

9.2 Notes: Graphing Rational Functions Day 2

Objectives:

- Be able to manipulate basic rational functions and recognize they are equivalent
- Be able to identify vertical and horizontal asymptotes

Manipulate the form of the rational function to illustrate the vertical and horizontal asymptotes.

$$f(x) = \frac{x+3}{x-1}$$

$$\begin{array}{r} x-1 \overline{) x+3} \\ \underline{-(x-1)} \\ 0+4 \end{array} \quad 1 + \frac{4}{x-1}$$

$$f(x) = \frac{4}{x-1} + 1$$

Transformations: right 1
up 1

VA: $x=1$ HA: $y=1$

$$f(x) = \frac{x-4}{x+2}$$

$$\begin{array}{r} x+2 \overline{) x-4} \\ \underline{-(x+2)} \\ 0-6 \end{array} \quad 1 - \frac{6}{x+2}$$

$$f(x) = -\frac{6}{x+2} + 1$$

Transformations: reflection,
vertical stretch,
left 2, up 1

VA: $x=-2$ HA: $y=1$

$$f(x) = \frac{2x+6}{x+1}$$

$$\begin{array}{r} x+1 \overline{) 2x+6} \\ \underline{-(2x+2)} \\ 0+4 \end{array} \quad 2 + \frac{4}{x+1}$$

$$f(x) = \frac{4}{x+1} + 2$$

Transformations: vertical stretch,
left 1, up 2

VA: $x=-1$ HA: $y=2$

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

$$x-2 \overline{) \begin{array}{r} 3x-5 \\ -(3x-6) \\ \hline 0+1 \end{array}}$$

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

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

Transformations: right 2,
up 3

VA: $x=2$ HA: $y=3$

Getting a common denominator to change it back to one fraction:

$$f(x) = \frac{2}{x+4} + \frac{1}{1} \frac{(x+4)}{(x+4)}$$

$$= \frac{2}{x+4} + \frac{x+4}{x+4}$$

$$f(x) = \frac{x+6}{x+4}$$

$$f(x) = \frac{3}{x-1} + \frac{4}{1} \frac{(x-1)}{(x-1)}$$

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

$$f(x) = \frac{4x-1}{x-1}$$

$$f(x) = \frac{-2}{x+5} - \frac{3}{1} \frac{(x+5)}{(x+5)}$$

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$$= \frac{-2}{x+5} - \frac{3x+15}{x+5}$$

$$f(x) = \frac{-3x-17}{x+5}$$