Name _____ Class _____ Date _____

8-2 Reteaching

The Reciprocal Function Family

A Reciprocal Function in General Form

The *general form* is $y = \frac{a}{x - h} + k$, where $a \neq 0$ and $x \neq h$.

The graph of this equation has a horizontal asymptote at $y = k$ and a vertical asymptote at $x = h$.

Two Members of the Reciprocal Function Family

When $a \neq 1$, $h = 0$, and $k = 0$, you get the *inverse variation function*, $y = \frac{a}{x}$.

When $a = 1$, $h = 0$, and $k = 0$, you get the *parent reciprocal function*, $y = \frac{1}{x}$.

Problem

What is the graph of the inverse variation function $y = \frac{-5}{x}$?

Step 1 Rewrite in general form and identify a, h, and k.

$y = \frac{-5}{x - 0} + 0$ $\quad a = -5, h = 0, k = 0$

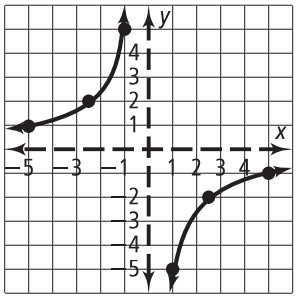
Step 2 Identify and graph the horizontal and vertical asymptotes.

horizontal asymptote: $y = k$, $y = 0$

vertical asymptote: $x = h$, $x = 0$

Step 3 Make a table of values for $y = \frac{-5}{x}$. Plot the points and then connect the points in each quadrant to make a curve.

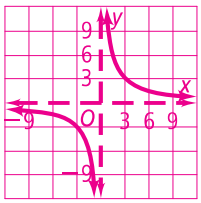
x	-5	-2.5	-1	1	2.5	5
y	1	2	5	-5	-2	-1



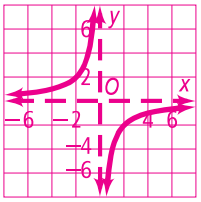
Exercises

Graph each function. Include the asymptotes.

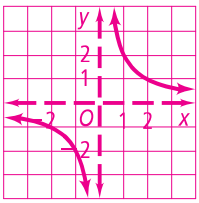
1. $y = \frac{9}{x}$



2. $y = -\frac{4}{x}$



3. $xy = 2$



Name _____ Class _____ Date _____

8-2 Reteaching (continued)

The Reciprocal Function Family

A reciprocal function in the form $y = \frac{a}{x - h} + k$ is a *translation* of the inverse variation function $y = \frac{a}{x}$. The translation is h units horizontally and k units vertically. The translated graph has asymptotes at $x = h$ and $y = k$.

Problem

What is the graph of the reciprocal function $y = -\frac{6}{x + 3} + 2$?

Step 1 Rewrite in general form and identify a, h, and k.

$y = \frac{-6}{x - (-3)} + 2$ $\qquad a = -6, h = -3, k = 2$

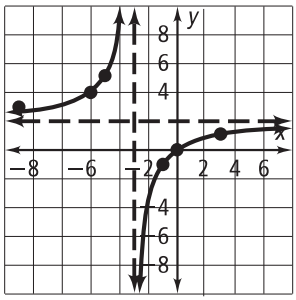
Step 2 Identify and graph the horizontal and vertical asymptotes.

horizontal asymptote: $y = k$, $y = 2$

vertical asymptote: $x = h$, $x = -3$

Step 3 Make a table of values for $y = \frac{-6}{x}$, then *translate* each (x, y) pair to $(x + h, y + k)$. Plot the translated points and connect the points in each quadrant to make a curve.

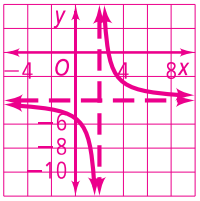
x	−6	−3	−2	2	3	6
y	1	2	3	−3	−2	−1
$x + (-3)$	−9	−6	−5	−1	0	3
$y + 2$	3	4	5	−1	0	1



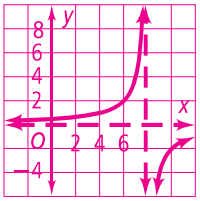
Exercises

Graph each function. Include the asymptotes.

4. $y = \frac{3}{x - 2} - 4$



5. $y = -\frac{4}{x - 8}$



6. $y = \frac{2}{3x} + \frac{3}{2}$