



College Prep Math
Graphing Rational Functions Notes

Today I will...	I'll know I've got it when...	Essential Question...

Domain and Range of Rational Functions

To find the domain of a rational function...

Example 1: Find the domain of each rational function.

A. $f(x) = \frac{3}{x-2}$

B. $g(x) = \frac{2x-1}{x}$

C. $h(x) = \frac{x}{x^2-x-2}$

To find the range of a rational function...

Example 2: Find the range of each rational function.

A. $f(x) = \frac{3}{x-2}$

B. $g(x) = \frac{2x-1}{x}$

C. $h(x) = \frac{x}{x^2-x-2}$

What is an asymptote?

Vertical Asymptotes

Example 3: Find all vertical asymptotes for each rational function.

A. $f(x) = \frac{3}{x-2}$

B. $g(x) = \frac{2x-1}{x}$

C. $h(x) = \frac{x}{x^2-x-2}$

Horizontal Asymptotes

Example 4: Find all horizontal asymptotes for each rational function.

A. $f(x) = \frac{3}{x-2}$

B. $g(x) = \frac{2x-1}{x}$

C. $h(x) = \frac{x}{x^2-x-2}$

Think About It...

Write a rational function that has the specified characteristics.

A. No vertical asymptotes and has a horizontal asymptote at $y = 2$.

B. Vertical asymptotes at $y = 0$ and $y = \frac{5}{3}$ and a horizontal asymptote at $y = -3$.

C. Give an example of a rational function whose domain is the set of all real numbers.

D. Given an example of a rational function whose domain is the set of all real numbers except $x = 20$.

Writing About Math...

Do you think it is possible for the graph of a rational function to cross its horizontal asymptote? If so how can you determine when the graph of a rational function will cross its horizontal asymptote?

Use the graphs of the following functions to investigate these questions. Write a summary of your conclusions. Explain your reasoning.

$$f(x) = \frac{x}{x^2+1}$$

$$g(x) = \frac{x}{x^2-3}$$

$$h(x) = \frac{x^2}{2x^3-x}$$

x and y-Intercepts

To find the x-intercept of a rational function...

To find the y-intercept of a rational function...

Example 5: Find the x and y-intercepts for each rational function.

A. $f(x) = \frac{3}{x-2}$

B. $g(x) = \frac{2x-1}{x}$

C. $h(x) = \frac{x}{x^2-x-2}$

Graphing Rational Functions

1. Find and graph the vertical asymptotes.
2. Find and graph the horizontal asymptotes.
3. Find and graph the x-intercept.
4. Find and graph the y-intercept.
5. Plot at least one point between, and one point beyond each x-intercept and vertical asymptote.

Example 6: Graph each rational function.

A. $f(x) = \frac{3}{x-2}$

B. $g(x) = \frac{x}{x^2-x-2}$

Vertical Asymptote(s):

Vertical Asymptote(s):

Horizontal Asymptote(s):

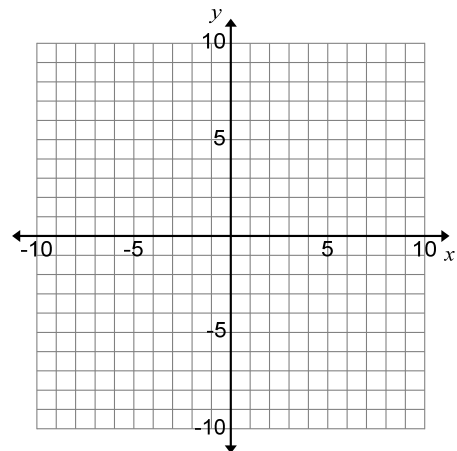
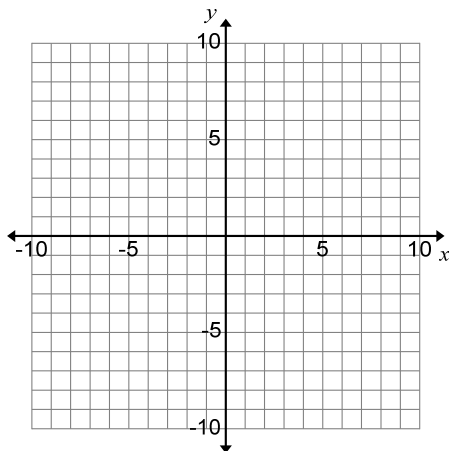
Horizontal Asymptote(s):

x-intercept(s):

x-intercept(s):

y-intercept(s):

y-intercept(s):



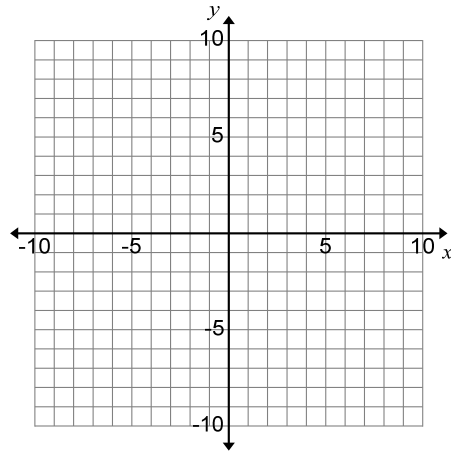
C. $h(x) = \frac{2x-1}{x}$

Vertical Asymptote(s):

Horizontal Asymptote(s):

x-intercept(s):

y-intercept(s):



Think About It...

Use a graphing calculator to graph the function. Explain why there is no vertical asymptote when a superficial examination of the function may indicate one.

$$f(x) = \frac{6-2x}{3-x}$$

$$g(x) = \frac{x^2+2x-2}{x-1}$$