

# Pre-Calculus 12 - Rational Expressions Quiz

## Matching

Match each graph of a rational function with its equation.

A.  $f(x) = \frac{9}{x^2 - 4}$

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

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

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

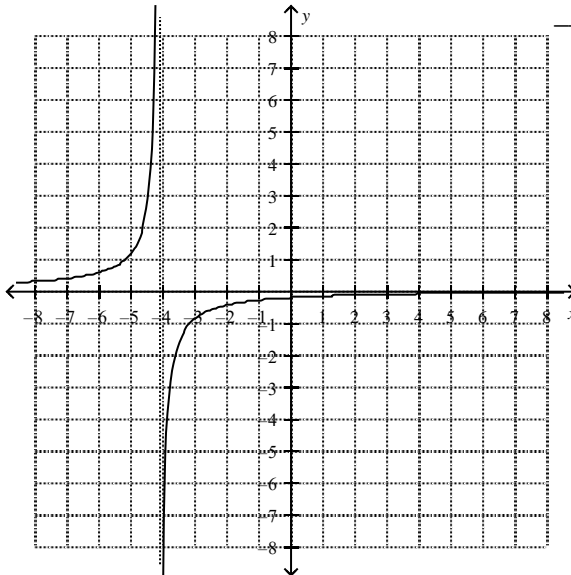
E.  $f(x) = \frac{-3x - 9}{x + 4}$

F.  $f(x) = \frac{9}{x^2 + 6x + 8}$

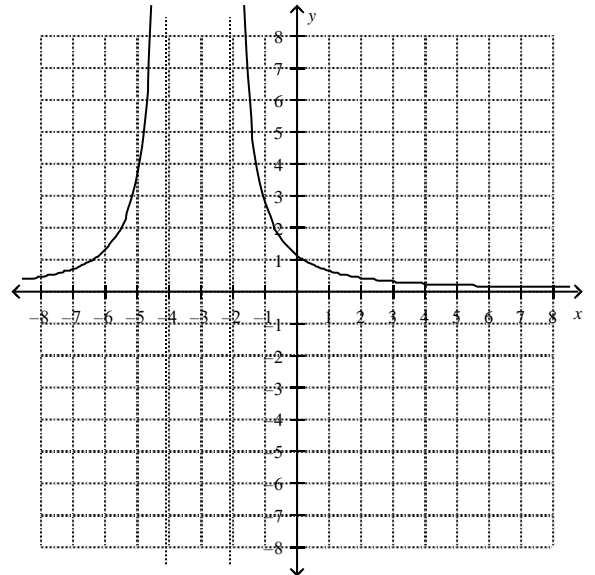
G.  $f(x) = \frac{1}{(x+4)^2}$

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

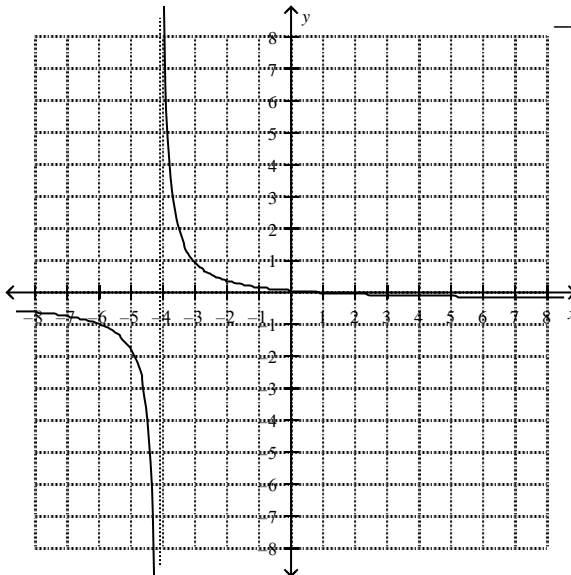
\_\_\_\_\_ 1.



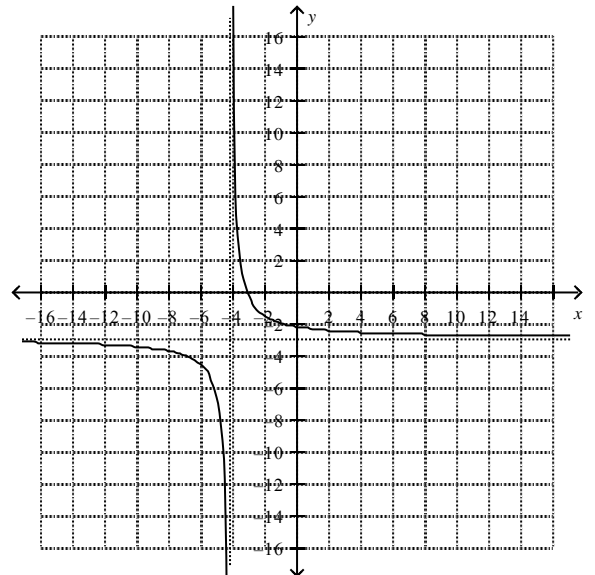
\_\_\_\_\_ 3.



\_\_\_\_\_ 2.

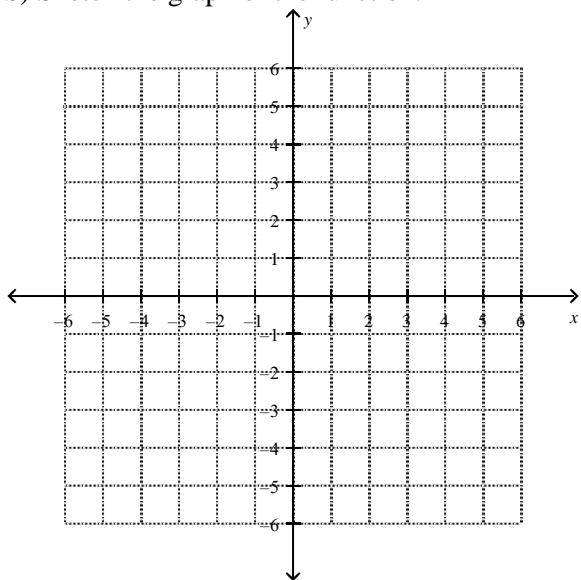


\_\_\_\_\_ 4.

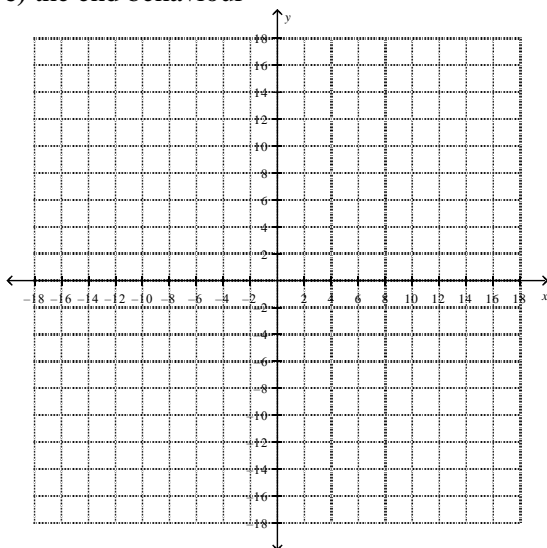


### Short Answer

1. a) Determine an equation in the form  $f(x) = \frac{1}{kx - c}$  for a function with a vertical asymptote at  $x = 2$  and a y-intercept of  $-\frac{1}{8}$ .
- b) Sketch the graph of the function.



2. Sketch the graph of the function  $f(x) = \frac{5}{x+3}$  using transformations and identify
- a) the vertical asymptotes (if any)
  - b) the horizontal asymptotes (if any)
  - c) the domain and range
  - d) the behaviour near any non-permissible values
  - e) the end behaviour

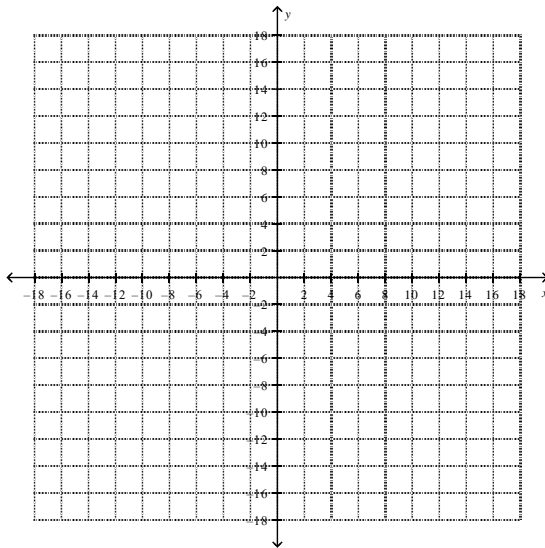


3. Solve the following algebraically.

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

4. Solve the following graphically

$$\frac{x+5}{x-3} = \frac{2x+7}{x}$$



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### Answer Section

#### MATCHING

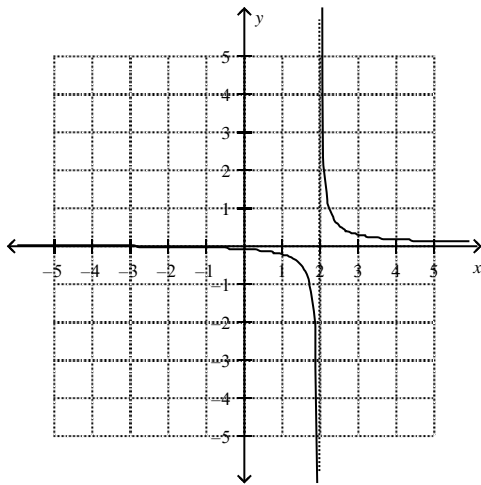
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|------------------------|---|--------------|--|
| 1. ANS: C<br>NAT: RF14 | PTS: 1<br>TOP: Analysing Rational Functions | DIF: Average | OBJ: Section 9.2<br>KEY: rational functions   graphs |
| 2. ANS: H<br>NAT: RF14 | PTS: 1<br>TOP: Analysing Rational Functions | DIF: Average | OBJ: Section 9.2<br>KEY: rational functions   graphs |
| 3. ANS: F<br>NAT: RF14 | PTS: 1<br>TOP: Analysing Rational Functions | DIF: Average | OBJ: Section 9.2<br>KEY: rational functions   graphs |
| 4. ANS: E<br>NAT: RF14 | PTS: 1<br>TOP: Analysing Rational Functions | DIF: Average | OBJ: Section 9.2<br>KEY: rational functions   graphs |
| 5. ANS: A<br>NAT: RF14 | PTS: 1<br>TOP: Analysing Rational Functions | DIF: Average | OBJ: Section 9.2<br>KEY: rational functions   graphs |

#### SHORT ANSWER

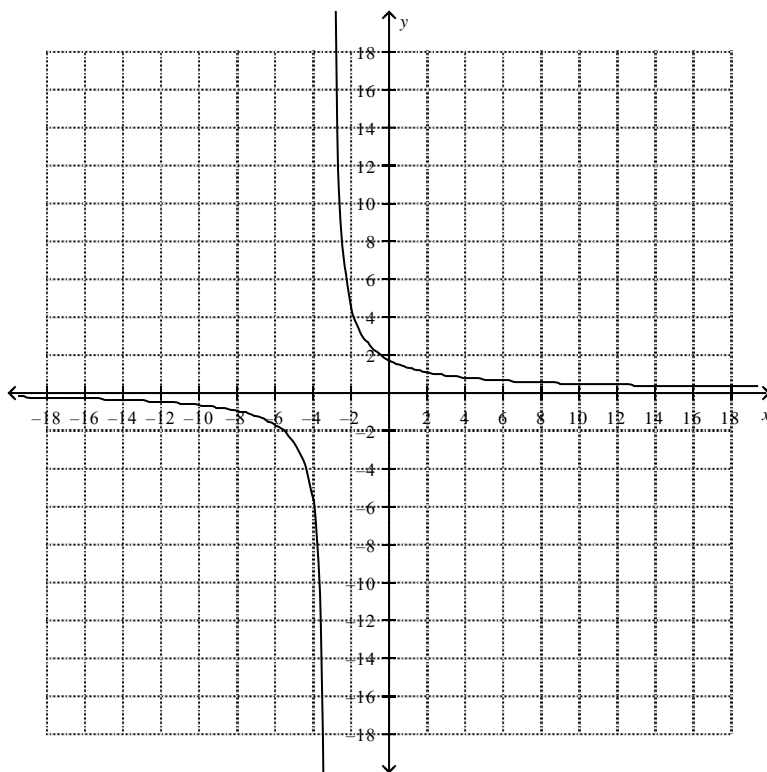
1. ANS:

a)  $f(x) = \frac{1}{4x - 8}$

b)



- PTS: 1      DIF: Average      OBJ: Section 9.1      NAT: RF14  
TOP: Exploring Rational Functions Using Transformations  
KEY: reciprocal of linear function | vertical asymptote | y-intercept | graph
2. ANS:



- a) vertical asymptote with equation  $x = -3$
- b) horizontal asymptote with equation  $y = 0$
- c) domain  $\{x \mid x \neq -3, x \in \mathbb{R}\}$ ; range  $\{y \mid y \neq 0, y \in \mathbb{R}\}$
- d) As  $x$  approaches  $-3$ ,  $|y|$  becomes very large.
- e) As  $|x|$  becomes very large,  $y$  approaches 0.

PTS: 1                      DIF: Easy                      OBJ: Section 9.1                      NAT: RF14  
 TOP: Exploring Rational Functions Using Transformations  
 KEY: graph | characteristics | transformations

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

$$3(x-2) = 4(2x-4)$$

$$3x-6 = 8x-16$$

$$5x = 10$$

$$x = 2$$

But  $x = 2$  is an inadmissible value for the equation, so there is no solution.

PTS: 1                      DIF: Average                      OBJ: Section 9.3                      NAT: RF14  
 TOP: Connecting Graphs and Rational Equations                      KEY: rational equation

4. ANS:  
 $x=7$  or  $x=-3$

