Algebra 2 8.3 Quiz 8.1-8.2

Determine properties of reciprocal functions
Graph transformations of reciprocal functions

continuous
discontinuous
parent graph
reciprocal function
hyperbola
asymptote close to...
domain
range

$\frac{2}{5} \rightarrow \frac{5}{2}$ $\quad x \rightarrow \frac{1}{x}$

$f(x) = \frac{1}{x}$ $\quad x \neq 0$

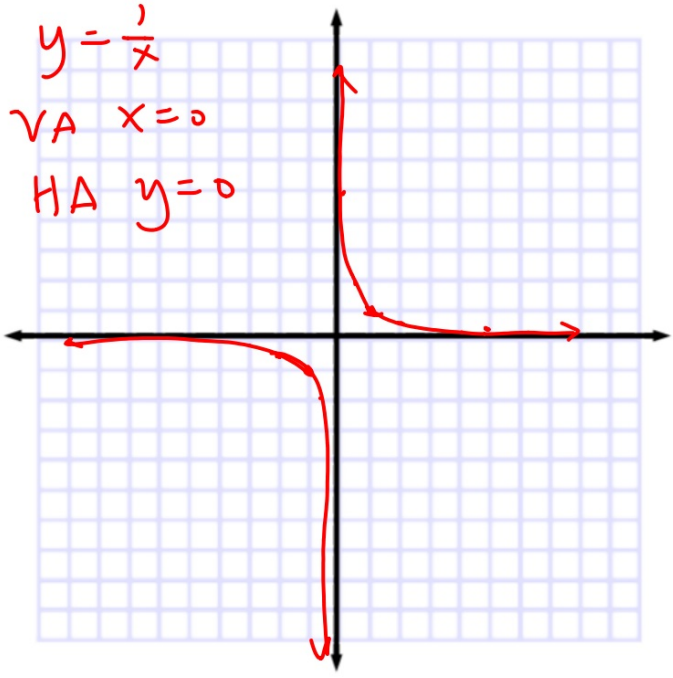
Is it ever OK to divide by zero?
whiteboards

Graph y= 1/x

x	$\frac{1}{x}$
0	—
1	1
2	.5
5	.2
$\frac{1}{2}$	2

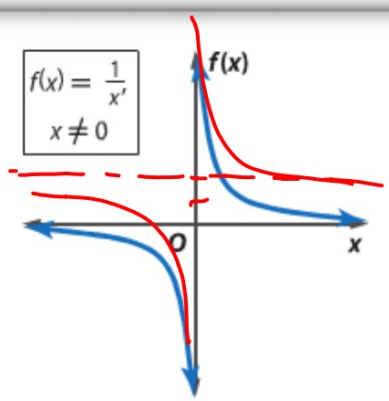
Are there any value(s) that can't be used?

$x \neq 0$



KeyConcept Parent Function of Reciprocal Functions

Parent function:	$f(x) = \frac{1}{(x+1)} + 2$
Type of graph:	**hyperbola**
Domain and range:	all nonzero real numbers
Asymptotes:	$x = 0$ and $f(x) = 0$
Intercepts:	none
Not defined:	$x = 0$



Parent graph: VA = HA =

(can't divide by 0)

The domain of a reciprocal function is limited ~~to values~~ for which the function is defined.

Functions:	$f(x) = \frac{-3}{x+2}$	$g(x) = \frac{4}{x-5}$	$h(x) = \frac{3}{x}$
Not defined at:	$x = -2$	$x = 5$	$x = 0$

VA $x=-2$
HA $y=0$

VA $x=5$
HA $y=0$

Translation (L-R) changes VA
(just like all other parent graphs)

GuidedPractice

Determine the value of x for which each function is not defined.

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

$x - 1 = 0$

VA $x = 1$

1B. $f(x) = \frac{7}{3x+2}$

$3x + 2 = 0$

$\frac{3x}{3} = -\frac{2}{3}$

VA $x = -\frac{2}{3}$

What would make the denom = 0?
Can't be used (domain)

Example 1 Limitations on Domain

Determine the value of x for which $f(x) = \frac{3}{2x+5}$ is not defined.

$$2x+5=0$$
$$2x=-5$$
$$x=-\frac{5}{2}$$

VA = where is it undefined?
HA = end behavior
Compare to parent graph...

8.3 Gr-Bso

$x = 3 \quad y = 0$

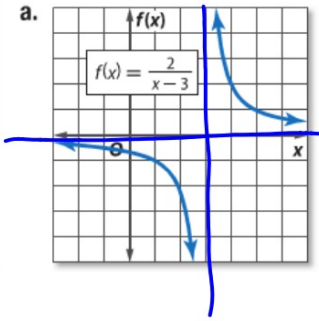
StudyTip

CCSS Structure Vertical asymptotes show where a function is undefined, while horizontal asymptotes show the end behavior of a graph.

Example 2 Determine Properties of Reciprocal Functions

Identify the asymptotes, domain, and range of each function.

a.



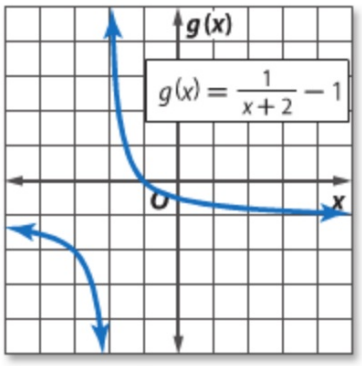
$y = \frac{2}{x-3}$

D: ARN $x \neq 3$
R: ARN $y \neq 0$

1, 2, 7-11
8.3

Use equation (if given) and graph

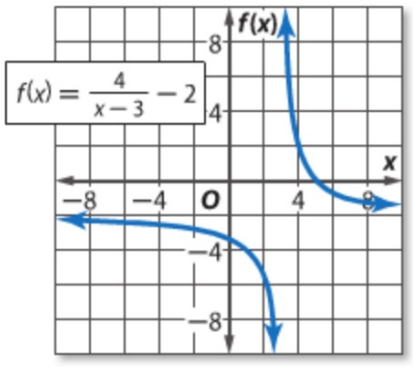
b.



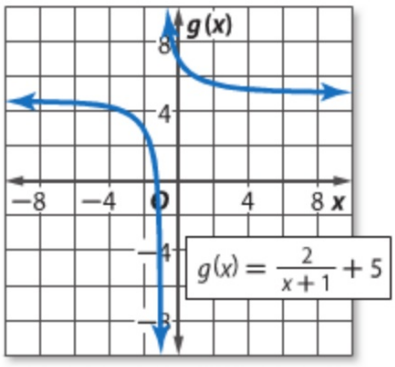
Compare to parent graph
(Don't go by eyeball)

GuidedPractice

2A.



2B.



StudyTip

Asymptotes The asymptotes of a reciprocal function move with the graph of the function and intersect at (h, k).

KeyConcept Transformations of Reciprocal Functions

$$f(x) = \frac{a}{x - h} + k$$

h – Horizontal Translation	k – Vertical Translation
h units right if h is positive	k units up if k is positive
$\lvert h \rvert$ units left if h is negative	$\lvert k \rvert$ units down if k is negative
The *vertical* asymptote is at $x = h$.	The *horizontal* asymptote is at $f(x) = k$.

a – Orientation and Shape

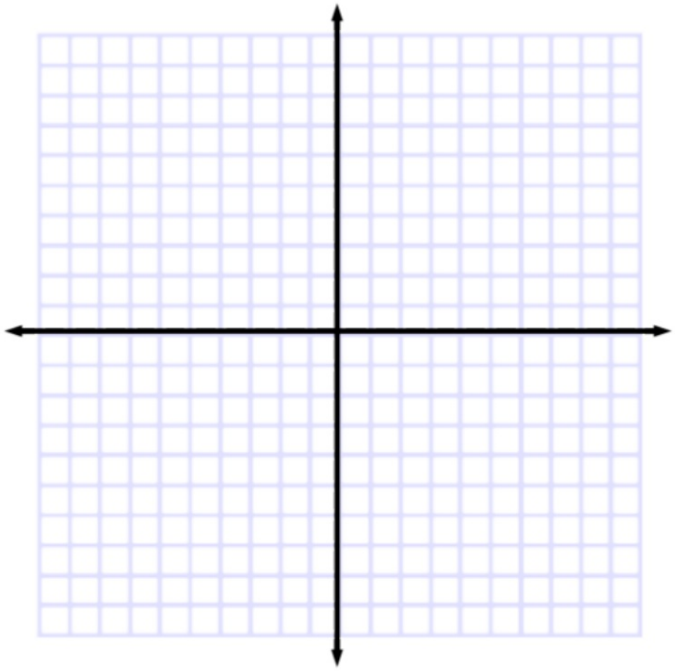
If $a < 0$, the graph is reflected across the x-axis.

If $\lvert a \rvert > 1$, the graph is stretched vertically.
If $0 < \lvert a \rvert < 1$, the graph is compressed vertically.

Example 3 Graph Transformations

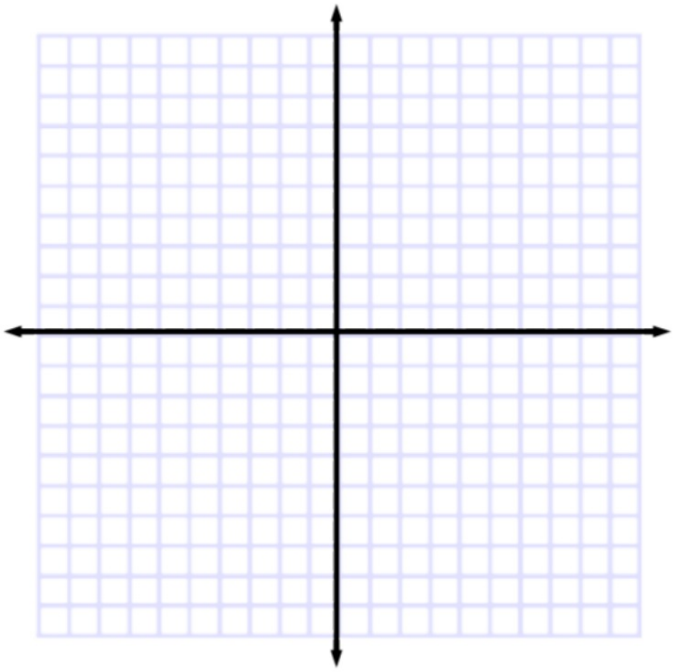
Graph each function. State the domain and range.

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

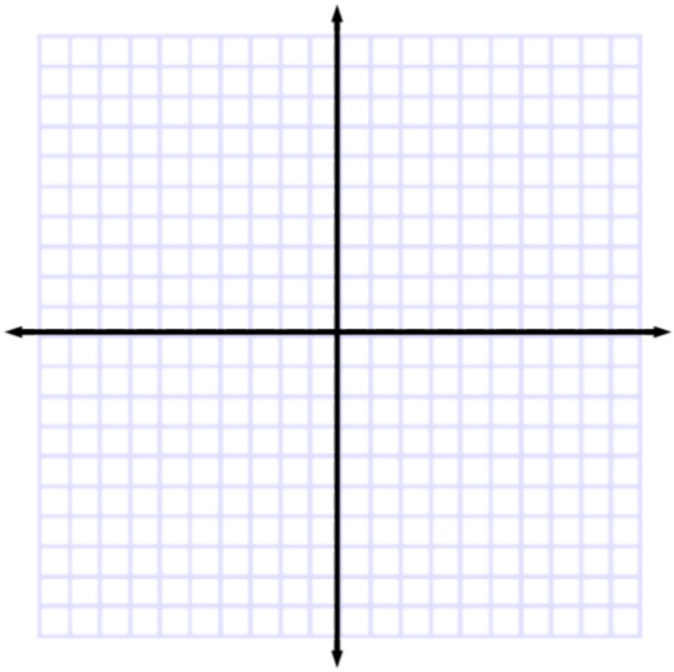


parent graph
VA
HA
reflection (maybe?)
find a few ord prs to locate the "quadrants"

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

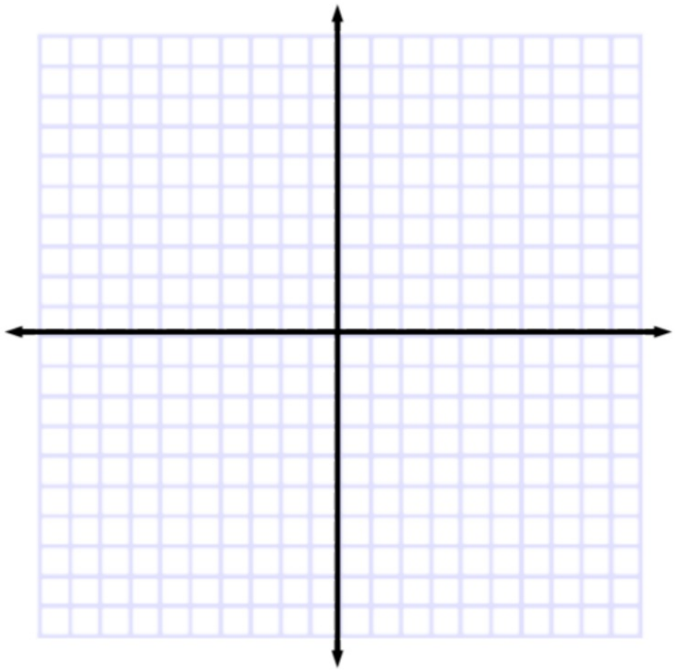


b. $f(x) = \frac{-3}{x+1} - 4$



GuidedPractice

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



3B. $g(x) = \frac{1}{3(x-1)} - 2$