

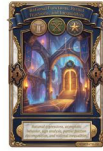
Rational Functions, Partial Fractions, and Inequalities

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

Name _____ Date _____

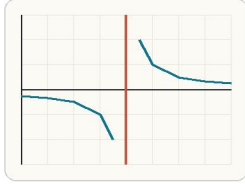
32 main 2-up grid 12 pages visible side quests

Completion Reward



Shown here as a small pack artifact, not a preview destination.

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

1.3. For $(x^2 - 9) / (x - 3)$, which value must still be excluded after simplification?

- A. -3
- B. 0
- C. 3
- D. 9

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 $x = 2$

2.3. For $h(x) = (2x + 3) / x^2$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 3$
- C. $y = 0$
- D. $x = 0$

1.1. For $f(x) = 1 / (x + 5)$, which value is excluded from the domain?

- A. 5
- B. -5
- C. 0
- D. 1

1.4. For $h(x) = (x + 2) / (x^2 - 16)$, which input is allowed?

- A. 4
- B. -4
- C. 3
- D. -2

2.1. For $f(x) = 3 / (x - 2)$, where is the vertical asymptote?

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

2.4. Which expression can create a hole at $x = -1$ after simplification?

- A. $(x + 1) / (x - 1)$
- B. $(x + 1)(x - 2) / (x + 1)$
- C. $1 / (x + 1)$
- D. $(x - 1) / (x + 2)$

1.2. For $g(x) = (x - 2) / ((x + 1)(x - 4))$, which values are excluded?

- A. -1 and 4
- B. 2 and 4
- C. -1 and 2
- D. 0 and 4

1.5. For $p(x) = 7 / (x - 1)$, which statement is correct?

- A. All real numbers are allowed
- B. x cannot equal 1
- C. x must be positive
- D. x must be greater than 1

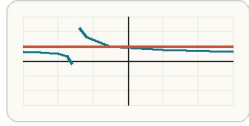
2.2. For $g(x) = (4x - 1) / (2x + 7)$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 4$
- C. $x = 2$
- D. $y = 0$

2.5. If the factor $x - 3$ appears in both numerator and denominator and cancels, what remains at $x = 3$?

- A. a vertical asymptote
- B. a horizontal asymptote
- C. a hole
- D. an x-intercept

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

3.3. For $h(x) = (2x + 3) / x^2$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 3$
- C. $y = 0$
- D. $x = 0$

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

4.3. If you solve $(x - 1) / (x + 2) > 0$, what happens to $x = -2$?

- A. include it because the graph is positive nearby
- B. exclude it because the expression is undefined there
- C. include it because the numerator is not 0
- D. turn it into a hole

3.1. For $f(x) = 3 / (x - 2)$, where is the vertical asymptote?

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

3.4. Which expression can create a hole at $x = -1$ after simplification?

- A. $(x + 1) / (x - 1)$
- B. $(x + 1)(x - 2) / (x + 1)$
- C. $1 / (x + 1)$
- D. $(x - 1) / (x + 2)$

4.1. When solving a rational inequality, the sign chart shows:

- A. where the graph crosses the y-axis
- B. where the expression is positive or negative
- C. the exact scale of the graph
- D. only the numerator zeros

4.4. For $(x - 4) / (x + 1) \geq 0$, why is $x = 4$ important?

- A. it makes the denominator 0
- B. it makes the numerator 0
- C. it is the y-intercept
- D. it is the asymptote

3.2. For $g(x) = (4x - 1) / (2x + 7)$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 4$
- C. $x = 2$
- D. $y = 0$

3.5. If the factor $x - 3$ appears in both numerator and denominator and cancels, what remains at $x = 3$?

- A. a vertical asymptote
- B. a horizontal asymptote
- C. a hole
- D. an x-intercept

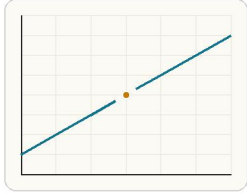
4.2. What should you mark first for a rational inequality?

- A. only the y-intercept
- B. zeros and undefined values
- C. the horizontal asymptote
- D. the slope

4.5. After marking critical values on a number line, the next step is to:

- A. multiply all factors together symbolically forever
- B. test one number from each interval
- C. graph only the numerator
- D. ignore the denominator

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.

5.3. For $h(x) = (2x + 3) / x^2$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 3$
- C. $y = 0$
- D. $x = 0$

5.1. For $f(x) = 3 / (x - 2)$, where is the vertical asymptote?

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

5.2. For $g(x) = (4x - 1) / (2x + 7)$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 4$
- C. $x = 2$
- D. $y = 0$

5.4. Which expression can create a hole at $x = -1$ after simplification?

- A. $(x + 1) / (x - 1)$
- B. $(x + 1)(x - 2) / (x + 1)$
- C. $1 / (x + 1)$
- D. $(x - 1) / (x + 2)$

5.5. If the factor $x - 3$ appears in both numerator and denominator and cancels, what remains at $x = 3$?

- A. a vertical asymptote
- B. a horizontal asymptote
- C. a hole
- D. an x-intercept

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

6.1. For $f(x) = 1 / (x + 5)$, which value is excluded from the domain?

- A. 5
- B. -5
- C. 0
- D. 1

6.2. For $g(x) = (x - 2) / ((x + 1)(x - 4))$, which values are excluded?

- A. -1 and 4
- B. 2 and 4
- C. -1 and 2
- D. 0 and 4

6.3. For $(x^2 - 9) / (x - 3)$, which value must still be excluded after simplification?

- A. -3
- B. 0
- C. 3
- D. 9

6.4. For $h(x) = (x + 2) / (x^2 - 16)$, which input is allowed?

- A. 4
- B. -4
- C. 3
- D. -2

6.5. For $p(x) = 7 / (x - 1)$, which statement is correct?

- A. All real numbers are allowed
- B. x cannot equal 1
- C. x must be positive
- D. x must be greater than 1

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

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

7.1. For $f(x) = 3 / (x - 2)$, where is the vertical asymptote?

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

7.2. For $g(x) = (4x - 1) / (2x + 7)$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 4$
- C. $x = 2$
- D. $y = 0$

7.3. For $h(x) = (2x + 3) / x^2$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 3$
- C. $y = 0$
- D. $x = 0$

7.4. Which expression can create a hole at $x = -1$ after simplification?

- A. $(x + 1) / (x - 1)$
- B. $(x + 1)(x - 2) / (x + 1)$
- C. $1 / (x + 1)$
- D. $(x - 1) / (x + 2)$

7.5. If the factor $x - 3$ appears in both numerator and denominator and cancels, what remains at $x = 3$?

- A. a vertical asymptote
- B. a horizontal asymptote
- C. a hole
- D. an x-intercept

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. $(x - 3)(x + 1) / (x - 3)$

8.1. For $f(x) = 3 / (x - 2)$, where is the vertical asymptote?

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

8.2. For $g(x) = (4x - 1) / (2x + 7)$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 4$
- C. $x = 2$
- D. $y = 0$

8.3. For $h(x) = (2x + 3) / x^2$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 3$
- C. $y = 0$
- D. $x = 0$

8.4. Which expression can create a hole at $x = -1$ after simplification?

- A. $(x + 1) / (x - 1)$
- B. $(x + 1)(x - 2) / (x + 1)$
- C. $1 / (x + 1)$
- D. $(x - 1) / (x + 2)$

8.5. If the factor $x - 3$ appears in both numerator and denominator and cancels, what remains at $x = 3$?

- A. a vertical asymptote
- B. a horizontal asymptote
- C. a hole
- D. an x-intercept

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

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

9.1. For $f(x) = 3 / (x - 2)$, where is the vertical asymptote?

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

9.2. For $g(x) = (4x - 1) / (2x + 7)$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 4$
- C. $x = 2$
- D. $y = 0$

9.3. For $h(x) = (2x + 3) / x^2$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 3$
- C. $y = 0$
- D. $x = 0$

9.4. Which expression can create a hole at $x = -1$ after simplification?

- A. $(x + 1) / (x - 1)$
- B. $(x + 1)(x - 2) / (x + 1)$
- C. $1 / (x + 1)$
- D. $(x - 1) / (x + 2)$

9.5. If the factor $x - 3$ appears in both numerator and denominator and cancels, what remains at $x = 3$?

- A. a vertical asymptote
- B. a horizontal asymptote
- C. a hole
- D. an x-intercept

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

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

10.1. For $f(x) = 3 / (x - 2)$, where is the vertical asymptote?

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

10.2. For $g(x) = (4x - 1) / (2x + 7)$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 4$
- C. $x = 2$
- D. $y = 0$

10.3. For $h(x) = (2x + 3) / x^2$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 3$
- C. $y = 0$
- D. $x = 0$

10.4. Which expression can create a hole at $x = -1$ after simplification?

- A. $(x + 1) / (x - 1)$
- B. $(x + 1)(x - 2) / (x + 1)$
- C. $1 / (x + 1)$
- D. $(x - 1) / (x + 2)$

10.5. If the factor $x - 3$ appears in both numerator and denominator and cancels, what remains at $x = 3$?

- A. a vertical asymptote
- B. a horizontal asymptote
- C. a hole
- D. an x-intercept

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.

11.1. What is the best first step to simplify $(x^2 - 25) / (x - 5)$?

- A. add 25
- B. factor the numerator
- C. divide every term by x
- D. plug in $x = 5$

11.2. What does $(x^2 - 9) / (x - 3)$ simplify to?

- A. $x - 3$
- B. $x + 3$
- C. $x^2 - 3$
- D. 1

11.3. After simplifying $(x^2 - x) / x$ to $x - 1$, which value is still excluded?

- A. -1
- B. 0
- C. 1
- D. x has no restriction

11.4. Which factorization helps simplify $(x^2 - 16) / (x - 4)$?

- A. $(x - 8)(x + 2)$
- B. $(x - 4)^2$
- C. $(x - 4)(x + 4)$
- D. $(x - 2)(x - 8)$

11.5. Which expression already has a common factor that can cancel?

- A. $(x + 1) / (x - 1)$
- B. $(x^2 + 1) / x$
- C. $x(x - 2) / x$
- D. $(x + 4) / (x + 5)$

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.

12.1. For $f(x) = 1 / (x + 5)$, which value is excluded from the domain?

- A. 5
- B. -5
- C. 0
- D. 1

12.2. For $g(x) = (x - 2) / ((x + 1)(x - 4))$, which values are excluded?

- A. -1 and 4
- B. 2 and 4
- C. -1 and 2
- D. 0 and 4

12.3. For $(x^2 - 9) / (x - 3)$, which value must still be excluded after simplification?

- A. -3
- B. 0
- C. 3
- D. 9

12.4. For $h(x) = (x + 2) / (x^2 - 16)$, which input is allowed?

- A. 4
- B. -4
- C. 3
- D. -2

12.5. For $p(x) = 7 / (x - 1)$, which statement is correct?

- A. All real numbers are allowed
- B. x cannot equal 1
- C. x must be positive
- D. x must be greater than 1

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

13.1. Evaluate $f(x) = (x + 3) / (x - 1)$ at $x = 5$.

- A. 1
- B. 2
- C. 3
- D. 4

13.2. Evaluate $g(x) = (2x - 5) / (x + 1)$ at $x = 3$.

- A. 1/2
- B. 1/4
- C. 2
- D. 3

13.3. For $h(x) = (x - 4) / (x + 6)$, what is the x-value of the vertical asymptote?

- A. -6
- B. 6
- C. 4
- D. -4

13.4. For $p(x) = (7x + 2) / (x - 9)$, what is the horizontal asymptote y-value?

- A. 0
- B. 1
- C. 7
- D. 9

13.5. Can you evaluate $q(x) = (x + 1) / (x - 3)$ at $x = 3$?

- A. yes, and the value is 0
- B. yes, and the value is 1
- C. no, because the function is undefined
- D. yes, and the value is 3

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

14.1. Evaluate $f(x) = (x + 3) / (x - 1)$ at $x = 5$.

- A. 1
- B. 2
- C. 3
- D. 4

14.2. Evaluate $g(x) = (2x - 5) / (x + 1)$ at $x = 3$.

- A. 1/2
- B. 1/4
- C. 2
- D. 3

14.3. For $h(x) = (x - 4) / (x + 6)$, what is the x-value of the vertical asymptote?

- A. -6
- B. 6
- C. 4
- D. -4

14.4. For $p(x) = (7x + 2) / (x - 9)$, what is the horizontal asymptote y-value?

- A. 0
- B. 1
- C. 7
- D. 9

14.5. Can you evaluate $q(x) = (x + 1) / (x - 3)$ at $x = 3$?

- A. yes, and the value is 0
- B. yes, and the value is 1
- C. no, because the function is undefined
- D. yes, and the value is 3

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

15.1. For $f(x) = 3 / (x - 2)$, where is the vertical asymptote?

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

15.2. For $g(x) = (4x - 1) / (2x + 7)$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 4$
- C. $x = 2$
- D. $y = 0$

15.3. For $h(x) = (2x + 3) / x^2$, the horizontal asymptote is:

- A. $y = 2$
- B. $y = 3$
- C. $y = 0$
- D. $x = 0$

15.4. Which expression can create a hole at $x = -1$ after simplification?

- A. $(x + 1) / (x - 1)$
- B. $(x + 1)(x - 2) / (x + 1)$
- C. $1 / (x + 1)$
- D. $(x - 1) / (x + 2)$

15.5. If the factor $x - 3$ appears in both numerator and denominator and cancels, what remains at $x = 3$?

- A. a vertical asymptote
- B. a horizontal asymptote
- C. a hole
- D. an x-intercept

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

16.1. For $f(x) = 3 / (x - 2)$, where is the vertical asymptote?

16.2. For $g(x) = (4x - 1) / (2x + 7)$, the horizontal asymptote is:

16.3. For $h(x) = (2x + 3) / x^2$, the horizontal asymptote is:

16.4. Which expression can create a hole at $x = -1$ after simplification?

16.5. If the factor $x - 3$ appears in both numerator and denominator and cancels, what remains at $x = 3$?

- A. $y = 2$
- B. $y = 3$
- C. $y = 0$
- D. $x = 0$

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

- A. $y = 2$
- B. $y = 4$
- C. $x = 2$
- D. $y = 0$

- A. $(x + 1) / (x - 1)$
- B. $(x + 1)(x - 2) / (x + 1)$
- C. $1 / (x + 1)$
- D. $(x - 1) / (x + 2)$

- A. a vertical asymptote
- B. a horizontal asymptote
- C. a hole
- D. an x-intercept

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

17.1. What is the best first step to simplify $(x^2 - 25) / (x - 5)$?

17.2. What does $(x^2 - 9) / (x - 3)$ simplify to?

17.3. After simplifying $(x^2 - x) / x$ to $x - 1$, which value is still excluded?

17.4. Which factorization helps simplify $(x^2 - 16) / (x - 4)$?

17.5. Which expression already has a common factor that can cancel?

- A. -1
- B. 0
- C. 1
- D. x has no restriction

- A. add 25
- B. factor the numerator
- C. divide every term by x
- D. plug in $x = 5$

- A. $x - 3$
- B. $x + 3$
- C. $x^2 - 3$
- D. 1

- A. $(x - 8)(x + 2)$
- B. $(x - 4)^2$
- C. $(x - 4)(x + 4)$
- D. $(x - 2)(x - 8)$

- A. $(x + 1) / (x - 1)$
- B. $(x^2 + 1) / x$
- C. $x(x - 2) / x$
- D. $(x + 4) / (x + 5)$

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

18.1. What is the best first step to simplify $(x^2 - 25) / (x - 5)$?

18.2. What does $(x^2 - 9) / (x - 3)$ simplify to?

18.3. After simplifying $(x^2 - x) / x$ to $x - 1$, which value is still excluded?

18.4. Which factorization helps simplify $(x^2 - 16) / (x - 4)$?

18.5. Which expression already has a common factor that can cancel?

- A. -1
- B. 0
- C. 1
- D. x has no restriction

- A. add 25
- B. factor the numerator
- C. divide every term by x
- D. plug in $x = 5$

- A. $x - 3$
- B. $x + 3$
- C. $x^2 - 3$
- D. 1

- A. $(x - 8)(x + 2)$
- B. $(x - 4)^2$
- C. $(x - 4)(x + 4)$
- D. $(x - 2)(x - 8)$

- A. $(x + 1) / (x - 1)$
- B. $(x^2 + 1) / x$
- C. $x(x - 2) / x$
- D. $(x + 4) / (x + 5)$

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

- A. -1
- B. 0
- C. 1
- D. x has no restriction

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

- A. -1
- B. 0
- C. 1
- D. x has no restriction

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

- A. -6
- B. 6
- C. 4
- D. -4

19.1. What is the best first step to simplify $(x^2 - 25)/(x - 5)$?

- A. add 25
- B. factor the numerator
- C. divide every term by x
- D. plug in $x = 5$

19.4. Which factorization helps simplify $(x^2 - 16)/(x - 4)$?

- A. $(x - 8)(x + 2)$
- B. $(x - 4)^2$
- C. $(x - 4)(x + 4)$
- D. $(x - 2)(x - 8)$

20.1. What is the best first step to simplify $(x^2 - 25)/(x - 5)$?

- A. add 25
- B. factor the numerator
- C. divide every term by x
- D. plug in $x = 5$

20.4. Which factorization helps simplify $(x^2 - 16)/(x - 4)$?

- A. $(x - 8)(x + 2)$
- B. $(x - 4)^2$
- C. $(x - 4)(x + 4)$
- D. $(x - 2)(x - 8)$

21.1. Evaluate $f(x) = (x + 3)/(x - 1)$ at $x = 5$.

- A. 1
- B. 2
- C. 3
- D. 4

21.4. For $p(x) = (7x + 2)/(x - 9)$, what is the horizontal asymptote y-value?

- A. 0
- B. 1
- C. 7
- D. 9

19.2. What does $(x^2 - 9)/(x - 3)$ simplify to?

- A. $x - 3$
- B. $x + 3$
- C. $x^2 - 3$
- D. 1

19.5. Which expression already has a common factor that can cancel?

- A. $(x + 1)/(x - 1)$
- B. $(x^2 + 1)/x$
- C. $x(x - 2)/x$
- D. $(x + 4)/(x + 5)$

20.2. What does $(x^2 - 9)/(x - 3)$ simplify to?

- A. $x - 3$
- B. $x + 3$
- C. $x^2 - 3$
- D. 1

20.5. Which expression already has a common factor that can cancel?

- A. $(x + 1)/(x - 1)$
- B. $(x^2 + 1)/x$
- C. $x(x - 2)/x$
- D. $(x + 4)/(x + 5)$

21.2. Evaluate $g(x) = (2x - 5)/(x + 1)$ at $x = 3$.

- A. 1/2
- B. 1/4
- C. 2
- D. 3

21.5. Can you evaluate $q(x) = (x + 1)/(x - 3)$ at $x = 3$?

- A. yes, and the value is 0
- B. yes, and the value is 1
- C. no, because the function is undefined
- D. yes, and the value is 3

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

22.1. For $f(x) = 1 / (x + 5)$, which value is excluded from the domain?

22.2. For $g(x) = (x - 2) / ((x + 1)(x - 4))$, which values are excluded?

- A. -3
- B. 0
- C. 3
- D. 9

- A. 5
- B. -5
- C. 0
- D. 1

- A. -1 and 4
- B. 2 and 4
- C. -1 and 2
- D. 0 and 4

22.3. For $(x^2 - 9) / (x - 3)$, which value must still be excluded after simplification?

22.4. For $h(x) = (x + 2) / (x^2 - 16)$, which input is allowed?

22.5. For $p(x) = 7 / (x - 1)$, which statement is correct?

- A. -3
- B. 0
- C. 3
- D. 9

- A. 4
- B. -4
- C. 3
- D. -2

- A. All real numbers are allowed
- B. x cannot equal 1
- C. x must be positive
- D. x must be greater than 1

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

23.1. Why do we decompose a rational expression into partial fractions?

23.2. Before using partial fractions, a good first step is usually to:

23.3. If the denominator is $(x - 1)(x + 2)$, the partial-fraction form should look like:

23.4. If the denominator has $(x - 3)^2$, which setup feature is needed?

23.5. If the numerator degree is at least the denominator degree, what should happen before partial fractions?

- A. $A / (x - 1) + B / (x + 2)$
- B. $A / (x - 1)(x + 2)$
- C. $A(x - 1) + B(x + 2)$
- D. $A / x + B$

- A. only one term $A / (x - 3)$
- B. two terms using $x - 3$ and $(x - 3)^2$
- C. a square root
- D. no constants

- A. do polynomial division first
- B. take a square root first
- C. set the numerator to 0
- D. ignore the degree issue

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

24.1. Why do we decompose a rational expression into partial fractions?

24.2. Before using partial fractions, a good first step is usually to:

24.3. If the denominator is $(x - 1)(x + 2)$, the partial-fraction form should look like:

24.4. If the denominator has $(x - 3)^2$, which setup feature is needed?

24.5. If the numerator degree is at least the denominator degree, what should happen before partial fractions?

- A. $A / (x - 1) + B / (x + 2)$
- B. $A / (x - 1)(x + 2)$
- C. $A(x - 1) + B(x + 2)$
- D. $A / x + B$

- A. only one term $A / (x - 3)$
- B. two terms using $x - 3$ and $(x - 3)^2$
- C. a square root
- D. no constants

- A. do polynomial division first
- B. take a square root first
- C. set the numerator to 0
- D. ignore the degree issue

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

- A. $A / (x - 1) + B / (x + 2)$
- B. $A / (x - 1)(x + 2)$
- C. $A(x - 1) + B(x + 2)$
- D. $A / x + B$

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

- A. $A / (x - 1) + B / (x + 2)$
- B. $A / (x - 1)(x + 2)$
- C. $A(x - 1) + B(x + 2)$
- D. $A / x + B$

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



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

27.3. After simplifying $(x^2 - x) / x$ to $x - 1$, which value is still excluded?

- A. -1
- B. 0
- C. 1
- D. x has no restriction

25.1. Why do we decompose a rational expression into partial fractions?

- A. to rewrite it as simpler rational pieces
- B. to remove every denominator
- C. to find only the horizontal asymptote
- D. to make every factor quadratic

25.4. If the denominator has $(x - 3)^2$, which setup feature is needed?

- A. only one term $A / (x - 3)$
- B. two terms using $x - 3$ and $(x - 3)^2$
- C. a square root
- D. no constants

26.1. Why do we decompose a rational expression into partial fractions?

- A. to rewrite it as simpler rational pieces
- B. to remove every denominator
- C. to find only the horizontal asymptote
- D. to make every factor quadratic

26.4. If the denominator has $(x - 3)^2$, which setup feature is needed?

- A. only one term $A / (x - 3)$
- B. two terms using $x - 3$ and $(x - 3)^2$
- C. a square root
- D. no constants

27.1. What is the best first step to simplify $(x^2 - 25) / (x - 5)$?

- A. add 25
- B. factor the numerator
- C. divide every term by x
- D. plug in $x = 5$

27.4. Which factorization helps simplify $(x^2 - 16) / (x - 4)$?

- A. $(x - 8)(x + 2)$
- B. $(x - 4)^2$
- C. $(x - 4)(x + 4)$
- D. $(x - 2)(x - 8)$

25.2. Before using partial fractions, a good first step is usually to:

- A. factor the denominator completely
- B. graph the numerator only
- C. take the derivative
- D. multiply by 0

25.5. If the numerator degree is at least the denominator degree, what should happen before partial fractions?

- A. do polynomial division first
- B. take a square root first
- C. set the numerator to 0
- D. ignore the degree issue

26.2. Before using partial fractions, a good first step is usually to:

- A. factor the denominator completely
- B. graph the numerator only
- C. take the derivative
- D. multiply by 0

26.5. If the numerator degree is at least the denominator degree, what should happen before partial fractions?

- A. do polynomial division first
- B. take a square root first
- C. set the numerator to 0
- D. ignore the degree issue

27.2. What does $(x^2 - 9) / (x - 3)$ simplify to?

- A. $x - 3$
- B. $x + 3$
- C. $x^2 - 3$
- D. 1

27.5. Which expression already has a common factor that can cancel?

- A. $(x + 1) / (x - 1)$
- B. $(x^2 + 1) / x$
- C. $x(x - 2) / x$
- D. $(x + 4) / (x + 5)$

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



Check intervals separated by the numerator zero and denominator zero.

28.1. What is the best first step to simplify $(x^2 - 25) / (x - 5)$?

- A. add 25
- B. factor the numerator
- C. divide every term by x
- D. plug in $x = 5$

28.2. What does $(x^2 - 9) / (x - 3)$ simplify to?

- A. $x - 3$
- B. $x + 3$
- C. $x^2 - 3$
- D. 1

28.3. After simplifying $(x^2 - x) / x$ to $x - 1$, which value is still excluded?

- A. -1
- B. 0
- C. 1
- D. x has no restriction

28.4. Which factorization helps simplify $(x^2 - 16) / (x - 4)$?

- A. $(x - 8)(x + 2)$
- B. $(x - 4)^2$
- C. $(x - 4)(x + 4)$
- D. $(x - 2)(x - 8)$

28.5. Which expression already has a common factor that can cancel?

- A. $(x + 1) / (x - 1)$
- B. $(x^2 + 1) / x$
- C. $x(x - 2) / x$
- D. $(x + 4) / (x + 5)$

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

29.1. What is the best first step to simplify $(x^2 - 25) / (x - 5)$?

- A. add 25
- B. factor the numerator
- C. divide every term by x
- D. plug in $x = 5$

29.2. What does $(x^2 - 9) / (x - 3)$ simplify to?

- A. $x - 3$
- B. $x + 3$
- C. $x^2 - 3$
- D. 1

29.3. After simplifying $(x^2 - x) / x$ to $x - 1$, which value is still excluded?

- A. -1
- B. 0
- C. 1
- D. x has no restriction

29.4. Which factorization helps simplify $(x^2 - 16) / (x - 4)$?

- A. $(x - 8)(x + 2)$
- B. $(x - 4)^2$
- C. $(x - 4)(x + 4)$
- D. $(x - 2)(x - 8)$

29.5. Which expression already has a common factor that can cancel?

- A. $(x + 1) / (x - 1)$
- B. $(x^2 + 1) / x$
- C. $x(x - 2) / x$
- D. $(x + 4) / (x + 5)$

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

30.1. What is the best first step to simplify $(x^2 - 25) / (x - 5)$?

- A. add 25
- B. factor the numerator
- C. divide every term by x
- D. plug in $x = 5$

30.2. What does $(x^2 - 9) / (x - 3)$ simplify to?

- A. $x - 3$
- B. $x + 3$
- C. $x^2 - 3$
- D. 1

30.3. After simplifying $(x^2 - x) / x$ to $x - 1$, which value is still excluded?

- A. -1
- B. 0
- C. 1
- D. x has no restriction

30.4. Which factorization helps simplify $(x^2 - 16) / (x - 4)$?

- A. $(x - 8)(x + 2)$
- B. $(x - 4)^2$
- C. $(x - 4)(x + 4)$
- D. $(x - 2)(x - 8)$

30.5. Which expression already has a common factor that can cancel?

- A. $(x + 1) / (x - 1)$
- B. $(x^2 + 1) / x$
- C. $x(x - 2) / x$
- D. $(x + 4) / (x + 5)$

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

31.1. Why do we decompose a rational expression into partial fractions?

31.2. Before using partial fractions, a good first step is usually to:

31.3. If the denominator is $(x - 1)(x + 2)$, the partial-fraction form should look like:

- A. $A / (x - 1) + B / (x + 2)$
- B. $A / (x - 1)(x + 2)$
- C. $A(x - 1) + B(x + 2)$
- D. $A / x + B$

- A. to rewrite it as simpler rational pieces
- B. to remove every denominator
- C. to find only the horizontal asymptote
- D. to make every factor quadratic

- A. factor the denominator completely
- B. graph the numerator only
- C. take the derivative
- D. multiply by 0

31.4. If the denominator has $(x - 3)^2$, which setup feature is needed?

- A. only one term $A / (x - 3)$
- B. two terms using $x - 3$ and $(x - 3)^2$
- C. a square root
- D. no constants

31.5. If the numerator degree is at least the denominator degree, what should happen before partial fractions?

- A. do polynomial division first
- B. take a square root first
- C. set the numerator to 0
- D. ignore the degree issue

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.

32.1. When solving a rational inequality, the sign chart shows:

- A. where the graph crosses the y -axis
- B. where the expression is positive or negative
- C. the exact scale of the graph
- D. only the numerator zeros

32.2. What should you mark first for a rational inequality?

- A. only the y -intercept
- B. zeros and undefined values
- C. the horizontal asymptote
- D. the slope

32.3. If you solve $(x - 1) / (x + 2) > 0$, what happens to $x = -2$?

- A. include it because the graph is positive nearby
- B. exclude it because the expression is undefined there
- C. include it because the numerator is not 0
- D. turn it into a hole

32.4. For $(x - 4) / (x + 1) \geq 0$, why is $x = 4$ important?

- A. it makes the denominator 0
- B. it makes the numerator 0
- C. it is the y -intercept
- D. it is the asymptote

32.5. After marking critical values on a number line, the next step is to:

- A. multiply all factors together symbolically forever
- B. test one number from each interval
- C. graph only the numerator
- D. ignore the denominator