

AP Precalculus
Vertical Asymptotes and One-Sided Behavior

Vertical Asymptotes and One-Sided Behavior | APPC-U01-P11

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 two signed one-sided limits, complete generic and exceptional classification, verified formula or impossibility proof, evidence-based pole decision, qualified local limit conclusion and exact pole set with residual orders.
8 PDFs and a README; 120 buyer pages.

AP Precalculus

**Vertical Asymptotes and
One-Sided Behavior**

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.

Determine every vertical asymptote of $f(x) = \frac{(x-2)^2(x-6)}{(x-2)^2(x-6)^2(x^2+19)}$. Collect common factors and compare multiplicities; do not call every original denominator zero a pole.

Bank label: _____

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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 every vertical asymptote of $f(x) = \frac{(x-11)^2(x-15)}{(x-11)^2(x-15)^2(x^2+28)}$. Collect common factors and compare multiplicities; do not call every original denominator zero a pole.

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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

For $f(x) = \frac{3}{(x-1)(x^2+18)}$, analyze the two one-sided limits at $x = 1$. Use the residual denominator parity and the sign of the nonzero local cofactor.

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.

An exact display uses $f(x) = \frac{1}{x-10}$ on window $[0, 4]$. A student claims: “No spike appears in the window $[0, 4]$, so the function has no vertical asymptote.” Diagnose the claim using residual denominator factors rather than visual height alone. Diagnose the no-spike claim by locating the actual pole relative to the displayed window.



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Full Worked Solutions - excerpt

Worked example

Problem. Construct a simple rational example satisfying one pole at $x = -6$ with left limit $+\infty$ and right limit $-\infty$, or prove it impossible. Verify pole order and every prescribed one-sided sign.

Answer. One example is $f(x) = -\frac{1}{x+6}$.

Explanation and check.

The denominator power 1 has the required parity and numerator sign -1 ; direct local sign analysis verifies both branches.

Worked example

Problem. Construct a simple rational example satisfying one pole at $x = 0$ with left limit $-\infty$ and right limit $+\infty$, or prove it impossible. Verify pole order and every prescribed one-sided sign.

Answer. One example is $f(x) = \frac{1}{x}$.

Explanation and check.

The denominator power 1 has the required parity and numerator sign 1; direct local sign analysis verifies both branches.