

Precalculus - Rational Functions and Asymptotes

- Quiz

Common Core A-APR.D.7, F-IF.C.7d, A-CED.A.1 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

Pick the best answer for 10 questions on rational functions. Each explanation names the common mistake, such as confusing holes with asymptotes.

Precalculus · Common Core State Standards: **A-APR.D.7, F-IF.C.7d, A-CED.A.1**

Questions

Question 1

What is the vertical asymptote of $f(x) = \frac{5}{x+4}$?

- A. $x = 4$
- B. $x = -4$
- C. $y = -4$
- D. $y = 5$

Question 2

What is the horizontal asymptote of $\frac{6x^2+1}{3x^2-5}$?

- A. $y = 0$
- B. $y = 3$
- C. $y = 2$
- D. $y = 6$

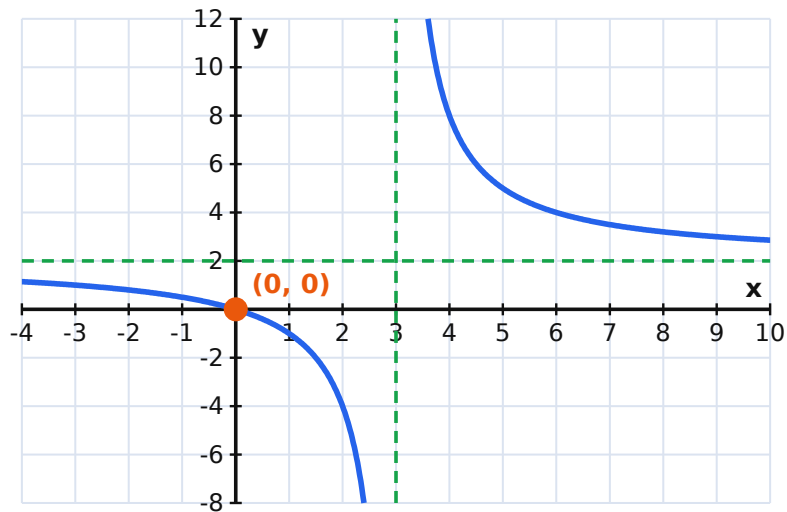
Question 3

Which describes $f(x) = \frac{x^2-1}{x-1}$ at $x = 1$?

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

Question 4

The graph shows $f(x) = \frac{2x}{x-3}$. What is the horizontal asymptote?



Graph of f .

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

Question 5

What is the slant asymptote of $\frac{x^2+1}{x}$?

- A. $y = 1$
- B. $y = x + 1$
- C. $y = x$
- D. There is none

Question 6

Solve $\frac{x}{x-1} = \frac{1}{x-1} + 2$.

x	left side	right side
1	undefined	undefined

Check $x = 1$.

- A. No solution
- B. $x = 1$
- C. $x = -1$
- D. $x = 2$

Question 7

Which function has a vertical asymptote at $x = 2$ and a hole at $x = -1$?

- A. $\frac{x-2}{(x-2)(x+1)}$
- B. $\frac{x+1}{(x-2)(x+1)}$
- C. $\frac{1}{(x-2)(x+1)}$
- D. $\frac{x+1}{x-2}$

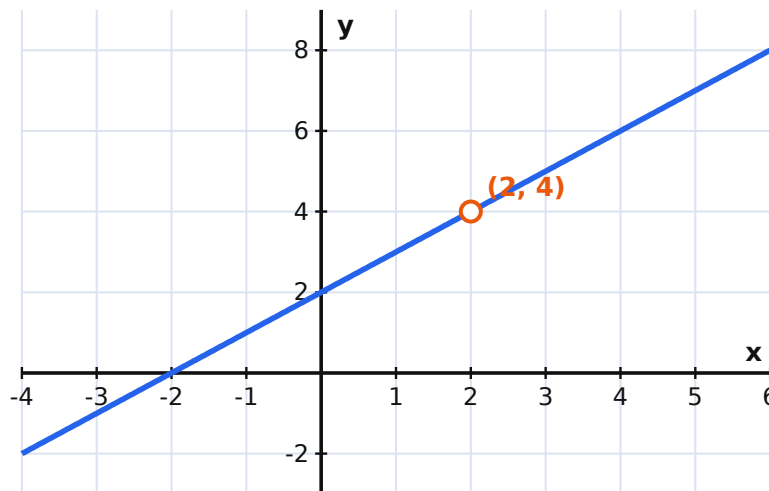
Question 8

What is the y -intercept of $f(x) = \frac{x-6}{x+3}$?

- A. $(0, -2)$
- B. $(6, 0)$
- C. $(0, 2)$
- D. $(-3, 0)$

Question 9

The graph shows a function with a hole. Where is it?



Graph with an open circle.

- A. $(4, 2)$
- B. $(2, 0)$
- C. $(0, 2)$
- D. $(2, 4)$

Question 10

Which is the domain of $f(x) = \frac{x+2}{x^2-4}$?

- A. $x \neq 2$
- B. $x \neq -2$
- C. All real numbers
- D. $x \neq \pm 2$

Answers

1. **B** - The denominator is 0 at $x = -4$. Vertical asymptotes are lines $x = a$.
2. **C** - Equal degrees: 6 divided by 3 gives 2.
3. **A** - $x - 1$ cancels, so the graph is $y = x + 1$ with a hole at $(1, 2)$.
4. **B** - The dashed horizontal line is $y = 2$. The line $x = 3$ is the vertical asymptote.
5. **C** - $x^2 + 1$ over $x = x + 1/x$, so the line is $y = x$.
6. **A** - Solving gives $x = 1$, which makes the denominator 0, so it is extraneous.
7. **B** - The cancelled factor $x + 1$ gives the hole at -1 , and the remaining $x - 2$ gives the asymptote.
8. **A** - $f(0) = -6/3 = -2$. The value 6 gives the x-intercept.
9. **D** - The open circle is at $x = 2$ on the line $y = x + 2$, so $y = 4$.
10. **D** - Both $x = 2$ and $x = -2$ make the denominator 0. The cancelled factor still removes -2 from the domain.

Remember

- Domain: all real numbers except zeros of the denominator.
- Vertical asymptote: a denominator zero that does not cancel. Hole: a cancelled factor.
- Degree of numerator < denominator: $y = 0$. Equal degrees: $y =$ ratio of leading coefficients.
- Degree of numerator = degree of denominator + 1: slant asymptote from division.
- Always check rational equation answers for extraneous solutions.