

3-3 Solving Radical Equations

Objectives:

1. I can solve radical equations and check for extraneous solutions.
2. I can solve radical equations from real world problems.

Solving Radical Equations

Graphically: Graph the two sides of the equation as separate functions, then see where they intersect.

Algebraically: Get x by itself using algebra.

Extraneous Solutions: Answers you get from solving algebraically that don't work when plugged into the equation.

Find the solution graphically

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

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

$$y_1 = 2 + \sqrt{x+10}$$

$$y_2 = x$$

Solve the following algebraically. Check for extraneous solutions.

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

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

-4 4

$$2x + 5 = 1$$

-5 -5

$$\frac{2x}{2} = \frac{-4}{2}$$

$$x = -2$$

Solve the following algebraically. Check for extraneous solutions.

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

$$5x-11 = (x-1)(x-1)$$

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

$$5x = x^2 - 2x + 12$$

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

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

$$0 = x - 3$$

$$0 = x - 4$$

$$x = 3, 4$$

extr. sol.

Solve.

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

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

$$x+2 = -8$$

$$x = -10$$

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

$$\sqrt[3]{x-50} = -\frac{10}{2}$$

$$\sqrt[3]{x-50} = -5$$

Solve the following:

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

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

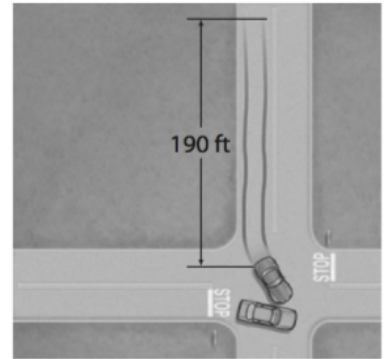
$$\begin{array}{r} x-5 = 7-x \\ +5 \quad +5 \end{array}$$

$$\begin{array}{r} x = 12-x \\ +x \quad +x \\ 2x = 12 \end{array}$$

Driving The speed s in miles per hour that a car is traveling when it goes into a skid can be estimated by using the formula $s = \sqrt{30fd}$, where f is the coefficient of friction and d is the length of the skid marks in feet.

After an accident, a driver claims to have been traveling the speed limit of 55 mi/h. The coefficient of friction under the conditions at the time of the accident was 0.6, and the length of the skid marks is 190 feet. Is the driver telling the truth about the car's speed? Explain.

Use the formula to find the length of a skid at a speed of 55 mi/h. Compare this distance to the actual skid length of 190 feet.



Your Turn

9. **Biology** The trunk length (in inches) of a male elephant can be modeled by $l = 23\sqrt[3]{t} + 17$, where t is the age of the elephant in years. If a male elephant has a trunk length of 100 inches, about what is his age?