incoming: The graph has asymptote x = 6 and domain $x < 6$.

Describe what happens near $x = 4$ and far to the left. The input condition is $x < 4$. Report allowed-side limits. Use rule $y = \ln(8 - 2x)$.

Your response: _____

AP Precalculus

Logarithmic Function Features

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.

Correct the claimed effect of the output translation. Identify why adding 6 to the output cannot move the vertical asymptote. Correct the claimed boundary. The input condition is real logarithm. Report repaired feature claim. Use claim Adding 6 to $\log_2(x-4)$ moves its vertical asymptote from $x=4$ to $x=10$..

Repair the inference by separating monotonicity from concavity. Locate the invalid implication from decreasing to concave down, then give both correct properties. The input condition is real logarithm. Report corrected curvature claim. Use claim The graph of log base $\frac{1}{3}$ of x is concave down because it is decreasing..

Repair the statement by distinguishing input position from possible outputs. Identify the confusion between the input side and the output set. Repair both statements. The input condition is real logarithm. Report corrected domain and range. Use claim Since ln(4-x) is drawn left of x=4, its range is y<4..

Explain why an asymptote cannot be used as an anchor point here. Diagnose why the proposed asymptote point is not on the graph and give a valid zero anchor. The input condition is real logarithm. Report correct boundary interpretation. Use claim The vertical asymptote $x=2$ supplies the point $(2,0)$ on $y=\log_3(x-2)$..

Logarithmic Function Features

Full Worked Solutions - excerpt

Worked example

Problem. Separate the sign of an input from the sign of a logarithm output.

Answer. The range is all real numbers; for example $\log_2(\frac{1}{2}) = -1$ even though the argument $\frac{1}{2}$ is positive.

Explanation and check.

Argument positivity is a domain condition, not a restriction to positive outputs.

Worked example

Problem. Solve the strict positivity condition for the entire argument. The input condition is real x. Report domain, asymptote, and branch side. Use rule $y = \ln(-3(x-4))$.

Answer. Vertical asymptote x = 4; domain $x < 4$, so the branch is on the left.

Explanation and check.

The condition $-3(x-4) > 0$ reverses to $x < 4$.