

key

Types of Rational Graphs:

1.

2.

Can't Touch Asymptotes

3.

Goes Through H.A.

2 Branches

Characteristics:

① X-intercepts (#, 0)

* Plug in 0 for y + solve for x !

* Solve for the numerator!!

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

② Y-intercepts (0, #)

* Plug in 0 for x + solve for y !!

* Cover x 's + look @ constants

$f(x) = \frac{x^2+6x-2}{x^2-4} \rightarrow (0, \frac{1}{2})$

③ Vertical Asymptotes $x =$

* Undefined variable

* Solve for denominator

~ will never cross on graph ~

$f(x) = \frac{x^2+3}{x^2-4} \rightarrow (x+2)(x-2)$ $x = -2, 2$

④ Horizontal Asymptotes $y =$

3 cases based on degree

① Degree bigger on top
 $y = \frac{x^3-1}{x-3} \rightarrow$ none

② Degrees same: Leading coeff
 $y = \frac{6x+1}{3x-1} \rightarrow y = \frac{6}{3}$ $y = 2$

③ degree bigger on bottom
 $y = \frac{2}{x+5}$ $y = 0$

Graphing Examples:

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

X-int: numerator $2=0$ none!

HA $x+3=0$ Vert: $x=-3$

Y-int $y=0$ Hor: $y=0$

Degrees: bottom x -int.: none

constants y -int.: $(0, \frac{2}{3})$

table:

x	y
-7	-.5
-5	-.1
-4	-.2

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

HA x^2-4x+3 $(x-1)(x-3)$ $x-1=0$ $x-3=0$

Y-int x^2+x-6 $(x+3)(x-2)$ $x+3=0$ $x-2=0$

Vert: $x=-3, 2$

Hor: $y=1$ (degrees same)

x -int.: $(3, 0)(1, 0)$

y -int.: $(0, -\frac{1}{2})$

x	y
-6	2.6
-4	5.8
-2	-3.75
0	-.5
5	.33

Find the vertical & horizontal asymptotes, x & y intercepts for the following rational functions.

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

Vert: $x=2$ Hor: $y=0$

x-int.: none y-int: $(0, -\frac{1}{2})$

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

Vert: $x=-1, 3$ Hor: $y=2$

x-int.: $(0,0)$ y-int: $(0,0)$
 $(2,0)$

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

Vert: $x=-\frac{1}{2}$ Hor: $y=-\frac{5}{2}$

x-int.: $(\frac{1}{5}, 0)$ y-int: $(0, 1)$

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

Vert: $x=2, -2$ Hor: $y=0$

x-int.: none y-int: $(0, -\frac{1}{4})$

5. $f(x) = \frac{5}{x+3}$

Vert: $x=-3$ Hor: $y=0$

x-int.: none y-int: $(0, \frac{5}{3})$

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

Vert: $x=1$ Hor: $y=2$

x-int.: $(\frac{3}{2}, 0)$ y-int: $(0, 3)$

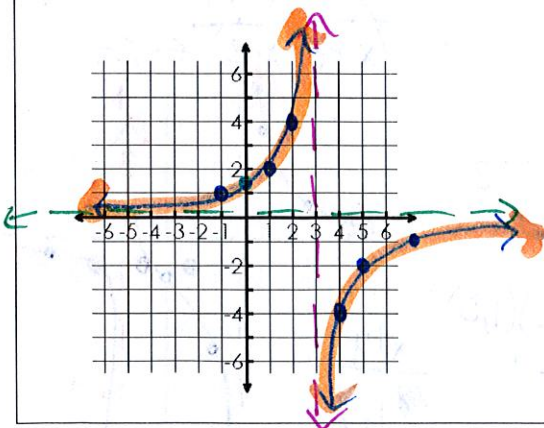
7. $f(x) = \frac{-4}{x-3}$

Vert: $x=3$ Hor: $y=0$

x-int.: none y-int: $(0, \frac{4}{3})$

Table

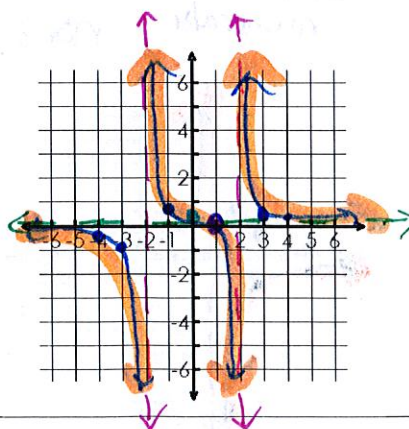
x	y
-1	1
1	2
2	4
4	-4
5	-2
7	-1



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

Vert: $x=2, -2$ Hor: $y=0$

x-int.: $(1, 0)$ y-int: $(0, \frac{1}{4})$



x	y
-4	-.41
-3	-.8
-1	.67
0	.25
1	0
3	.4
4	.25