Let's put this all together.
Graph the following Rational Function showing:

- All asymptotes as dashed lines
- X & Y-intercepts, if any
- Correct behavior around each asymptote.

$$y = \frac{x^2 - x - 20}{x^2 - 4} = \frac{(x-5)(x+4)}{(x-2)(x+2)}$$

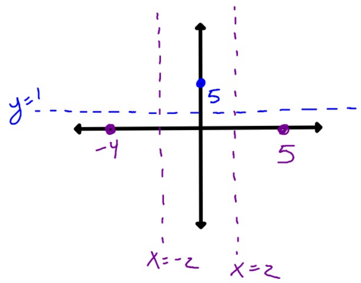
x-int: $x = -4, 5$

y-int: $y = 5$

VA: $x = \pm 2$

HA: $y = 1$

Place all this information on the graph

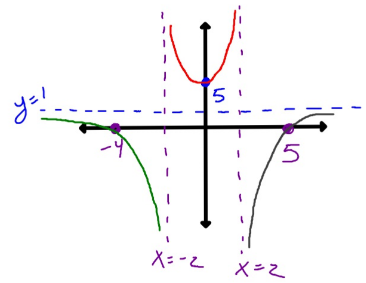


Then draw the three parts making sure to pass through all the intercepts but not crossing the axes anywhere else, making sure to get close to the HA at the far left and right and showing the correct behavior as the graph approaches the VA.

Draw the middle piece first by passing through the y-intercept but not crossing the x-axis

The left piece must cross the x-axis at -4 and probably goes down on the leftt side of the VA and then gets close to the HA at the far left.

The right piece must cross the x-axis at 5 and probably goes down on the right side of the VA and then gets close to the HA at the far right.



$$y = \frac{x^2 + x - 2}{x^2 + 3x - 18} = \frac{(x+2)(x-1)}{(x+6)(x-3)}$$

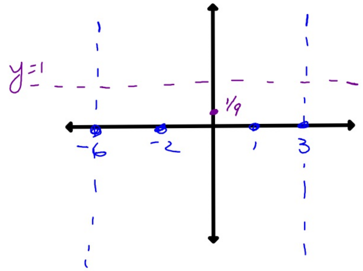
y-int: $y = 1/9$

x-int: $x = -2, 1$

VA: $x = -6, 3$

HA: $y = 1$

Place all this information on the graph

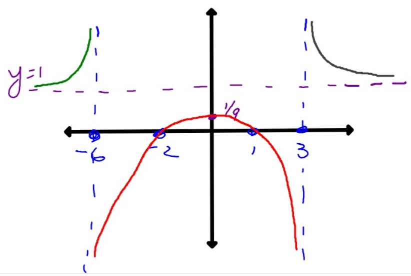


Then draw the three parts making sure to pass through all the intercepts but not crossing the axes anywhere else, making sure to get close to the HA at the far left and right and showing the correct behavior as the graph approaches the VA.

Draw the middle piece first by connecting the x and y intercepts.

The left piece can't cross the x-axis and probably goes up on the left side of the VA and then gets close to the HA at the far left.

The right piece can't cross the x-axis and probably goes up on the right side of the VA and then gets close to the HA at the far right.



$$y = \frac{x^2 + 6x + 5}{x^2 - x - 12} = \frac{(x+5)(x+1)}{(x-4)(x+3)}$$

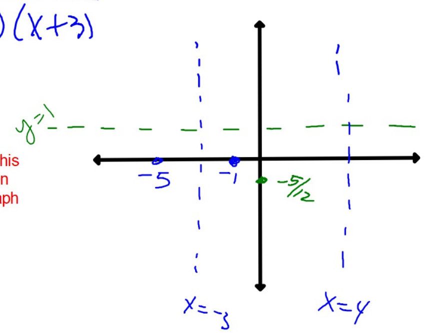
y-int: $y = -5/12$

x-int: $x = -5, -1$

VA: $x = -3, 4$

HA: $y = 1$

Place all this information on the graph

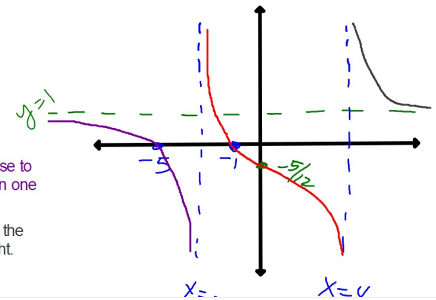


Then draw the three parts making sure to pass through all the intercepts but not crossing the axes anywhere else, making sure to get close to the HA at the far left and right and showing the correct behavior as the graph approaches the VA.

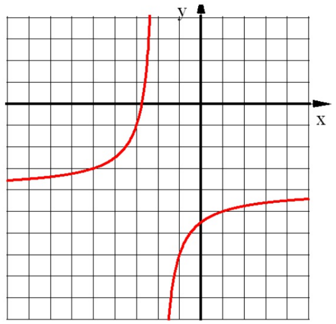
Draw the middle piece first by connecting the x and y intercepts.

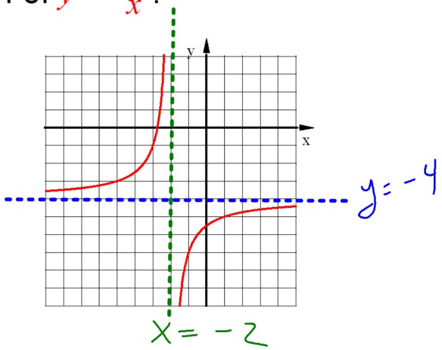
Draw the left piece by passing through the x-int and getting close to the HA at the far left. Also, remembe that if a graph goes up on one side of a VA it usually goes down on the other side.

The right piece can't cross the x-axis and probably goes up on the right side of the VA and then gets close to the HA at the far right.



Write the equation of this function which is a transformation of $y = \frac{3}{x}$.





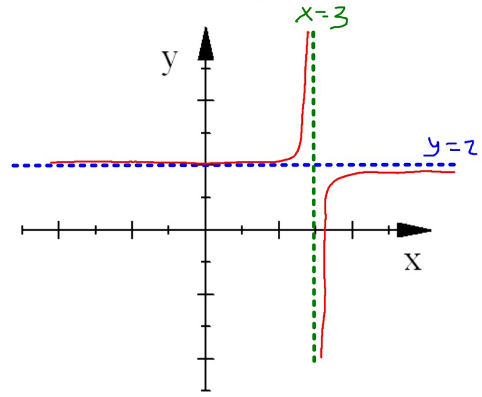
Since the HA is y = -4 the graph has moved 4 units down.
Since the VA is x= -2 the graph has moved 2 units left.
Since the branches are in "Quadrants II and IV" there is an x-axis reflection.

$$y = \frac{-3}{x+2} - 4$$

Sketch the graph of this function. Show asymptotes as dashed lines and label them with their equation.

$$y = \frac{-0.1}{x-3} + 2$$

since there is a negative the branches are in "Quadrants II and IV". The 0.1 is small so the branches will be close to the asymptotes.
The x-3 means the graph has moved 3 units right (VA is x=3)
The +2 means the graph has moved 2 units up (HA is y=2)



State all points of discontinuity. Then identify each as either a Vertical Asymptote or a Hole.

$$y = \frac{\overset{3x(x^2-4)}{(3x^3 - 12x)}(2x^2 - 5x - 18)}{(x^2 + 3x + 2)(x^2 - 4x + 4)}$$

-18
-9 +4
-5

	x	+2
2x	$2x^2$	+4x
-9	-9x	-18

$$y = \frac{3x(x+2)(x-2)(x+2)(x-9)}{(x+2)(x+1)(x-2)(x-2)}$$

PTS of Discontinuity: $x = -2, -1, 2$

Holes: $x = -2$

VA: $x = -1, 2$