

Example :

$$y = \frac{x^2 + 7x + 12}{2x^2 + 10x + 8}$$

1. Simplify
2. Cancel out -- find the holes
3. denominator = 0 -- vertical asymptotes
4. highest degree -- horizontal asymptote

Highest degree

top → slant

bottom → $y = c$

same → coefficients

$$y = \boxed{-}$$

1. Simplify

$$y = \frac{(x+3)(x+4)}{2(x+1)(x+4)}$$

2. Cancel out -- find the holes

$$y = \frac{(x+3)\cancel{(x+4)}}{2(x+1)\cancel{(x+4)}}$$

$$x+4=0$$

$$x = -4 \quad y = \frac{1}{6}$$

$$(-4, \frac{1}{6})$$

$$\frac{\overset{-4+3}{(x+3)}}{2\overset{-4}{(x+1)}} = \frac{-1}{2(-3)} = \frac{1}{6}$$

3. denominator = 0 -- vertical asymptotes

$$2(x+1)\cancel{(x+4)}$$

$$2(x+1) = 0$$

$$\cancel{2(x+1)} = \frac{0}{2}$$

$$x+1=0$$

$$x = -1$$

vertical asymptote

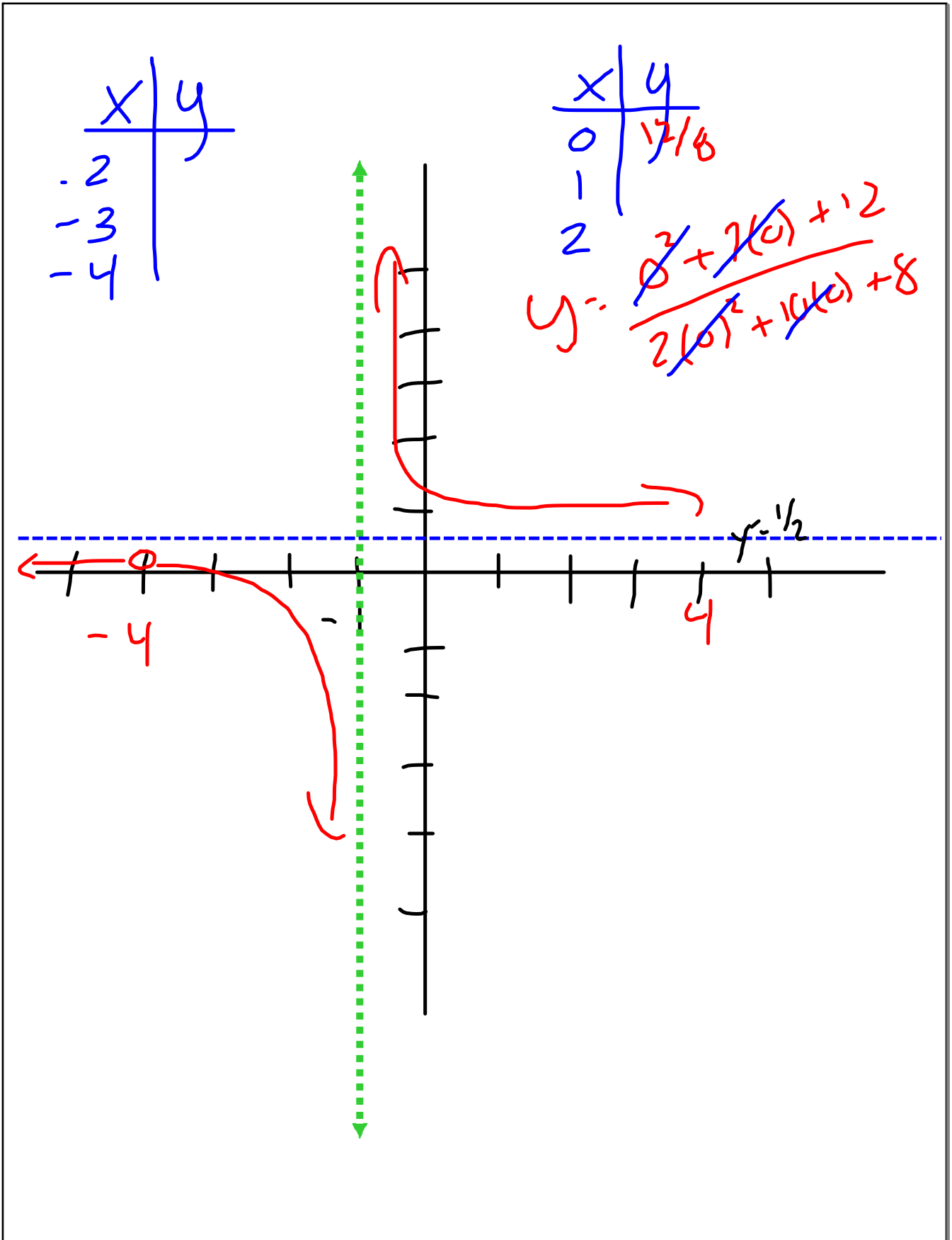
4. highest degree -- horizontal asymptote

$$y = \frac{x^{\textcircled{2}} + 7x + 12}{2x^{\textcircled{2}} + 10x + 8}$$

SAME ⇒ coefficients

$$y = \frac{1x^2 \dots}{2x^2 \dots}$$

$$y = \frac{1}{2} \text{ horizontal asymptote}$$



$$y = \frac{3x^2 + 12x}{x^2 + 6x + 8}$$

1. Simplify

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

2. Cancel out -- find the holes

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

$$x+4=0$$

$$x = -4 \quad y = ?$$

$$(-4, 6)$$

$$\frac{3(-4)}{(-4+2)} = \frac{-12}{-2} = 6$$

3. denominator = 0 -- vertical asymptotes

$$\cancel{(x+4)}(x+2)$$

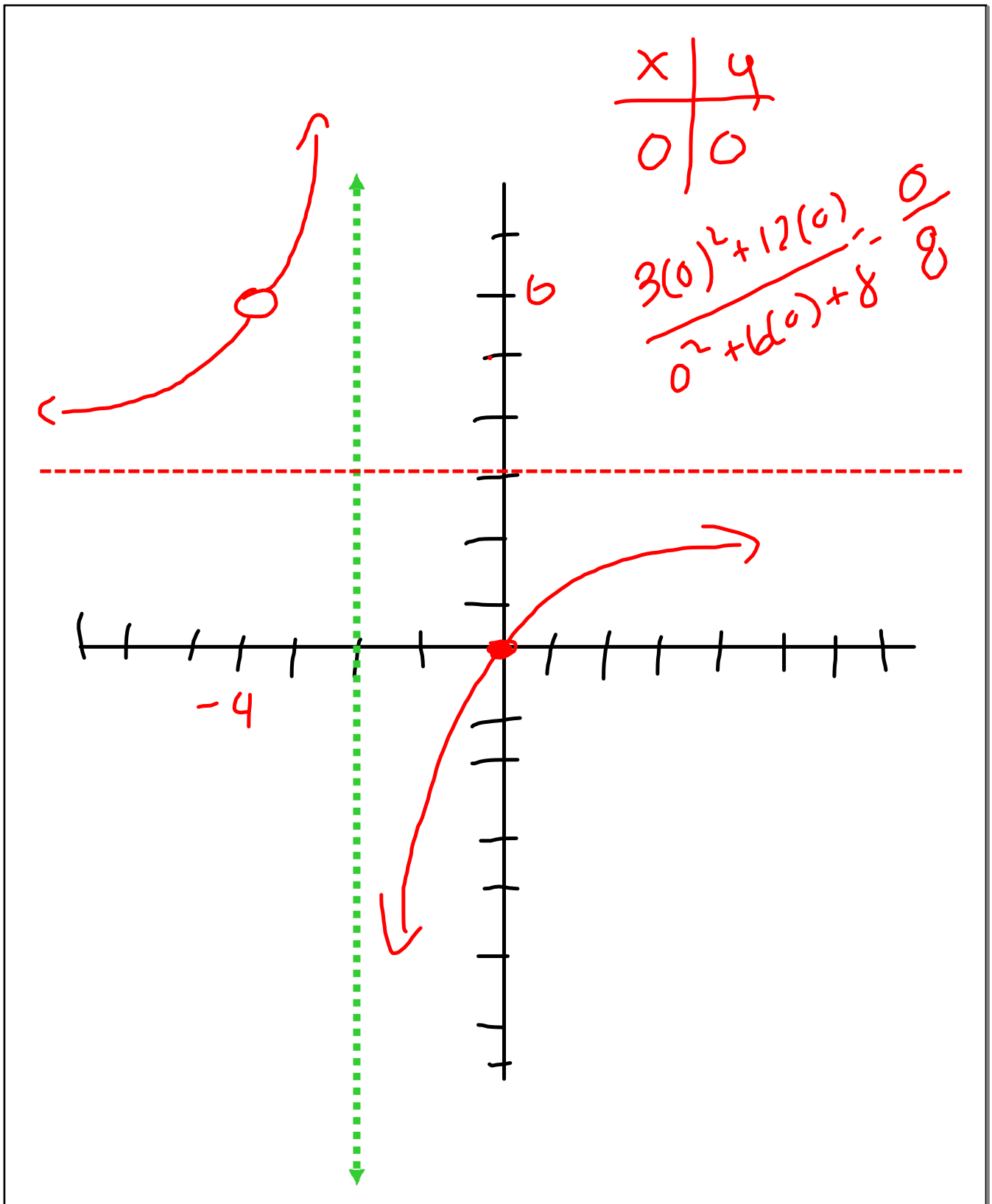
$$x+2=0$$

$x = -2$ vertical asymptote

4. highest degree -- horizontal asymptote

$$y = \frac{3x^2 + 12x}{x^2 + 6x + 8}$$

$y = \frac{3}{1} \quad y = 3$ horizontal asymptote



Homework on Last 4 Pages

3rd Period

Example :

$$y = \frac{x^2 + 7x + 12}{2x^2 + 10x + 8}$$

1. Simplify
2. Cancel out -- find the holes
3. denominator = 0 -- vertical asymptotes
4. highest degree -- horizontal asymptote

Highest degree

top → slant

bottom → $y = \dots$

same → coefficients

$$y = \boxed{-}$$

1. Simplify

$$y = \frac{(x+3)(x+4)}{2(x+1)(x+4)}$$

2. Cancel out -- find the holes

$$y = \frac{(x+3)\cancel{(x+4)}}{2(x+1)\cancel{(x+4)}}$$

$$x+4=0$$

$$x=-4$$

$$y = ?$$

$$(-4, \frac{1}{6})$$

$$\frac{\cancel{(x+3)}}{2\cancel{(x+1)}} = \frac{-1}{-6}$$

3. denominator = 0 -- vertical asymptotes

$$\frac{\cancel{2(x+1)}\cancel{(x+4)}}{2(x+1)} = 0$$

$$\cancel{2(x+1)} = \frac{0}{2}$$

$$x+1=0$$

$$x=-1$$

vertical asymptote $x=-1$

4. highest degree -- horizontal asymptote

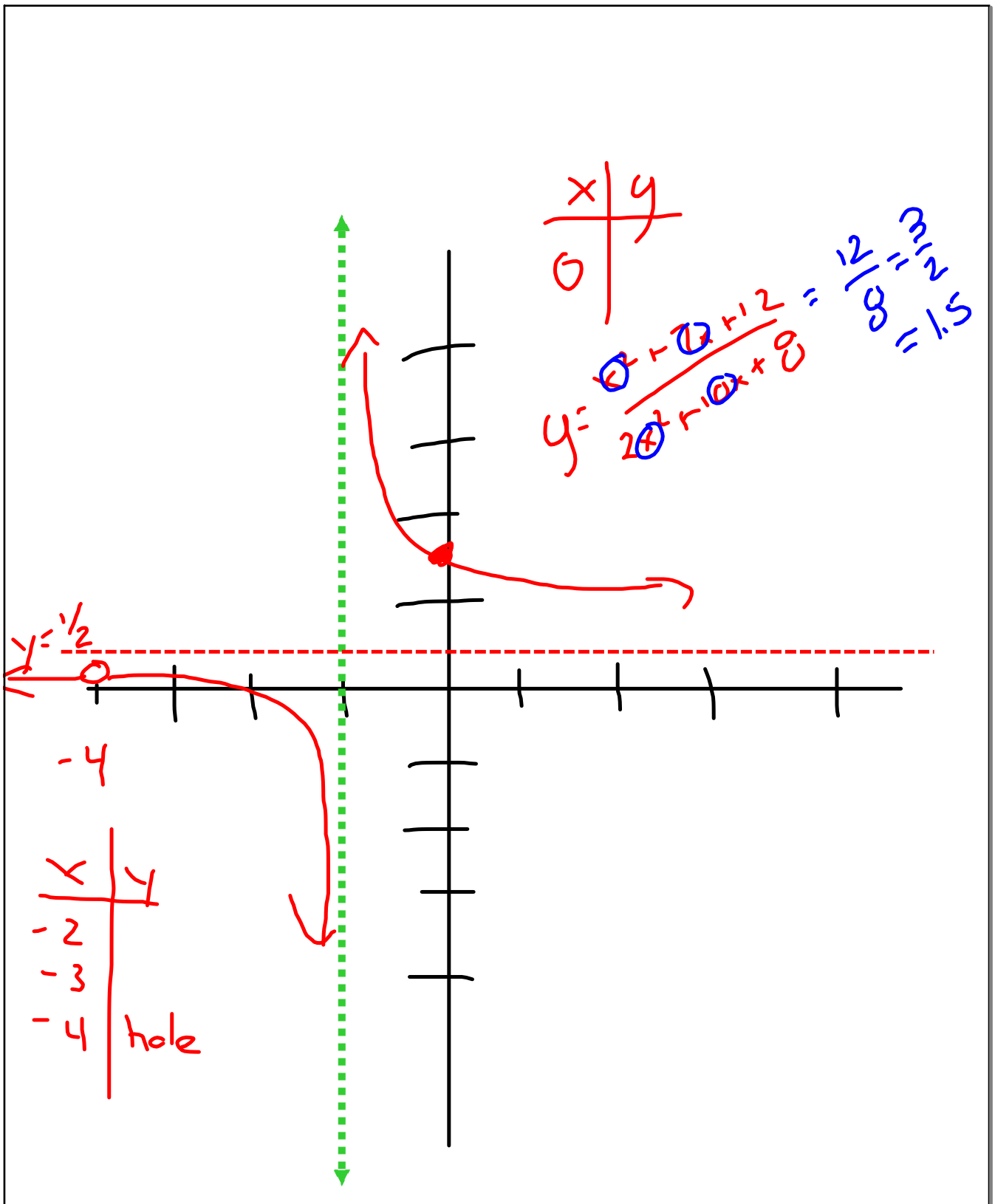
top slant

bottom $y=0$

same coefficients

$$y = \frac{1x^2 + 7x + 12}{2x^2 + 10x + 8}$$

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



$$y = \frac{3x^2 + 12x}{x^2 + 6x + 8}$$

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

2. Cancel out -- find the holes

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

$x+4=0$
 $x=-4$

$$\frac{3(x+4)}{\cancel{(x+4)}} = \frac{-12}{-2} = 6$$

$(-4, 6)$

3. denominator = 0 -- vertical asymptotes

$$\cancel{(x+4)}(x+2) = 0$$

$$x+2=0$$

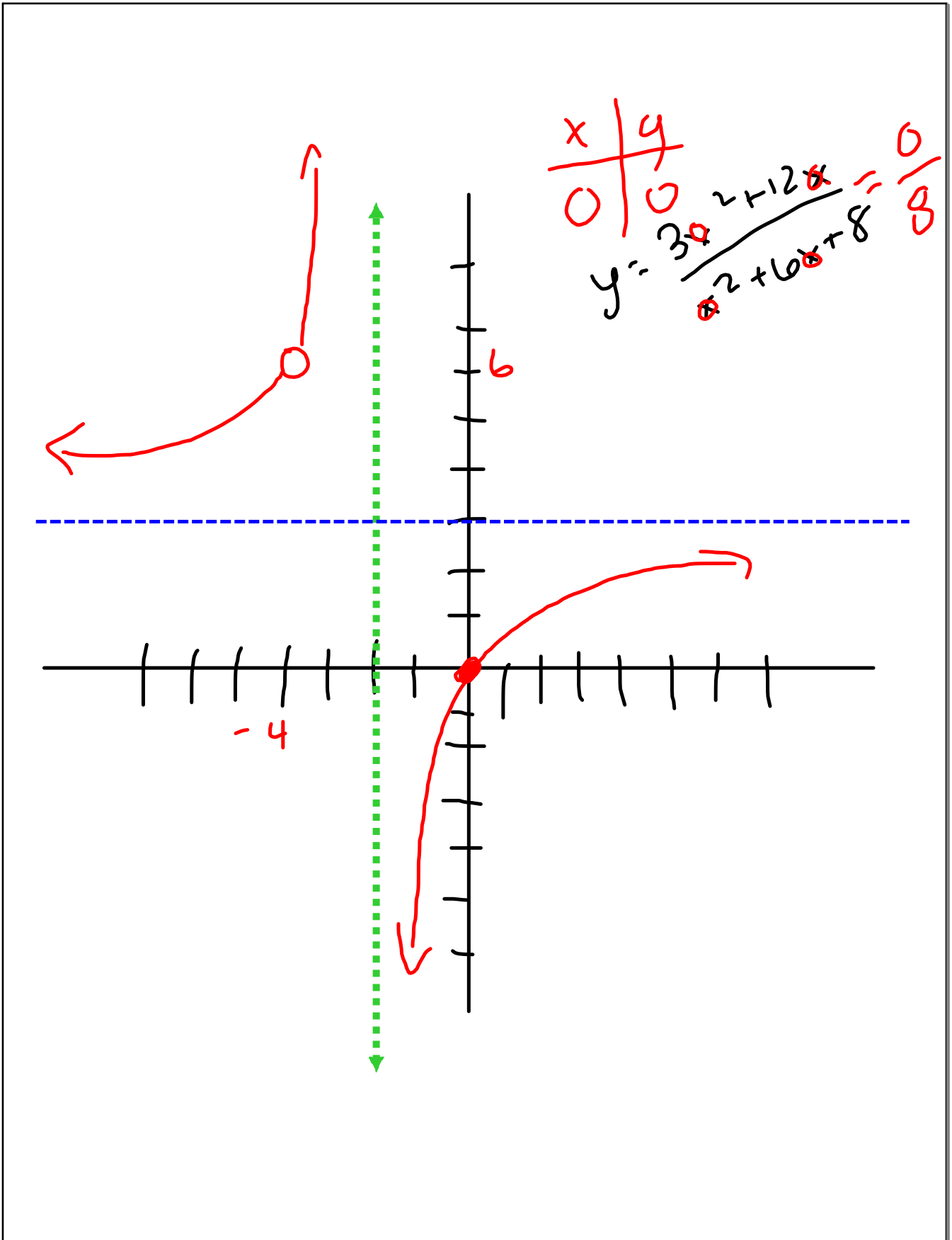
$$x=-2 \leftarrow \text{vertical asymptote}$$

4. highest degree -- horizontal asymptote

$$y = \frac{3x^2 + 12x}{1x^2 + 6x + 8}$$

$$y = \frac{3}{1} = 3$$

$y=3$ horizontal asymptote



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

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

2. Cancel out -- find the holes

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

Nothing cancels out

No Holes

3. denominator = 0 -- vertical asymptotes

$$f(x) = \frac{\cancel{3x+9}}{(x+2)(x-1)} = 0$$

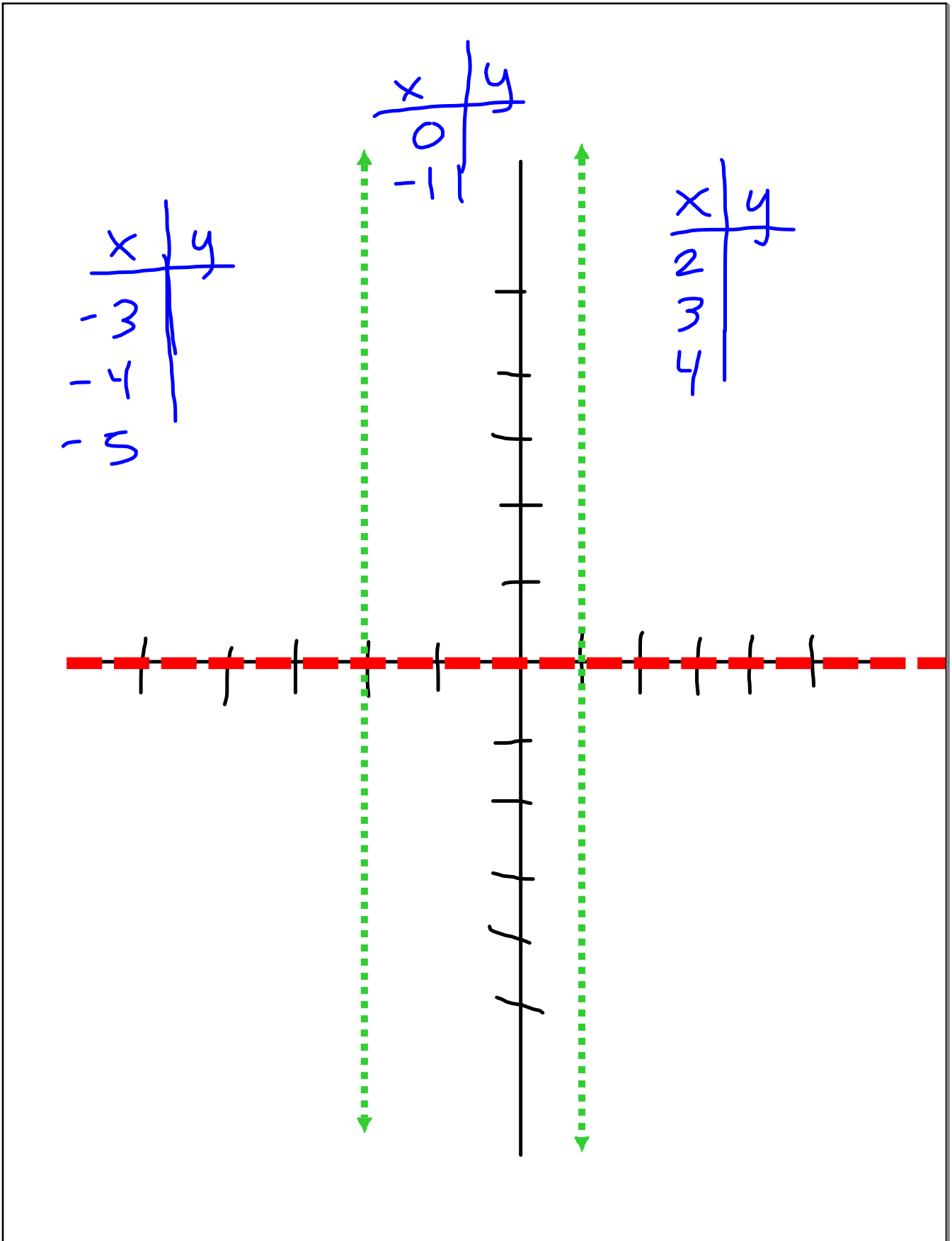
$$x+2=0 \quad x-1=0$$

$$x=-2 \quad x=1$$

4. highest degree -- horizontal asymptote

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

highest degree bottom $y=0$



Homework on Last 4 Pages

6th Period

Example :

$$y = \frac{x^2 + 7x + 12}{2x^2 + 10x + 8}$$

$2(x^2 + 5x + 4)$
1.4

1. Simplify
2. Cancel out -- find the holes
3. denominator = 0 -- vertical asymptotes
4. highest degree -- horizontal asymptote

Highest degree

top → slant

bottom → $y = \dots$

same → coefficients

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

1. Simplify

$$y = \frac{(x+4)(x+3)}{2(x+4)(x+1)}$$

$$\frac{\overset{-4}{x+3}}{2(\overset{-4}{x+1})} = \frac{-1}{-2}$$

2. Cancel out -- find the holes

$$y = \frac{\cancel{(x+4)}(x+3)}{2(\cancel{x+4})(x+1)}$$

$x+4=0$
 $x=-4$ $y = ? \frac{1}{2}$
 $(-4, \frac{1}{2})$

3. denominator = 0 -- vertical asymptotes

$$2(x+1)\cancel{(x+4)} = 0$$

$$x+1=0$$

$$\cancel{\frac{2(x+1)}{2}} = \frac{0}{2}$$

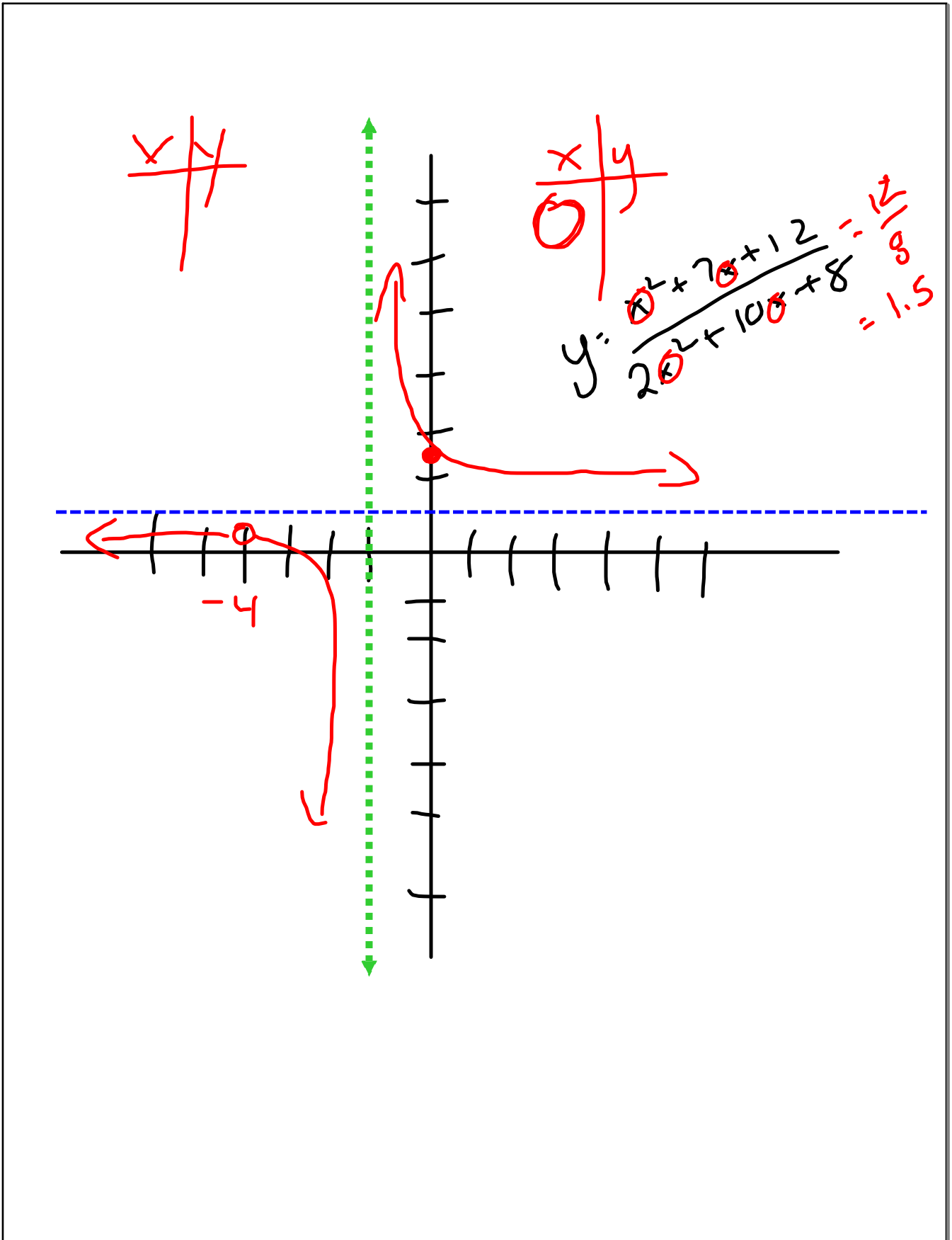
$x = -1$ vertical asymptote

4. highest degree -- horizontal asymptote

$$y = \frac{x^{\textcircled{2}} + 7x + 12}{2x^{\textcircled{2}} + 10x + 8}$$

SAME ⇒

$$y = \frac{1}{2} \text{ horizontal asymptote}$$



$$y = \frac{3x^2 + 12x}{x^2 + 6x + 8} \rightarrow \begin{matrix} 1 \cdot 8 \\ 2 \cdot 4 \end{matrix}$$

$1+5=6$
 $2+4=6$

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

2. Cancel out -- find the **holes** YES

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

$\frac{3(x+4)}{(x+2)} = \frac{-12}{-2} = 6$
 $x+4=0$
 $x=-4$ $y=6$
 $(-4, 6)$

3. denominator = 0 -- vertical asymptotes

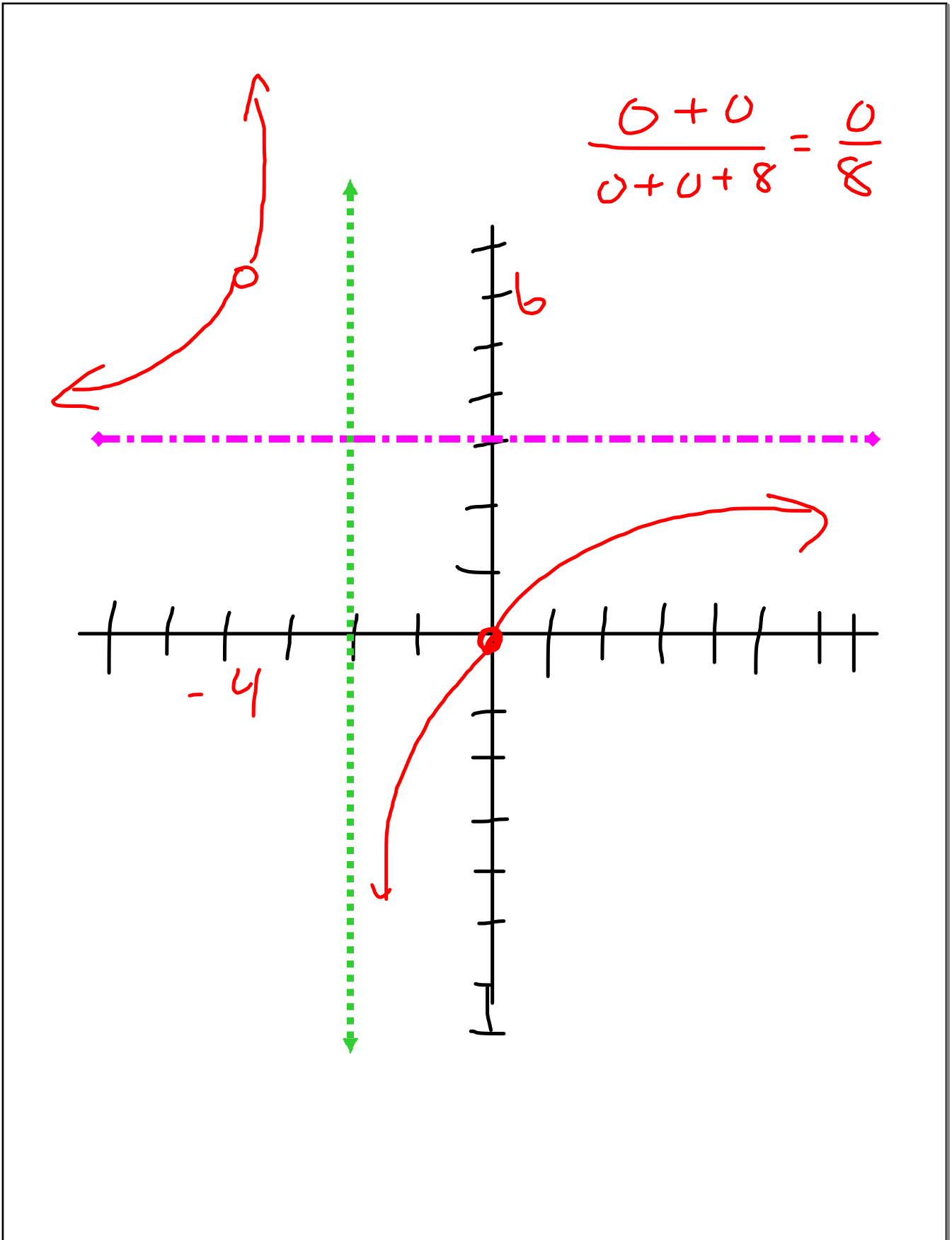
$$\cancel{(x+4)}(x+2)$$

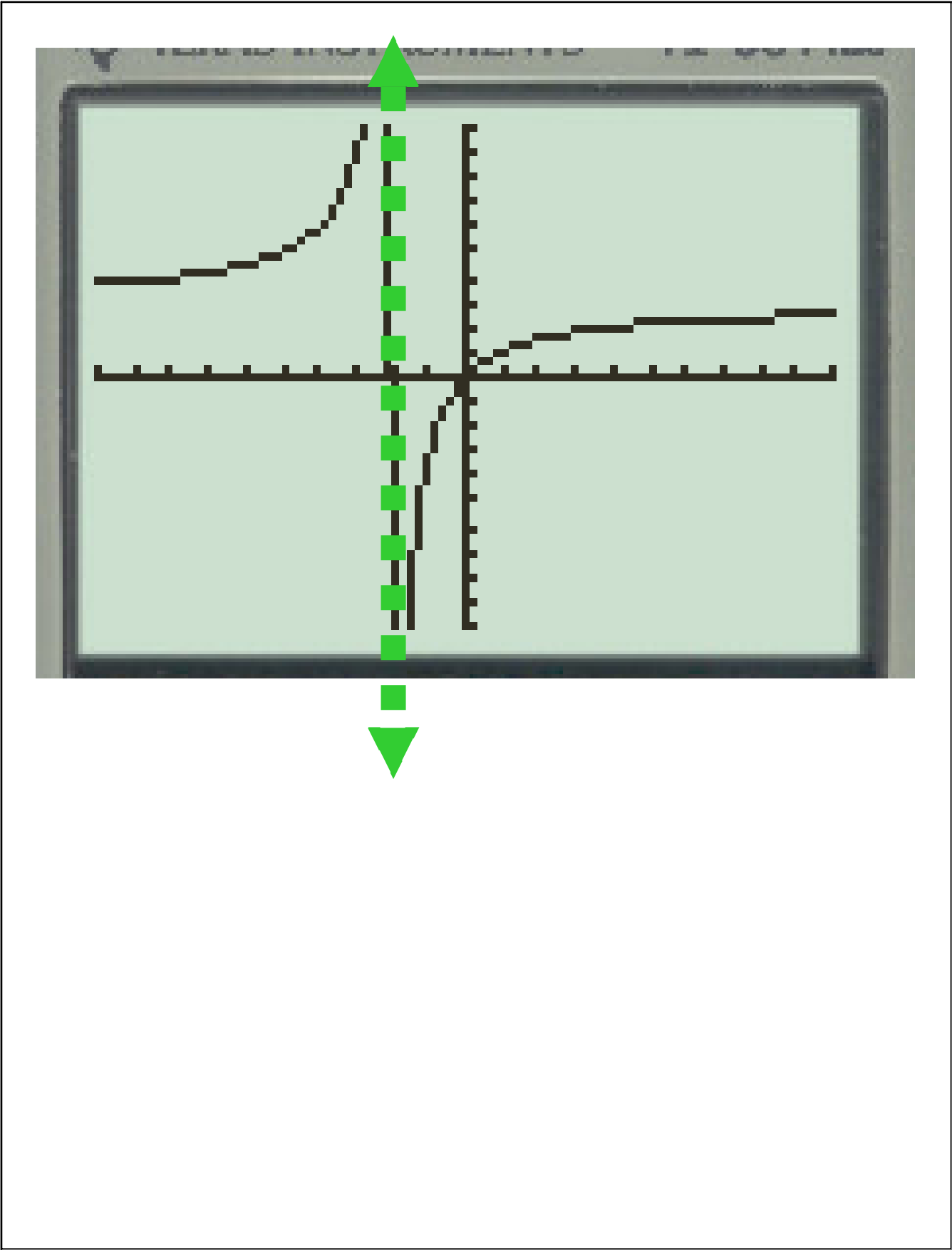
$(x+2)=0$
 $x+2=0$
 VA @ $x=-2$

4. highest degree -- horizontal asymptote

$$y = \frac{3x^2 + 12x}{x^2 + 6x + 8}$$

$y = \frac{3}{1} = 3$ HA is @ $y=3$

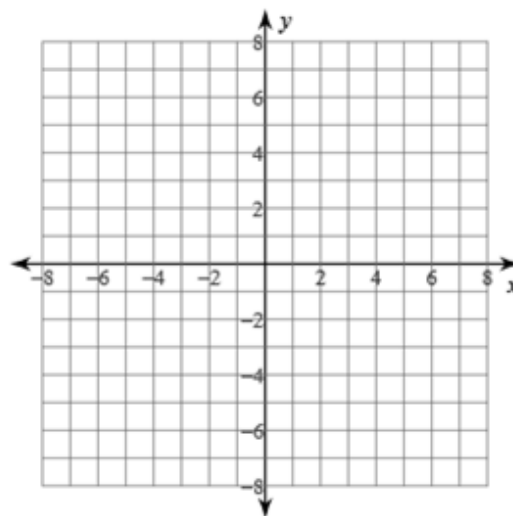




1. Simplify
2. Cancel out -- find the holes
3. denominator = 0 -- vertical asymptotes
4. highest degree -- horizontal asymptote

$$5) f(x) = \frac{x^3 - 2x^2 - 8x}{3x^2 - 3x - 36}$$

$$5) f(x) = \frac{x^3 - 2x^2 - 8x}{3x^2 - 3x - 36}$$

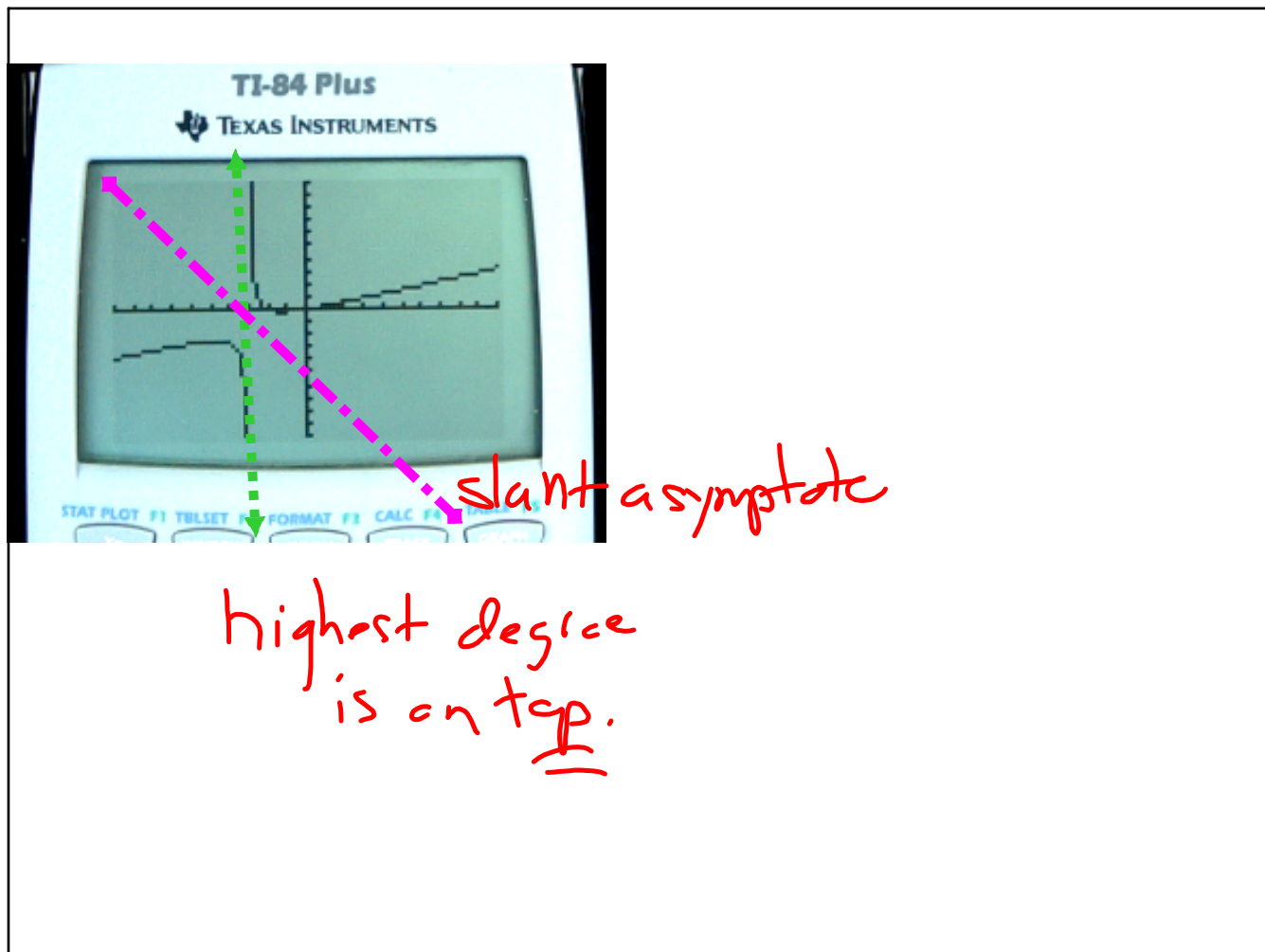


1. Simplify

2. Cancel out -- find the holes

3. denominator = 0 -- vertical asymptotes

4. highest degree -- horizontal asymptote



$$y = \frac{3x^2 + 12x}{x^2 + 6x + 8}$$

1. Simplify
2. Cancel out -- find the holes
3. denominator = 0 -- vertical asymptotes

$$\frac{\cancel{x+4}}{(\cancel{x+4})(x+2)}$$

4. highest degree -- horizontal asymptote

Homework and Answers

Next 4 Pages

Algebra 2 CC

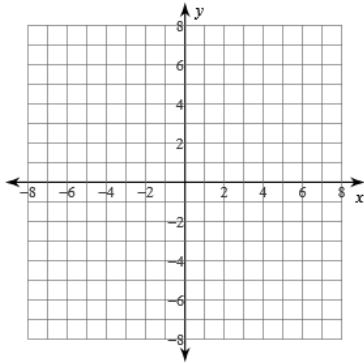
Name _____ ID: 1

Graphing Rational

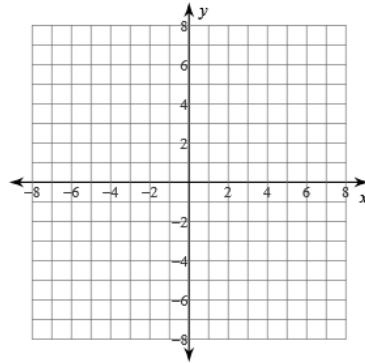
Date _____ Period _____

Identify the holes, vertical asymptotes, and horizontal asymptote of each. Then sketch the graph.

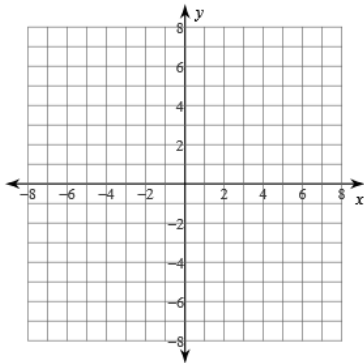
1) $f(x) = \frac{4}{x - 4}$



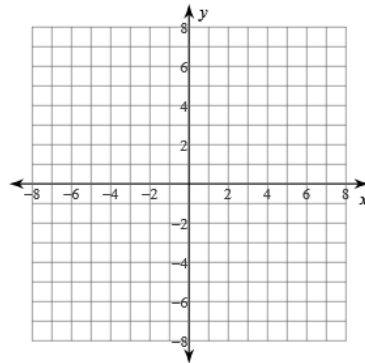
2) $f(x) = \frac{x^2 - 2x - 8}{-3x^2 + 15x - 12}$



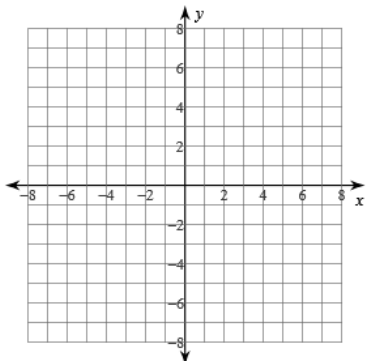
3) $f(x) = \frac{3x + 9}{x^2 + x - 2}$



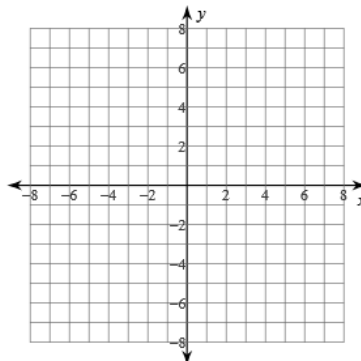
4) $f(x) = \frac{x^2 - 4x}{4x^2 + 12x}$



5) $f(x) = \frac{x^3 - 2x^2 - 8x}{3x^2 - 3x - 36}$



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



Algebra 2 CC

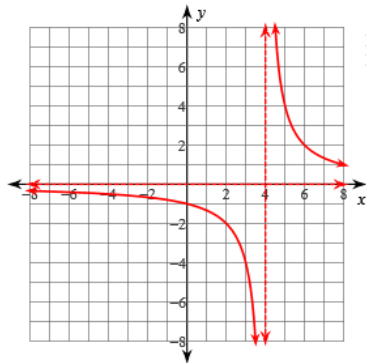
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Graphing Rational

Date _____ Period _____

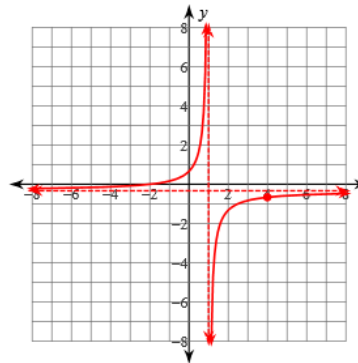
Identify the holes, vertical asymptotes, and horizontal asymptote of each. Then sketch the graph.

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



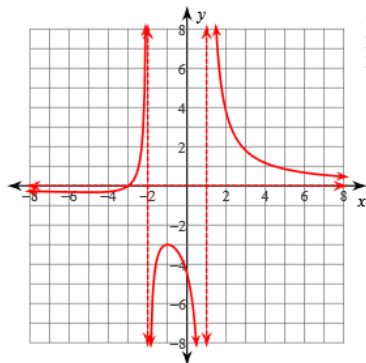
Vertical Asym: $x = 4$
Holes: None
Horz. Asym: $y = 0$

2) $f(x) = \frac{x^2 - 2x - 8}{-3x^2 + 15x - 12}$



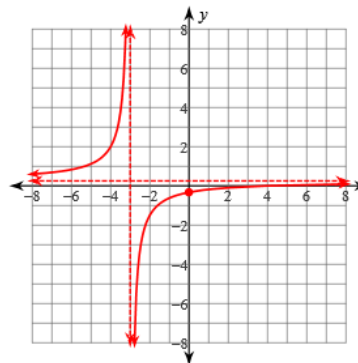
Vertical Asym: $x = 1$
Holes: $x = 4$
Horz. Asym: $y = -\frac{1}{3}$

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



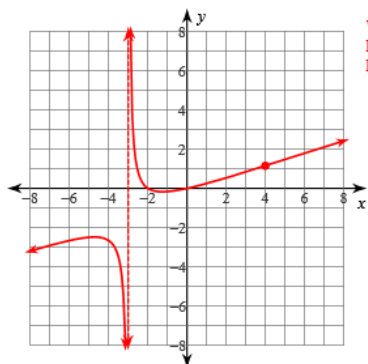
Vertical Asym: $x = -2, x = 1$
Holes: None
Horz. Asym: $y = 0$

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



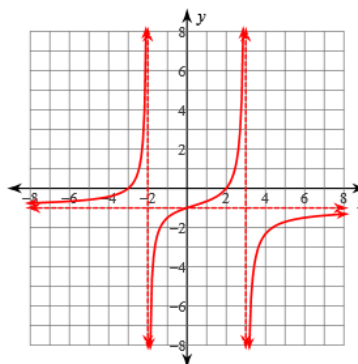
Vertical Asym: $x = -3$
Holes: $x = 0$
Horz. Asym: $y = \frac{1}{4}$

5) $f(x) = \frac{x^3 - 2x^2 - 8x}{3x^2 - 3x - 36}$



Vertical Asym: $x = -3$
 Holes: $x = 4$
 Horz. Asym: None

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



Vertical Asym: $x = -2, x = 3$
 Holes: None
 Horz. Asym: $y = -1$