

Algebra 2 · Rational Functions and Their Graphs · Quiz

Common Core F-IF.C.7d, F-IF.B.4 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

Ten multiple-choice questions check your skill with rational functions: asymptotes, domain and range, holes, graph transformations of $y = 1/x$, and inverse variation. Choose the one correct answer, then read the explanation to learn the typical mistake.

Algebra 2 Common Core: F-IF.C.7d · F-IF.B.4

Questions

Question 1

What is the vertical asymptote of $y = \frac{5}{x+7} - 2$?

- A. $x = 7$
- B. $x = -2$
- C. $x = 2$
- D. $x = -7$

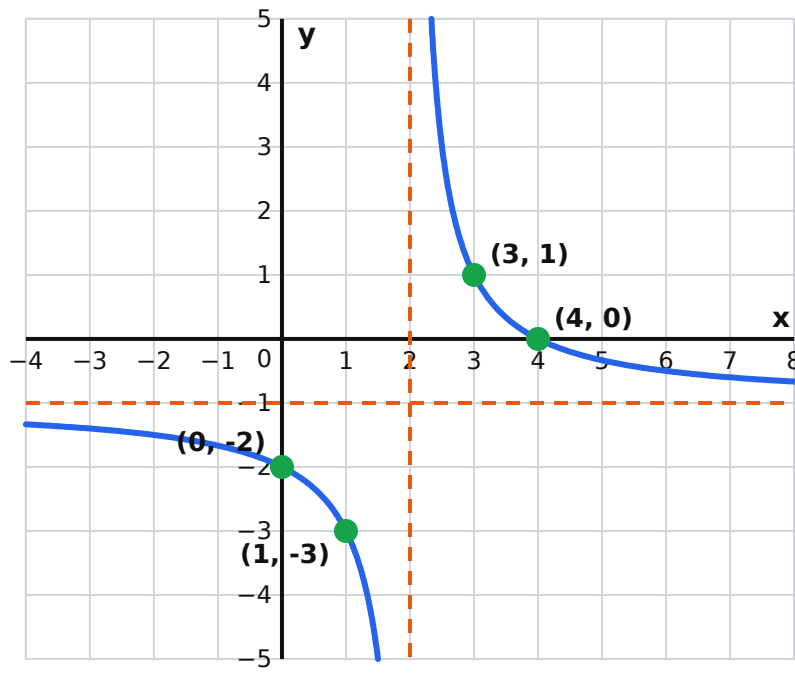
Question 2

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

- A. $y = 0$
- B. $y = 6$
- C. $y = -\frac{1}{5}$
- D. $y = 3$

Question 3

Which equation matches the graph?



A hyperbola with dashed asymptotes.

- A. $y = \frac{2}{x+2} - 1$
- B. $y = \frac{2}{x-2} - 1$
- C. $y = \frac{2}{x-2} + 1$
- D. $y = -\frac{2}{x-2} - 1$

Question 4

What is the domain of $f(x) = \frac{x+3}{x^2-16}$?

- A. $x \neq 4$
- B. $x \neq -3$
- C. $x \neq 16$ and $x \neq -16$
- D. $x \neq 4$ and $x \neq -4$

Question 5

How is the graph of $y = \frac{1}{x-4} + 3$ related to the graph of $y = \frac{1}{x}$?

- A. Left 4 and up 3
- B. Right 4 and down 3
- C. Right 4 and up 3
- D. Right 3 and up 4

Question 6

The variable y varies inversely with x , and $y = 6$ when $x = 4$. What is y when $x = 8$?

- A. 12

- B. 48
- C. 3
- D. 24

Question 7

The table shows an inverse variation. What is the constant k ?

x	2	3	6	9
y	18	12	6	4

Values of an inverse variation.

- A. 36
- B. 20
- C. 9
- D. 18

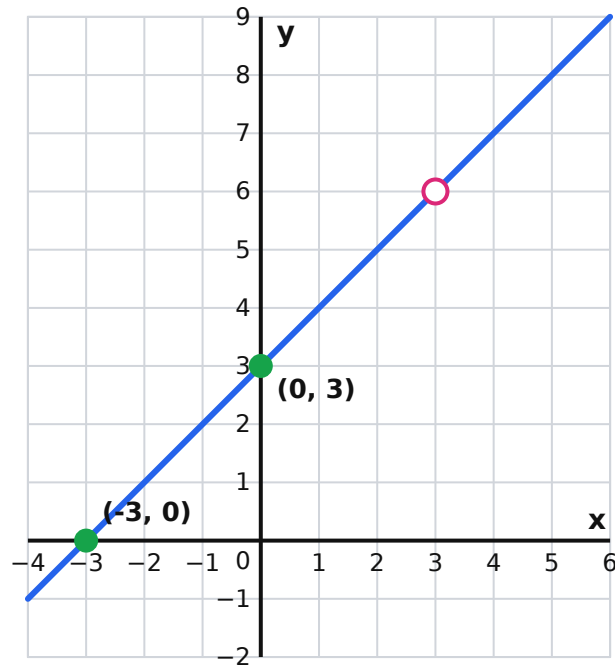
Question 8

What is the range of $y = \frac{1}{x+3} + 4$?

- A. $y \neq -4$
- B. $y \neq 3$
- C. $y \neq 4$
- D. $y \neq -3$

Question 9

The graph of $f(x) = \frac{x^2-9}{x-3}$ is shown. What are the coordinates of the open circle?



A line with one open circle.

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

Question 10

A bus rental is split equally among n students, so each pays $c = \frac{240}{n}$ dollars. As n gets very large, what happens to c ?

- A. It becomes exactly
- B. It gets close to but never equals
- C. It approaches 0
- D. It grows without bound

Answer key

1. **D** - The denominator is zero at $x = -7$. The constant -2 moves the horizontal asymptote, not the vertical one.
2. **D** - The degrees are equal, so divide the leading coefficients: $\frac{6}{2} = 3$. The answer $y = 0$ is only for a smaller numerator degree.
3. **B** - The asymptotes are $x = 2$ and $y = -1$, so $h = 2$, $k = -1$. The point $(3, 1)$ gives $a = 2$. Reading the signs of h and k backward is the usual error.
4. **D** - Solve $x^2 - 16 = 0$: $(x - 4)(x + 4) = 0$, so both 4 and -4 are excluded. The numerator does not affect the domain here.
5. **C** - Subtracting 4 inside the denominator moves the graph right 4 , and adding 3 outside moves it up 3 . The sign inside the denominator acts opposite to what it seems.
6. **C** - The constant is $k = 4 \cdot 6 = 24$, so $y = \frac{24}{x} = 3$. Doubling x halves y ; the answer 12 treats it as direct variation.
7. **A** - Multiply paired values: $2 \cdot 18 = 3 \cdot 12 = 6 \cdot 6 = 9 \cdot 4 = 36$. Adding x and y or dividing them does not give a constant.
8. **C** - The horizontal asymptote is $y = 4$, and the graph never reaches that height. The value -3 is the excluded x -value, which belongs to the domain.
9. **A** - Cancel $x - 3$ to get $y = x + 3$. At $x = 3$ the height is 6 . The point $(-3, 0)$ is on the line and is filled in.
10. **B** - The horizontal asymptote is $c = 0$. A quotient of 240 by a very large number is tiny but positive, so it never equals zero.

Remember:

- Standards F-IF.C.7d and F-IF.B.4: graph rational functions and identify asymptotes, intercepts, domain and end behavior.
- The graph of $y = \frac{a}{x-h} + k$ has asymptotes $x = h$ and $y = k$ and center (h, k) .
- A canceled factor $x - c$ leaves a hole at $x = c$; a factor that remains in the denominator gives a vertical asymptote.
- Compare degrees: smaller numerator gives $y = 0$, equal degrees give the ratio of leading coefficients, larger numerator gives none.
- Inverse variation $y = \frac{k}{x}$ means the product xy is constant.