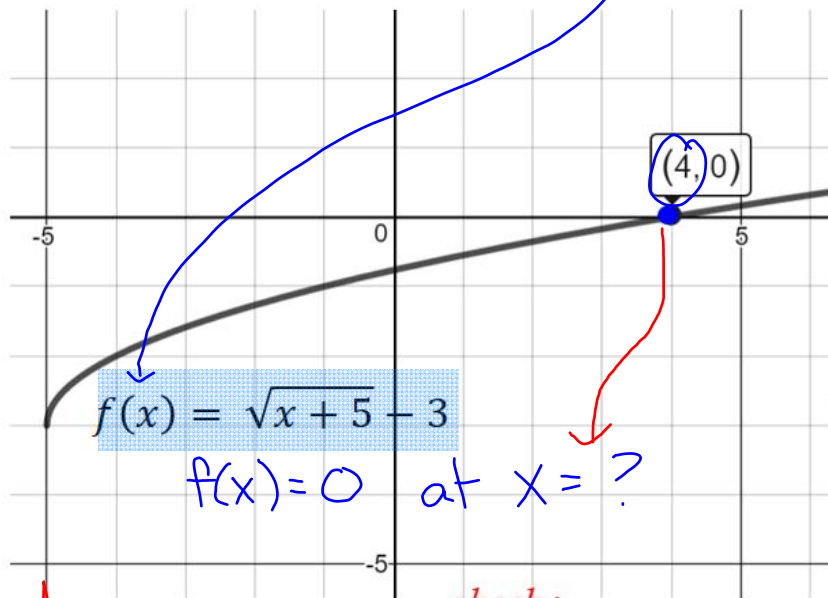


Objective: Solve radical equations graphically.

Concept

Solve $\sqrt{x+5} - 3 = 0$ graphically using one function.



$f(x) = \sqrt{x+5} - 3$

$f(x) = 0$ at $x = ?$

(4, 0)

If one function is used to solve an equation graphically, the solution to the equation corresponds to the zero of the function. This is because the equation is equal to 0 and the 0 has become the function values, i.e. $f(x)$. Therefore the solution is where $f(x) = 0$.

If reasonable, you can also **check your solution** by plugging it into the equation and making sure it results in a true statement.

★ The solution to $\sqrt{x+5} - 3 = 0$ is $x = 4$.

check :
 $\sqrt{4+5} - 3 = 0$
 $\sqrt{9} - 3 = 0$
 $3 - 3 = 0$
 $0 = 0$ true statement

Objective: Solve radical 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 you are solving for where $f(x) = 0$ which corresponds to the zero of the function.
3. Graph the function and determine the zero. If there is no zero, then the equation has no solution.
4. State the solution(s) to the equation.

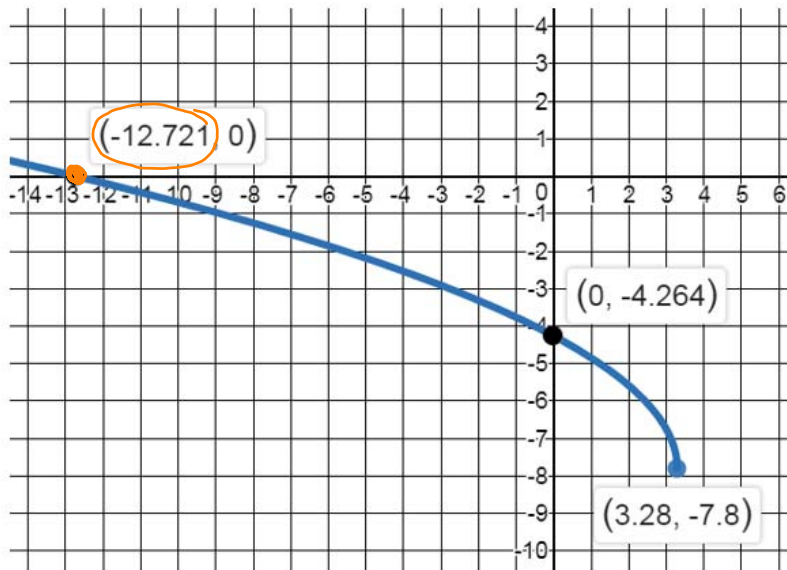


Objective: Solve radical equations graphically.

Ex) Use the graph of the function to state the solution(s) to the related equation.

Solve: $\sqrt{12.5 - 3.8x} = 7.8$
 $-7.8 - 7.8$
 $= 0$

$f(x) = \sqrt{12.5 - 3.8x} - 7.8$



The solution to
 $\sqrt{12.5 - 3.8x} = 7.8$
 is $x = -12.721$.



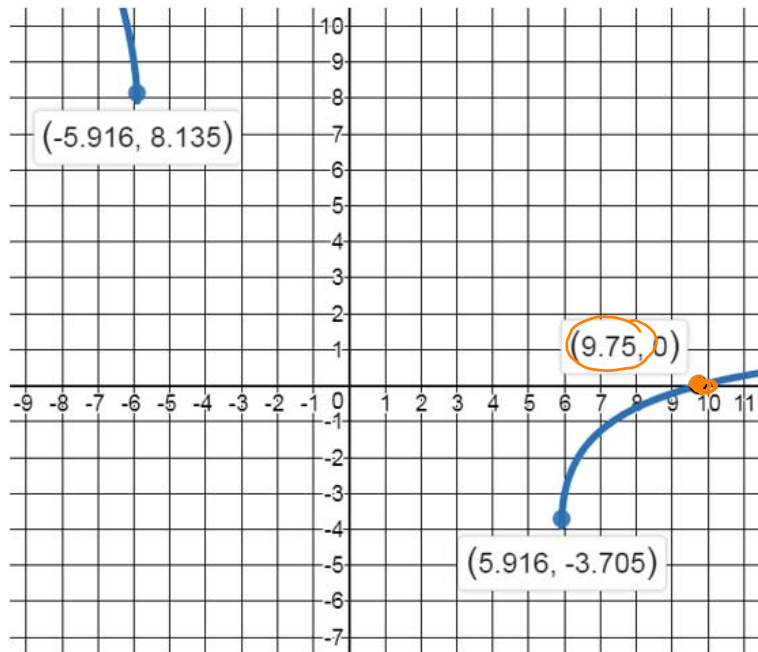
Objective: Solve radical equations graphically.

Ex) Use the graph of the function to state the solution(s) to the related equation.

Solve: $\sqrt{x^2 - 35} = x - 2$

$-x + 2 \quad -x + 2$
 $= 0$

$f(x) = \sqrt{x^2 - 35} - x + 2$



The solution to $\sqrt{x^2 - 35} = x - 2$ is $x = 9.75$.



Objective: Solve radical equations graphically.

Ex) Solve each radical equation graphically using one function. Write the function used. Graph the function using a graphing calculator and then sketch the graph. If there is a solution, mark the point(s) on the graph where the solution(s) can be found. State the solution(s) to the equation.

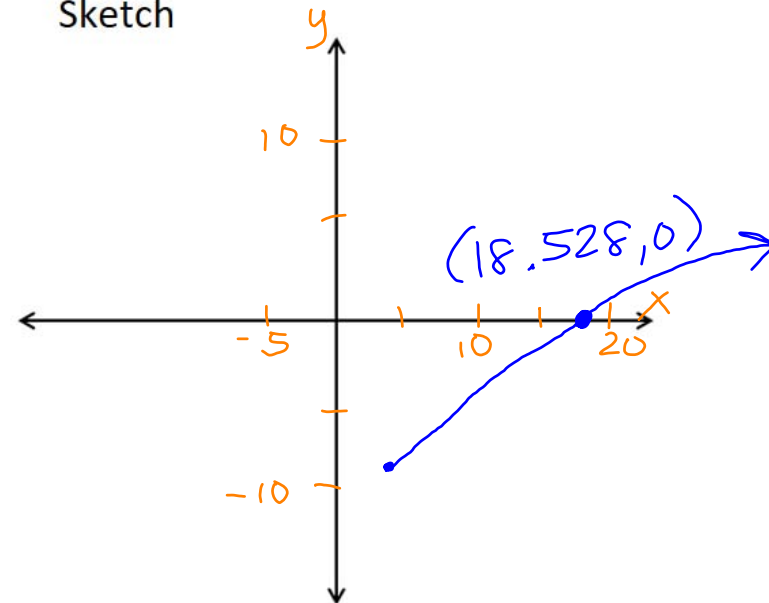
$$\begin{aligned} \sqrt{5x-8} &= 9.2 \\ &\quad \underline{-9.2-9.2} \\ \sqrt{5x-8} - 9.2 &= 0 \end{aligned}$$

Function: $f(x) = \sqrt{5x-8} - 9.2$

Conclusion

The solution to
 $\sqrt{5x-8} = 9.2$ is
 $x = 18.528$.

Sketch



Objective: Solve radical equations graphically.

Ex) Solve each radical equation graphically using one function. Write the function used. Graph the function using a graphing calculator and then sketch the graph. If there is a solution, mark the point(s) on the graph where the solution(s) can be found. State the solution(s) to the equation.

$$-\sqrt{x+7} = 2.8$$

$$+\sqrt{x+7} \quad +\sqrt{x+7}$$

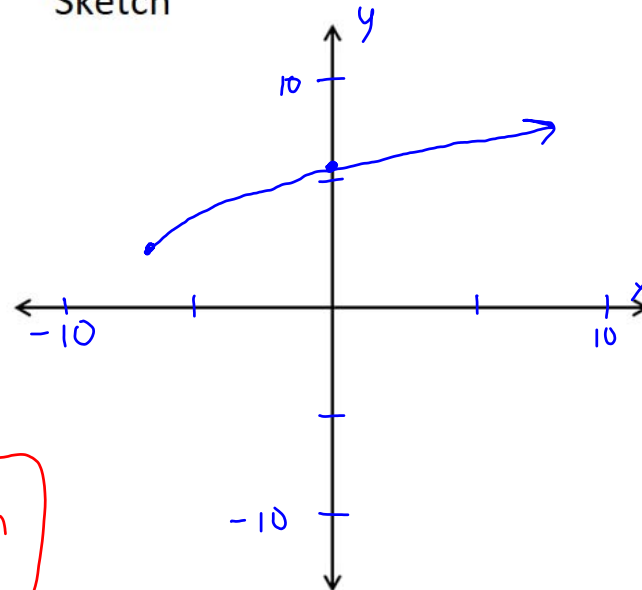
$$0 = 2.8 + \sqrt{x+7}$$

Function: $f(x) = 2.8 + \sqrt{x+7}$

Conclusion

There is no solution to $-\sqrt{x+7} = 2.8$.

Sketch

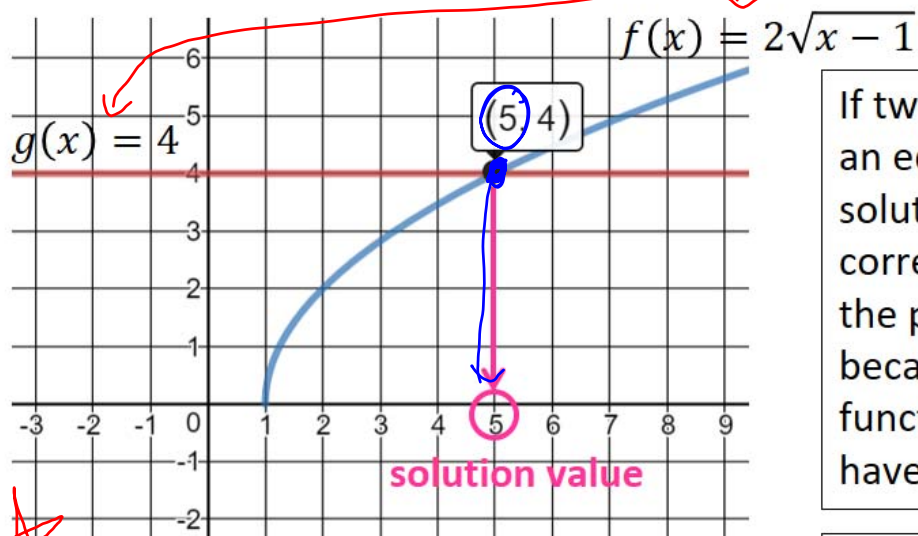


Objective: Solve radical equations graphically.

Solve the radical equation $2\sqrt{x-1} = 4$ graphically using two functions.

Concept

$f(x) = g(x)$



If two functions are used to solve an equation graphically, the solution to the equation corresponds to the x -coordinate of the point(s) of intersection, because this is where the two functions are equal in value (i.e. have the same y value).

The solution to $2\sqrt{x-1} = 4$ is $x = 5$.

check:
 $2\sqrt{5-1} = 4$
 $2\sqrt{4} = 4$
 $4 = 4$ true statement

If reasonable, you can also **check your solution(s)** by plugging the value(s) into the equation and making sure the result is a true statement.



Objective: Solve radical 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, because this is the value of x where the two functions are equal in value. If the two functions do not intersect, then the equation has no solution.
3. State the solution(s) to the equation.



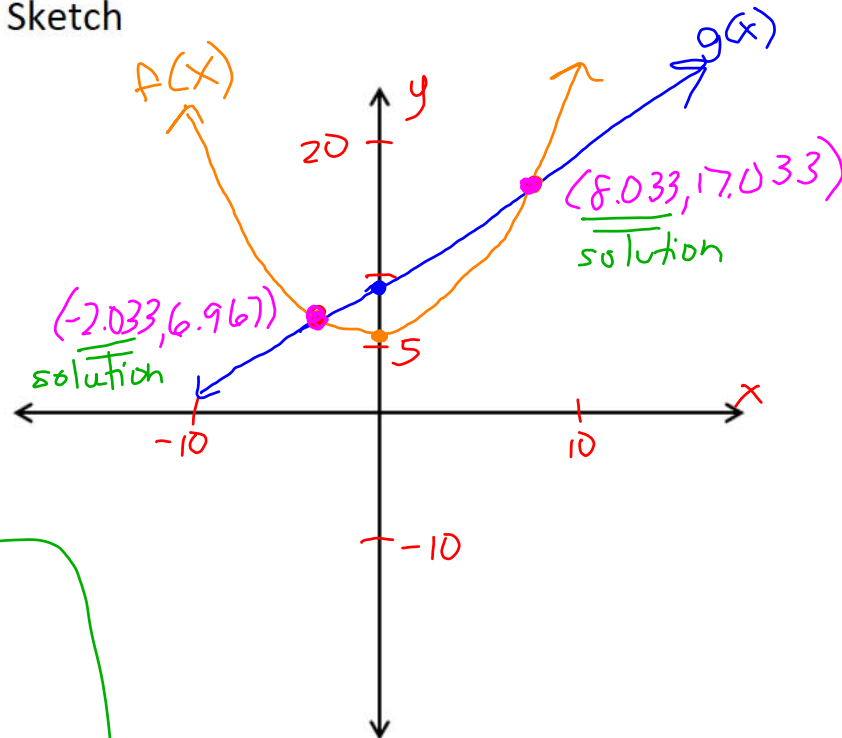
Objective: Solve radical equations graphically.

Ex) Solve each radical equation graphically using two functions. Write the functions used. Graph the functions using a graphing calculator. Sketch the graph. If there is a solution, mark the point(s) where solution(s) are found. State the solution(s) to the equation.

$$2\sqrt{x^2 + 8} = x + 9$$

Functions: $f(x) = 2\sqrt{x^2 + 8}$
 $g(x) = x + 9$

Sketch



Conclusion

The solutions to $2\sqrt{x^2 + 8} = x + 9$ are $x = -2.033$ and $x = 8.033$.



Objective: Solve radical equations graphically.

Ex) Solve each radical equation graphically using two functions. Write the functions used. Graph the functions using a graphing calculator. Sketch the graph. If there is a solution, mark the point(s) where solution(s) are found. State the solution(s) to the equation.

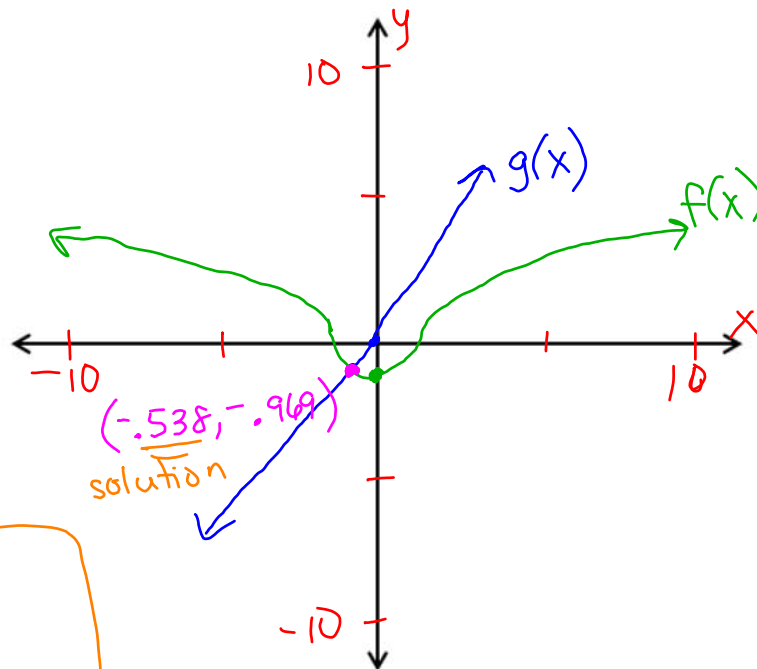
$$\sqrt[3]{x^2 - 1.2} = 1.8x$$

Functions:

$$f(x) = \sqrt[3]{x^2 - 1.2}$$

$$g(x) = 1.8x$$

Sketch



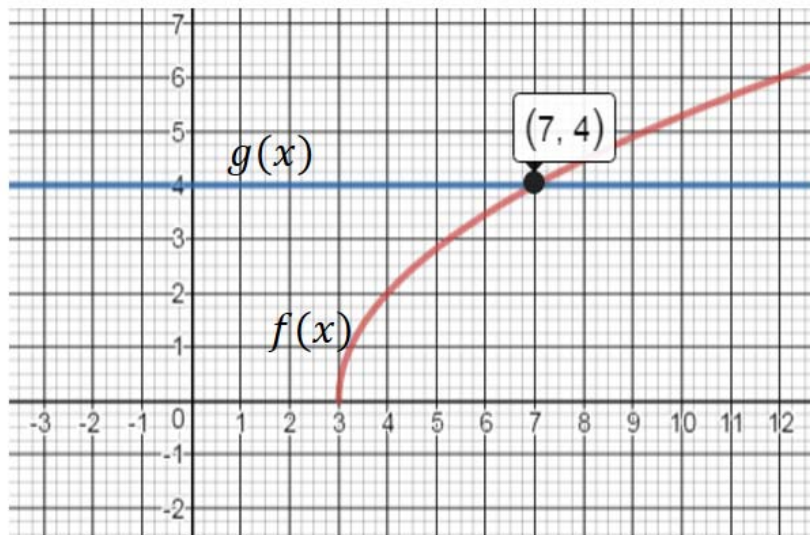
Conclusion The solution to
 $\sqrt[3]{x^2 - 1.2} = 1.8x$
 is $x = -0.538$.

Objective: Solve radical equations graphically.

Closure

Rachael was solving the equation $2\sqrt{x-3} = 4$ graphically using two functions. She says the solution is 4. Is she correct? Explain your reasoning.

$$f(x) = 2\sqrt{x-3} \qquad g(x) = 4$$



Rachael is not correct. The solution to the equation would be 7, because this is the value of x where the two functions have the same y value, which is 4.