Worksheet: *Gra* * some problems have much more work than needed !!!

Sketch each of the resented in class.

Name: Key

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

H.A. : $y = 0$

V.A. : $x = 2$

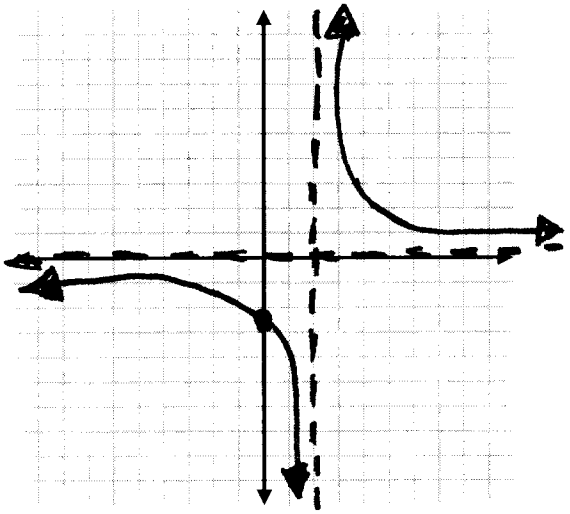
X-int : (NONE)

Y-int : $(0, -2.5)$

HOLES : NONE

BECAUSE THIS IS A TRANSFORMATION OF THE RECIPROCAL FUNCTION (VERT. STRETCH BY 5 & TRANSLATED RIGHT 2)

WE DO NOT NEED ADDITIONAL POINTS TO DETERMINE THE SHAPE & THE RECIPROCAL FUNC. DOESN'T CROSS ITS H.A. SO THIS ONE DOESN'T EITHER.



$(x) = \dfrac{4x-5}{x+3}$

H.A. : $y = 4$

V.A. : $x = -3$

x-int : $(1.25, 0)$

y-int : $(0, -1.6\overline{)})$

HOLES : (NONE)

NEED TO KNOW WHERE THE GRAPH IS TO THE LEFT OF THE V.A.

... SO I PLUGGED IN x-VALUE OF -4

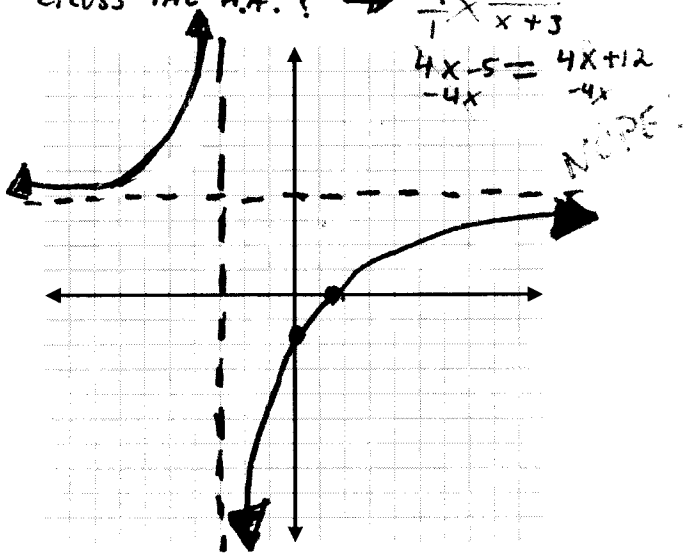
$y = \dfrac{4(-4)-5}{(-4)+3} = \dfrac{-16-5}{-1} = \dfrac{-21}{-1} = 21$ (-4, 21)

DOES THIS GRAPH CROSS THE H.A. ? → $\dfrac{4}{1} = \dfrac{4x-5}{x+3}$

$4x - 5 = 4x + 12$

$-4x \quad -4x$

NOPE



Worksheet: ***Graphing Rational f(x)'s*** **Name**: KEY

3. $f(x)=\dfrac{2x^2+7}{x^2+5}$

H.A. : $y=2$

V.A. : NONE

X-int : (NONE)

$0=\dfrac{2x^2+7}{x^2+5}$

$0=2x^2+7$

$-7=2x^2$

$-\frac{7}{2}=x^2$ NOPE

Y-int : (0, 1.4)

$y=\dfrac{2(0)^2+7}{(0)^2+5}$

$y=\frac{7}{5}=1\frac{2}{5}=1.4$

HOLES : NONE

EVEN SYMMETRY

B/C $f(x)=f(-x)$

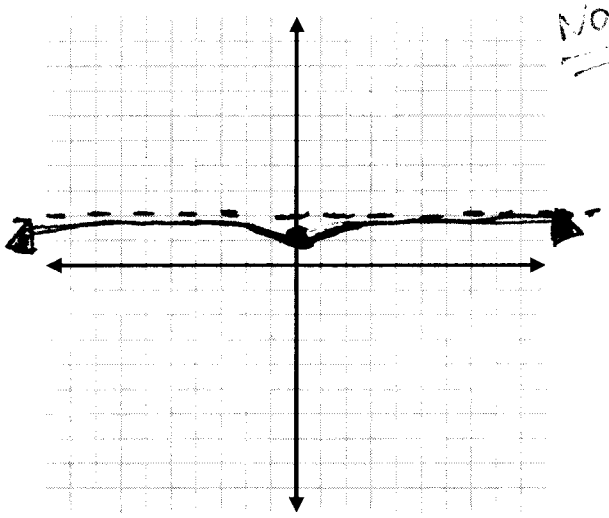
DOES THIS GRAPH CROSS THE ASYMPTOTE? $\dfrac{2}{1}=\dfrac{2x^2+7}{x^2+5}$

$2x^2+10=2x^2+7$

$-2x^2 \quad -2x^2$

$10=7$

NOPE!



4. $f(x)=\dfrac{x^3}{x^2-4}$

$x^2+0x+4 \overline{)\,x^3+0x^2+0x-4}$ $\quad x$

$-(x^3+0x^2-4x)$

$4x-4$ REMAINDER

E.B.A. : $y=x$

V.A. : $x=2$ & $x=-2$

x-int : (0, 0)

y-int : (0, 0)

HOLES : (NONE)

$f(-x)=-f(x)$

$\dfrac{(-x)^3}{(-x)^2-4}=-1\cdot\dfrac{x^3}{x^2-4}$

$\dfrac{-x^3}{x^2-4}=\dfrac{-x^3}{x^2-4}$

$\therefore$ ODD

$\dfrac{(3)^3}{(3)^2-4}=\dfrac{27}{5}=5.4$ (3, 5.4) (1, $\frac{1}{3}$)

DOES THIS GRAPH CROSS THE E.B.A.?

$x=\dfrac{x^3}{x^2-4}$

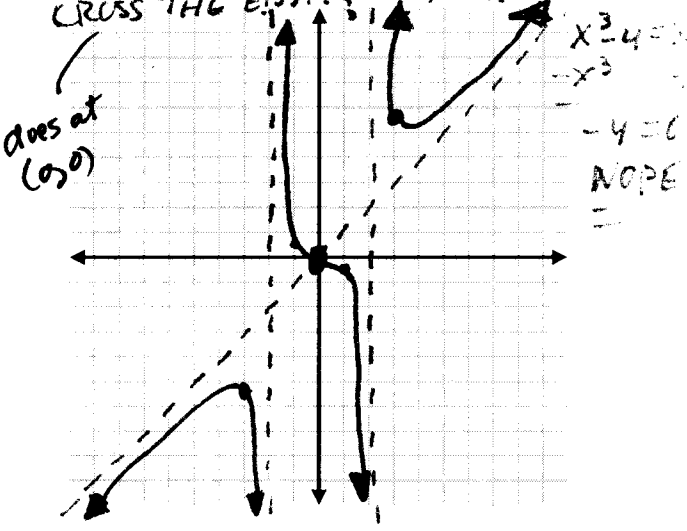
$x^3-4x=x^3$

$-x^3 \quad -x^3$

$-4x=0$

NOPE

does at (0,0)



Worksheet: ***Graphing Rational f(x)'s*** **Name**: KEY

5. $f(x)=\dfrac{x-2}{x^2-2x-8}=\dfrac{(x-2)}{(x-4)(x+2)}$

H.A.: $y=0$

V.A.: $x=4$ & $x=-2$

X-int: $(2,0)$ ← THIS ONE CROSSES THE ASYMPTOTE!! ONLY ONCE

Y-int: $(0,1/4)$

HOLES: (NONE)

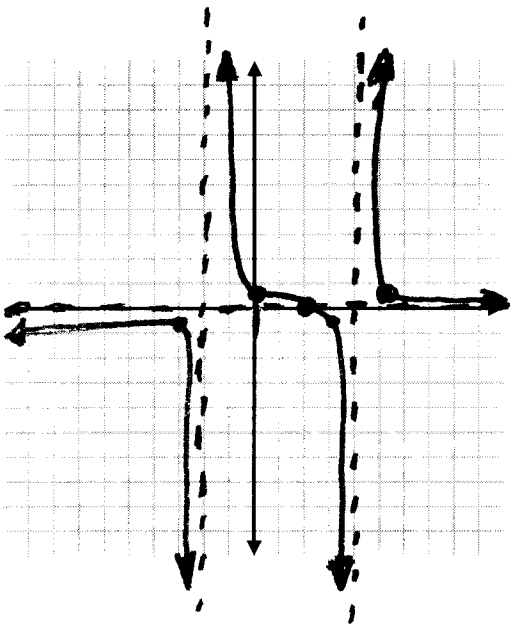
I NEED MORE POINTS!

X	Y
3	$-1/5$
5	$3/7$
-3	$-5/7$

$f(3)=\dfrac{3-2}{9-6-8}=\dfrac{1}{-5}$

$f(5)=\dfrac{5-2}{25-10-8}=\dfrac{3}{7}$

$f(-3)=\dfrac{-3-2}{9+6-8}=\dfrac{-5}{7}$



6. $f(x)=\dfrac{3x^2-3}{x^2-16}=\dfrac{3(x^2-1)}{(x+4)(x-4)}=\dfrac{3(x+1)(x-1)}{(x+4)(x-4)}$

H.A.: $y=3$

V.A.: $x=-4$ & $x=4$

X-int: $(-1,0)$ & $(1,0)$

Y-int: $(0,3/16)$

HOLES: (NONE)

$f(-x)=f(x)$

EVEN SYMM.!!

~~DOES~~ THIS CROSS THE ASYMPTOTE?

$3=\dfrac{3x^2-3}{x^2-16}$

$3x^2-48=3x^2-3$

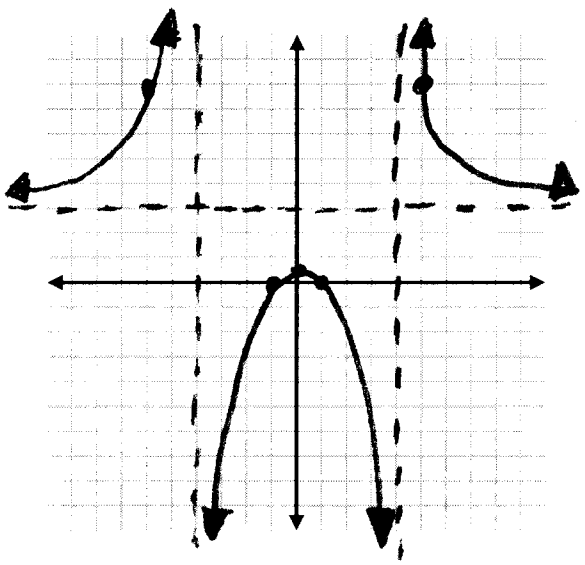
$-48=-3$

NOPE!

I NEED MORE POINTS!

X	Y
5	8
-5	8

$f(5)=\dfrac{75-3}{25-16}=\dfrac{72}{9}$



Worksheet: ***Graphing Rational f(x)'s*** **Name**: Key

7. $f(x)=\dfrac{x^3-3x^2+3x+1}{x-1}$

1 | $1\ -3\ 3\ 1$
$\downarrow\ 1\ -2\ 1$
$1\ -2\ 1\ |\ 2$

E.B.A: $y=x^2-2x+1$ (THIS IS A PERFECT SQUARE!) OR $y=(x-1)^2$

V.A.: $x=1$

X-int: * * * yes it has one (see graph) but numerator doesn't factor even w/ rat. root. thm, so need a calc to find exactly where x-int is.

Y-int: $(0,-1)$

WILL THIS GRAPH CROSS THE E.B.A.?

$\dfrac{x^2-2x+1}{1} = \dfrac{x^3-3x^2+3x+1}{(x-1)}$

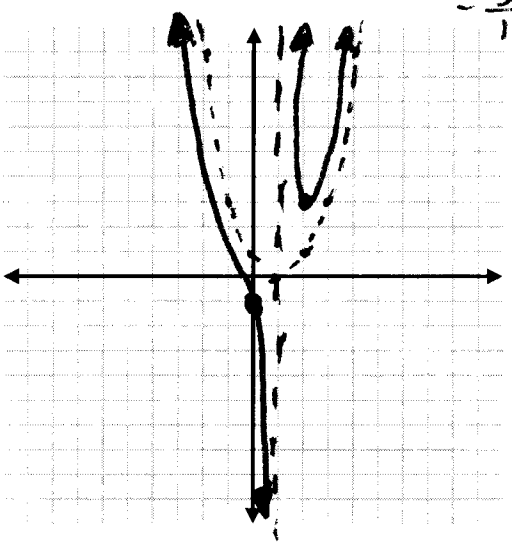
$x^3-3x^2+3x+1 = x^3-2x^2+x-x^2+2x-1$

$x^3-3x^2+3x+1 = x^3-3x^2+3x-1$

$-x^3+3x^2-3x \quad -x^3+3x^2-3x$

$1=-1$ NOPE

NEED 1 MORE POINT: $f(2)=\dfrac{8-12+6+1}{2-1}=\dfrac{3}{1}=3$



8. $g(x)=\dfrac{x^2-5x-6}{x^2-x-2}=\dfrac{(x-6)(x+1)}{(x-2)(x+1)}$

H.A.: $y=1$

V.A.: $x=2$

X-int: $(6,0)$

Y-int: $(0,3)$

HOLE: $(-1,7/3)$

WILL THIS ONE CROSS THE ASYMPTOTE?

$\dfrac{1}{1}=\dfrac{x-6}{x-2}$

$x-2=x-6$
$-x \quad -x$

$-2=-6$

NOPE