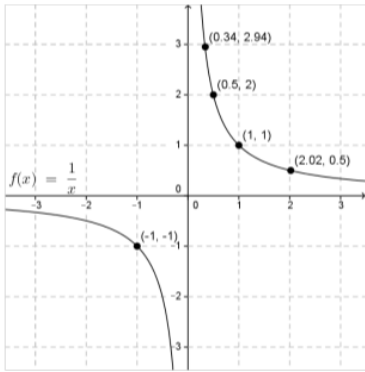


Name:

Period:

Date:

Math Lab: Graphing Rational Functions



The parent graph of a rational function is $f(x) = \frac{1}{x}$. Like all parent graphs, it passes through the point (__,__). It has a horizontal asymptote at _____ and a vertical asymptote at _____. The graph approaches but does not cross these lines. The parent graph of a rational function has a domain of _____ and a range of _____. The parent graph of a rational function is always decreasing. The graphs below show the parent graphs with different transformations. Describe how each variable in $f(x) = \frac{a}{x-h} + k$ changes the parent graph (in bold).

$y = \frac{1}{x}, \quad y = \frac{2}{x}, \quad y = \frac{3}{x}$

How does increasing a change the graph?

$y = \frac{1}{x}$ and $y = \frac{-1}{x}$

How does multiplying a by negative one change the graph?

$y = \frac{1}{x}, \quad y = \frac{1}{x+1}, \quad y = \frac{1}{x+2}$

How does adding h to the x change the graph?

$y = \frac{1}{x}, \quad y = \frac{1}{x-1}, \quad y = \frac{1}{x-2}$

How does subtracting h from the x change the graph?

$y = \frac{1}{x}, \quad y = \frac{1}{x} + 1, \quad y = \frac{1}{x} + 2$

How does adding k to the function change the graph?

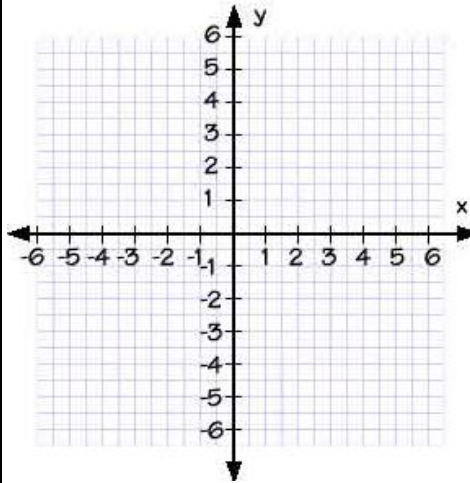
$y = \frac{1}{x}, \quad y = \frac{1}{x} - 1, \quad y = \frac{1}{x} - 2$

How does subtracting k from the function change the graph?

Identify the horizontal and vertical asymptotes, sketch each graph, and state the domain and range.

1] $y = \frac{1}{x-3} + 2$

Two points:

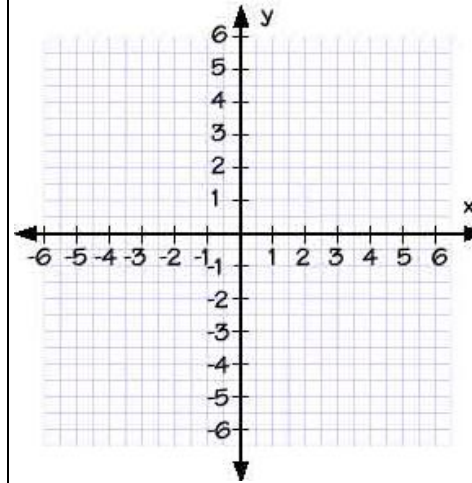


Domain:

Range:

2] $y = \frac{1}{x+2} - 3$

Two points:

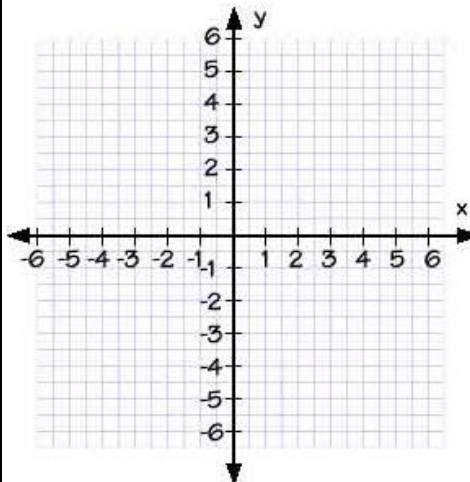


Domain:

Range:

3] $y = \frac{-1}{x+4}$

Two points:

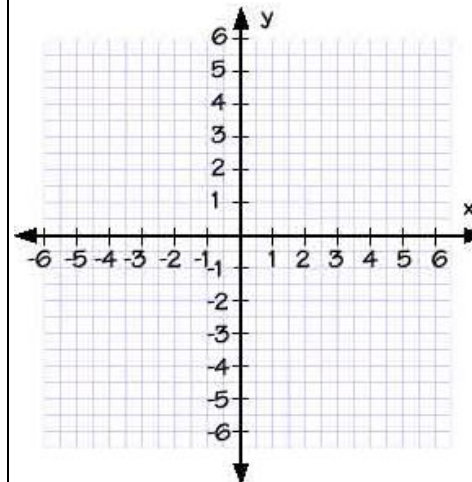


Domain:

Range:

4] $y = \frac{-1}{x-2} + 3$

Two points:

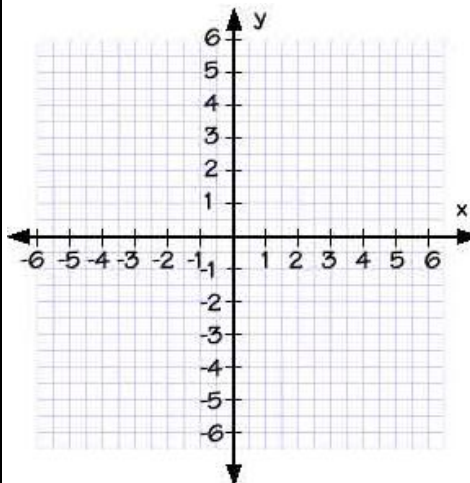


Domain:

Range:

5] $y = \frac{3}{x} - 2$

Two points:

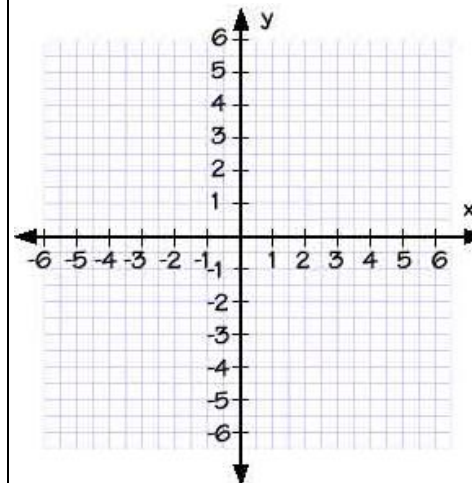


Domain:

Range:

6] $y = \frac{-2}{x+3}$

Two points:

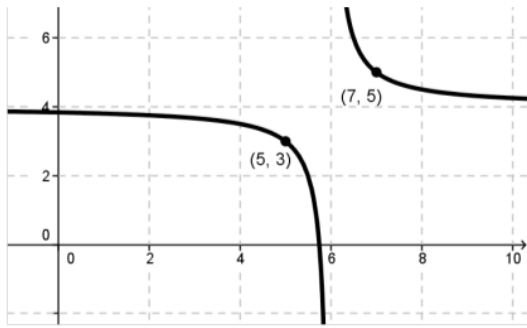


Domain:

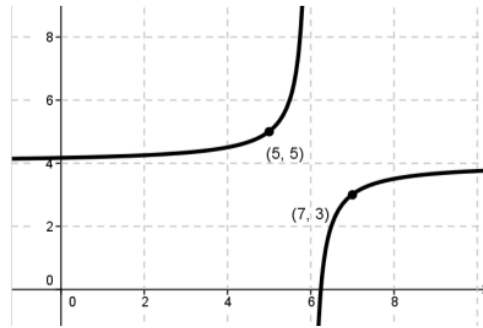
Range:

Write the equation that produces each graph. Then use the given points to check the equation.

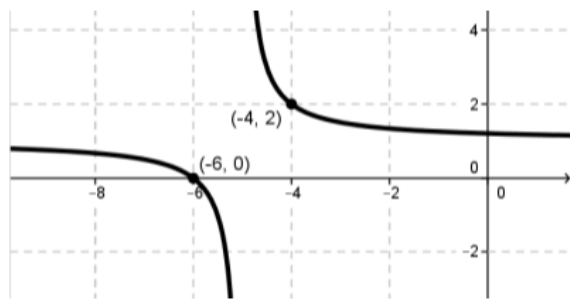
7]



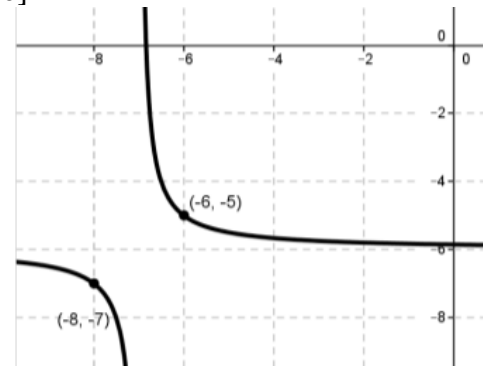
8]



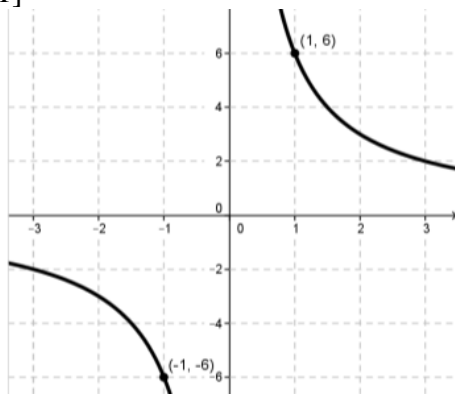
9]



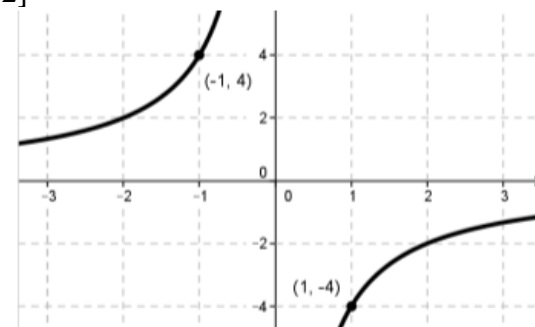
10]



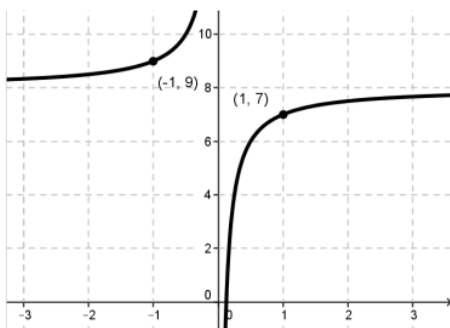
11]



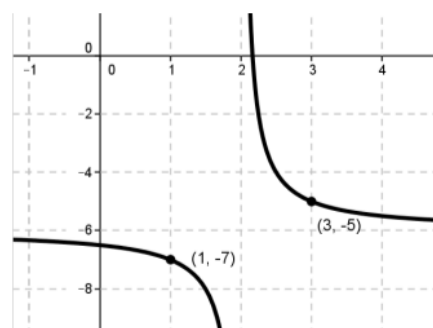
12]



13]



14]



Complete the missing information in the table below. Assume $a = 1$ or -1 for all equations.

	Equation	Domain	Range	Increasing or Decreasing
15]	$y = \frac{1}{x+7} - 10$	$x \neq -7$		Decreasing
16]	$y = \frac{-1}{x-4}$		$y \neq 0$	Increasing
17]	$y = \frac{1}{x} + 8$	$x \neq 0$		
18]		$x \neq 5$	$y \neq 2$	Decreasing
19]	$y = \frac{-1}{x} - 5$			Increasing
20]		$x \neq -2$	$y \neq 0$	Increasing
21]	$y = \frac{1}{x+10} + 3$			
22]	$y = \frac{1}{x-4} + 9$			
23]		$x \neq -9$	$y \neq -4$	Decreasing

24] Write the equation of the rational function that has been translated left six units, down five units, and has been reflected in the x-axis.

25] Identify the domain, range, and two points on the graph of the equation you wrote in #24.