Rules for Graphing Rational Functions

Step 1. Factor and cancel if possible –

IF a factor cancels, a hole on the graph is created at that number.

Step 2. To find zeros (x–intercepts) –

Set numerator =0 and solve.

Step 3. To find vertical asymptotes (VA) –

Set denominator =0 and solve. These are always x = # equations.

Step 4. To find horizontal asymptotes (HA) –

Look at the degree of the numerator & denominator & determine which is true below:

a.	b.	c.
degree of Numerator < degree of Denominator	degree of Numerator = degree of Denominator	degree of Numerator > degree of Denominator
HA → y = 0 (x-axis)	**HA →** $y = \frac{LC\ of\ numerator}{LC\ of\ denominator}$	**HA → NONE** **Has a slant asymptote.**

Step 5. To find slant asymptotes (SA) –

Use long/synthetic division to find the equation of the slant asymptote (y = mx + b).

Step 6. To find y–intercept –

Some rational functions will have a y-intercept (some will not). To find the y-intercept, find f(0).

Step 7. Sketch graph.

Draw lines for the graph from asymptote to asymptote through the zeros. If needed, find more points using the table in your calculator.

You CAN HAVE: HA & VA & HOLES, VA & SA & HOLES & You CANNOT HAVE: SA & HA

Sometimes, a rational graph will cross the HA or SA, but they will NEVER cross a VA.