

AP Precalculus
Exponential and Logarithmic Inequalities

Exponential and Logarithmic Inequalities | APPC-U02-P24

96 problems · Four activity formats

01	Answer Bank Challenge	24 tasks
02	Grid Rounds	24 tasks
03	Match & Move	24 cards
04	Error Analysis & Strategy	24 tasks
05	Quick Answer Key	96 answers
06	Full Worked Solutions	96 solutions
07	Teacher / Parent Use Guide	included
08	Terms of Use & License	included

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.

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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 $-2 \leq x \leq 4$ and $0 \leq y \leq 25$. The comparison is $e^x \leq e^2$. 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 $k \cdot 2^x \leq 8k$. 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 $a \neq 1$. _____ _____

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Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

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 $\ln(x + 5) \leq 0$. 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: _____

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Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

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 $-3 \leq x \leq 3$ and $0 \leq y \leq 8$.

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

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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 $4 < x^2 \leq 6$.