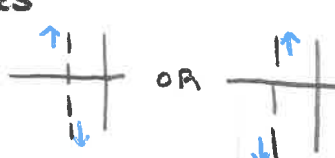
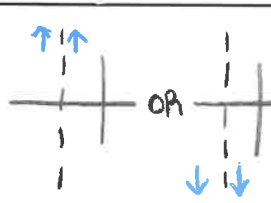




Steps to Graphing Rational Functions:

1. FACTOR! Cancel any terms \rightarrow removable discontinuity *hole on graph
2. Vertical Asymptotes \rightarrow function undefined
set denominator = 0

Behavior		
	Description	Example
Odd Degree * degree of factor	approaches ∞ & $-\infty$ on each side 	$f(x) = \frac{3x}{x+1}$
Even Degree	approaches only ∞ OR only $-\infty$ on each side 	$f(x) = \frac{x-1}{(x+1)^2}$


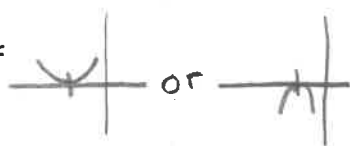
3. Horizontal Asymptotes or Oblique Asymptotes \rightarrow end behavior *not where und. \rightarrow can cross HA
 $x \rightarrow \infty \quad f(x) \rightarrow ?$
 $x \rightarrow -\infty \quad f(x) \rightarrow ?$

	Description	Example
a. Numerator and Denominator Same Degree	ratio of coefficients $\leftarrow - \quad - \rightarrow$ 	$f(x) = \frac{3x^2+1}{6x^2+4x+2}$ $f(x) \rightarrow \frac{3}{6} = \frac{1}{2}$
b. Denominator Greater Degree	den. takes over HA $y=0$ 	$f(x) = \frac{3x^3+2x}{x^4-5x^2}$ $f(x) \rightarrow 0$
c. Numerator Greater Degree	slant or oblique num takes over long division HA $y = \text{quotient}$	$f(x) = \frac{x^5+2}{3x^3-1}$

3.5 Rational Functions:
Graph, Applications, and Models
Honors Algebra 2 with Trig

4. Y-Intercept → evaluate equation when $x=0$

5. X-Intercept → evaluate equation when $y=0$
* results in num = 0

Behavior		
	Description	Example
Odd Degree	Cross x-axis 	$f(x) = \frac{(x+1)(x-2)}{x+4}$
Even Degree	Bounce off x-axis 	$f(x) = \frac{(x+1)^2}{3x}$

6. Plot Any Extra Points

$\begin{array}{c|c} x & y \\ \hline & \end{array}$ } smart points in spaces
unsure of egt behavior

Graph:

1. $f(x) = \frac{2x+1}{x^2+6x+8} = \frac{2x+1}{(x+4)(x+2)}$

2) VA

$0 = (x+4)(x+2)$

$x = -4 \quad x = -2$
both opposite

3) HA

$y = 0$

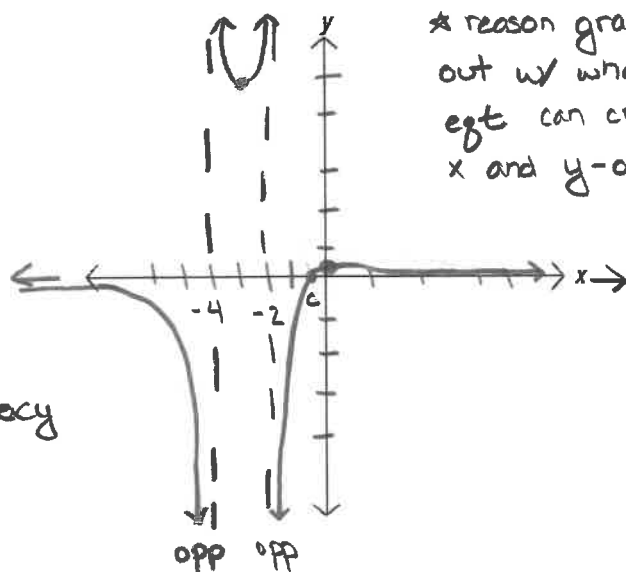
1) $(0, 1/8)$

5) $0 = 2x+1$

$(-1/2, 0)$ cross

6) could plug $x = -3$ for greater accuracy

$\begin{array}{c|c} x & y \\ \hline -3 & 5 \end{array}$



* reason graph out w/ where egt can cross x and y-axis

3.5 Rational Functions:

Graph, Applications, and Models
 Honors Algebra 2 with Trig
 *cant cross x-axis (-1, 4) so know ↷

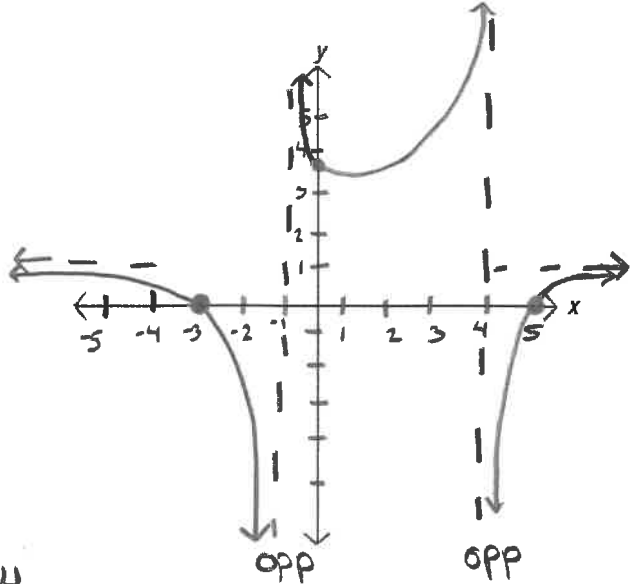
II. $f(x) = \frac{(x+3)(x-5)}{(x+1)(x-4)}$

2) VA $x = -1$ $x = 4$
 both opp

3) HA $y = 1$

4) $f(0) = \frac{-15}{-4} = \frac{15}{4}$ $(0, 15/4)$

5) $(-3, 0)$ $(5, 0)$
 both cross



III. $f(x) = \frac{x^2-16}{x+4} = \frac{(x-4)(x+4)}{x+4} = x-4, x \neq -4$

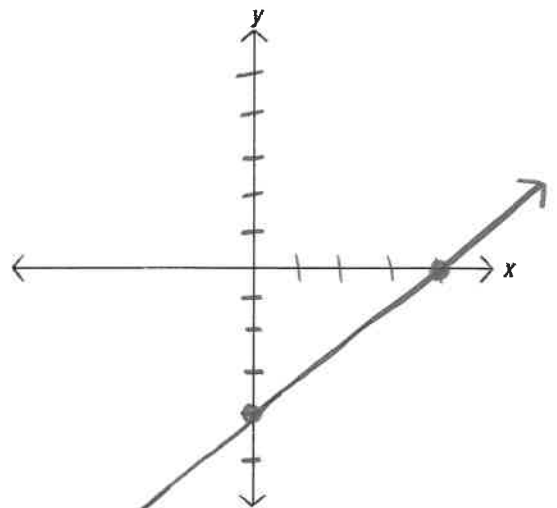
2) VA none

hole $(-4, -8)$

3) HA none

4) $(0, -4)$

5) $(4, 0)$
 cross



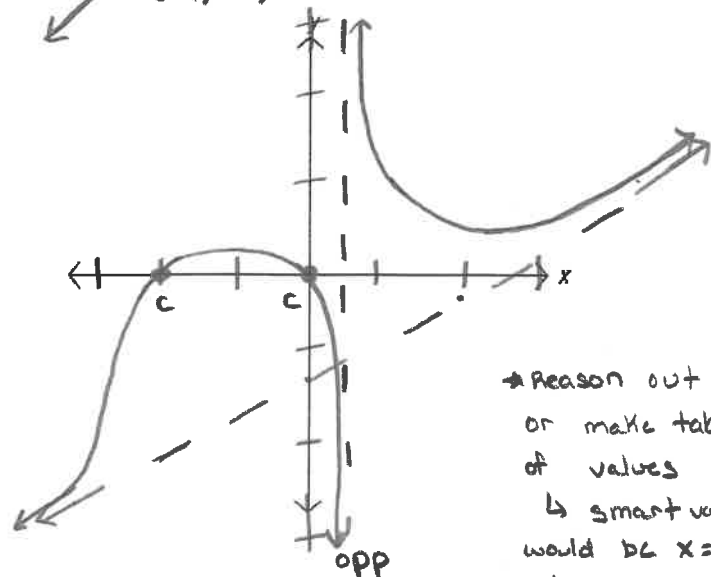
IV. $f(x) = \frac{x^2+2x}{2x-1} = \frac{x(x+2)}{2x-1}$

2) VA $x = 1/2$ opposite

3) HA

$$\begin{array}{r} \frac{1}{2}x + \frac{5}{4} \\ 2x-1 \overline{) x^2 + 2x + 0} \\ \underline{-(x^2 - \frac{1}{2}x)} \\ \frac{5}{2}x + 0 \\ \underline{-(\frac{5}{2}x - \frac{5}{4})} \\ \frac{5}{4} \end{array}$$

$y = \frac{1}{2}x - \frac{5}{4}$



Reason out or make table of values
 ↳ smart val would be $x =$ and $x = 2$ to above or below $x =$

4) $(0, 0)$

5) $(0, 0)$ $(-2, 0)$
 both cross

