Name:____Date:______________Period:_______

8-3 Rational Functions and Their Graphs

Standards

A2. F.IF.A.1 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
A2. F.IF.B.3 Graph functions expressed symbolically and show key features of the graph, by hand and using technology

Key Concepts

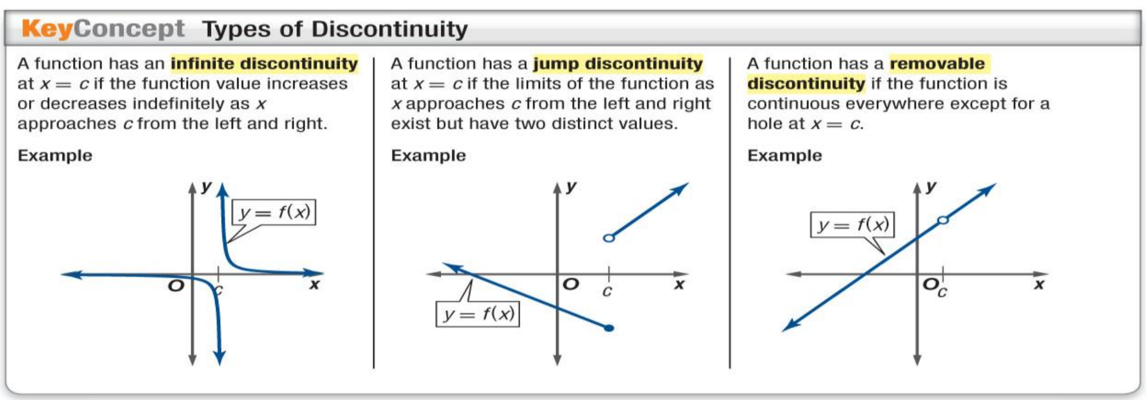
__________________ – a function that you can write in the form $f(x) = \frac{P(x)}{Q(x)}$, where $Q(x) \neq 0$

____________________________ – a graph that has no breaks, jumps, or holes.

_________________________ – a graph that has jumps, breaks or holes.

___________________________ – the point at which the graph is not continuous ($x = a$)

________________________________ – the graph has a vertical asymptote at $x = a$ if it has non-removable discontinuity at $x = a$.



___________________________ **-** to find a horizontal asymptote, compare the degree of the numerator to the degree of the denominator.

- If degree of numerator < degree of denominator, then the horizontal asymptote is $y = 0$
- If degree of numerator = degree of denominator, then the horizontal asymptote is y = ratio of leading coefficients.
- If degree of numerator > degree of denominator, then there is no horizontal asymptote.

Examples

1. (I do) Consider the rational function $y = \frac{x+4}{x^2-x-12}$
   a. What is the domain of the rational function?

   b. Identify the points of discontinuity. Are the points of discontinuity removable or non-removable?

   c. What are the *x*- and *y* – intercepts?

2. (We do) Consider the rational function $y = \frac{2x}{x^2+12}$
   a. What is the domain of the rational function?

   b. Identify the points of discontinuity. Are the points of discontinuity removable or non-removable?

   c. What are the *x*- and *y* – intercepts?

3. (They do) Consider the rational function $y = \frac{x^2-4}{x+2}$
   a. What is the domain of the rational function?

   b. Identify the points of discontinuity. Are the points of discontinuity removable or non-removable?

   c. What are the *x*- and *y* – intercepts?

4. (I do) What are the vertical asymptotes for the graph?
   a. $y = \frac{(x+3)}{(x-3)(x+2)}$

   b. $y = \frac{(x+7)}{(x^2+9x+14)}$

5. (We do) What are the horizontal asymptotes for the graph?
   a. $y = \frac{-4x+3}{2x+1}$

   b. $y = \frac{x-2}{x^2-2x-3}$

   c. $y = \frac{x^2}{4x-1}$

6. (They do) Graph the rational function $y = \frac{x+1}{x^2-x-6}$

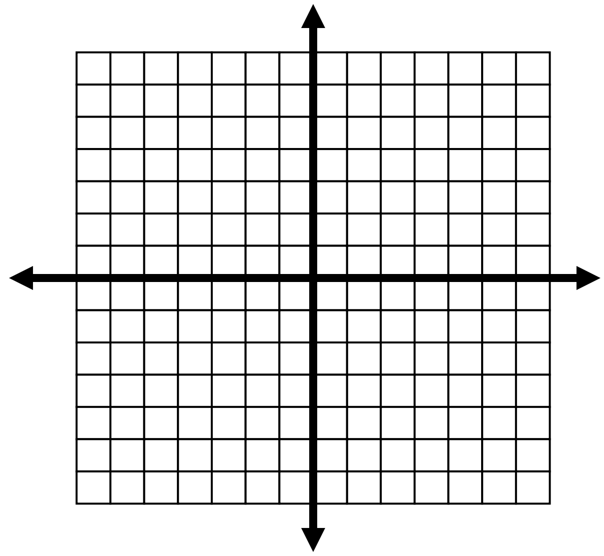
Step 1: Find HA

Step 2: Factor

Step 3: Find VA

Step 4: Find x- and y- intercepts

Step 5: Graph and get additional points on the graph



7. (They do) You work at a pharmacy that mixes different concentrations of saline. The pharmacy has a supply of two different concentrations, 0.5% and 2%. The function $y = \frac{100(0.02)+x(0.005)}{100+x}$ gives the concentration of the mixture after adding x milliliters of the 0.5% solution to 100 milliliters of the 2%. How many milliliters of the 0.5% solution must you add for the combined solution to have a concentration of 0.9%?

(You do) Practice 8-3: Complete your assignment on a separate sheet of paper. Show all work.

1. State the domain, find any points of discontinuity for each rational function, state the x- and y-intercepts. Are there any vertical asymptotes? Are the points of discontinuity removable or non-removable?

a. $y = \frac{x+5}{x^2+9x+20}$ b. $y = \frac{x-1}{(x+1)^2}$ c. $y = \frac{x^2-x-2}{3x^2-7x+2}$

2. Find the horizontal asymptotes.

a. $y = \frac{x-3}{x+5}$ b. $y = \frac{x-3}{x^2+5x+6}$ c. $y = \frac{x^2-1}{2x+2}$

3. Sketch the graph of each rational function $y = \frac{x+3}{x^2-7x+6}$

4. (See example 7, use the same function) How many milliliters of the 0.5% solution must be added to the 2% solution to get a 0.65% solution?