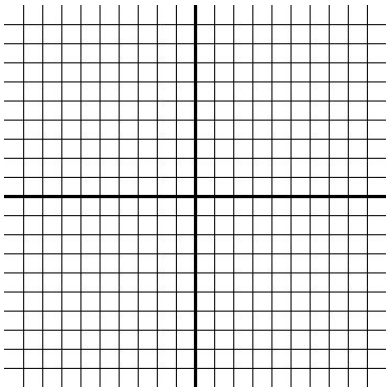
BIG PICTURE of this UNIT:	• What is a Polynomial and how do they look? • What are the attributes of a polynomial? • How do I work with polynomials?		
CONTEXT of this LESSON:	Where we've been We have discussed the basics of polynomial functions (appearance & simple algebra)	Where we are We have solidified the basics of polynomials and their graphs. Now we have a small adventure into rational functions	Where we are heading What are the key attributes of a rational function, linear over linear?

(A) Lesson Objectives:

a. Work on and attempt to develp an understanding of KEY rational vocabulary.
b. Begin to analyze the the attributes of a rational functions and it's effect on the graph.
c. Observations and patterns in the graphs of rational functions.

(B) Review of the rational parent function

Sketch a graph of $y = \frac{1}{x}$. Make sure to include any asymptotes.



Label the TWO key points on this function and write them down:

Write down the equations of the asymptote(s):

State the domain and range:

State the zero(s) (if they exist):

State the extrema (if they exist):

State the intervals of increase and decrease:

Is the function continuous or discontinuous?

(C) Review of transformations

$$f(x) = a(x - c) + d$$

How does "a" affect f(x)?

How does "c" affect f(x)?

How does "d" affect f(x)?

(D) Rational Functions Investigation #1

Using Desmos and your brain, let's explore rational functions! Open this Google Doc, make a copy for you and your partner, and then fill out the table in the document investigating $f(x) = \frac{1}{x - c} + d$.

(E) Rational Functions Investigation #2

Using Desmos and your brain, let's explore rational functions! Using the same Google Doc, fill out the table in the document investigating $f(x) = \frac{a}{x}$ and $f(x) = \frac{a}{x - c} + d$.

Transformation form for rational functions: $f(x) = \frac{a}{x-c} + d$

EVENTUALLY, we will look at rational functions taking the form below. In this course g(x) and h(x) will be restricted to linear functions of the form ax + b. So we will be working with functions that look a bit like…

$$f(x) = \frac{g(x)}{h(x)} = \frac{ax+b}{cx+d}$$

$$ex.$$

$$f(x) = \frac{2x-1}{x+5}$$

*It is a much needed fact that h(x)≠0.

(F) Algebra with Rational Functions

Converting from transformation form to linear/linear.

Write the following as ONE fraction:

$\frac{2}{x} + 3$

$4 - \frac{3}{x}$

$\frac{1}{x+3} + 1$

$\frac{1}{x-2} - 4$

$\frac{1}{x+5} - 2$

$\frac{1}{x-4} + 3$