Name_____ Date _____ Period _____

Reciprocal Function Exploration

Use DESMOS to do the following:

1) Type in the following function. Add sliders for each. Explore each value.

a. $f(x) = (\frac{a}{x-h}) + k$; $y = k$; $x = h$; click the point where $y = k$ and $x = h$ touch the axis to see its value; change the color style for the last two functions as dashed.

b. Explain the function of a. What happens when it's 0?

c. Explain the function of h. What happens when it's 0?

d. Explain the function of k. What happens when it's 0?

e. Explain the function of $x = h$. What is this?

f. Explain the function of $y = k$. What is this?

g. Does the change in a affect the values for $x = h$ or $y = k$? Explain.
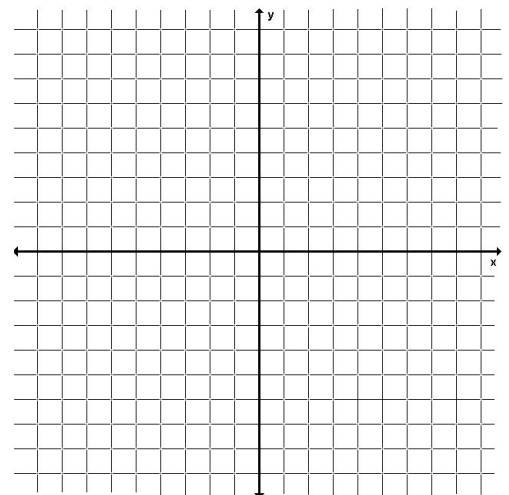
2) Consider $f(x) = \frac{1}{x-3} + 4$.

a. Horizontal translation: _____

b. Vertical asymptote: _____

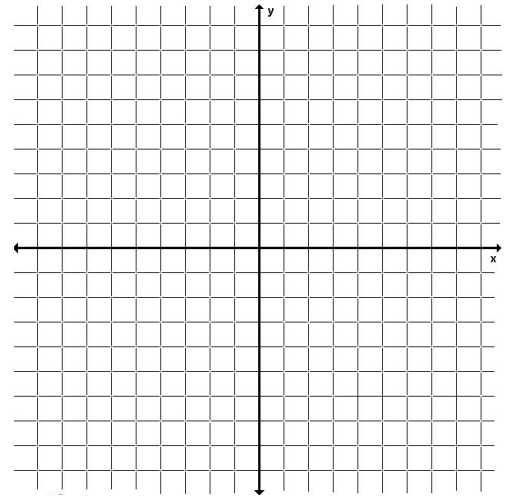c. Vertical translation: _____

d. Horizontal asymptote: _____

e. Sketch the asymptotes and the points.
   Then sketch each part of the graph.
   Check your graph on DESMOS.

3) Consider $f(x) = \frac{-5}{x+2} - 3$.

   a. Horizontal translation: _____

   b. Vertical asymptote: _____

   c. Vertical translation: _____

   d. Horizontal asymptote: _____

   e. Sketch the asymptotes and the points.
      Then sketch each part of the graph.
      Check your graph on DESMOS.

4. Write the equation of the transformation based on the given information. Check your equation.

Horizontal Asymptote	Vertical Asymptote	Stretch/Shrink	Reflection	Equation
$y = 4$	$x = 0$	1	yes	
$y = 3$	$x = -2$	2	no	
$y = -2$	$x = -3$	1/2	yes	
$y = 1$	$x = 1$	1/4	yes	
$y = -8$	$x = 4$	3	yes	

5. Create your own equations with the given parameters. Check your equation.

Horizontal Asymptote	Vertical Asymptote	Stretch/Shrink	Reflection	Equation
down	right	stretch	yes	
up	left	none	no	
none	left	shrink	yes	
down	none	shrink	no	
up	right	stretch	yes	

6. Graph one reciprocal function from #4 and #5.