

**LESSON 7.3** Skills Practice

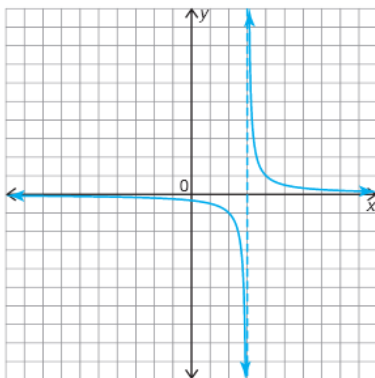
Name \_\_\_\_\_ Date \_\_\_\_\_

**A Rational Approach**  
Exploring Rational Functions Graphically

**Problem Set**

Sketch each function without using a graphing calculator. Indicate the domain, range, vertical and horizontal asymptote(s), and y-intercept.

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



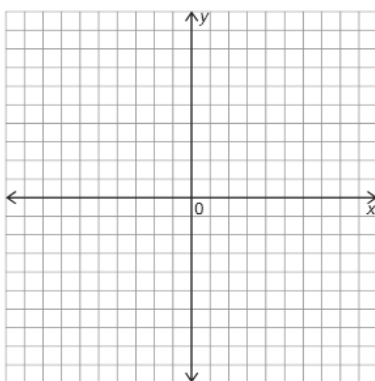
Domain: All real numbers except 3.

Range: All real numbers except 0.

Asymptote(s): Vertical asymptote at  $x = 3$ .  
Horizontal asymptote at  $y = 0$ .

y-intercept:  $0, -\frac{1}{3}$

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



Domain:

Range:

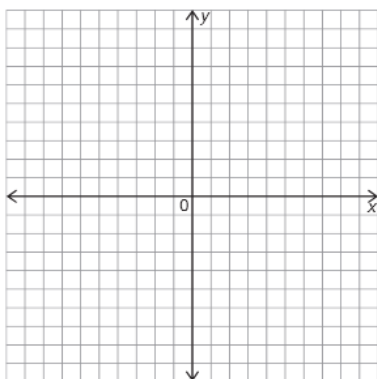
Asymptote(s):

y-intercept:

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



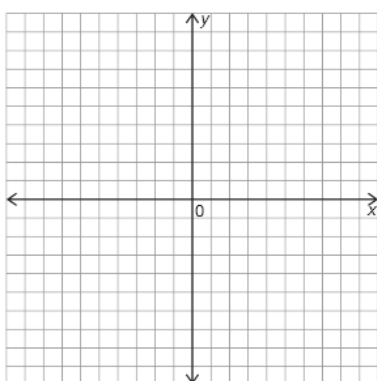
Domain:

Range:

Asymptote(s):

y-intercept:

4.  $f(x) = \frac{1}{x^2 + x - 6}$



Domain:

Range:

Asymptote(s):

y-intercept:

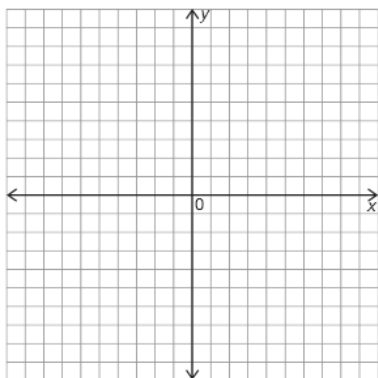
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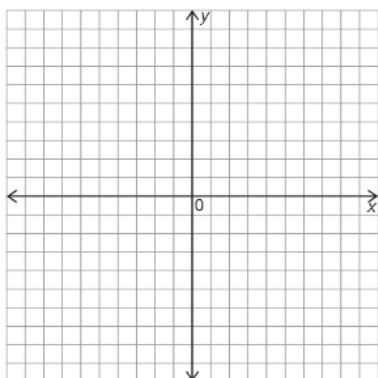
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5.  $f(x) = \frac{1}{x^2 - 1}$



Domain:  
 Range:  
 Asymptote(s):  
 y-intercept:

6.  $f(x) = \frac{1}{x^2 + 4x + 4}$



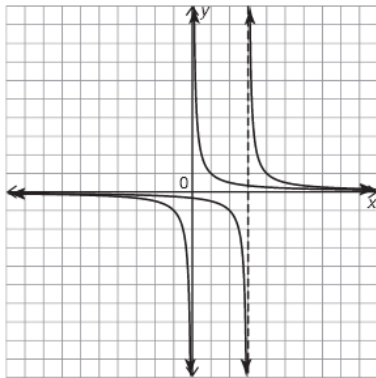
Domain:  
 Range:  
 Asymptote(s):  
 y-intercept:

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The function  $f(x) = \frac{1}{x}$  is shown on each coordinate plane. Determine whether the other function shown is the graph of  $g(x)$ ,  $p(x)$ , or  $q(x)$ . Explain your reasoning.

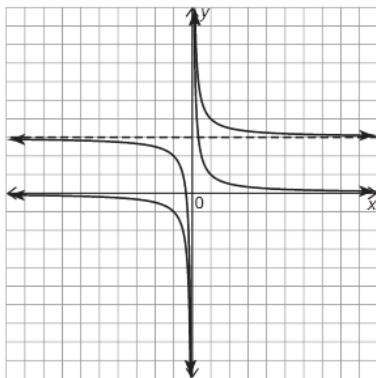
7.  $g(x) = \frac{1}{x-3}$   
 $p(x) = \frac{1}{x+3}$   
 $q(x) = \frac{1}{x} + 3$



Function:  $g(x) = \frac{1}{x-3}$

Explanation: The original function  $f(x) = \frac{1}{x}$  has been shifted 3 units to the right. This results from a change in the C value.

8.  $g(x) = \frac{1}{x-3}$   
 $p(x) = \frac{1}{x+3}$   
 $q(x) = \frac{1}{x} + 3$



Function:

Explanation:

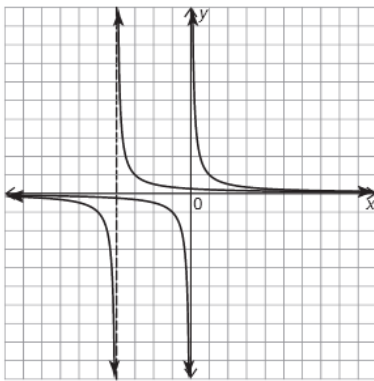
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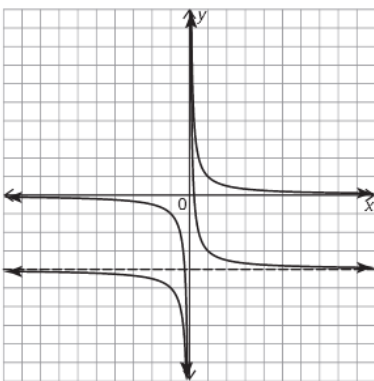
9.  $g(x) = \frac{1}{x - 4}$   
 $p(x) = \frac{1}{x + 4}$   
 $q(x) = \frac{1}{x} - 4$



Function:

Explanation:

10.  $g(x) = \frac{1}{x - 4}$   
 $p(x) = \frac{1}{x + 4}$   
 $q(x) = \frac{1}{x} - 4$



Function:

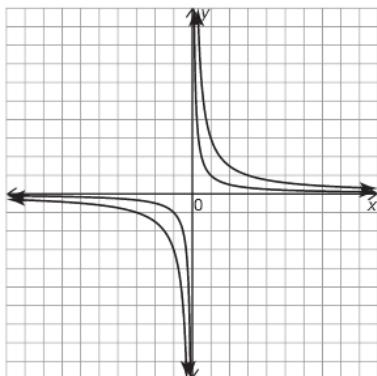
Explanation:

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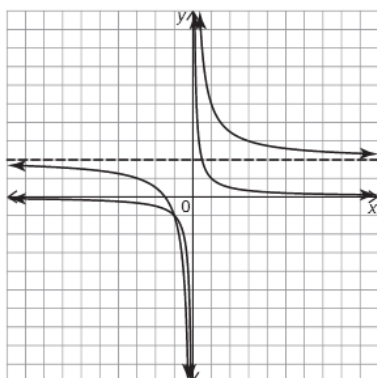
11.  $g(x) = \frac{3}{x}$   
 $p(x) = \frac{-3}{x}$   
 $q(x) = \frac{3}{x} + 2$



Function:

Explanation:

12.  $g(x) = \frac{3}{x}$   
 $p(x) = \frac{-3}{x}$   
 $q(x) = \frac{3}{x} + 2$



Function:

Explanation:

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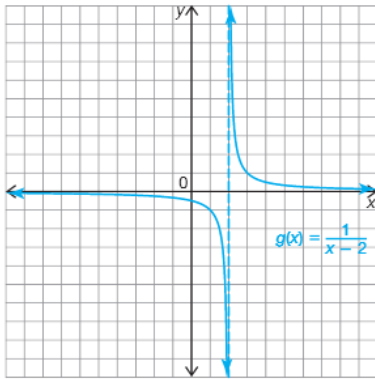
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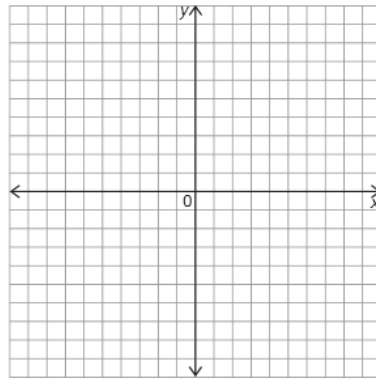
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Sketch  $g(x)$  on each coordinate plane, given  $f(x) = \frac{1}{x}$ .

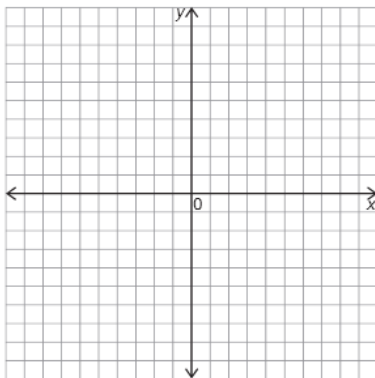
13.  $g(x) = f(x - 2)$



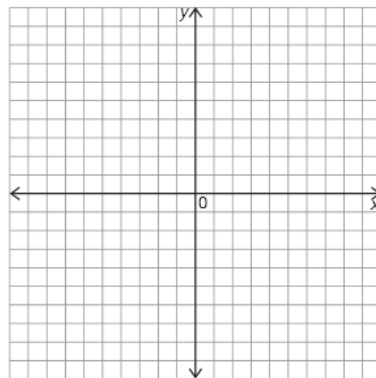
14.  $g(x) = f(x) - 4$



15.  $g(x) = f(x + 3)$



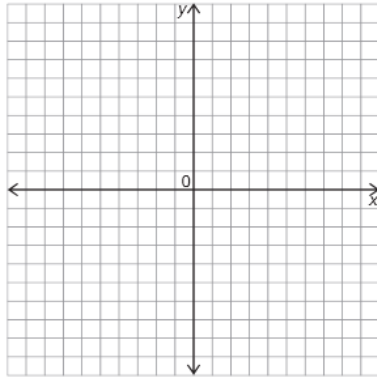
16.  $g(x) = 2f(x)$



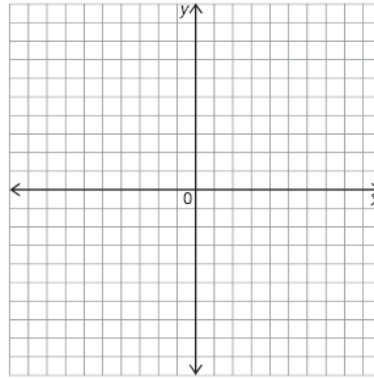
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17.  $g(x) = f(x + 2) - 1$



18.  $g(x) = f(x - 1) + 1$



Write a rational function  $g(x)$  that matches the given characteristic(s).

19. Vertical asymptote at  $x = 5$

Answers will vary.

$$g(x) = \frac{1}{x - 5}$$

20. Vertical asymptotes at  $x = -2$  and  $x = 1$

21. Vertical asymptote at  $x = 4$   
Horizontal asymptote at  $y = -3$

22. Vertical asymptotes at  $x = -3$  and  $x = 5$   
Horizontal asymptote at  $y = 1$

23. For  $f(x) = \frac{1}{x}$ ,  $g(x) = f(x + 7) - 2$ .

24. For  $f(x) = \frac{1}{x}$ ,  $g(x)$  shifts  $f(x)$  left 1 unit and down 2 units.

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