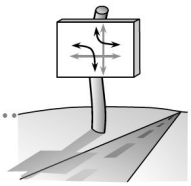
CW#____ Name:_____

# 4.2.1 Are you feeling rational?

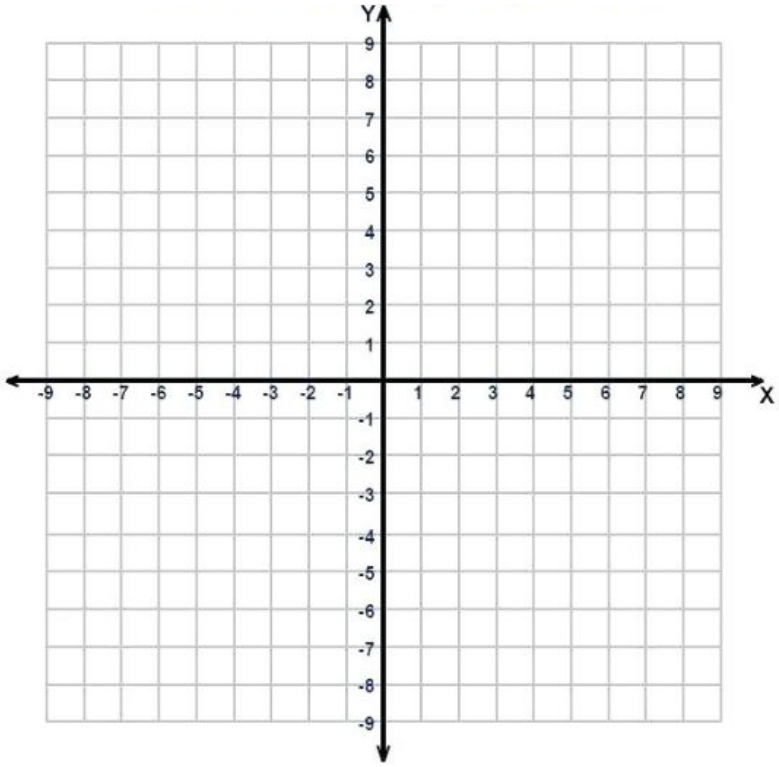
Graphing Transformations of $y = \frac{1}{x}$



**#50** GRAPHING RATIONAL FUNCTIONS, Part 1

a. Without a calculator, sketch the graph of $g(x) = \frac{1}{x+2} + 3$.

Think of it as a transformation of $f(x) = \frac{1}{x}$.




b. State the domain and range of *g*.

c. State the intercepts of $y = g(x)$.

d. Where are the asymptotes (both horizontal and vertical) of $y = g(x)$?

e. Describe the end behavior of *g*. That is:

As the *x*-values increase the *y*-values _____. (As $x \to \infty$, $y \to$ _____.)

As the *x*-values decrease the *y*-values _____. (As $x \to -\infty$, $y \to$ _____.)

f. For this function you can write an equation to describe the end behavior. Use your answers to part (e) to write the equation of the end-behavior function.

**#51** REWRITING RATIONAL FUNCTIONS

Some rational functions look complicated, but are simply shifts of $f(x) = \frac{1}{x}$.

a. Use polynomial division (long division or an area model) to rewrite $h(x) = \frac{3x+7}{x+2}$. What do you notice?

b. Where are the intercepts of $y = h(x)$? Which form of the equation is most useful for determining the intercepts?

c. Where are the asymptotes (both horizontal and vertical) of $y = h(x)$? Which form of the equation is most useful for determining the asymptotes?

**#52** Now that her team has completed the polynomial division in problem 4-51, Najma thinks she knows another way to rewrite equations of rational functions. Najma says to her team, *"If rational functions are fractions, perhaps we can use a process similar to writing a fraction greater than 1 as a mixed number."*

a. Write $\frac{20}{17}$ as a mixed number.

b. Najma wants to rewrite the fraction by using a Giant One: $\frac{20}{17} = \frac{17+3}{17} = \frac{17}{17} + \frac{3}{17} = 1 + \frac{3}{17}$. Explain the steps that are used in this approach.

c. Illustrate this new approach on the number $\frac{19}{7}$.

**#52 Continued**

d. Work with your team to rewrite $\frac{x+3}{x+1}$ using the same technique as outlined in part (b).

e. Now use this method to rewrite $h(x) = \frac{3x+7}{x+2}$, the function in problem 4-51.

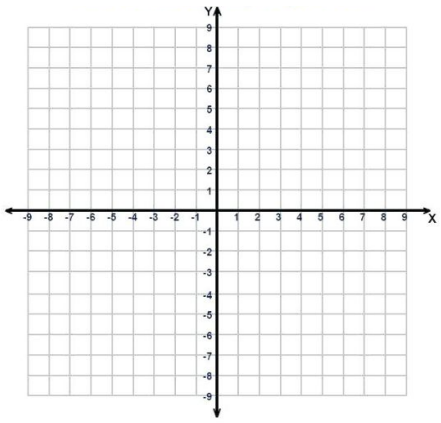
**#53** Consider the function $k(x) = \frac{2x-5}{x-3}$.

a. Use polynomial division or Najma's method to rewrite $k(x)$ in the form $y = \frac{a}{x-h} + k$.

b. Where are the intercepts of $y = k(x)$?

c. Where are the asymptotes (both horizontal and vertical) of $y = k(x)$?

d. Graph $y = k(x)$.




e. Describe the end behavior of $y = k(x)$.