

Rational Transformations

Name _____ Period _____

Objective: Discover the patterns for rational function graphs.

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

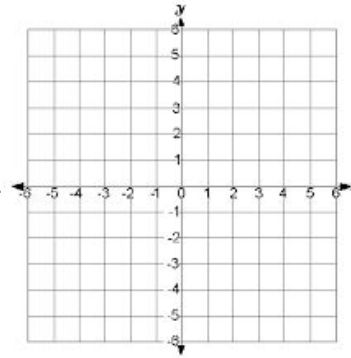
I. **Equation 1** $\frac{1}{x^p}$

a. What happens when you slide “p”?

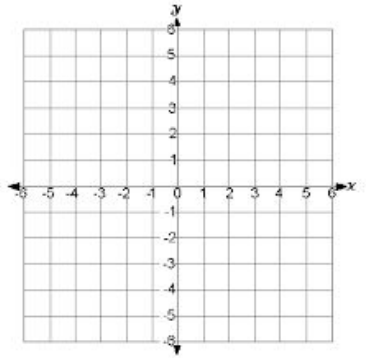
b. Odd “p’s” look like _____

c. Even “p’s” look like _____

d. How is this similar to Odd and Even Polynomial graphs like x^2 or x^3 ?



odd exponent



even exponent

Deselect Equation 1 and Select Equation 2.

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

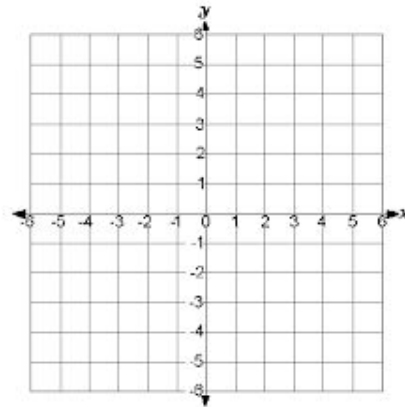
a. Changing “a” moves the graph _____

b. Changing “h” moves the graph _____

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

c. $a = -3$ moves the graph _____

d. $h = -4$ moves the graph _____



Deselect Equation 2 and Select Equation 3.

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

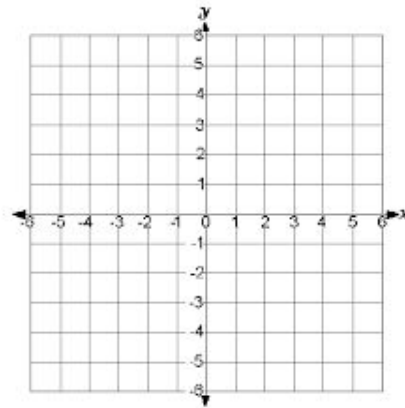
i. Draw the graph with $a = 2, b = -1, h = 0$ →

a. $b = -1$ moves the graph _____

b. Vertical Asymptotes $x = \underline{\hspace{1cm}}$, $x = \underline{\hspace{1cm}}$

c. Horizontal Asymptote $y = \underline{\hspace{1cm}}$

d. Degree of Denominator _____



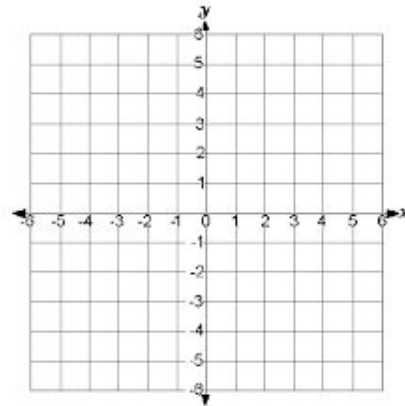
ii. Draw the graph with $a = 4, b = -2, h = 0$ →

e. $b = -2$ moves the graph _____

f. Vertical Asymptotes $x = \underline{\hspace{1cm}}$, $x = \underline{\hspace{1cm}}$

g. Horizontal Asymptote $y = \underline{\hspace{1cm}}$

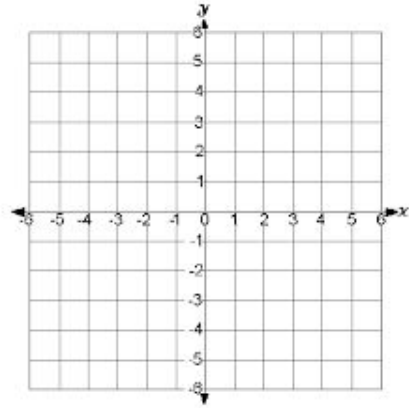
h. Degree of Denominator _____



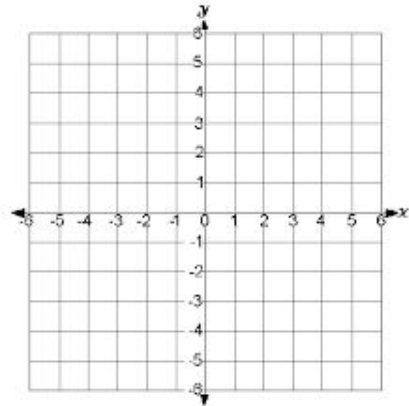
Deselect Equation 3 and Select Equation 4.

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

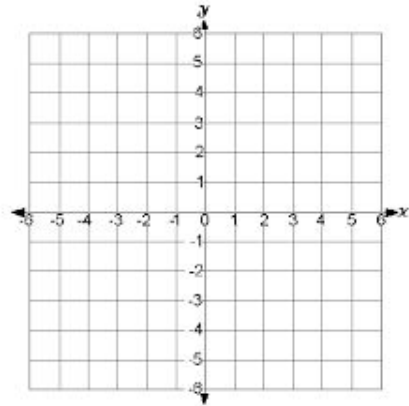
- i. Draw the graph with $a=2, b=-3, c=0, h=0 \rightarrow$
- $b=-3$ moves the graph _____
 - What does c move? _____
 - Vertical Asymptotes $x=$ ____ , $x=$ ____
 - Horizontal Asymptote $y=$ _____
 - Degree of Denominator _____
 - Location of x-intercept _____



- ii. Draw the graph with $a=2, b=-3, c=4, h=0 \rightarrow$
- What does c move? _____
 - Vertical Asymptotes $x=$ ____ , $x=$ ____
 - Horizontal Asymptote $y=$ _____
 - Degree of Numerator _____
 - Degree of Denominator _____
 - Location of x-intercept _____



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



V. Summary

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

- b. What information from the numerator helps you graph the function? _____

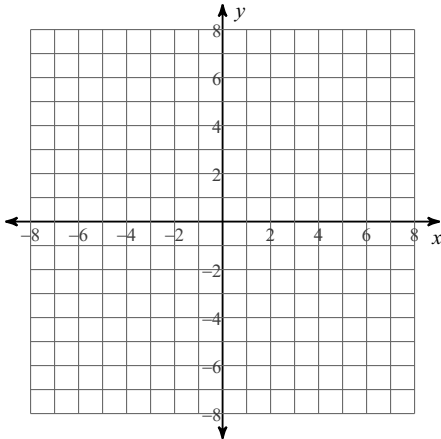
- c. What information from the denominator helps you graph the function? _____

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

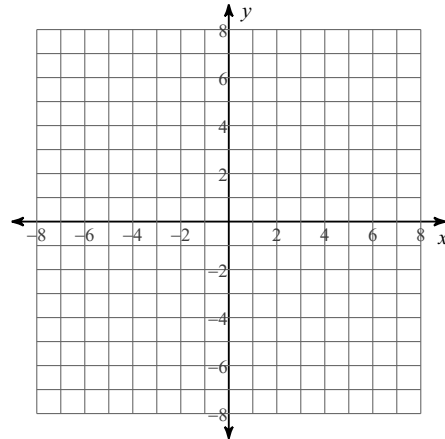
Graphing Rationals Worksheet 2

Graph each function.

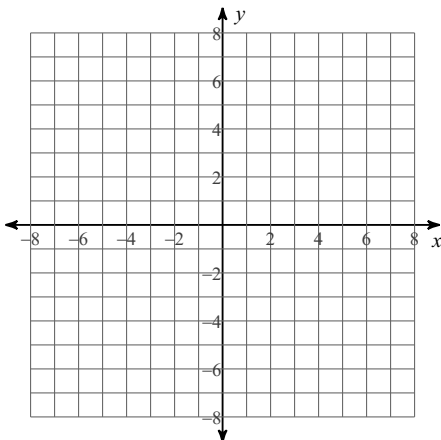
1) $f(x) = \frac{4}{x}$



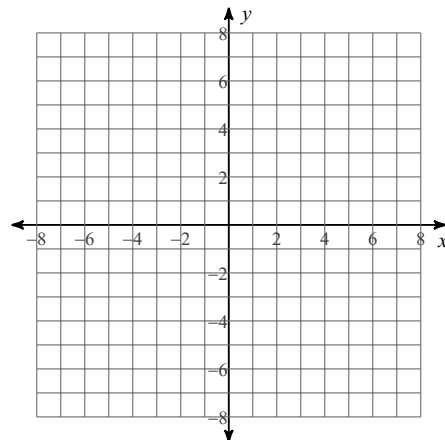
2) $f(x) = \frac{1}{x-2} + 3$



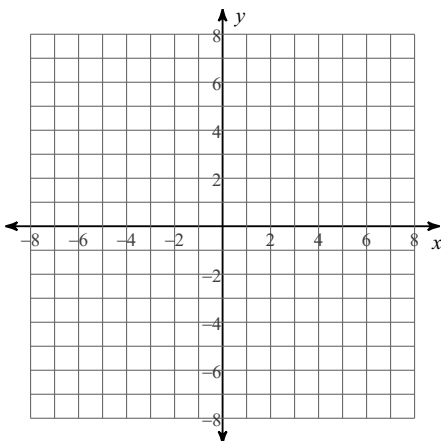
3) $f(x) = -\frac{1}{x+4} - 1$



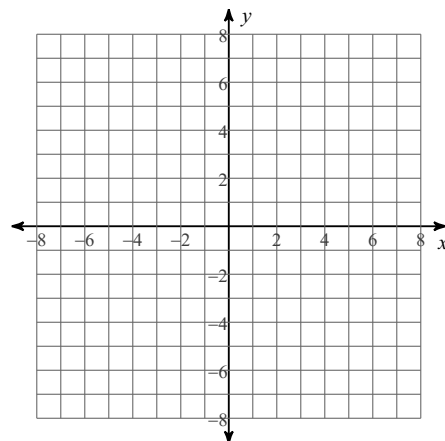
4) $f(x) = -\frac{2}{x+2} + 2$



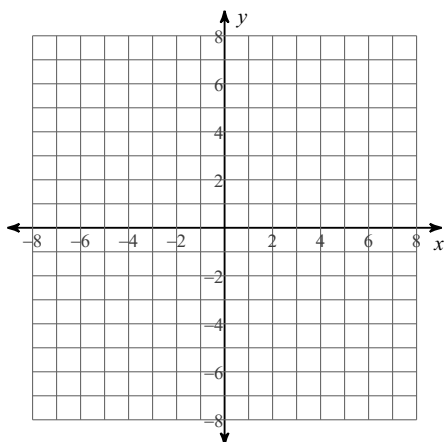
5) $f(x) = \frac{3}{x-4}$



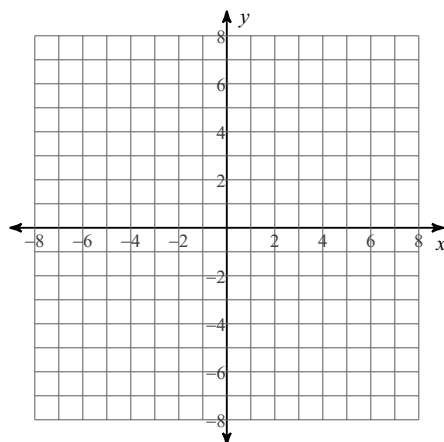
6) $f(x) = \frac{3}{x^2 - x - 6}$



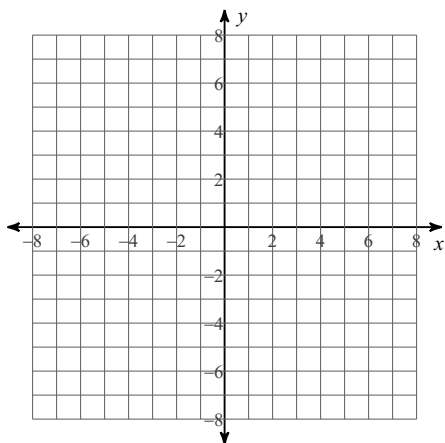
$$7) f(x) = \frac{1}{x^2 - 4}$$



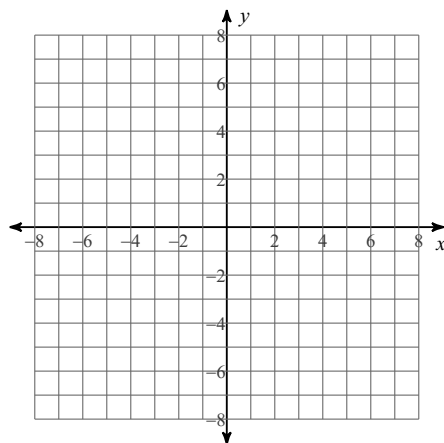
$$8) f(x) = \frac{1}{3x^2 - 12}$$



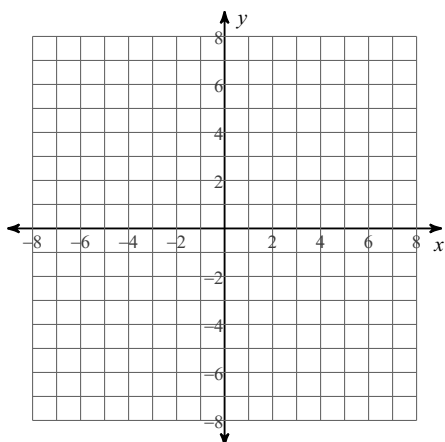
$$9) f(x) = \frac{3}{x^2 + 2x - 3}$$



$$10) f(x) = \frac{2}{x^2 - 9}$$



$$11) f(x) = -\frac{2}{x^2 - 9}$$



$$12) f(x) = -\frac{3}{x^2 + 3x}$$

