

Chapter 12  
Section 3

Solving Radical  
Equations

## Question

- How do we solve equations that have a radical in them?

- Ex.  $\sqrt[3]{16} - 5 = 10$

## Answer: Follow these steps

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- Isolate the radical on one side of the equation
- Raise both sides to the appropriate exponent to “undo” the radical
- Solve for the variable
- Check for **extraneous solutions**
  - Plug answers into original problem to check

## Examples:

1.  $\sqrt{x} - 7 = -4$

$$\begin{array}{r} +7 \quad +7 \\ \sqrt{x} - 7 = -4 \\ \hline \sqrt{x} = 3 \end{array}$$

$$x = 9$$

~~~~~

$$\sqrt{9} - 7 = -4$$

$$3 - 7 = -4$$

$$-4 = -4$$

✓

2.  $\sqrt{x} + 6 = 14$

$$\begin{array}{r} -6 \quad -6 \\ \sqrt{x} + 6 = 14 \\ \hline \sqrt{x} = 8 \end{array}$$

$$x = 64$$

~~~~~

$$\sqrt{64} + 6 = 14$$

$$8 + 6 = 14$$

$$14 = 14$$

✓

## Examples

3.  $\sqrt{x-2} = 5$

$$x - 2 = 25$$

$$x = 27$$

$$\sqrt{27-2} = 5$$

$$\sqrt{25} = 5$$

$$5 = 5$$

✓

4.  $\sqrt{x+3} = -2$

$$x + 3 = 4$$

$$x = 1$$



$$\sqrt{1+3} = -2$$

$$\sqrt{4} = -2$$

$$2 \neq -2$$

## Examples:

5.  $5\sqrt{x-5} = 5$

$$\frac{5}{5} \sqrt{x-5} = \frac{5}{5}$$
$$\sqrt{x-5} = 1$$
$$x-5 = 1$$
$$+5 \quad +5$$
$$\underline{x = 6}$$
$$5\sqrt{6-5} = 5$$
$$5\sqrt{1} = 5$$
$$5 \cdot 1 = 5 \quad \checkmark$$

6.  $\sqrt{2x-3} + 3 = 4$

$$\sqrt{2x-3} = 1$$
$$2x-3 = 1$$
$$+3 \quad +3$$
$$\frac{2x}{2} = \frac{4}{2}$$
$$\underline{x = 2}$$
$$\sqrt{2 \cdot 2 - 3} + 3 = 4$$
$$\sqrt{1} + 3 = 4$$
$$1 + 3 = 4$$
$$4 = 4$$
$$\checkmark$$

## Examples:

7.  $\sqrt{x} + 13 = 0$

$-13 \quad -13$

$\sqrt{x} = -13$

~~$x = 169$~~

$\sqrt{169} + 13 = 0$

$13 + 13 = 0$

$26 \neq 0$

∅

$\sqrt{4 \cdot 3 - 3} = 3$

$\sqrt{9} = 3$

8.  $\sqrt{4x-3} = x$

$4x-3 = x^2$

$0 = x^2 - 4x + 3$

$(x-3)(x-1) = 0$

$x = 3, 1$

$\sqrt{4 \cdot 1 - 3} = 1$

$\sqrt{1} = 1 \quad \checkmark$

## Examples

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

$$x+2 = x^4$$

$$0 = x^4 - x - 2$$

$$0 = (x-2)(x+1)$$

$$x = 2, \text{ } \cancel{x = -1}$$

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

$$\sqrt{4} = 2 \quad \checkmark$$

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

$$\sqrt{1} = -1$$

$$1 \neq -1$$



# CLASSWORK

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● Pg 725 # 4-12

## Homework

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