11.3 Solving Radical Equations

Solving Square Root and $\frac{1}{2}$ Power Equations

Learning Target E: I can solve square root and $\frac{1}{2}$ power equations algebraically.

A radical equation contains a variable within a radical or a variable raised to a (non-integer) rational power. To solve a square root equation, or, equivalently, an equation involving the power of $\frac{1}{2}$, you can square both sides of the equation and solve the resulting equation.

Because opposite numbers have the same square, squaring both sides of an equation may introduce an apparent solution that is not an actual solution (an extraneous solution).

Solve each equation. Check for extraneous solutions.

A) $2 + \sqrt{x + 10} = x$

B) $(x + 6)^{\frac{1}{2}} - (2x - 4)^{\frac{1}{2}} = 0$

C) $(x + 5)^{\frac{1}{2}} - 2 = 1$

D) The graphs of each side of the equation in part A are shown on the graphing calculator screen below. How can you tell from the graph that one of the two solutions you found algebraically is extraneous?
Solving Cube Root and \( \frac{1}{3} \) – Power Equations

Learning Target F: I can solve cube root and \( \frac{1}{3} \) – power equations algebraically.

You can solve radical equations that involved roots other than square roots by raising both sides to the index of the radical. So, to solve a cube root equation, or, equivalently, and equation involving the power \( \frac{1}{3} \), you can cube both sides of the equation and solve the resulting equation.

Solve each equation.

A) \( \sqrt[3]{x} + 2 + 7 = 5 \)

B) \( \sqrt[3]{x} - 5 = x + 1 \)

C) \( 2(x - 50)^{\frac{1}{3}} = -10 \)

D) \( \sqrt[3]{x} = \sqrt[7]{x + 5} \)