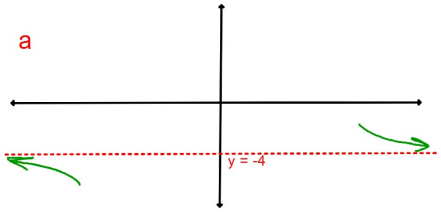
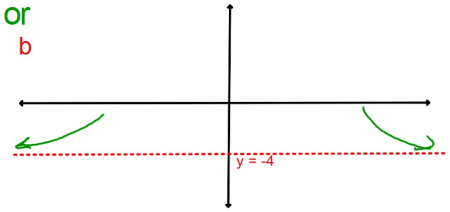
End behavior of graph with Horizontal Asymptotes:

a



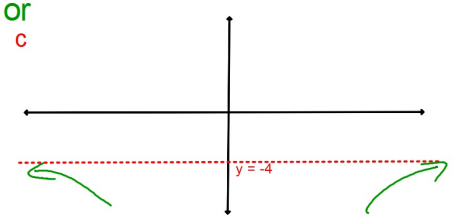
or

b



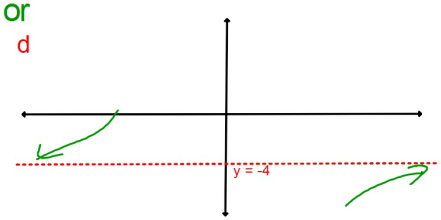
or

c



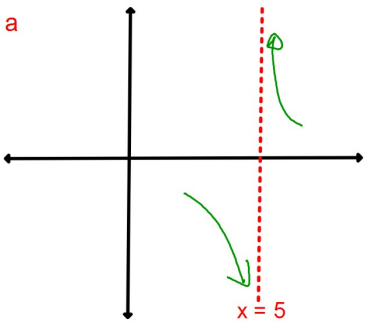
or

d



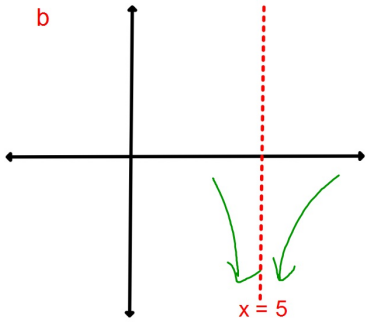
Behavior of graph around a Vertical Asymptote:

a



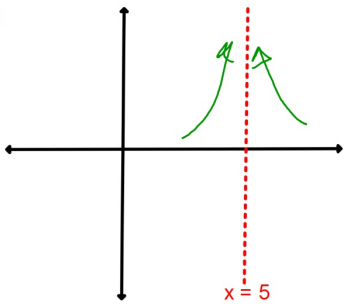
or

b



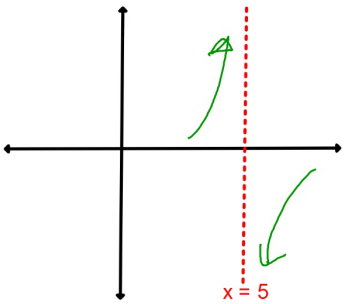
or

c

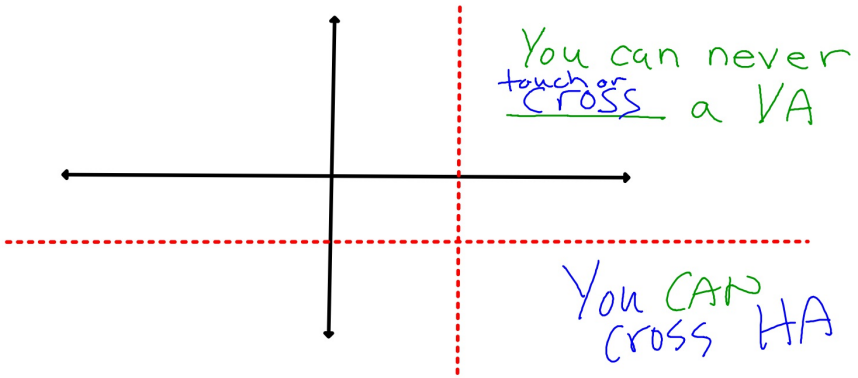


or

d

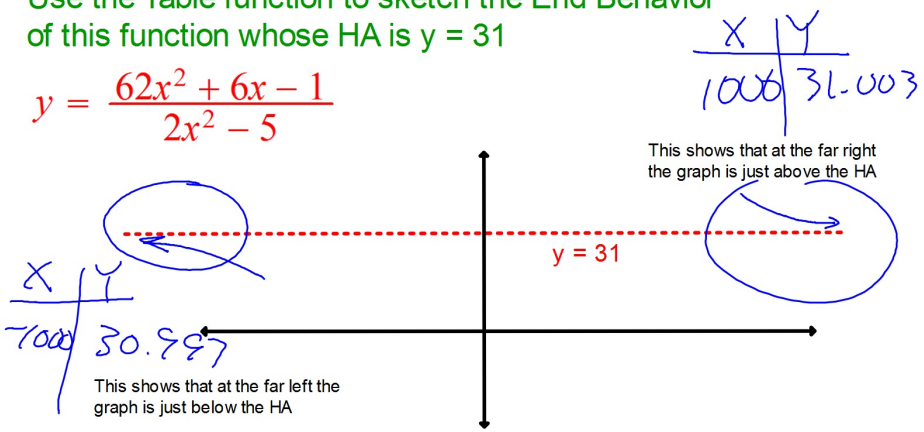


What is the difference between a HA and a VA?



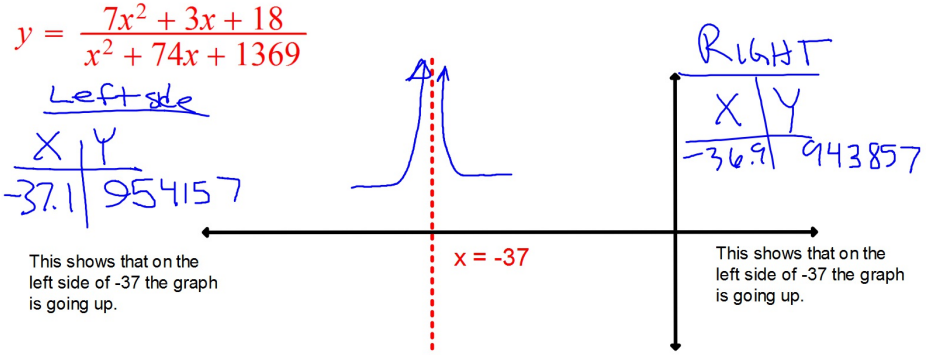
Use the Table function to sketch the End Behavior of this function whose HA is y = 31

$$y = \frac{62x^2 + 6x - 1}{2x^2 - 5}$$



Use the Table function to sketch the behavior of the graph on the left and right side of the VA x = -37

$$y = \frac{7x^2 + 3x + 18}{x^2 + 74x + 1369}$$



What are the vertical asymptotes?

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

VA: x = 1 VA: x = -4

what does the graph do on the left and right of each VA?

	x	y
Left Side .9		-5.143 NEG down
Right Side 1.01		60.882 POS up

	x	y
Left Side -4.01		561.88 POS up
Right Side -3.9		-54.12 NEG down

VA: x=1

On the left side the graph

decreases w/o bound

On the right side the graph

increases w/o bound

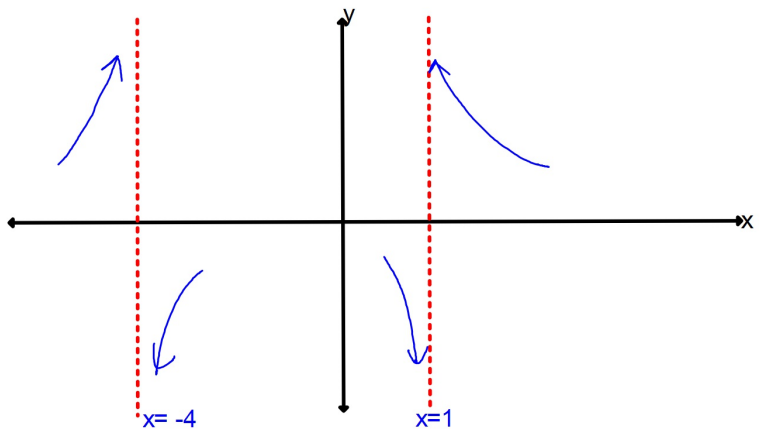
VA: x= -4

On the left side the graph

increases w/o bound

On the right side the graph

decreases w/o bound



Sign Analysis

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

VA: x = 1

VA: x = -4

Replace each x with a number and write down if each factor is POS or NEG. Use this to decide if the entire function is POS or NEG. A POS result means the graph goes UP and a NEG result means the graph goes DOWN.

x	y
Left Side .9	+ + / − = ⊖ down
Right Side 1.1	+ + / + = ⊕ up

x	y
Left Side -4.1	− − / − = ⊕ up
Right Side -3.9	− − / + = ⊖ down

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

What is the HA? $y = 2$

How does the graph behave at the Right End?

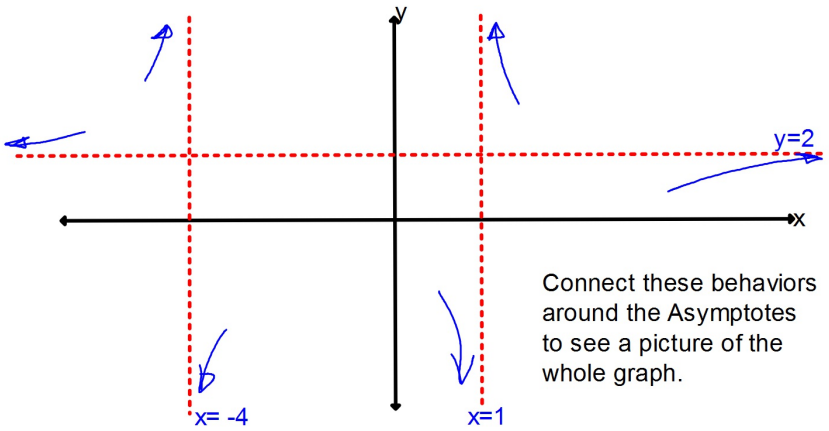
x	y
1000	1.995

Less than 2 means the graph is below the HA at the far right.

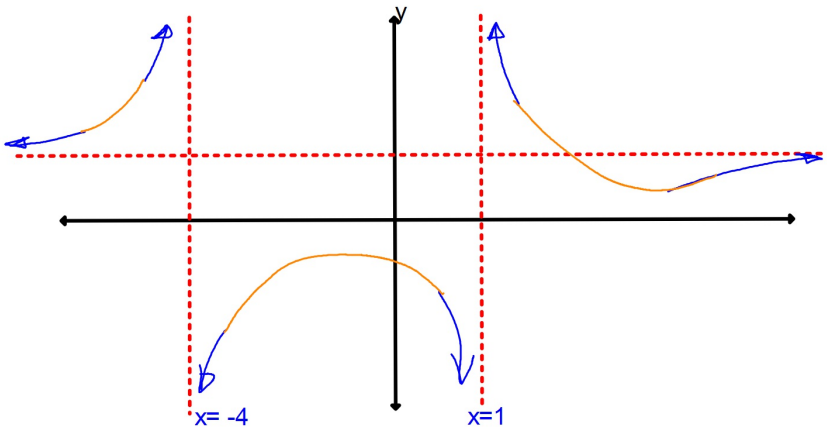
How does the graph behave at the Left End?

x	y
-1000	2.005

Greater than 2 means the graph is above the HA at the far left.



Connect these behaviors around the Asymptotes to see a picture of the whole graph.



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

This is the actual graph of this Rational Function