LESSON 7.2 Skills Practice

Name _____ Date _____

A Rational Shift in Behavior

Translating Rational Functions

Problem Set

Complete the table. Use your graphing calculator to help.

	c-value	$g(x) = \frac{1}{x - c}$	Vertical Asymptote(s)	Horizontal Asymptote(s)	Domain	Range
1.	3	$g(x) = \frac{1}{x - 3}$	$x = 3$	$y = 0$	Real Numbers except 3	Real Numbers except 0
2.	−4					
3.	$\frac{1}{2}$					
4.	−2.7					
5.	5					
6.	$-\frac{7}{8}$					

LESSON 7.2 Skills Practice

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

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

Domain: All real numbers except 0.

Range: All real numbers except 0.

Vertical Asymptote at $x = 0$.

Horizontal Asymptote at $y = 0$.

8. $f(x) = \frac{1}{x - 9}$

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

10. $f(x) = 2x + 1$

11. $f(x) = \frac{-7}{2x + 3}$

12. $f(x) = \frac{x}{7}$

Write a rational function for each table, graph, or description provided. Explain your reasoning.

13. Vertical asymptote at $x = 2$ and a horizontal asymptote at $y = 0$.

Answers will vary.

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

The denominator cannot be 2, so there will be a vertical asymptote at $x = 2$. The function has a constant in the numerator and variable in the denominator, so the output will approach 0 as x increases or decreases, creating a horizontal asymptote at $y = 0$.

7

Name _____ Date _____

14. Vertical asymptote at $x = -5$ and a horizontal asymptote at $y = 0$.

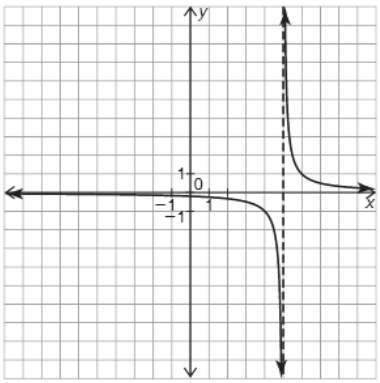
15.

x	$f(x)$
−4	−1
−3	$-\frac{3}{2}$
−2	−3
−1	undefined
0	3
1	$\frac{3}{2}$
2	1

16. The domain is all real numbers except $x = 6$. The range is all real numbers except $y = 0$.

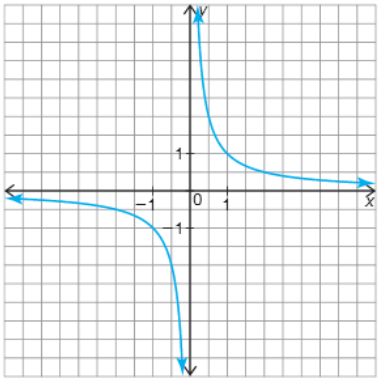
17. Vertical asymptote at $x = -3$. The range is all real numbers except $y = 0$.

18.

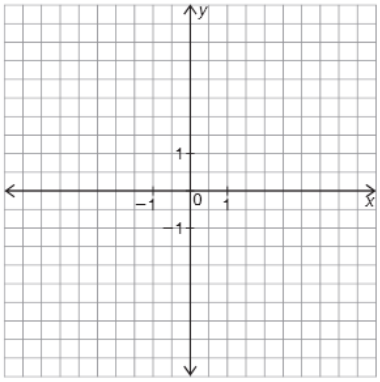


Sketch each rational function without using a graphing calculator.

19. $f(x) = \frac{1}{x}$



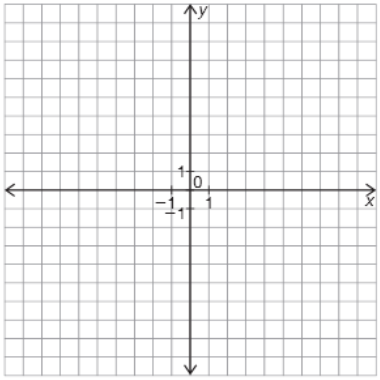
20. $f(x) = \frac{1}{x^2}$



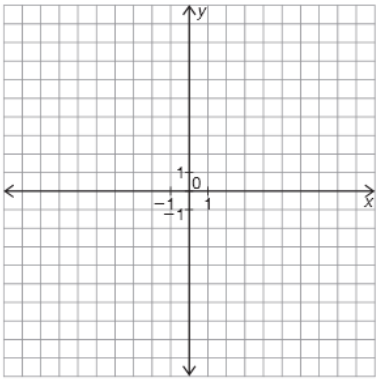
7

Name _____ Date _____

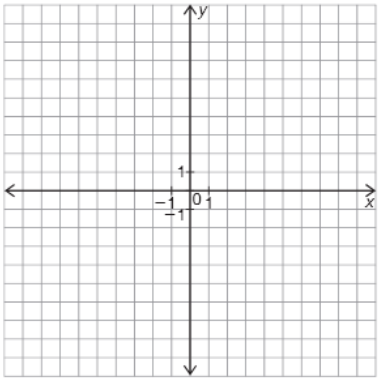
21. $f(x) = \frac{1}{x - 4}$



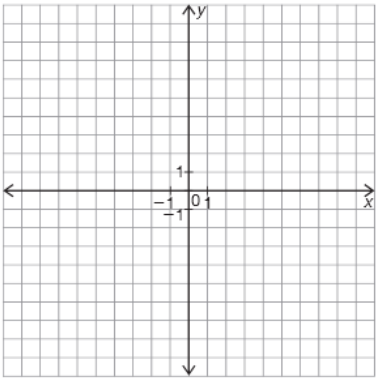
22. $f(x) = \frac{-1}{x - 4}$



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



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



LESSON 7.2 Skills Practice

Analyze each rational function. Use algebra to determine the vertical asymptotes. Do not use a graphing calculator.

25. $f(x) = \frac{2}{3x - 15}$

$3x - 15 = 0$

$3x = 15$

$x = 5$

A vertical asymptote exists at $x = 5$.

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

27. $f(x) = \frac{12x}{x^2 + 4x - 5}$

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

29. $f(x) = \frac{7}{x^2 + 1}$

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

7

Name _____ Date _____

Determine two different rational functions with the given characteristics.

31. The rational functions have a vertical asymptote at $x = -1$.

Answers will vary.

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

32. The rational functions have a vertical asymptote at $x = 0$.

33. The rational functions have vertical asymptotes at $x = -4$ and $x = 2$.

34. The rational functions have vertical asymptotes at $x = 0$ and $x = 7$.

35. The rational functions have a vertical asymptote at $x = 3$ and a y-intercept of $(0, -1)$.

36. The rational functions have a vertical asymptote $x = -2$. Also they each have a second vertical asymptote but not the same one.