

Rational Transformations

Name _____ Period _____

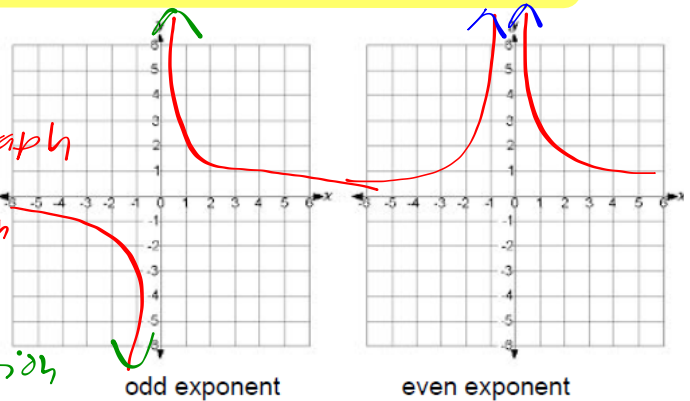
Objective: Discover the patterns for rational function graphs.

Directions: Go to → gublermath.weebly.com → Sec 3 → Mod 4 → "Rational Transformations"

I. Equation 1 $\frac{1}{x^p}$

- a. What happens when you slide "p"?
flips the left side of graph
- b. Odd "p's" look like opposite, ↑ ↓
- c. Even "p's" look like same direction
- d. How is this similar to Odd and Even

Polynomial graphs like x^2 or x^3 ?
even, same direction
odd opposite direction



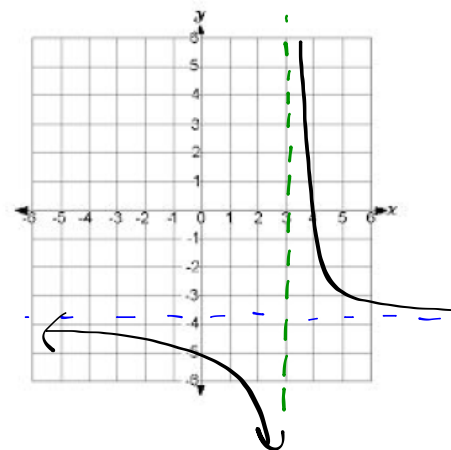
Deselect Equation 1 and Select Equation 2.

II. Equation 2 $\frac{1}{(x+a)} + h$

- a. Changing "a" moves the graph left & right
- b. Changing "h" moves the graph up & down

Draw the graph with $a = -3$ and $h = -4$ →

- c. $a = -3$ moves the graph right 3
- d. $h = -4$ moves the graph down 4

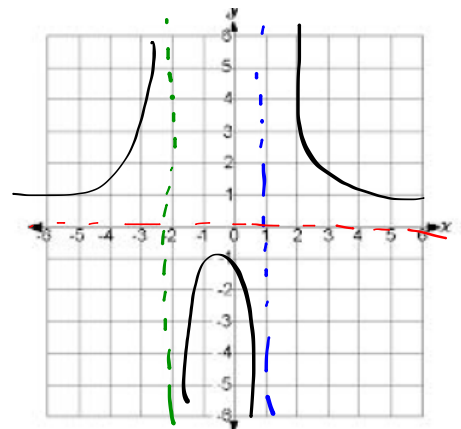


Deselect Equation 2 and Select Equation 3.

III. Equation 3 $\frac{1}{(x+a)(x+b)} + h$

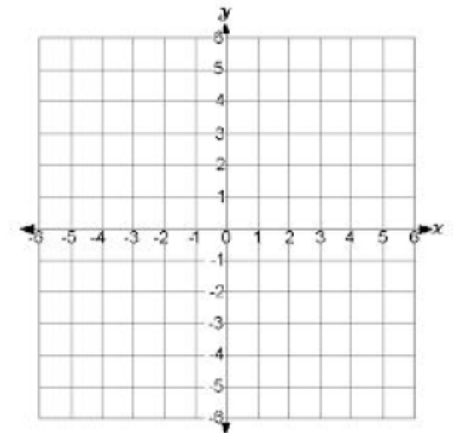
i. Draw the graph with $a=2, b=-1, h=0 \rightarrow$

- a. $b=-1$ moves the graph right 1
- b. Vertical Asymptotes $x=$ -2, $x=$ 1
- c. Horizontal Asymptote $y=$ 0
- d. Degree of Denominator $\frac{1}{x^2} \leftarrow$ degree 2



ii. Draw the graph with $a=4, b=-2, h=0 \rightarrow$

- e. $b=-2$ moves the graph _____
- f. Vertical Asymptotes $x=$ ____, $x=$ ____
- g. Horizontal Asymptote $y=$ _____

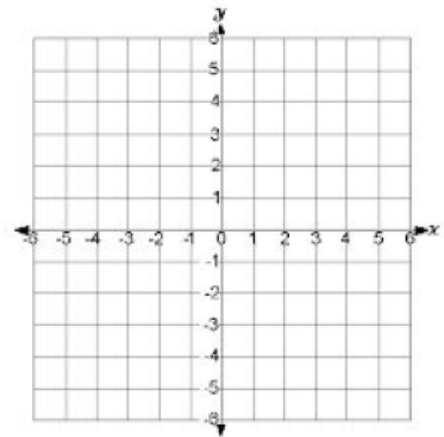


Deselect Equation 3 and Select Equation 4.

IV. Equation 4 $\xrightarrow{\text{green}} \frac{x+c}{(x+a)(x+b)} + h$
 $\xrightarrow{\text{red}}$

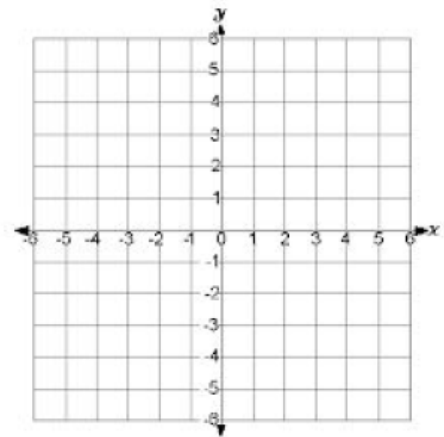
i. Draw the graph with $a=2, b=-3, c=0, h=0 \rightarrow$

- a. $b=-3$ moves the graph _____
- b. What does c move? _____
- c. Vertical Asymptotes $x=$ ____, $x=$ ____
- d. Horizontal Asymptote $y=$ _____
- e. Degree of Denominator _____
- f. Location of x-intercept _____

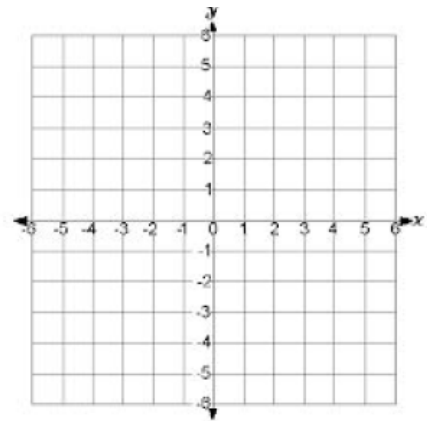


ii. Draw the graph with $a=2, b=-3, c=4, h=0 \rightarrow$

- g. What does c move? _____
- h. Vertical Asymptotes $x=$ ____, $x=$ ____
- i. Horizontal Asymptote $y=$ _____
- j. Degree of Numerator _____
- k. Degree of Denominator _____
- l. Location of x-intercept _____



- iii. Draw the graph with $a = 2, b = -3, c = -5, h = 0 \rightarrow$
- Vertical Asymptotes $x = \underline{\hspace{2cm}}, x = \underline{\hspace{2cm}}$
 - Horizontal Asymptote $y = \underline{\hspace{2cm}}$
 - Degree of Numerator $\underline{\hspace{2cm}}$
 - Degree of Denominator $\underline{\hspace{2cm}}$
 - Location of x-intercept $\underline{\hspace{2cm}}$
 - End Behavior $x \rightarrow -\infty \quad f(x) \rightarrow \underline{\hspace{2cm}}$
 $x \rightarrow \infty \quad f(x) \rightarrow \underline{\hspace{2cm}}$



V. Summary

- a. Slide "c" from left to right, describe what occurs.

moves the x-intercept, sways the graph.

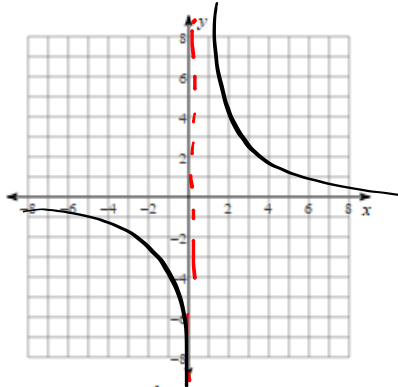
- b. What information from the numerator helps you graph the function? find x-intercept or crossing points.

- c. What information from the denominator helps you graph the function? find asymptote vertical boundaries $(x+a) \rightarrow$ left.

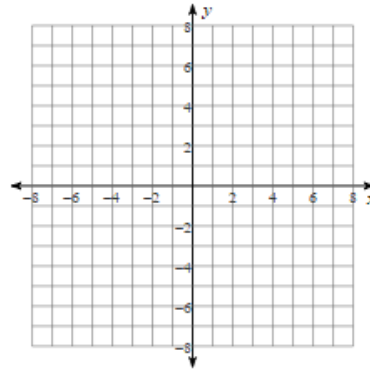
- d. How do you know what shape the graph is and where it starts? odd or even shape.

Graph each function.

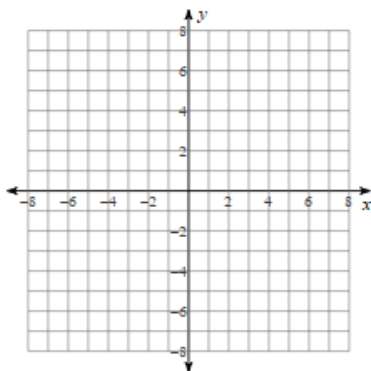
1) $f(x) = \frac{4}{x}$ ← 6



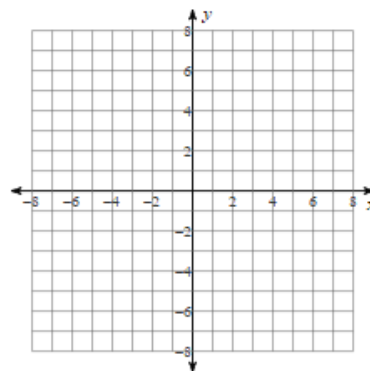
2) $f(x) = \frac{1}{x-2} + 3$



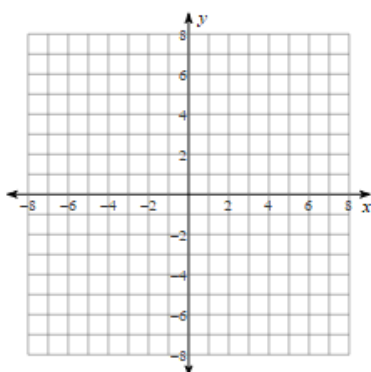
3) $f(x) = -\frac{1}{x+4} - 1$



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



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



6) $f(x) = \frac{3}{x^2 - x - 6}$

