

9.1 Rational Functions in Simplest Form

consider $y = \frac{-4}{(x+1)} + 2$. Write it in "simplest form" (one fraction)

$$y = \frac{-4}{x+1} + \frac{2(x+1)}{1(x+1)} \quad \text{common denominator}$$

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

$$\text{VA: } x = -1 \quad \text{D: } x \neq -1 \quad \text{x-int: } (1, 0)$$

$$\text{HA: } y = 2 \quad \text{R: } y \neq 2 \quad \text{y-int: } (0, -2)$$

Stretch factor: 4 Reflection over x-axis

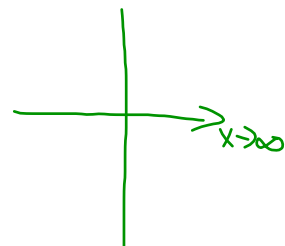
Graph both forms on your calculator to confirm that they are identical.

To find HA, it is the ratio of the lead coef. when the function is in simplest form and num. & denom. have the same degree.

$$\text{let } x = 350$$

$$y = \frac{2x-2}{x+1} = \frac{698}{351} \approx 2$$

$$y = \frac{2(\infty)-2}{\infty+1} = \frac{2\cancel{\infty}}{\cancel{\infty}} = 2$$



$$\text{ex) } y = \frac{4x-5}{x-2}$$

$$4x-5=0 \\ x=5/4$$

$$\text{VA: } x=2 \quad \text{D: } x \neq 2$$

$$\text{x-int: } (5/4, 0)$$

$$\text{HA: } y=4 \quad \text{R: } y \neq 4$$

$$\text{y-int: } (0, 5/2)$$

Now write the function in T.F.

$$\frac{4x-5}{x-2} \rightarrow \frac{a}{x-2} + \frac{k(x-2)}{x-2}$$

$$\frac{4x - \overset{0}{8} + 8 - 5}{x-2}$$

$$\frac{4(x-2) + 3}{(x-2)}$$

$$\frac{4(x-2)}{(x-2)} + \frac{3}{x-2}$$

$$4 + \frac{3}{x-2}$$

Stretch
by 3

$$y = \frac{3}{x-2} + 4$$

$$\text{VA } x=2$$

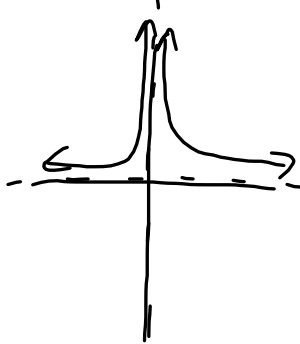
$$\text{HA: } y=4$$

Graph both
forms to
verify.

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

Simplest Form: $y = \frac{p(x)}{q(x)}$ $p(x)$ & $q(x)$ are polynomials
(single fraction)

Consider $f(x) = \frac{1}{x^2}$. Graph it.



$$D: x \neq 0$$

$$R: y > 0$$

ex) $h(x) = \frac{3}{x^2 - 10x + 25}$ What will the graph look like?

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

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

VS of 3
HT right 5 (VA $x=5$)

$$\text{ex) } g(x) = 6 - \frac{1}{(x+4)^2} \rightarrow -\frac{1}{(x+4)^2} + 6$$

Reflection
HT left 4 (VA $x=-4$)
VT up 6 (HA $y=6$)

pg. 442-445

2, 4-6, 9, 11, 12, 18, 20, 21