

# Graphing Rational Functions

Steps:

1. Find hole, VA, and HA/SA
2. Sketch asymptotes with a dashed line. VA: HA:
3. Plot x-intercepts ( #, 0 ), y-intercepts ( 0, # ) and holes ( x, y ).
4. Type function into graphing calculator or make a table.  
 $y = (\text{numerator}) \div (\text{denominator})$

Graph to see the graph

**★ Use Table** to find at least 2 points in each section of the graph (close to VA)

5. Sketch graph to match calculator, It will go through intercepts and holes and "hug" asymptotes ( don't cross )

Ex.  $f(x) = \frac{x^2 - 2x - 3}{x^2 + x - 12} = \frac{(x-3)(x+1)}{(x+4)(x-3)}$

$x-3=0$   
 $x=3$

$y = \frac{3+1}{3+4} = \frac{4}{7}$

**★ new problem**  
 $y = \frac{|x+1|}{|x+4|}$

Hole:

(3, 4/7)

VA:

$x = -4$

HA:

$y = 1$

SA:

none

x-int:

(-1, 0)

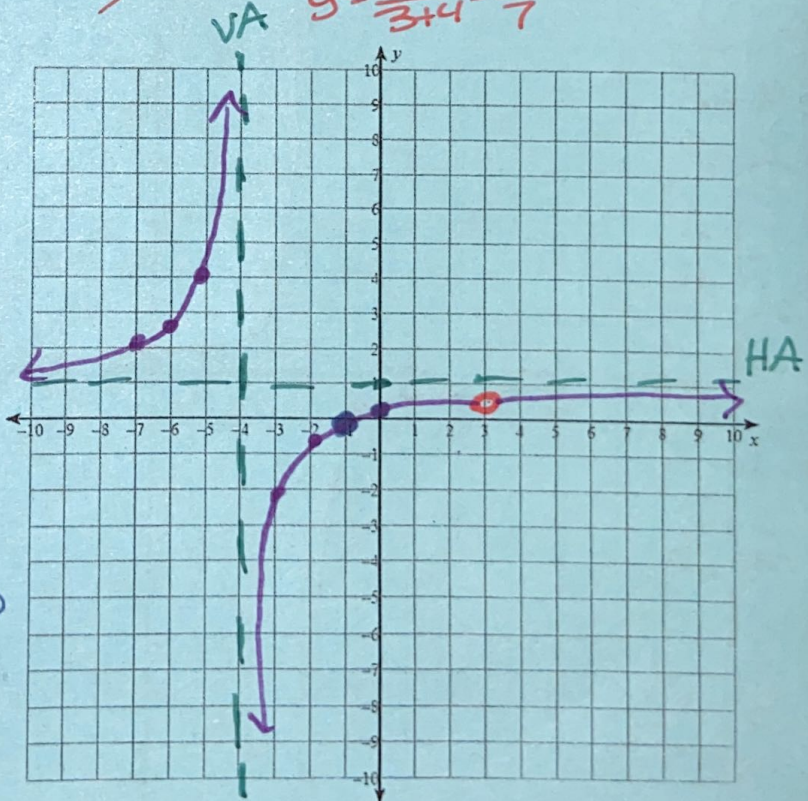
y-int:

(0, 1/4)

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

x-int:  
 $x+1=0$   
 $x=-1$

y-int  
 $y = \frac{0+1}{0+4} = \frac{1}{4}$



x	y
-5	4
-6	2.5
-7	2

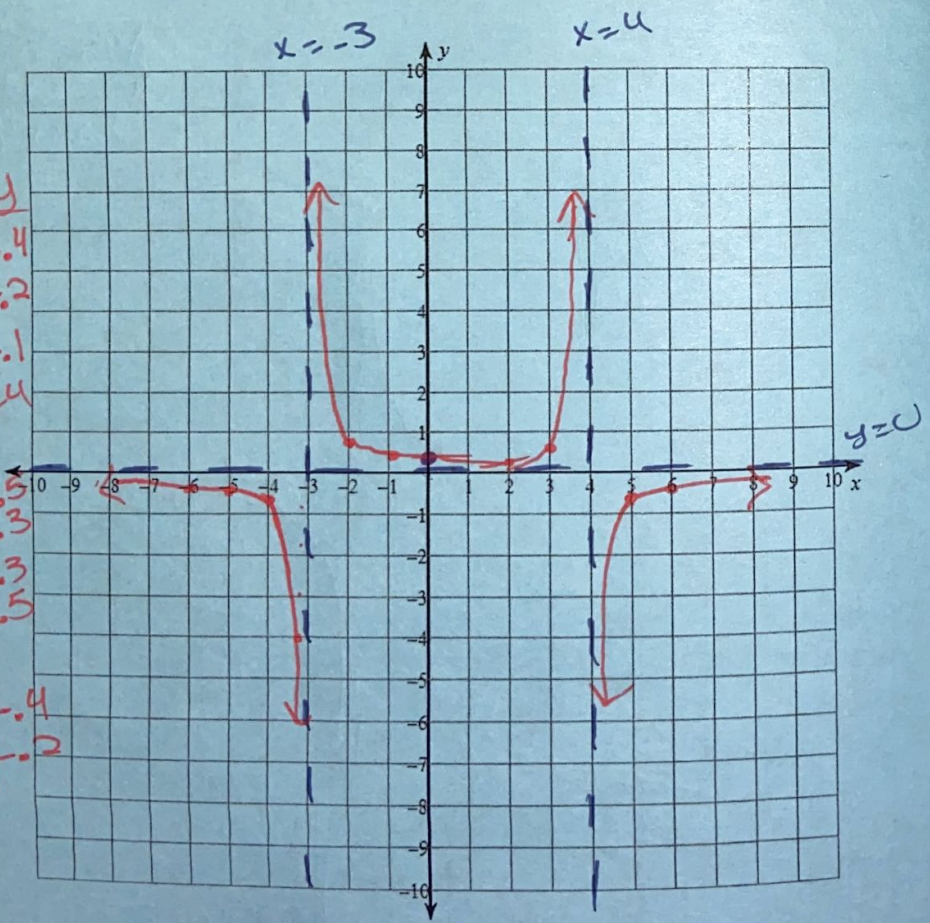
x	y
-3	-2
-2	-0.5



Ex.  $f(x) = \frac{-3x^0}{x^2-x-12}$   $y = \frac{-3}{(x-4)(x+3)}$

Hole: none  
 VA:  $x=4 + x=-3$   $x-4=0$   $x+3=0$   
 $x=4$   $x=-3$   
 HA:  $y=0$   
 SA: none  
 x-int: none  $-3 \neq 0$   
 y-int:  $(0, \frac{1}{4})$   $y = \frac{-3}{-12} = \frac{1}{4}$

x	y
-4	-0.4
-5	-0.2
-6	-0.1
-3	0.4
-2	0.5
-1	0.3
2	0.3
3	0.5
5	-0.4
6	-0.2



Ex.  $f(x) = \frac{x^2+5x+6}{x+1}$   $y = \frac{(x+3)(x+2)}{x+1}$

Hole: none  
 VA:  $x=-1$   $x+1=0$   
 $x=-1$   
 HA: none  
 SA:  $y=x+4$   $\leftarrow y=mx+b$   
 $m=\frac{1}{1}$  slope  $\uparrow$   $y$ -int.  $b=4$  ignore rem.  
 x-int:  $(-3,0)$   $(-2,0)$   $\uparrow$  Begin w/ b  
 y-int:  $(0,6)$   $\uparrow$  move w/ m  
 $(x+3)=0$   $x+2=0$   $y = \frac{(0+3)(0+2)}{0+1} = \frac{6}{1}$   
 $x=-3$   $x=-2$

Slant Asym.  
 $-1 \overline{) 1 \ 5 \ 6}$   
 $\downarrow -1 \ -4$   
 $1 \times 4 \ 0$   
 $\uparrow$   
 ignore rem.

