5-3 Graphs of Rational Functions Notes

A rational function is a function that is a _______________ and has a __________________________ in the

_______________________________ (originally) and/or ________________________________.

Graphing Rational Functions

- Since rational functions contain variables in the denominator, then its graph contains _______________
- There are two types of Points of Discontinuity
  - _________________________________ of discontinuity which _____________________________
    - Vertical asymptotes – _____________________ that a graph _____________________________
  - _________________________________ of discontinuity which _______________________________
    - Holes – _______________________ that create an ________________ in the middle of the graph
- When graphing rational functions, you will have to find specific characteristics:
  - ________________________ which include ____________________ and ____________________

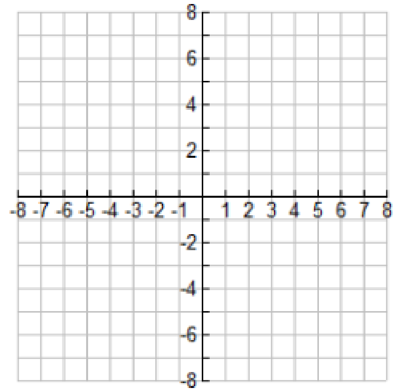
    (draw with dotted lines)
  - ________________________ which include ____________________ and ____________________

    (plot with closed points)
  - ________________________ which occur when any ____________________________________

    (plot with open points)
  - If a rational function has only 1 VA, then there will be ________________ to sketch in the graph.
  - If a rational function has 2 VA's, then there will be ________________ to sketch in the graph.
- **How to find all the needed information**:
  - VA (x = ?) – set denominator = 0, factor, and solve for x
  - HA (y = ?) – refer to the degrees of numerator and denominator
    - Degree of numerator < Degree of denominator – HA: y = 0
    - Degree of numerator = Degree of denominator – y = ratio of lead coefficients
  - x-intercepts (?, 0) – set numerator = 0, factor, and solve for x
  - y-intercept (0, ?) – ratio of constants (make sure numbers are multiplied out)
  - hole (x, y) – occurs when the factor cancels out, set the canceled out factor = 0, solve for x, plug x back into reduced function to get the value of y.

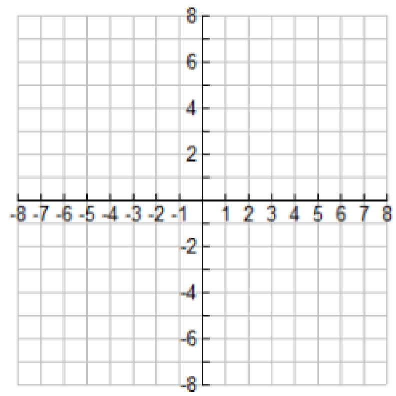
Example: Complete the table about each rational function, then graph it on the coordinate plane. Use a colored pen or pencil to draw the asymptotes. Show your work.

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



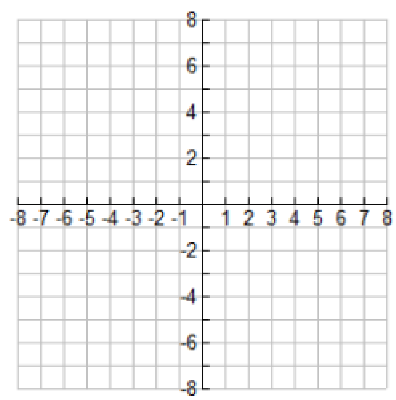
VA(s)	HA	x-int(s)	y-int	Hole

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



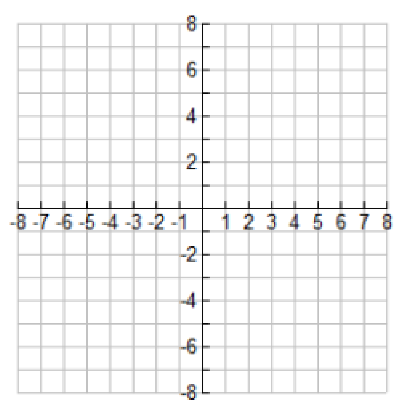
VA(s)	HA	x-int(s)	y-int	Hole

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



VA(s)	HA	x-int(s)	y-int	Hole

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



VA(s)	HA	x-int(s)	y-int	Hole