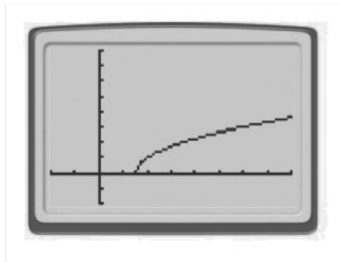


1-3 Solving Radical Equations

Remember that you can graph the two sides of an equation as separate functions to find solutions of the equation: a solution is any x -value where the two graphs intersect.

The graph of $y = \sqrt{x-3}$ is shown on a calculator window of $-4 \leq x \leq 16$ and $-2 \leq y \leq 8$. Reproduce the graph on your calculator. Then add the graph of $y = 2$.



How many solutions does the equation $\sqrt{x-3} = 2$ have? _____ How do you know?

On your calculator, replace the graph of $y = 2$ with the graph of $y = -1$.

How many solutions does the equation $\sqrt{x-3} = -1$ have? _____ How do you know?

Find the solution graphically

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

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

$$y_2 = 1$$

$$\boxed{x = 4}$$

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

$$x = 6$$

Solve the following, check for extraneous solutions

$$(2\sqrt{x})^2 = (3\sqrt{x-2})^2$$

$$4x = 9(x-2)$$

$$4x = 9x - 18$$

$$-9x \quad -9x$$

$$\frac{-5x}{-5} = \frac{-18}{-5}$$

$$x = \frac{18}{5} = 3.6$$

$$(\sqrt{5x-11})^2 = (x-1)^2$$

$$5x-11 = x^2 - 2x + 1$$

$$-5x + 11 \quad -5x + 11$$

$$0 = x^2 - 7x + 12$$

$$0 = (x-3)(x-4)$$

$$x-3=0 \quad x-4=0$$

$$x=3 \quad x=4$$

Solve the following, check for extraneous solutions

$$\sqrt{2x+5} + 4 = 3$$

$$-4 - 4$$

$$\sqrt{2x+5} = -1$$

NO SOLUTION

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

$$\sqrt{x+6} - \sqrt{2x-4} = 0$$

$$\sqrt{x+6} = \sqrt{2x-4}$$

$$(\sqrt{x+6})^2 = (\sqrt{2x-4})^2$$

$$x+6 = 2x-4$$

$$-x + 4 \quad -x \quad +4$$

$$10 = x$$

Example 2 Solve the equation.

$$\sqrt[3]{x+2} + 7 = 5$$

$$\sqrt[3]{x+2} + 7 = 5$$

$$x = -10$$

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

$$x = -75$$

Solve the following equations

$$\left(\sqrt[3]{x-5}\right)^3 = \left(\sqrt[3]{7-x}\right)^3$$

$$\begin{array}{r} x-5 = 7-x \\ +x \quad +5 \quad \quad +x \\ \quad \quad \quad +5 \end{array}$$

$$\frac{2x}{2} = \frac{12}{2}$$

$$\boxed{x=6}$$

$$\left(\sqrt[3]{x+2}\right)^3 = \left(\sqrt[3]{x+3}\right)^3$$

$$\begin{array}{r} x+2 = x+3 \\ -x-2 \quad -x-2 \end{array}$$

$$0 = 1$$

NO SOLUTION