

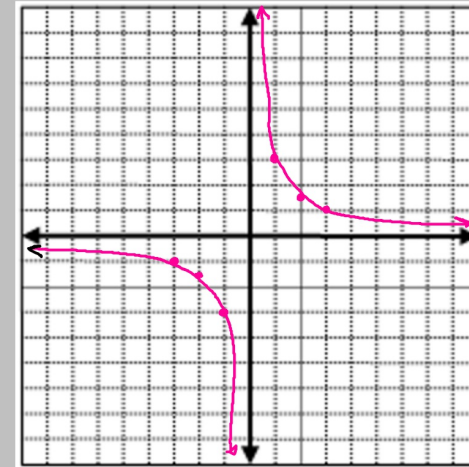
9.2 Graphing Inverse Variation

The graphs of inverse variations have 2 parts. Each part is called a branch.

The parent function is the inverse function $f(x) = \frac{1}{x}$ $x \neq 0$

Draw a graph.

x	$f(x) = \frac{3}{x}$
-3	-1
-2	-1.5
-1	-3
0	-
1	3
2	1.5
3	1



As you can see, the graph approaches both axes but does not cross either. A line is an asymptote of a graph if the graph approaches a vertical or horizontal line.

\mathbb{R} = all real numbers

State the vertical and horizontal asymptotes and the domain and range.

VA: $x = 0$ HA: $y = 0$

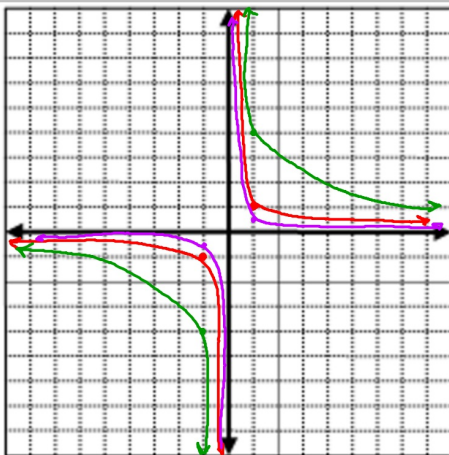
d: $\mathbb{R} \neq 0$ r: $\mathbb{R} \neq 0$

Use a graphing calculator. Draw and compare the graphs. Compare their intersections with the line $y = x$.

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

$y = \frac{4}{x}$

$y = \frac{0.5}{x}$

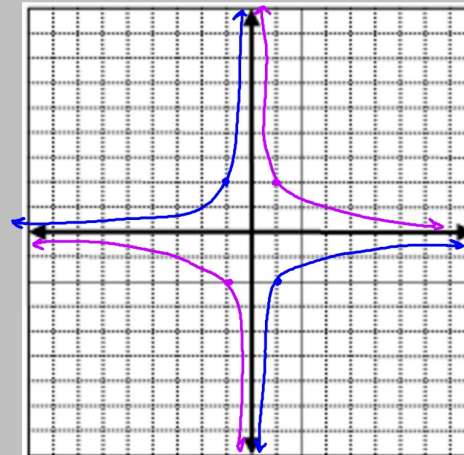


Use a graphing calculator. Draw and compare the graphs.

$y = \frac{2}{x}$

$y = -\frac{2}{x}$

reflects over x-axis



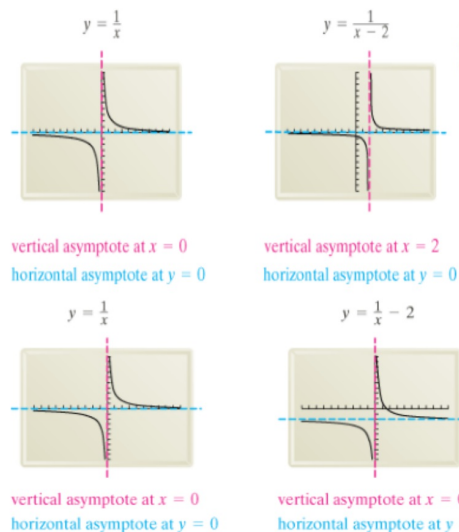
The frequency, f , in hertz of a sound wave varies inversely with its wavelength, w . The function $f = \frac{343}{w}$ models the relationship between f and w for a wave with a velocity of 343 meters per second. Find the wavelength of a sound wave with a frequency of 440 Hz.

$$440 = \frac{343}{w}$$

$$\frac{440w}{440} = \frac{343}{440}$$

$$w = .78m$$

The graph of many rational functions are related to each other. Look at the graphs of the functions below.



The graphs are identical in shape, but the second graph is translated two units to the right.

When the numerator and denominator of a rational function have no common factors other than 1, there is a vertical asymptote at the x -value that makes the denominator equal zero. This is because division by zero is undefined.

The domain of a function does not include that x -value where there is a vertical asymptote.

You can see how to shift the graph of a rational function vertically. The graphs are identical in shape, but the second graph is translated two units down.

The graph of a rational function in the form $y = \frac{1}{x-b} + c$ has a VERTICAL ASYMPTOTE at $x = b$ and a HORIZONTAL ASYMPTOTE at $y = c$.

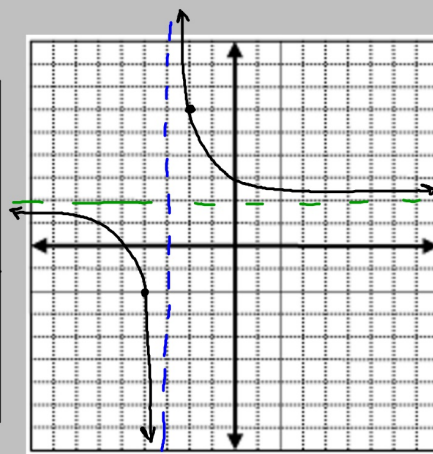
The graph is a translation of the inverse function b units left or right and c units up or down.

Identify the asymptotes of the function. Make a table. Then graph.

$$y = \frac{4}{(x+3)} + 2$$

horizontal: $y = 2$
vertical: $x = -3$

x	y
-7	1
-6	2/3
-5	0
-4	-2
-3	-
-2	6
-1	4
0	3 1/3



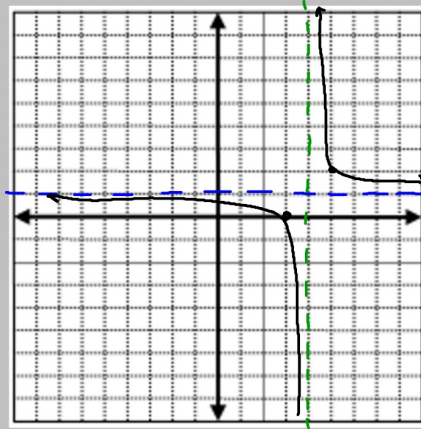
Identify the asymptotes of the function. Make a table. Then graph.

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

horizontal: $y = 1$

vertical: $x = 4$

x	y
1	2/3
2	1/2
3	0
4	-
5	2
6	1.5
7	1 1/3



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Identify the asymptotes of the function. Make a table. Then graph.

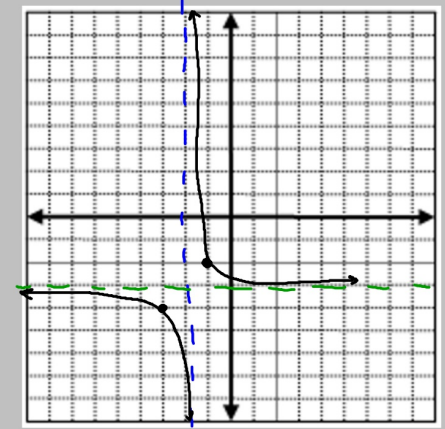
$$y = \frac{1}{x+2} - 3$$

horizontal: $y = -3$

vertical: $x = -2$

$$\frac{1}{x}$$

x	y
-5	
-4	
-3	-4
-2	-
-1	-2
0	
1	



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Write an equation for the translation of $y = -\frac{7}{x}$ with asymptotes $x = 8$ and $y = -4$

$$y = -\frac{7}{x-8} - 4$$

Write an equation for the translation of $y = \frac{3}{x}$ with asymptotes $x = -4$ and $y = 5$

$$y = \frac{3}{x+4} + 5$$

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homework.

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