

Chapter 9 Review

Name: Key Hour: \_\_\_\_\_

1) Find the horizontal asymptote of the graph of each rational function.

a.  $y = \frac{2}{x-6}$

$y = 0$

b.  $y = \frac{(x+3)}{2(x+4)}$

$y = \frac{1}{2}$

c.  $y = \frac{3x^3 - 12}{x^2 - 2}$

None

2) Describe the points of discontinuity (vertical asymptotes and holes) for the graph of each rational function.

a.  $y = \frac{x-2}{x^2-2x}$

$\frac{\cancel{(x-2)}}{x(\cancel{x-2})}$

Hole @  $x = 2$

VA @  $x = 0$

b.  $y = \frac{x^2-4}{x^2+4x+4}$

$\frac{\cancel{(x+2)}\cancel{(x-2)}}{(x+2)(x+2)}$

VA @  $x = -2$

Holes: none

c.  $y = \frac{\cancel{(x-2)}(2x+3)}{(5x+4)(x-3)\cancel{(x-2)}^2}$

VA @  $x = 3, -4/5, 2$

Holes: none

d.  $y = \frac{15x^2-7x-2}{x^2-4}$

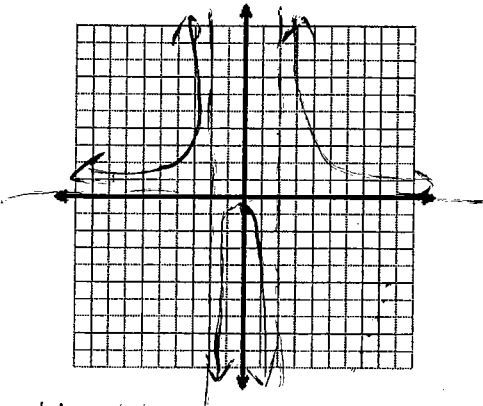
$\frac{(-5x-2)(5x+1)}{(x+2)(x-2)}$

VA @  $x = 2, -2$

$\frac{15x^2 - 10x - 5x - 2}{(5x+1)(x-2)}$   
 $\frac{15x^2 - 15x - 2}{(5x+1)(x-2)}$   
 $\frac{15x(x-1) - 2}{(5x+1)(x-2)}$   
 $\frac{15x^2 - 15x - 2}{(5x+1)(x-2)}$   
 AC @  $x = -30$   
 $\uparrow$   
 $-10 \downarrow$

3) Sketch the graph of each rational function by finding VA, HA, Holes, X-intercept, and Y-intercepts.

a.  $y = \frac{3}{(x-2)(x+2)}$



VA  $x = 2, -2$

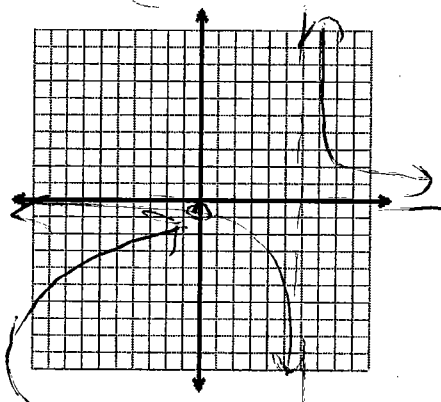
Holes: none

HA:  $y = 0$

X-int: none

Y-int  $(0, -3/4)$

b.  $y = \frac{x}{x(x-6)}$



Hole  $x = 0$

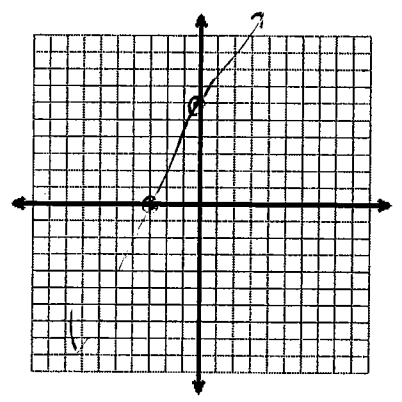
VA  $x = 6$

HA  $y = 0$

X-int: none

Y-int  $-1/6$

c.  $y = \frac{2x^2-12x-54}{x-9}$



$2(x^2-6x-27)$

$\frac{2(x-9)(x+3)}{x-9}$

HA: none

VA: none

Hole  $x = 9$

X-int  $x = -3$

Y-int  $(0, 4)$

Multiply, divide, add or subtract to simplify each answer. Write the answer in simplest form. State any restrictions on the variables.

4)  $\frac{x^2 - 9}{5x^3 + 17x^2 + 6x} \cdot \frac{5x^2 + 2x}{x - 3}$

$\frac{(x+3)(x-3)}{(5x+2)(x+3)} \cdot \frac{x(5x+2)}{x-3} = 1$   
 $x+3, -3, -2/5$   
 $x \neq 0$

5)  $\frac{y^2 - 2y}{y^2 + 7y - 18} \cdot \frac{y^2 - 81}{y^2 - 11y + 18}$

$\frac{y(y-2)}{(y+9)(y-2)} \cdot \frac{(y+9)(y-9)}{(y-9)(y-2)}$

7)  $\frac{\frac{3}{x+1}}{\frac{5}{x-1}} \div \frac{5}{x-1}$   
 $\frac{3}{x+1} \cdot \frac{x-1}{5}$

$\frac{3x-3}{5x+5} \quad x \neq -1, 1$

6)  $\frac{y^2 - 49}{(y-7)^2} \div \frac{5y+35}{y^2 - 7y}$

$\frac{(y+7)(y-7)}{(y-7)(y-7)} \cdot \frac{y(y-7)}{5(y+7)}$

$\frac{y}{5} \quad y \neq 7, -7, 0$

8)  $\frac{6}{5x^2y} + \frac{5}{10xy^2} \cdot \frac{x}{x}$

$\frac{12y + 5x}{10x^2y^2} \quad x \neq 0, y \neq 0$

9)  $\frac{3}{x^2 - x - 6} + \frac{2}{x^2 + 6x + 5}$

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

$3(x+5)(x-1) + 2(x-3)(x+1)$

11)  $\frac{x(x-2)}{(x-1)} + \frac{1}{x-1}$

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

$x \neq 1$

$x(x-2)$   
 $x \neq 1$

10)  $\frac{4}{x^2 - 3x} + \frac{6}{3x - 9} \cdot \frac{x}{x}$

$\frac{12+6x}{3x(x-3)} \quad x \neq 0, x \neq 3$

$\frac{(x+1)x}{(x-1)(x-1)} - \frac{6x}{x+1} \cdot \frac{(x-1)}{(x-1)}$

$\frac{x^2 + x}{(x+1)(x-1)} - \frac{6x^2 + 6x}{(x+1)(x-1)}$

$\frac{7x^2 - 5x}{(x+1)(x-1)} \quad x \neq 1, x \neq -1$

$\frac{2}{x} + \frac{5}{x-2} \cdot \frac{x}{x}$

$\frac{2(x-2)}{x(x-2)} + \frac{5x}{x(x-2)}$

$\frac{7x - 4}{x(x-2)} \quad x \neq 0, 2$

Solve each equation.

$$14) \frac{1}{4-5x} = \frac{3}{x+9}$$

$$x+9 = 12 - 15x$$

$$16x = 3$$

$$x = 3/16$$

$$\frac{(x-2)}{(x-2)}x + \frac{10}{x-2} = \frac{x^2+3x}{x-2}$$

$$\frac{x^2-2x}{x-2} + \frac{10}{x-2} = \frac{x^2+3x}{x-2}$$

$$x^2 - 2x + 10 = x^2 + 3x$$

$$10 = 5x$$

~~2-x~~  
N.S.

$$16) \frac{2}{x} + \frac{5x}{x-2} = 8$$

$$17) \frac{2}{3} + \frac{3x-1}{6} = \frac{5}{2}$$

$$\frac{2x-4}{x(x-2)} + \frac{5x}{x(x-2)} = 8$$

$$\frac{4}{6} + \frac{3x-1}{6} = \frac{5}{2}$$

$$\frac{7x-4}{x(x-2)} = \frac{8}{1}$$

$$8x(x-2) = 7x-4$$

$$\frac{3x+3}{6} = \frac{5}{2}$$

$$30 = 6x + 6$$

$$8x^2 - 16x = 7x - 4$$

$$8x^2 - 23x + 4 = 0$$

$$x = .186$$

$$x = 2.689$$

$$24 = 6x$$

$$4 = x$$

18) While driving down Woodward, Tyler can drive 7 miles North in the same time it takes him to drive 6 miles South. His rate of which his speedometer shows his car moving is 45 mph. Find the speed of the wind current that is causing him to drive slower going south.

	R	T	D
N	45+W	7	7
S	45-W	6	6

$$\frac{7}{45+W} = \frac{6}{45-W}$$

$$315 - 7W = 270 + 6W$$

$$45 = 13W$$

$$3.46 = W$$

19) Working together, it takes Cassidy, Carson, and Giada two hours to paint one room. When Cassidy is working alone, she can paint one room in 6 hours. When Carson works alone, he can paint one room in 4 hours. Determine how long it would take Giada to paint one room on her own.

	R	T	D
CS	1/6	6	1
G	1/4	4	1
CR	1/x	x	1
Tot	1/2	2	1

$$\frac{1}{6} + \frac{1}{4} + \frac{1}{x} = \frac{1}{2}$$

$$\frac{2x}{12x} + \frac{3x}{12x} + \frac{12}{12x} = \frac{1}{2}$$

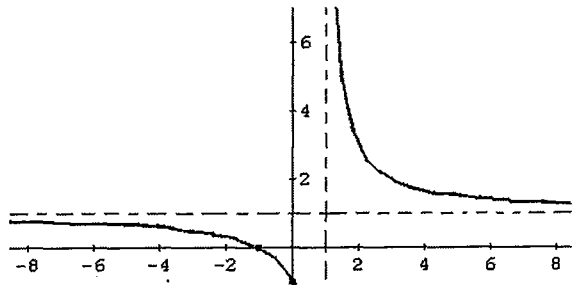
$$\frac{5x+12}{12x} = \frac{1}{2}$$

$$2(5x+12) = 12x$$

$$24 = 2x$$

$$x = 12 \text{ hrs}$$

20) Write an equation in factored form for each graph.

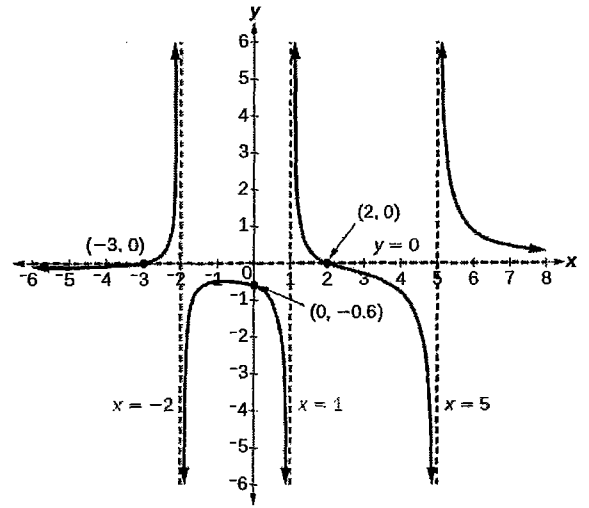


B/c of  
HA  $y=1$

B/c of  
 $x=1$

$$y = \frac{1(x+1)}{1(x-1)}$$

B/c of VA



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