Unit 4
Module 8.1

Graph Rational Function

Learning Intentions

Given a rational function, students will be able to find its vertical and horizontal asymptotes and identify the excluded values to state its domain.

Success Criteria

I will be to recognize a rational function.

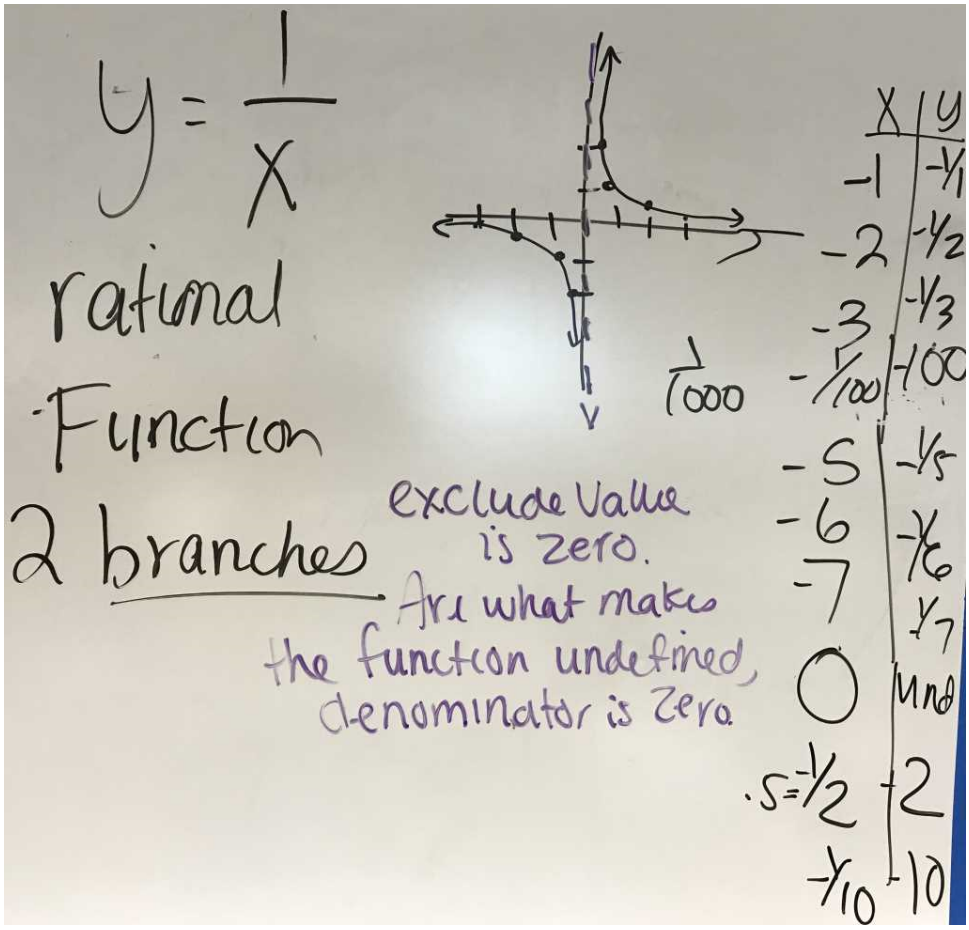
I will be able to find vertical asymptotes (excluded values).
I will be able to find points, x and y intercepts on a rational function.

I will be able to sketch the graph of a polynomial function.

I will be able to write a rational function given a graph or its asymptotes.

A rational function is in the form of $f(x) = \frac{p(x)}{q(x)}$ where p(x) and q(x) are polynomials functions and q(x) $\neq$ 0.

$$f(x) = \frac{1}{x}$$



Use desmos to graph the following functions

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

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

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

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

What patterns do you observe?

The graph translated left or right.

Use desmos to graph the following functions

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

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

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

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

What patterns do you observe?

The graph reflects across the x-axis

Use desmos to graph the following functions

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

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

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

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

What patterns do you observe?

The graph translates up or down.

KEY CONCEPT *For Your Notebook*

Parent Function for Simple Rational Functions

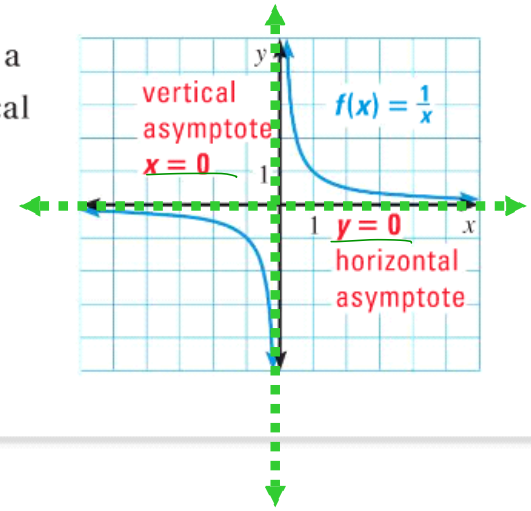
The graph of the parent function $f(x) = \frac{1}{x}$ is a *hyperbola*, which consists of two symmetrical parts called *branches*.

Domain $(-\infty, 0) \cup (0, \infty)$

range $(-\infty, 0) \cup (0, \infty)$

Vertical asymptote $x = 0$

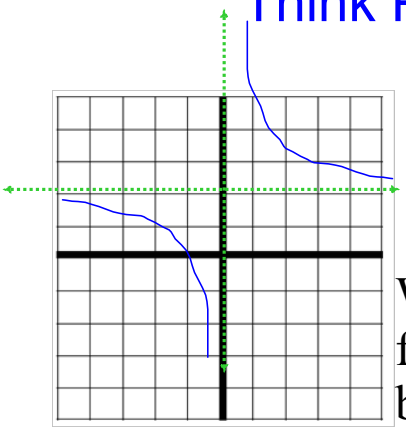
Horizontal Asymptote $y = 0$



General Form

$$y = \frac{a}{x-h} + k$$

Think Pair Share



Parent Function

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

What is the transformation of the parent function to arrive at the rational function below? why?

1. $y = \frac{1}{x} + 2$

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

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