

Name: \_\_\_\_\_ Class: \_\_\_\_\_

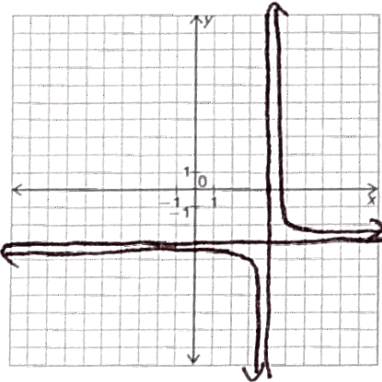
## Introduction Rational Functions and Graphs Homework (Lesson 1)

1. Complete the table

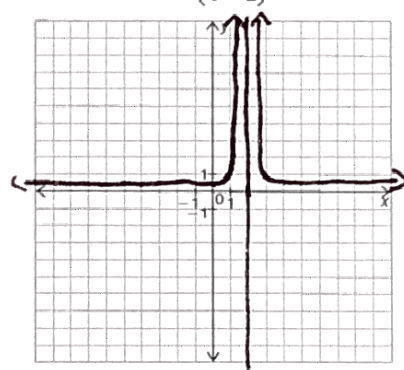
	$h$ and/or $k$ value	$g(x) = \frac{1}{(x-h)} + k$	Vertical Asymptote(s)	Horizontal Asymptote(s)	Domain	Range	y-intercept
a.	$h = 3$	$\frac{1}{x-3}$	$x = 3$	$y = 0$	$x \neq 3$	$y \neq 3$	$-\frac{1}{3}$
b.	$k = -4$	$\frac{1}{x} - 4$	$x = 0$	$y = -4$	$x \neq 0$	$y \neq -4$	<del>                    </del>
c.	$h = \frac{1}{2}$ $k = 3$	$\frac{1}{2x-1} + 3$	$x = \frac{1}{2}$	$y = 3$	$x \neq \frac{1}{2}$	$y \neq 3$	2
d.	$k = 5$	$\frac{1}{x} + 5$	$x = 0$	$y = 5$	$x \neq 0$	$y \neq 5$	<del>                    </del>

Sketch each rational function without using a graphing calculator.

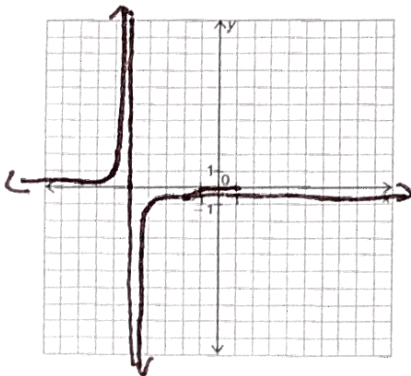
2.  $f(x) = \frac{1}{x-4} - 3$



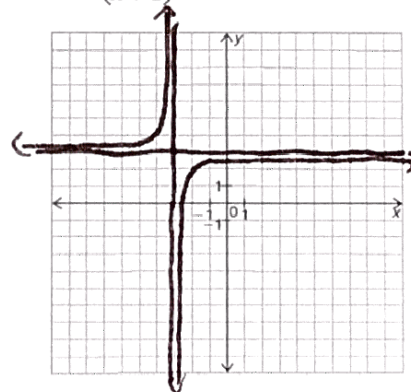
3.  $f(x) = \frac{1}{(x-2)^2}$



4.  $f(x) = \frac{-1}{x+5}$

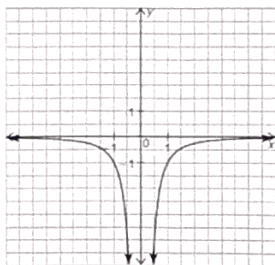


5.  $f(x) = \frac{-1}{(x+3)^2} + 3$



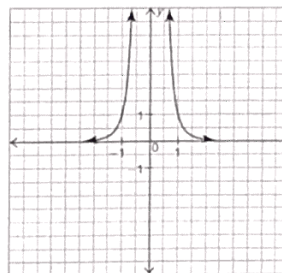
Describe the vertical and horizontal asymptotes for each graph, provided they exist. Each figure represents the graph of a rational function.

6.



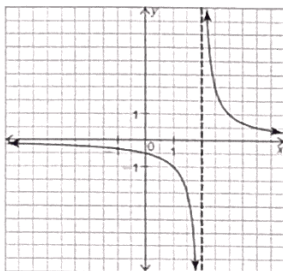
VA:  $x=0$   
HA:  $y=0$

7.



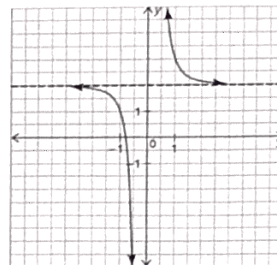
VA:  $x=0$   
HA:  $y=0$

8.



VA:  $x=4$   
HA:  $y=0$

9.



VA:  $x=0$   
HA:  $y=4$

Write a rational function for each description provided. Explain your reasoning.

10. The domain is all real numbers except  $x=6$ . The range is all real numbers except  $y=0$ .  $y = \frac{1}{x-6}$
11. Vertical asymptote is at  $x=-3$ . The range is all real numbers except  $y=0$ .  $y = \frac{1}{x+3}$
12. Vertical asymptotes at  $x=-2$  and  $x=1$ .  $y = \frac{1}{x^2+x-2}$
13. Vertical asymptotes at  $x=-3$  and  $x=5$ . Horizontal asymptote at  $y=1$ .  $y = \frac{1}{x^2-2x-15} + 1$
14. For  $f(x) = \frac{1}{x}$ ,  $g(x) = f(x+7) - 2$ .  $g(x) = \frac{1}{x+7} - 2$
15. For  $f(x) = \frac{1}{x}$ ,  $g(x)$  shifts  $f(x)$  left 1 unit and down 2 units.  $g(x) = \frac{1}{x+1} - 2$

Determine the domain, range, and vertical and horizontal asymptotes of each rational function without using a graphing calculator.

16.  $f(x) = \frac{1}{x-9}$  | D:  $x \neq 9$  | VA:  $x=9$  | R:  $y \neq 0$  | HA:  $y=0$
17.  $f(x) = \frac{1}{x+9}$  | D:  $x \neq -9$  | VA:  $x=-9$  | R:  $y \neq 0$  | HA:  $y=0$
18.  $f(x) = \frac{-7}{2x+3}$  | D:  $x \neq -\frac{3}{2}$  | VA:  $x = -\frac{3}{2}$  | R:  $y \neq 0$  | HA:  $y=0$