

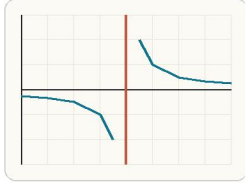
Rational Functions, Partial Fractions, and Inequalities

Rational expressions, asymptotic behavior, sign analysis, partial fraction decomposition, and rational inequalities.

Name _____ Date _____

32 main 2-up grid 2 pages

1. For $f(x) = 1 / (x - 4)$, which value is not allowed?



Any x-value that makes the denominator zero is excluded from the domain.

- A. 4
B. 0
C. -4
D. 1

4. To solve a rational inequality, what do you usually need to track?

- A. Where the expression changes sign
B. Only the y-intercept
C. Only the constant term
D. Whether the numerator is linear

7. For $f(x) = (2x + 1) / x^2$, what is the horizontal asymptote?

- A. $y = 2$
B. $y = 0$
C. $x = 0$
D. $x = 2$

10. For $h(x) = (5x - 1) / (2x + 9)$, what is the horizontal asymptote?

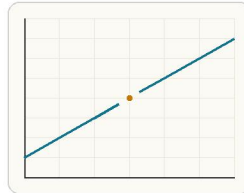
- A. $y = 2.5$
B. $y = 5$
C. $y = 9$
D. $x = 2.5$

13. Evaluate $f(x) = (x + 1) / (x - 2)$ at $x = 5$. Answer with a number.

2. If the denominator is 0 at $x = 2$ and the factor does not cancel, what graph feature often appears?

- A. A vertical asymptote at $x = 2$
B. A y-intercept at $x = 2$
C. A maximum at $x = 2$
D. A horizontal asymptote at $x = 2$

5. What causes a hole in a rational graph?



A common factor that cancels removes one point from the graph instead of creating a full vertical asymptote.

- A. A common factor cancels from numerator and denominator.
B. The denominator has a unique zero only.
C. The numerator degree is larger.
D. The x-values are all positive.

8. Which expression could create a hole at $x = 3$ after simplification?

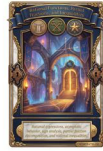
- A. $(x + 3) / (x - 3)$
B. $1 / (x - 3)$
C. $(x - 3) / (x + 1)$
D. $(x - 3)(x + 1) / (x - 3)$

11. What is the best first step to simplify $(x^2 - 16) / (x - 4)$?

- A. Add 16 to both sides.
B. Factor the numerator.
C. Square the denominator.
D. Find the y-intercept.

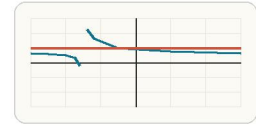
14. Evaluate $g(x) = (2x - 1) / (x + 3)$ at $x = 1$. Answer with a number.

Completion Reward



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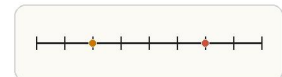
3. For a rational function with equal degrees top and bottom, what determines the horizontal asymptote?



When numerator and denominator have the same degree, the horizontal asymptote comes from the ratio of leading coefficients.

- A. The ratio of leading coefficients
B. The constant term only
C. The x-intercepts
D. The degree of the denominator only

6. For $q(x) = (x + 4) / ((x - 1)(x + 3))$, which values are excluded from the domain?



Exclude every x-value that makes any denominator factor equal to zero.

- A. 4 and -4
B. 1 only
C. 1 and -3
D. -3 only

9. For $g(x) = 4 / (x + 6)$, where is the vertical asymptote?

- A. $y = -6$
B. $x = 6$
C. $x = -6$
D. $y = 6$

12. A student simplifies $(x^2 - x) / x$ to $x - 1$ and then says x can be any real number. What is the mistake?

- A. $x = 0$ was excluded in the original expression and stays excluded.
B. They should have added 1 back to the expression.
C. The expression should simplify to x only.
D. Any canceled factor becomes allowed automatically.

15. For $h(x) = (x + 2) / (x - 7)$, what is the x-value of the vertical asymptote? Answer with a number.

16. For $p(x) = (3x + 1) / (x - 5)$, what is the y-value of the horizontal asymptote? Answer with a number.

17. Evaluate $(x^2 - x) / x$ at $x = 5$. Answer with a number.

18. For $r(x) = 5 / ((x - 2)(x + 1))$, how many excluded x-values are there? Answer with a number.

19. Solve $1 / x = 4$. Answer in the form $x = \dots$

20. Simplify $(8x) / 2$. Answer as an expression.

21. Evaluate $f(x) = (x - 3) / (x + 1)$ at $x = 7$. Answer with a number.

22. State the domain restriction for $f(x) = 1 / (x - 8)$. Answer as a restriction on x.

23. Simplify $(x^2 - 9) / (x - 3)$. Answer as an expression.

24. Simplify $(x^2 + 5x) / x$. Answer as an expression.

25. Write $5 / (x(x + 1))$ in the form $A/x + B/(x + 1)$. Answer as an equation.

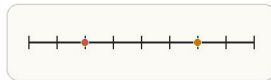
26. Write $3 / (x(x - 2))$ in the form $A/x + B/(x - 2)$. Answer as an equation.

27. Solve $x / (x - 2) > 0$. Answer as an inequality in x.



Zeros and undefined values split the number line into test intervals.

28. Solve $(x - 1) / (x + 3) < 0$. Answer as an inequality in x.



Check intervals separated by the numerator zero and denominator zero.

29. Simplify $(x^2 - 16) / (x - 4)$. Answer as an expression.

30. Simplify $(3x^2 + 6x) / (3x)$. Answer as an expression.

31. Write $4 / (x(x - 1))$ in the form $A/x + B/(x - 1)$. Answer as an equation.

32. Solve $(x + 2) / (x - 1) > 0$. Answer as an inequality in x.



The solution will come from interval tests around the critical x-values.