

Today's Plan:

Learning Target (standard): I will graph rational functions using transformations.

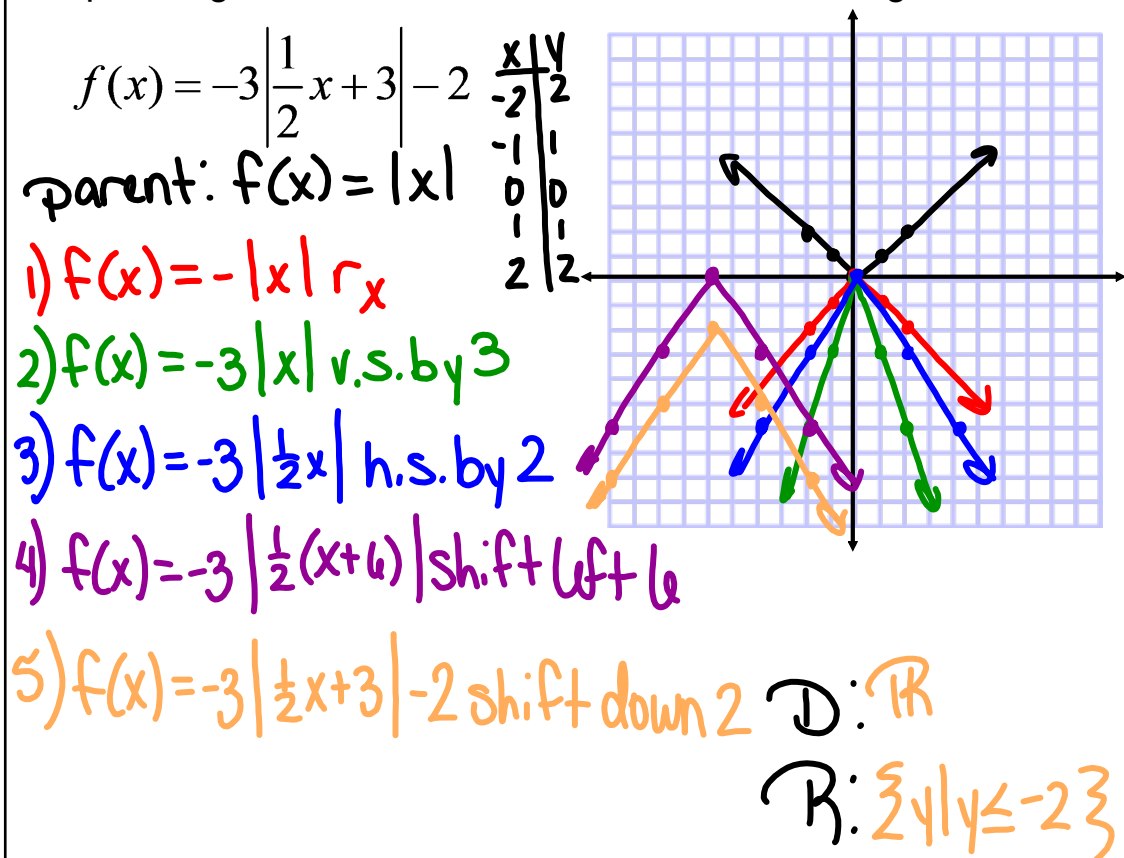
Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

Graph using transformations. Find domain and range.



Rational Function:

- a function that can be written as the quotient of two polynomials
 - all exponents in the numerator and denominator must be whole numbers (positive integers)
- a rational function with a degree of 0 in the numerator and a degree of 1 in the denominator is one that can be put into transformational form based on the parent function of $f(x) = \frac{1}{x}$

Asymptotes:

- Vertical (VA: $x = \#$)
 - occur where the function is undefined after the function has been factored and reduced
 - may NOT be intersected
- Horizontal (HA: $y = \#$)
 - describes the **end behavior** of the function
 - may be intersected since it describes the end behavior

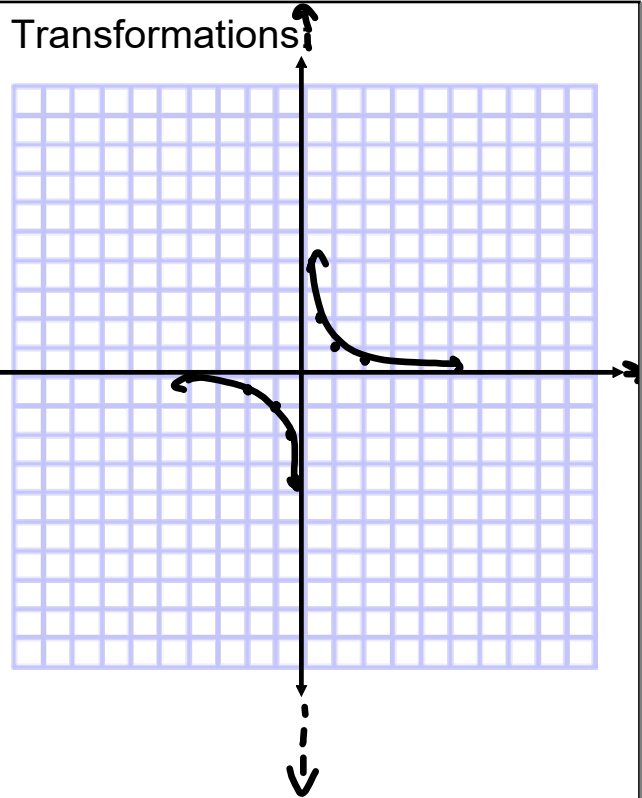
Graphing Rational Functions using Transformations

parent: $f(x) = \frac{1}{x}$

VA: $x=0$

HA: $y=0$

x	y
-2	$-\frac{1}{2}$
-1	-1
$-\frac{1}{2}$	-2
0	-
$\frac{1}{2}$	2
1	1
2	$\frac{1}{2}$



Transformational Form:

$$f(x) = \frac{a}{x+b} + c$$

1) reflection over the x-axis

$$a < 0$$

2) reflection over the y-axis



3) vertical stretch or vertical compression

$$0 < a < 1 \text{ v.c. by "a"}$$

$$a > 1 \text{ v.s. by "a"}$$

4) horizontal stretch or horizontal compression

- clear the coefficient prior to transforming

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

5) shift left or right

$$b > 0 \text{ shift left}$$

$$b < 0 \text{ shift right}$$

shift the VA as well

6) shift up or down

$$c > 0 \text{ shift up}$$

$$c < 0 \text{ shift down}$$

shift the HA as well

* If an asymptote does not change from one step to the next, extend the asymptote(s) with the new color. *

Graph using transformations. Find domain and range.

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

parent: $f(x) = \frac{1}{x}$ VA: $x=0$ HA: $y=0$

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

2) $f(x) = -\frac{2}{x}$ v.s. by 2

3) $f(x) = -\frac{2}{x-4}$ shift right 4
VA: $x=4$

4) $f(x) = -\frac{2}{x-4} + 3$ shift up 3
HA: $y=3$

x	y
-2	-1/2
-1	-1
-1/2	-2
0	0
1/2	2
1	1
2	1/2

D: $\{x \mid x \neq 4\}$
R: $\{y \mid y \neq 3\}$

Graph using transformations. Find domain and range.

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

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

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

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

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