Sets & Steps
Math Practice & Worked Solutions

Precalculus

Exponential & Log Equations and Inequalities | 4-Topic Precalculus Bundle

4-topic bundle | 384 problems | Four activity formats

---

01 **Log Properties and Change of Base**

View individual product and its full preview

02 **Solving Exponential Equations**

View individual product and its full preview

03 **Solving Logarithmic Equations**

View individual product and its full preview

04 **Exponential and Logarithmic Inequalities**

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.

32 PDFs and 4 READMEs; 287 buyer PDF pages across the 4 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.

Published by Tusils LLC.

Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

Log Properties and Change of Base

Log Properties and Change of Base | APPC-U02-P21

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for value to nearest thousandth, correction and denominator issue, valid subset and failing branch, correct interval, correct form and domain and source domain and extra condensed intervals.

8 PDFs and a README; 60 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.

AP Precalculus

Log Properties and Change of Base

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 the logarithm using natural logarithms. 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. Start with $\log_2(7)$. Bank label: _____	Combine the two terms and carry along the original domain. 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. Start with $\log_5(u) + \log_5(v)$. Bank label: _____
Separate the positive factors into individual base-five logarithms. 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. Start with $\log_5(7rs)$. Bank label: _____	Convert the expression to a quotient of common logarithms. 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. Start with $\log_5(11)$. Bank label: _____
Combine the difference into one base-eight logarithm and retain both source restrictions. 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. Start with $\log_8(p) - \log_8(q)$. Bank label: _____	Expand the product into separate logarithms of its constant and variable factors. 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. Start with $\ln(11at)$. Bank label: _____
Represent the value using only natural logarithms. 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. Start with $\log_6(13)$. Bank label: _____	Correct the proposed power-law rewrite so it is equivalent on the full domain of the original expression. 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. The candidate expression is $2\ln(x)$. Start with $\ln(x^2)$. Bank label: _____

AP Precalculus

Log Properties and Change of Base

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.

Expand the logarithm completely, keeping the positive constant inside its own logarithm. Start with $\log_2(3xy)$.	Condense to one logarithm and retain the domain of the displayed expression. Start with $\log_3(x) + \log_3(y)$.
Decide whether the claim is an identity, and justify the decision with one exact counterexample if it is false. Evaluate the claim $\ln(u + v) = \ln(u) + \ln(v)$.	Identify the first invalid line and state what valid law could replace the mistaken idea. The student writes: $\ln(a + b) = \ln(a) + \ln(b) = \ln(ab)$.
Write the expression as a sum and difference of natural logarithms with no powers inside them. Start with $\ln(a^2 \cdot \frac{\sqrt{b}}{c})$.	Produce an equivalent single logarithm and report the original restrictions. Start with $2\ln(a) - \ln(b)$.

AP Precalculus

Log Properties and Change of Base

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

Expand the quotient and simplify the logarithm of the numerical factor. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Start with $\log_6(\frac{x}{36yz})$.

Your response: _____

Incoming: Yes; the equality holds for every allowed a and x.

Combine the shifted logarithms and derive the allowed x-values from the separate terms. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Start with $\log_7(x+2) + \log_7(x-4)$.

Your response: _____

Incoming: $k = \frac{1}{2}$

Express the function using a base-three logarithm and simplify the coefficient. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Use logarithms with base 3.

Start with $\log_9(y)$.

Your response: _____

Incoming: 1.661

Pull the exponent in front without losing inputs less than the center. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Start with $\log_7((z-1)^2)$.

Your response: _____

Incoming: $6\log_5|2x-1|$, with $x \neq \frac{1}{2}$

Test the proposed quotient rule and disprove it exactly if it is not an identity. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Evaluate the claim $\log_4(\frac{u}{v}) = \frac{\log_4(u)}{\log_4(v)}$.

Your response: _____

Incoming: $\log_3(m^4 \cdot \frac{\sqrt[3]{p}}{n^2})$, with $m > 0, n > 0, p > 0$

Find the scaling constant that makes the two logarithmic functions identical. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Use the identity $K\log_3(x) = \log_{81}(x)$.

Your response: _____

AP Precalculus

Log Properties and Change of Base

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 the identity claim and, if needed, refute it using powers of 2. Identify the precise error or unsupported step in the stated claim or method, then give the corrected conclusion and justify it from the supplied information.

Evaluate the claim $\log_2(uv) = \log_2(u)\log_2(v)$.

Use base 2 as the change-of-base reference to find the exact value. Student work: $-\frac{3}{1}$ Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

The reference logarithm base is 2.

Start with $\log_{\frac{1}{4}}(8)$.

Log Properties and Change of Base

Full Worked Solutions - excerpt

Worked example

Problem. Expand the logarithm completely, keeping the positive constant inside its own logarithm.

Start with $\log_2(3xy)$.

Answer. $\log_2(3) + \log_2(x) + \log_2(y)$

Explanation and check.

The argument is a product of the three positive factors $3, x$, and y, so the product law separates them.

Worked example

Problem. Decide whether the claim is an identity, and justify the decision with one exact counterexample if it is false.

Evaluate the claim $\ln(u + v) = \ln(u) + \ln(v)$.

Answer. False; $u = v = 1$ gives $\ln(2)$ on the left and 0 on the right.

Explanation and check.

Logarithms convert products, not sums, into sums; the positive pair $1, 1$ directly contradicts the claim.

Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

Solving Exponential Equations

Solving Exponential Equations | APPC-U02-P22

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for real solution set, time-domain conclusion, time or impossibility, solution set, all real solutions and finite none or all.

8 PDFs and a README; 64 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.

AP Precalculus

Solving Exponential Equations

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.

Rewrite the reciprocal as a power of 3 and equate exponents. 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: real x. equation: $3^{x-2} = \frac{1}{27}$. Bank label: _____	Solve the exponential equation exactly using logarithms. 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: real x. equation: $3^x = 10$. Bank label: _____
Use the indicated positive substitution and recover every admissible x-value. 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: real x. equation: $4^x - 5 \cdot 2^x + 4 = 0$; substitution: $u = 2^x$. Bank label: _____	Find the unique real input where the two exponential expressions are equal. 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: real x. equation: $2 \cdot 3^x = 6 \cdot 2^x$. Bank label: _____
Rewrite the reciprocal and the left side as powers of 2. 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: real x. equation: $4^{x-1} = \frac{1}{8}$. Bank label: _____	Give the exact solution using natural logarithms. 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: real x. equation: $7^x = 13$. Bank label: _____
Factor after substitution and invert both positive values of u. 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: real x. equation: $9^x - 5 \cdot 3^x + 4 = 0$; substitution: $u = 3^x$. Bank label: _____	Divide to obtain one base-two power and solve the crossover exactly. 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: real x. equation: $2 \cdot 4^x = 16 \cdot 2^x$. Bank label: _____

AP Precalculus

Solving Exponential Equations

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.

Choose a so that $x = 2$ is a solution, then decide whether that equation has any other real solution. Context/domain: $a > 0$ and real x. equation: $a \cdot 3^x = 45$; required solution: $x = 2$.	Identify the first invalid logarithm step and solve the original equation correctly. Context/domain: real x. equation: $2^x + 3 = 11$; student work: $[\ln(2^x) + \ln(3) = \ln(11), x = \frac{\ln(11)}{\ln(2)+\ln(3)}]$.
Solve without dividing by an expression that could be zero, and classify the solution set. Context/domain: real x. equation: $5 \cdot 2^x = 7 \cdot 2^x$.	Choose k from the prescribed solution, then inspect whether $x = 3$ remains the only solution. Context/domain: $k > 0$ and real x. equation: $k \cdot 2^x = 4 \cdot 2^{x+1}$; required solution: $x = 3$.
Find the first point at which the student turns an inadmissible substitution root into an x-value. Context/domain: real x. equation: $4^x + 3 \cdot 2^x - 4 = 0$; student work: $[u = 2^x, (u-1)(u+4) = 0, x = 0$ or $x = 2]$.	Solve the level equation conceptually and determine whether its time belongs to the model's operating domain. Context/domain: $t \geq 0$ years. model: $A(t) = 200(1.1)^t$; target: 150 units.

AP Precalculus

Solving Exponential Equations

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

Solve exactly without approximating the irrational exponent. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Context/domain: real x. equation: $11^x = 2$.

Your response: _____

Incoming: $x \approx 1.771$, uniquely on $[-2, 3]$

Use the positive substitution and invert both factored roots. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Context/domain: real x. equation: $16^x - 5 \cdot 4^x + 4 = 0$; substitution: $u = 4^x$.

Your response: _____

Incoming: n = 4

Express every factor as a power of 3 and solve. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Context/domain: real x. equation: $3 \cdot 9^x = 81 \cdot 3^x$.

Your response: _____

Incoming: x = 4

Use the unique exponent that produces 1 for base 5, then solve the resulting algebraic equation. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Context/domain: real x. equation: $5^{x^2-3x} = 1$.

Your response: _____

Incoming: x = $\frac{2}{3}$

Isolate the positive exponential quantity and state the exact real solution. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Context/domain: real x. equation: $7 \cdot 3^{2x} - 1 = 0$.

Your response: _____

Incoming: x = 1 or $x = \frac{\ln(3)}{\ln(2)}$

Form one exponential ratio and solve for the crossover input. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Context/domain: real x. equation: $3 \cdot 5^x = 12 \cdot 2^x$.

Your response: _____

AP Precalculus

Solving Exponential Equations

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.

Determine whether the declining model reaches the higher target after $t = 0$. Student work: No nonnegative time; 360 would require extending the growth model backward. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens. error hunt. Context/domain: $t \geq 0$ weeks. model: $A(t) = 300(0.9)^t$; target: 360 units.

Apply the repeated-exponential substitution and verify both recovered exponents. Student work: $x = 1$ or $x = 4$ Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens. error hunt. Context/domain: real x. equation: $9^x - 30 \cdot 3^x + 81 = 0$; substitution: $u = 3^x$.

Choose a to make $x = 3$ a solution and check whether the solution is unique. Student work: $a = 3$; strict increase makes $x = 3$ not unique Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens. error hunt. Context/domain: $a > 0$. equation: $a \cdot 4^{x-1} = 48$; required solution: $x = 3$.

Evaluate the x-independent exponential and decide whether the equation is an identity or contradiction. Student work: No x works because the left side is fixed at 171, not 169. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens. error hunt. Context/domain: real x. equation: $7 \cdot 5^{0x+2} - 4 = 170$.

Solving Exponential Equations

Full Worked Solutions - excerpt

Worked example

Problem. Use base 3, solve the resulting quadratic, and retain both real roots. Context/domain: real x. equation: $9^{x^2} = 3^{5x+6}$.

Answer. x = $\frac{5-\sqrt{73}}{4}$ or $x = \frac{5+\sqrt{73}}{4}$

Explanation and check.

Equating exponents gives $2x^2 - 5x - 6 = 0$, whose discriminant is 73.

Worked example

Problem. Express every factor as a power of 3 and solve. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. Context/domain: real x. equation: $3 \cdot 9^x = 81 \cdot 3^x$.

Answer. x = 3 from $2x + 1 = x + 4$

Explanation and check.

The sides become 3^{2x+1} and 3^{x+4}, whose exponents agree only at $x = 3$.

Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

Solving Logarithmic Equations

Solving Logarithmic Equations | APPC-U02-P23

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for complete solution set, solution interval, solution intervals, solution set, correct root and method error and correct solution set and domain error.

8 PDFs and a README; 94 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.

AP Precalculus

Solving Logarithmic Equations

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 intensity ratio represented by the logarithmic scale target. 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. Your complete response must include positive intensity ratio. Use the condition $\frac{I}{I_0} > 0$. Use the model $L = 10\log(\frac{I}{I_0})$. The target is $L = 30$ decibels. Bank label: _____	Solve the quadratic in the logarithmic quantity and exponentiate each real u-root. 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. Your complete response must include positive x-solutions. Use the condition $x > 0$. Solve the equation $(\log_2(x))^2 - 3\log_2(x) + 2 = 0$. Use the substitution $u = \log_2(x)$. Bank label: _____
Solve by exponentiating and verify the logarithm's original argument condition. 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. Your complete response must include real solution set. Use the condition real x. Solve the equation $\log_2(x-1) = 3$. Bank label: _____	Recover the concentration represented by the given pH target. 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. Your complete response must include positive hydrogen-ion concentration. Use the condition $[H+] > 0$ mol/L. Use the model pH=-log($[H+]$). The target is pH=6.5. Bank label: _____

AP Precalculus

Solving Logarithmic Equations

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.

Check both algebraic candidates in the two original logarithm arguments.

Your complete response must include valid solution set and rejection reason.

Use the condition real x.

Solve the equation $\log_2(x-3)+\log_2(x-5)=3$.

The student proposes the candidate values 17.

Condense the logs, solve the quadratic, and enforce both starting restrictions.

Your complete response must include valid roots.

Use the condition real x.

Solve the equation $\log_2(x-1)+\log_2(x+1)=3$.

Exponentiate, solve the quadratic, and test both roots in the original argument.

Your complete response must include all real roots.

Use the condition real x.

Solve the equation $\log_3(x^2-5)=2$.

Use the supplied maximum fact to determine whether the curves ever meet.

Your complete response must include solution set.

Use the condition $x>0$.

Solve the equation $\ln(x)=x$.

Use the supplied evidence: For $x>0, \ln(x)-x$ has maximum -1 at $x=1$.

Recover the intensity ratio, then decide whether the calibrated model supports that target.

Your complete response must include ratio and calibration status.

Use the condition $1 \le \frac{I}{I_0} \le 10^8$ calibration range.

Use the model $L=10\log(\frac{I}{I_0})$.

The target is 100 decibels.

Explain why exponentiating to obtain 9 does not validate the student's answer in the real logarithm setting.

Your complete response must include correct conclusion.

Use the condition real x.

Solve the equation $\log_{-3}(x)=2$.

The student reports $x=9$.

AP Precalculus

Solving Logarithmic Equations

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: x = $2 + \sqrt{3}$ only

Factor the quadratic in u and invert the natural logarithm for both roots. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Your complete response must include positive x-solutions.

Use the condition $x > 0$.

Solve the equation $(\ln(x))^2 - 5\ln(x) + 6 = 0$.

Use the substitution $u = \ln(x)$.

Your response: _____

Incoming: x = 10

Exponentiate the equation and verify positivity of the original argument. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Your complete response must include real root.

Use the condition real x.

Solve the equation $\log_7(2x - 5) = 2$.

Your response: _____

Incoming: x = e^2 or $x = e^3$

Use both roots of the difference of squares and exponentiate each one. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Your complete response must include positive x-solutions.

Use the condition $x > 0$.

Solve the equation $(\log_4(x))^2 - 1 = 0$.

Use the substitution $u = \log_4(x)$.

Your response: _____

Incoming: x = e is the only intersection

Determine the input count that reaches the stated logarithmic capacity target. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Your complete response must include positive device count.

Use the condition $n > 0$ devices.

Use the model $C(n) = 12\log_2(n)$.

The target is $C = 48$ units.

Your response: _____

Incoming: $x \approx 2.763$, the sole intersection for $x > 1$

Intersect the argument restrictions and then equate the arguments. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Your complete response must include valid root.

Use the condition real x.

Solve the equation $\ln(2 - x) = \ln(x + 5)$.

Your response: _____

Incoming: x = $2 + \sqrt{10}$ only

Condense the difference and retain the common positivity restriction. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Your complete response must include valid real root.

Use the condition real x.

Solve the equation $\ln(x + 2) - \ln(x - 4) = \ln(3)$.

Your response: _____

AP Precalculus

Solving Logarithmic Equations

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.

Use injectivity and check the result against both affine positivity conditions. Student work: $x = \frac{9}{3}$ Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

Your complete response must include valid rational root.

Use the condition real x.

Solve the equation $\log_7(3x + 2) = \log_7(11 - x)$.

Factor in u and remember that both negative logarithmic values produce positive inputs. Student work: $x = e^{+1}$ or $x = e^{-5}$ Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

Your complete response must include positive x-values.

Use the condition $x > 0$.

Solve the equation $(\ln(x))^2 + 6\ln(x) + 5 = 0$.

Use the substitution $u = \ln(x)$.

Solving Logarithmic Equations

Full Worked Solutions - excerpt

Worked example

Problem. Solve the condensed quadratic and screen its roots against each source logarithm.

Your complete response must include valid solution set.

Use the condition real x.

Solve the equation $\log_5(x) + \log_5(x + 4) = 1$.

Answer. x = 1; discard $x = -5$

Explanation and check.

The source requires $x > 0$. Since $x(x + 4) = 5$ has roots 1 and -5, only 1 remains.

Worked example

Problem. Equate the same-base arguments, then check positivity at each resulting root.

Your complete response must include all valid roots.

Use the condition real x.

Solve the equation $\log_3(x^2 + 2) = \log_3(5x - 4)$.

Answer. x = 2 or $x = 3$; both arguments are positive

Explanation and check.

The equation $x^2 + 2 = 5x - 4$ factors as $(x - 2)(x - 3) = 0$, and both roots make $5x - 4$ positive.

Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

Exponential and Logarithmic Inequalities

Exponential and Logarithmic Inequalities | APPC-U02-P24

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for case intervals, solution by k region, solution intervals by base region, solutions by m sign, solutions by p sign and case solutions.

8 PDFs and a README; 69 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.

AP Precalculus

Exponential and Logarithmic Inequalities

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.

Combine the logarithm domain with the transformed inequality. 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: real x or the stated contextual schedule.

Solve the inequality $\log_2(x-1) > 3$.

Bank label: _____

Solve the quadratic inequality in u and map its positive interval back to x. 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: real x or the stated contextual schedule.

Solve the inequality $4^x - 5 \cdot 2^x + 4 < 0$.

The substitution is $u = 2^x > 0$.

Bank label: _____

Isolate the positive exponential and solve the strict threshold. 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: real x or the stated contextual schedule.

Solve the inequality $2^x + 1 > 9$.

Bank label: _____

Translate the base-seven comparison directly into exponent order. 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: real x.

Solve the inequality $7^{x+2} \le 7^5$.

Bank label: _____

AP Precalculus

Exponential and Logarithmic Inequalities

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.

Use the intersection as a boundary and identify where the exponential is at or below the horizontal line.

Context: real x or the stated contextual schedule.

the horizontal axis measures input; the vertical axis measures output; the displayed window has $-2 \le x \le 4$ and $0 \le y \le 25$.

The comparison is $e^x \le e^2$.

Compare the curves $(y = e^x, y = e^2)$.

The intersection is at $x = 2$; this input is included.

Separate increasing and decreasing valid bases before comparing exponents.

Context: real x or the stated contextual schedule.

Solve the inequality $a^x > a^2$.

Assume $a > 0$ and $a \neq 1$.

Check the order direction for the reciprocal base.

Context: real x or the stated contextual schedule.

Solve the inequality $(\frac{1}{2})^x > (\frac{1}{2})^3$.

Evaluate this student answer: $x > 3$.

Separate positive, negative, and zero scale factors before dividing.

Context: real x or the stated contextual schedule.

Solve the inequality $k \cdot 2^x \le 8k$.

Assume real k.

First reduce the two positivity conditions, then compare the arguments and intersect the sign solution.

Context: real x or the stated contextual schedule.

Solve the inequality $\ln(x^2 - 4) > \ln(3x)$.

Partition the parameter by monotonicity and retain the positive argument domain in both cases.

Context: real x or the stated contextual schedule.

Solve the inequality $\log_a(x) > 1$.

Assume $a > 0$ and $a \neq 1$.

AP Precalculus

Exponential and Logarithmic Inequalities

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

Combine positivity with the nonpositive logarithm condition. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Context: real x.

Solve the inequality $\ln(x+5) \le 0$.

Your response: _____

Incoming: Week 4

Compare exponents of the increasing natural base. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Context: real x.

Solve the inequality $e^{2x-1} > e^{3}$.

Your response: _____

Incoming: $[2, 8]$ within the displayed domain

Remove the factor 2 before using the base-five boundary. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Context: real x.

Solve the inequality $2 \cdot 5^{x} + 3 > 13$.

Your response: _____

Incoming: $\log_{\frac{1}{2}}(3) < x < -1$

Separate coefficient signs before division. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Context: real x and real s.

Solve the inequality $s \cdot 2^{x} < 4s$.

Your response: _____

AP Precalculus

Exponential and Logarithmic Inequalities

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.

Use the crossing and graph order on either side. Student work: $(-1, \infty)$ Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

Context: real x.

Use standard Cartesian axes; the horizontal axis measures input; the vertical axis measures function value.

The comparison is $e^x > 1$.

Compare the curves $(y = e^x, y = 1)$.

The intersection is at $x = 0$; this input is excluded.

The displayed window has $-3 \le x \le 3$ and $0 \le y \le 8$.

Use strict positivity of the exponential to classify the threshold. Student work: $x = 0$ is a solution because both sides of $2 - 5^x \ge 2$ are then nonnegative. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

Exponential and Logarithmic Inequalities

Full Worked Solutions - excerpt

Worked example

Problem. Use strict positivity of the exponential to classify the threshold. Student work: $x = 0$ is a solution because both sides of $2 - 5^x \geq 2$ are then nonnegative. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

Answer. No real solution

Explanation and check.

The inequality would require $-5^x \geq 0$, impossible because $5^x > 0$.

Worked example

Problem. Reverse when removing the negative factor, then intersect with strict argument positivity.

Context: real x.

Solve the inequality $-\log_2(x^2 - 4) \geq -1$.

Answer. $[-\sqrt{6}, -2) \cup (2, \sqrt{6}]$

Explanation and check.

The conditions are $x^2 > 4$ and $x^2 - 4 \leq 2$, so $4 < x^2 \leq 6$.