Name _____   Date _____

Graphing Rational Functions - Step-by-Step Lesson

Graph the following function:

$$f(x) = \frac{2x + 3}{x - 2}$$

Explanation:

Step 1) Find the y intercept.

This is where the line will cross the y-axis (x = 0).

This is the same thing as evaluating f(0).

$$f(0) = \frac{2\,(0)+3}{0-2} \qquad f(0) = \frac{3}{-2} \quad = 0 \quad \text{ or } (0, \text{-}1.5)$$

Step 2) Find the x intercept.

This is where the line will cross the x-axis (y = 0).

This is the same thing as evaluating f(x) = 0. So we set the function equal to 0.

$$0 = \frac{2x+3}{x-2} \qquad 0 = \frac{x+3}{-2} = \qquad x = -\frac{3}{2} \quad \text{ or } (\text{-}1.5, 0)$$

Step 3) Identify the Vertical Asymptotes, if any is available.

This is where the function will not exist and therefore the denominator would be equal to 0. This is where a vertical line at the x position will be located. We will set the denominator of the function equal to zero and solve for x.

x-2 = 0

x = 2

Step 4) Identify the Horizontal Asymptote

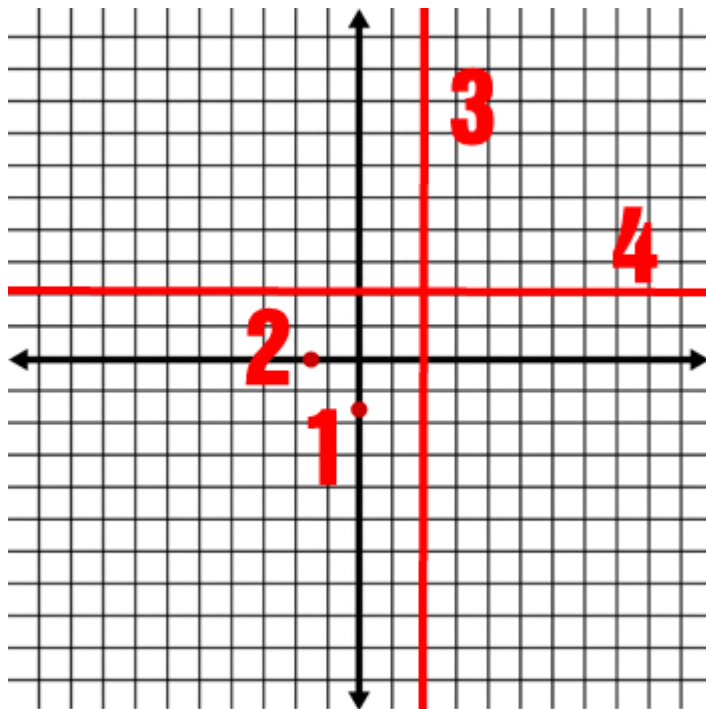The Horizontal Asymptote is the result of dividing the leading coefficients. In this case 2/1 = 2

Step 5) Sum up what we know already on the graph.

1. y-intercept = (0, -1.5)   2. x-intercept = (-1.5, 0)

3. Vertical Asymptotes = 2   4. Horizontal Asymptote= 2

Step 6) Pick a number of x-values to plot and work them through.

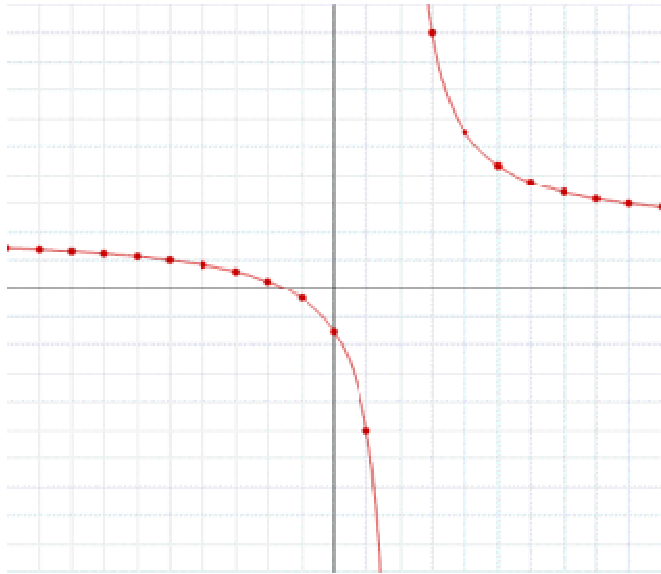| x-value	plug in	y value
1	$\dfrac{2 + 3}{1 - 2}$	-5
3	$\dfrac{6 + 3}{3 - 2}$	9
4	$\dfrac{8 + 3}{4 - 2}$	11/2 = 5.5
9	$\dfrac{18 + 3}{9 - 2}$	3
-3	$\dfrac{-6 + 3}{-3 - 2}$	0.6
-5	$\dfrac{-10 + 3}{-5 - 2}$	1

Step 7) Plot the points.

I added more points than I list in Step 6 to allow you to see the full curve.

After plotting the points connect the dots with a line to reveal your curves.