Objective: Solve rational equations graphically.

Concept

Steps to Solve an Equation Graphically Using Two Functions

1. Create two functions, $f(x)$ and $g(x)$ using the left and right sides of the equation.

2. Graph the functions and determine the point of intersection. This corresponds to where $f(x) = g(x)$. **The x-coordinate of the point of intersection will be the solution to the related equation**, because this is the value of x where the two functions are equal in value (have the same y value).

3. State the solution(s) of the equation (the x-coordinates of all points of intersection).

Objective: Solve rational equations graphically.

Concept

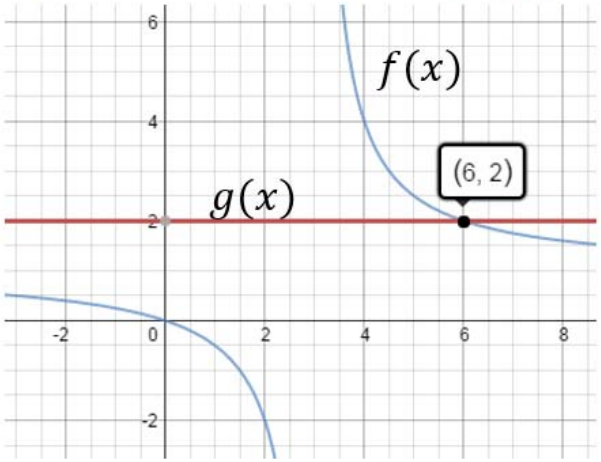
Solve the rational equation $\frac{x}{x-3} = 2$ **graphically using two functions**.

1. Create two functions, $f(x)$ and $g(x)$ using the left and right sides of the equation.

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

2. Graph the two functions and determine the point of intersection.

point of intersection = (6,2)

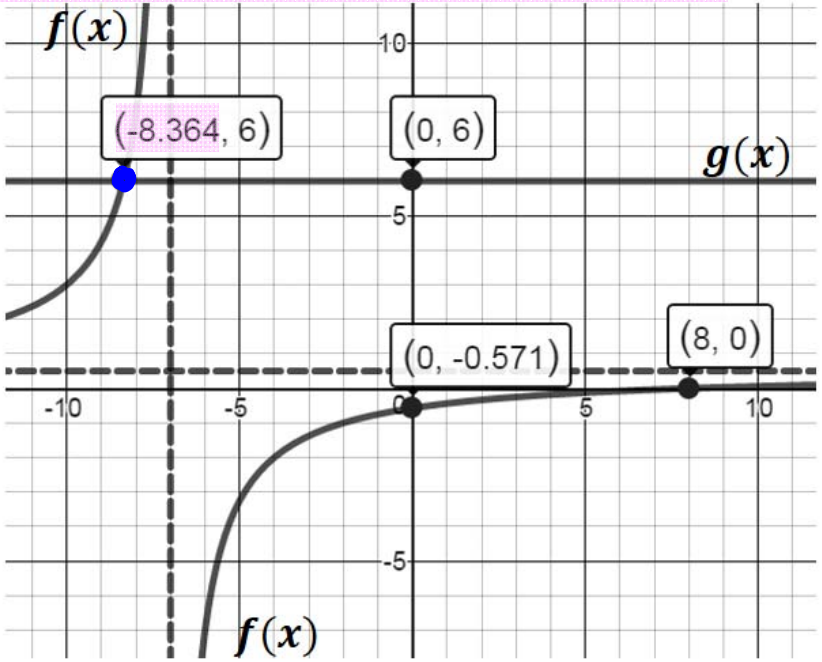


3. State the solution to the related equation (the x-coordinate of the intersection point.)

The solution to $\frac{x}{x-3} = 2$ is $x = 6$.

Objective: Solve rational equations graphically.

Ex) The equation $\frac{0.5x-4}{x+7} = 6$ is solved graphically using two functions. The graph of the related functions is shown. Use the graph to determine the solution to the equation.



Solution is
$x = -8.364$.

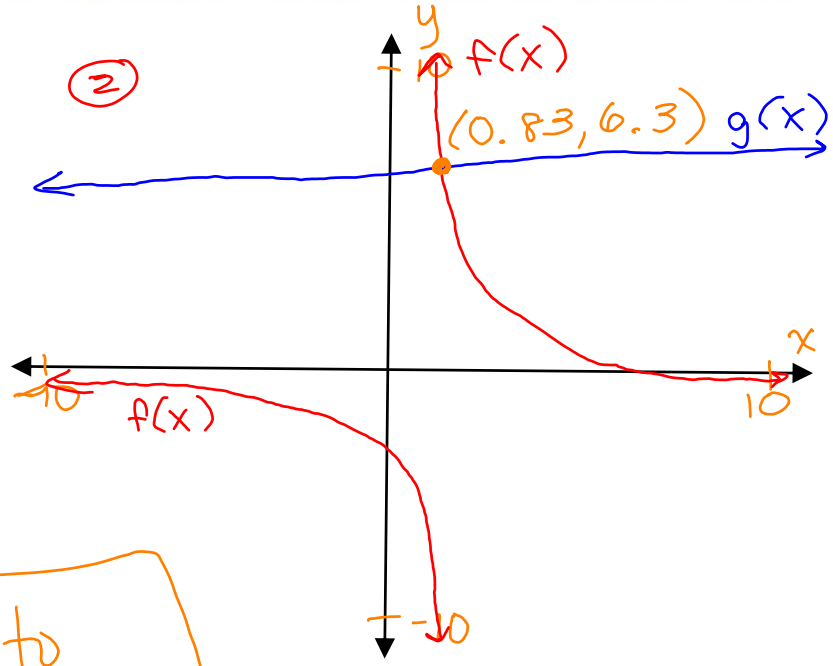
Objective: Solve rational equations graphically.

Ex) Solve the rational equation graphically using two functions. Write the functions. Use a graphing calculator to graph the functions. Sketch the graph. State the solution to the equation.

$$\frac{-x+7}{6x-4} = 6.3$$

① $f(x) = \frac{-x+7}{6x-4}$

$g(x) = 6.3$



③ The solution to $\frac{-x+7}{6x-4} = 6.3$ is 0.83.

Objective: Solve rational equations graphically.

Concept

Steps to Solve an Equation Graphically Using One Function

1. Set the equation equal to 0.
2. Create a function by replacing 0 with $f(x)$. **This now means the solution to the equation is where $f(x) = 0$ which corresponds to the zero of the function.**
3. Graph the function and determine the zero(s).
4. State the solution of the equation (which is the zero(s) of the function).

Objective: Solve rational equations graphically.

Concept

Solve the rational equation $\frac{x}{x-3} = 2$ **graphically using one function**.

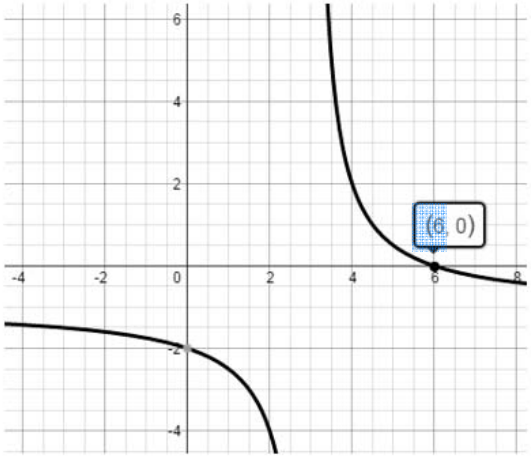
1. Set the equation equal to 0.

$$\frac{x}{x-3} - 2 = 0$$

2. Replace 0 with $f(x)$. This now represents the related function whose zero corresponds to the solution of the equation.

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

3. Graph the function and determine the zero. zero = 6



4. State the solution to the equation (which is the zero of the function).

The solution to $\frac{x}{x-3} = 2$ is $x = 6$.

Objective: Solve rational equations graphically.

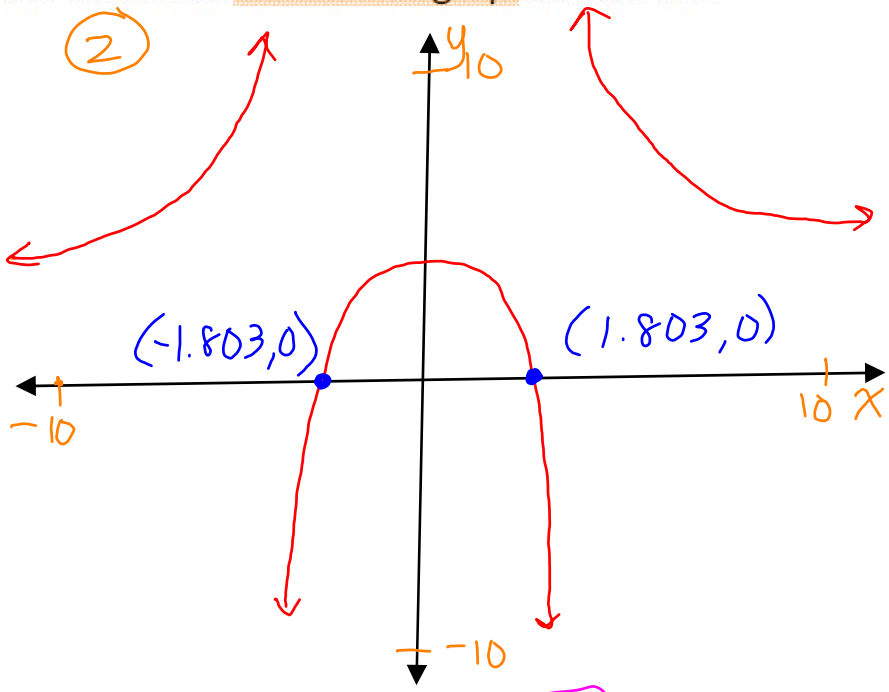
Ex) Solve the rational equation graphically using one function. Write the function. Use a graphing calculator to graph the function. Sketch the graph. State the solution to the equation.

(1) $\dfrac{3x}{x^3-4x} = -4$

$+4 \quad +4$

$\dfrac{3x}{x^3-4x} + 4 = 0$

$f(x) = \dfrac{3x}{x^3-4x} + 4$



(3) The solutions are -1.803 and 1.803.

Objective: Solve rational equations graphically.

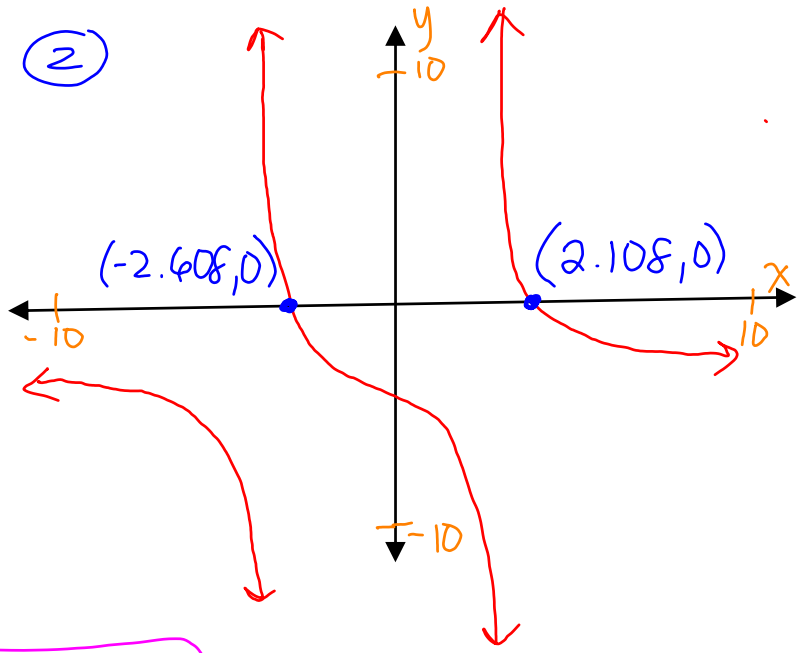
Ex) Solve the rational equation graphically using one function. Write the function. Use a graphing calculator to graph the function. Sketch the graph. State the solution to the equation.

$$\frac{x-1}{x^2+x-6} = 2$$

① $\frac{x-1}{x^2+x-6} - 2 = 0$

$f(x) = \frac{x-1}{x^2+x-6} - 2$

②



③ The solutions are −2.608 and 2.108.

Objective: Solve rational equations graphically.

Closure

When solving a rational equation graphically using two functions, explain why the x-coordinate of the point of intersection is the solution to the given rational equation.

When solving a rational equation using the graph of two functions, the x-coordinate of the point of intersection is the solution because this is the value of x where the two functions are equal, or have the same y value.