

## 5-2 Graphing Transformation Form

I can graph the transformation form of a rational expression.

The image shows two hand-drawn diagrams in blue ink. The first diagram on the left is a circle containing a horizontal line with a vertical line intersecting it at its center. Below the horizontal line is an 'X' mark. A small arrow points from the top of the vertical line to the top of the circle. The second diagram on the right is a coordinate system with a horizontal line and a vertical line intersecting at the origin. A small '2' is written below the horizontal line. The entire diagram is crossed out with a large 'X'.

OR

When given a rational function in the form of  $f(x) = \frac{mx+n}{px+q}$  where  $m \neq 0$  and  $p \neq 0$ , you can use division to re-write the function in a form to identify the transformations.

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

$$x-1 \overline{) 3x-4}$$

$$\begin{array}{r} 3 \quad -4 \\ \downarrow \\ \hline 3 \quad \underline{-1} \end{array}$$

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

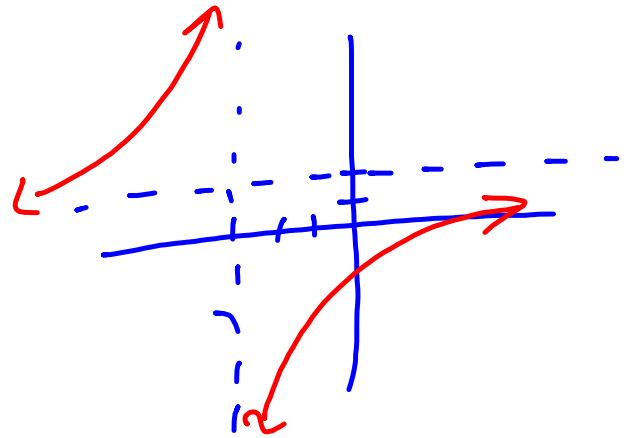
$$\frac{-1}{x-1} + 3$$

- UP 3
- flip
- Right 1

Given  $f(x) = \frac{2x-1}{x+3}$ , use division to re-write the function and identify the transformations.

$$\begin{array}{r}
 -3 \overline{) 2 \quad -1} \\
 \underline{\phantom{-3} 2 \quad -6} \\
 \phantom{-3} 2 \quad -7
 \end{array}$$

$$2 + \frac{-7}{x+3}$$



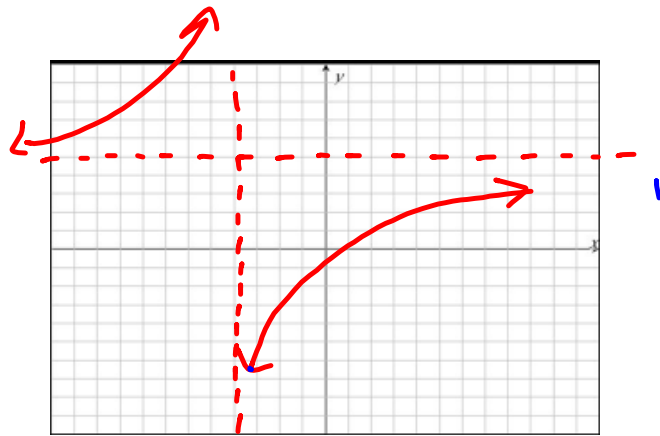
- left + 3
- up 2
- flip

Given  $f(x) = \frac{4x+7}{x+4}$ , use division to re-write the function and

identify the transformations. Then sketch a graph and state the domain, range, and intervals of increasing and decreasing.

$$\begin{array}{r} -4 \overline{) 4 \quad 7} \\ \underline{4} \phantom{0} \\ -16 \\ \underline{4} \phantom{0} \\ -9 \end{array}$$

$$4 + \frac{-9}{x+4}$$



- flip
  - UP 4
  - $\text{Left } +4$
- $D: (-\infty, -4) \cup (-4, \infty)$   
 $R: (-\infty, 4) \cup (4, \infty)$   
 $I: (-\infty, -4) \cup (-4, \infty)$   
 $De: DNE$

Given  $f(x) = \frac{3x+7}{x+2}$ , use division to re-write the function and

identify the transformations. Then sketch a graph and analyze.

Domain:  $(-\infty, -2) \cup (-2, \infty)$

Range:  $(-\infty, 3) \cup (3, \infty)$

V Asymptote:  $x = -2$

H Asymptote:  $y = 3$

End Behavior:

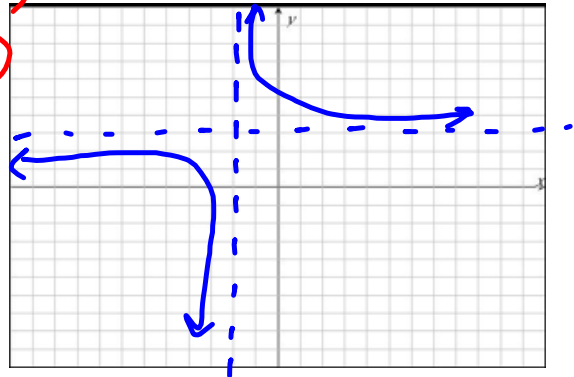
$x \rightarrow \infty, y \rightarrow 3$

$x \rightarrow -\infty, y \rightarrow 3$

V. Asymptote behavior

$x \rightarrow -2^+ \quad y \rightarrow \infty$

$x \rightarrow -2^- \quad y \rightarrow -\infty$



$$\begin{array}{r} -2 \overline{) 3} \quad \overline{) -6} \\ \underline{3} \quad \underline{6} \\ 0 \quad 0 \end{array}$$

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

• left +2

• up 3

$$f(x) = \frac{5 - 2x}{x + 4}$$

Domain:  $(-\infty, -4) \cup (-4, \infty)$

Range:  $(-\infty, -2) \cup (-2, \infty)$

V Asymptote:  $x = -4$

H Asymptote:  $y = -2$

End Behavior:

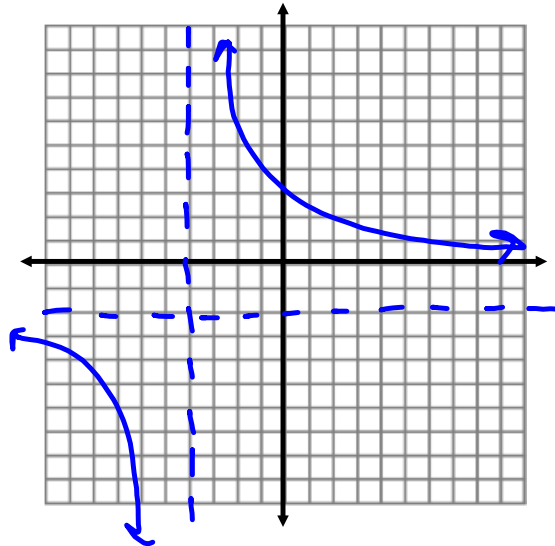
$x \rightarrow \infty \quad y \rightarrow$

$x \rightarrow -\infty \quad y \rightarrow$

Asymptote behavior:

$x \rightarrow -4^+ \quad y \rightarrow$

$x \rightarrow -4^- \quad y \rightarrow$



$$\begin{array}{r} -4 \overline{) 5} \\ \underline{-8} \phantom{0} \\ -2 \phantom{0} \\ \underline{-8} \phantom{0} \\ 13 \phantom{0} \end{array}$$

$$-2 + \frac{13}{x+4}$$

· left + 4  
· Down 2

$$\frac{13}{x+4} - 2$$

$$f(x) = \frac{4 - 3x}{x - 5}$$

Domain:

Range:

V Asymptote:

H Asymptote:

End Behavior:

Asymptote behavior:

