Algebra 2 8.3

Determine properties of reciprocal functions

Graph transformations of reciprocal functions

continuous

discontinuous

parent graph

reciprocal function

hyperbola

asymptote

domain

range

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

Is it ever OK to divide by zero?

whiteboards

Quiz 8.1-8.2

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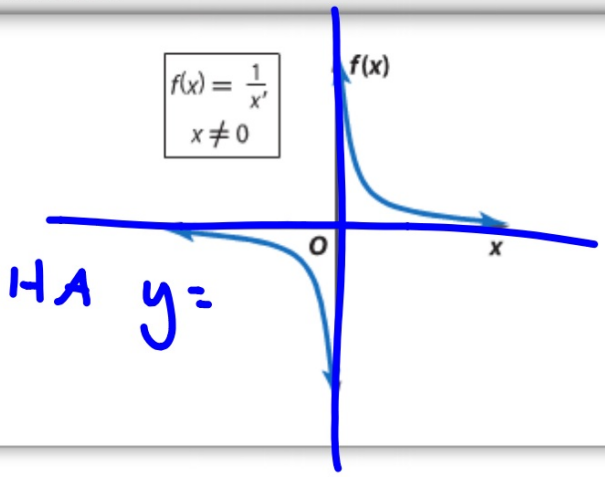
KeyConcept Parent Function of Reciprocal Functions

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

VA x=



HA y=

GuidedPractice

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

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

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

$3x+2=0$

$3x=-2$

$\frac{1}{3}\quad\frac{2}{3}$

StudyTip

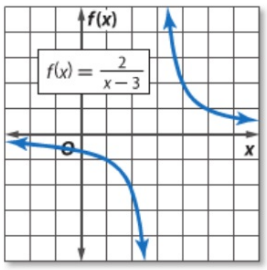
CCSS **Structure** Vertical asymptotes show where a function is undefined, while horizontal asymptotes show the end behavior of a graph.

Example 2 Determine Properties of Reciprocal Functions

PT

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

a.



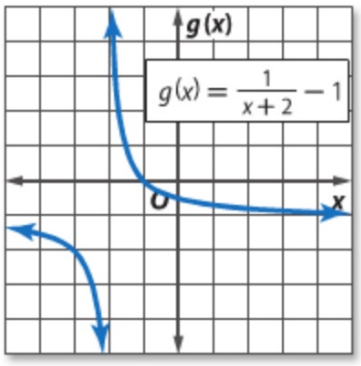
VA $x = 3$

HA $y = 0$

D ARN $x \neq 3$.

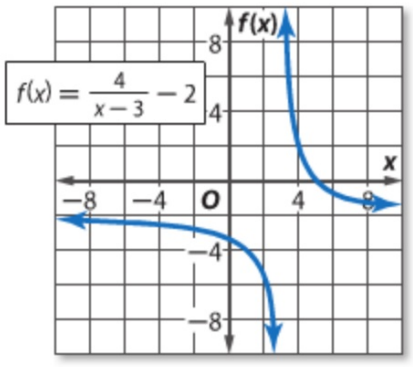
R ARN $y \neq 0$

b.

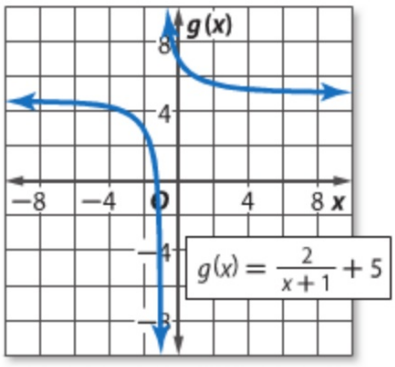


GuidedPractice

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.

Whiteboards

Example 3 Graph Transformations

Graph each function. State the domain and range.

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

What happened to the parent graph?
Use transformation(s)
VA=
HA=

Can use a couple of ordered pairs. But if you use a whole bunch...

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

GuidedPractice

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

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

(23)

$D = RT$

$R = \frac{D}{T}$

$T = \frac{D}{R}$

m		d
D	R ·	T
5000	$\frac{5000}{d}$	d

$\frac{5000}{d} = \frac{?}{d}$ d

n =

D	R	T
120 mi	(10)	? (5)
	10+x	4

$$T = \frac{120}{10+x}$$

$$5 = \frac{120}{10+x} \qquad 4 = \frac{120}{(\ )+x}$$