

## Graphing Simple Rational Functions

Identify the vertical asymptotes, horizontal asymptote, domain, and range of each.

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

V.A.  $x = 0$

H.A.  $y = 0$

$D = \{x \mid x \neq 0, x \in \mathbb{R}\}$

$R = \{y \mid y \neq 0, y \in \mathbb{R}\}$

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

V.A.  $x = 1$

H.A.  $y = 1$

$D = \{x \mid x \neq 1, x \in \mathbb{R}\}$

$R = \{y \mid y \neq 1, y \in \mathbb{R}\}$

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

V.A.  $x = 1$

H.A.  $y = -1$

$D = \{x \mid x \neq 1, x \in \mathbb{R}\}$

$R = \{y \mid y \neq -1, y \in \mathbb{R}\}$

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

V.A.  $x = 0$

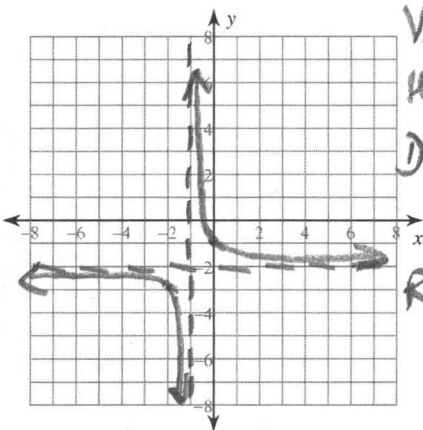
H.A.  $y = 0$

$D = \{x \mid x \neq 0, x \in \mathbb{R}\}$

$R = \{y \mid y \neq 0, y \in \mathbb{R}\}$

Identify the vertical asymptotes, horizontal asymptote, domain, and range of each. Then sketch the graph.

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



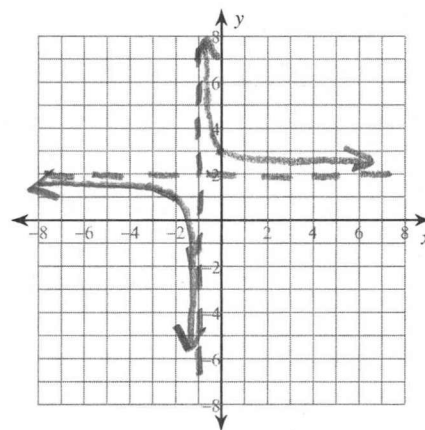
V.A.  $x = -1$

H.A.  $y = -2$

$D = \{x \mid x \neq -1, x \in \mathbb{R}\}$

$R = \{y \mid y \neq -2, y \in \mathbb{R}\}$

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



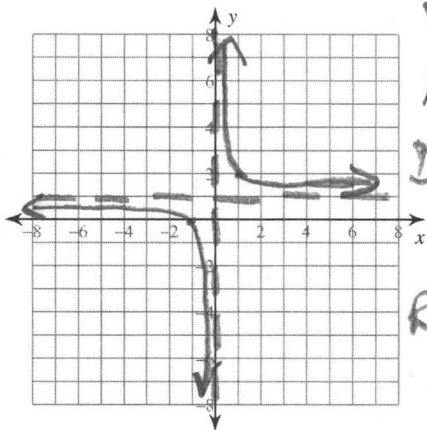
V.A.  $x = -1$

H.A.  $y = 2$

$D = \{x \mid x \neq -1, x \in \mathbb{R}\}$

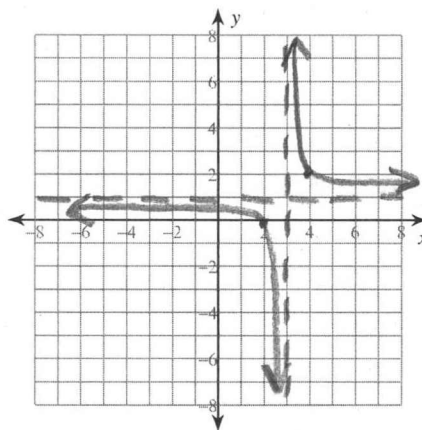
$R = \{y \mid y \neq 2, y \in \mathbb{R}\}$

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



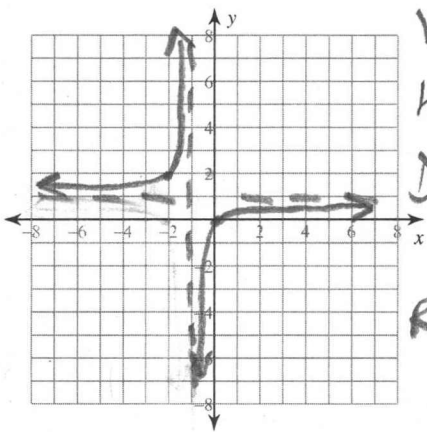
V.A.  $x=0$   
 H.A.  $y=1$   
 $D = \{x | x \neq 0, x \in \mathbb{R}\}$   
 $R = \{y | y \neq 1, y \in \mathbb{R}\}$

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



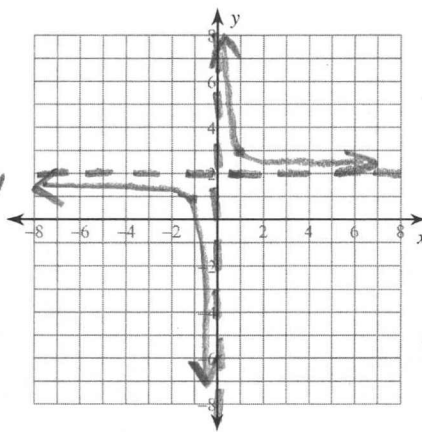
V.A.  $x=3$   
 H.A.  $y=1$   
 $D = \{x | x \neq 3, x \in \mathbb{R}\}$   
 $R = \{y | y \neq 1, y \in \mathbb{R}\}$

$$9) f(x) = -\frac{4}{x+1} + 1$$



V.A.  $x=-1$   
 H.A.  $y=1$   
 $D = \{x | x \neq -1, x \in \mathbb{R}\}$   
 $R = \{y | y \neq 1, y \in \mathbb{R}\}$

$$10) f(x) = \frac{4}{x} + 2$$



V.A.  $x=0$   
 H.A.  $y=2$   
 $D = \{x | x \neq 0, x \in \mathbb{R}\}$   
 $R = \{y | y \neq 2, y \in \mathbb{R}\}$

**Critical thinking question:**

11) Write a function of the form  $f(x) = \frac{a}{x-h} + k$  with a vertical asymptote at  $x=25$

Any value for "a" except zero  
 Any value for "k"  
 $h=25$