

Simplify each expression

1. $2i + (-4 - 2i)$

2. $(4 + 3i)(1 + 2i)$

3. $\sqrt{-175}$

4. $6\sqrt{3} - \sqrt{75}$

Objectives

Recognize when extraneous solutions may arise when solving radical equations and check solutions to determine which solutions may be extraneous.

Create quadratic equations from given roots.

Homework

6-5 Worksheet, 1-21 odd

Quadratics from Roots, all practice problems.

Exercises

Solve. Check your solutions.

1. $x^{\frac{1}{2}} = 13$ **169**

2. $3\sqrt{2x} = 12$ **8**

3. $\sqrt{3x} + 5 = 11$ **12**

4. $(3x + 4)^{\frac{1}{2}} - 1 = 4$ **7**

5. $(6 - x)^{\frac{1}{2}} + 2 = 5$ **-3**

6. $\sqrt{3x + 13} = 4$ **1**

7. $(x + 2)^{\frac{1}{2}} - 5 = 0$ **23**

8. $\sqrt{3 - 2x} - 2 = 3$ **-11**

9. $\sqrt[3]{5x + 2} - 3 = 0$ **5**

10. $\sqrt{5x + 1} = \sqrt{4x + 3}$ **2**

11. $\sqrt{x^2} + 3 = x + 1$ **no solution**

12. $\sqrt{3x} = \sqrt{x + 6}$ **3**

13. $x = \sqrt{x + 7} + 5$ **9**

14. $x - 3\sqrt{x} - 4 = 0$ **16**

15. $\sqrt{x + 2} = x - 4$ **7**

16. $\sqrt{2x - 10} = x - 5$ **5, 7**

17. $\sqrt{3x - 6} = 2 - x$ **2**

18. $\sqrt{x - 1} + 7 = x$ **10**

19. $\sqrt{5x + 1} = \sqrt{3x + 15}$ **7**

20. $\sqrt{x + 9} = x + 7$ **-5**

21. $x - \sqrt{x + 2} = 40$ **47**

What is a Radical Equation?

An equation that has a variable in a radicand or a variable with a rational exponent.

$$3 + \sqrt{2x - 3} = 8$$

Three basic step...

$$\begin{array}{r} 3 + \sqrt{2x - 3} = 8 \\ -3 \qquad \qquad -3 \end{array}$$

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

$$(\sqrt{2x - 3})^2 = 5^2$$

$$\begin{array}{r} 2x - 3 = 25 \\ +3 \quad +3 \end{array}$$

$$2x = 28$$

$$\frac{2x}{2} = \frac{28}{2}$$

$$x = 14$$

1. Isolate the radical expression

2. Square both sides

3. Solve for x

Do problems 2, and 4 on worksheet 6-5. page 49.

2.)

4.)



It can get a little complicated.
Sometimes we cause **extraneous**
solutions to appear when we solve
radical equations.

So what do we mean by extraneous solutions...

ex·tra·ne·ous  [ik-strey-nee-uhs]  [Show IPA](#)

adjective

1. introduced or coming from without; not belonging or proper to a thing; external; foreign: *extraneous substances in our water.*
2. not pertinent; irrelevant: *an extraneous remark; extraneous decoration.*

Origin:

1630-40; < Latin *extrāneus* external, foreign, equivalent to *extr(a)-* extra- + *-ān(us)* -an + *-eus* -eous

What is the solution of $\sqrt{x + 7} - 5 = x$? Check your results.

$$\sqrt{x + 7} - 5 = x$$

Isolate the radical.

Square each side.

Simplify.

Combine like terms.

Factor.

Zero-Product Property

To check our answers we substitute them back into the original equation and see if they produce a true statement.

Check

$$\begin{aligned}\sqrt{x+7}-5 &= x \\ \sqrt{-3+7}-5 &\stackrel{?}{=} -3\end{aligned}$$

$$\begin{aligned}\sqrt{x+7}-5 &= x \\ \sqrt{-6+7}-5 &\stackrel{?}{=} -6\end{aligned}$$

?

It's time to work **backwards**

We've been finding solutions to quadratic equations using factoring, graphing and the quadratic formula.

Now we'll work backwards from the solutions and create the original quadratic solution.

EXAMPLE 1 – Find the quadratic equations whose roots are 4 and -2.

Set each solution equal to x .

Subtract the constant from both sides to make the equation equal to zero.

Create a factor equation. (Look familiar?)

Foil the factors.

Combine Like Terms. This is our Quadratic Equation.

EXAMPLE 2 – Find the quadratic equations whose solutions are $\frac{2}{3}$ and $\frac{3}{4}$.

Set each solution equal to x .

Clear the fractions by multiplying by the denominators.

Subtract the constant from both sides to make the equation equal to zero.

Create a factor equation.

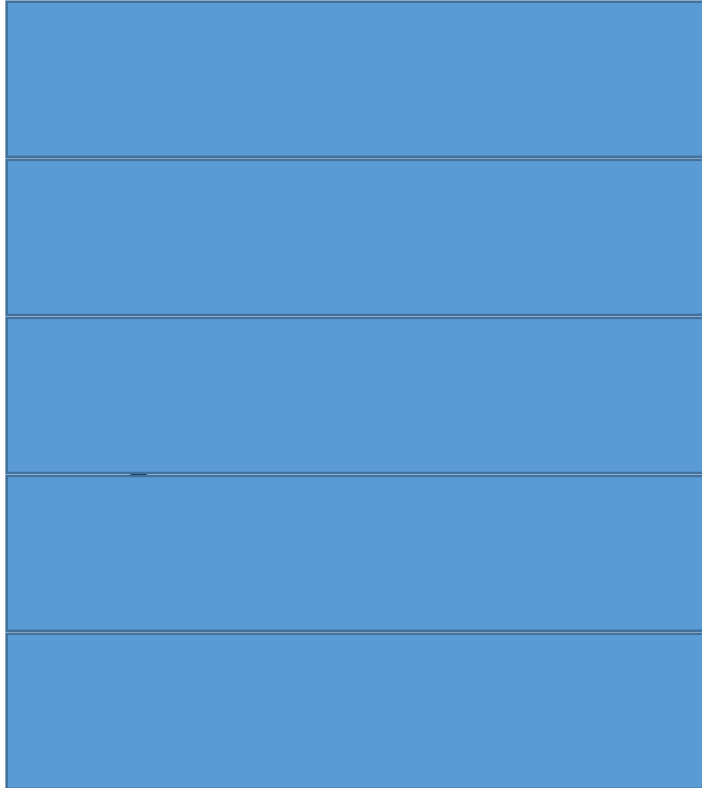
Foil the factors.

Combine Like Terms. This is our Quadratic Equation.

Complete Practice Problem 1 and 2.

Irrational Solutions

EXAMPLE 4 – Find the quadratic equations whose solutions are $2 - 5\sqrt{2}$ and $2 + 5\sqrt{2}$.



Write as one expression equal to x .

Isolate the radical term.

Square both sides and simplify.

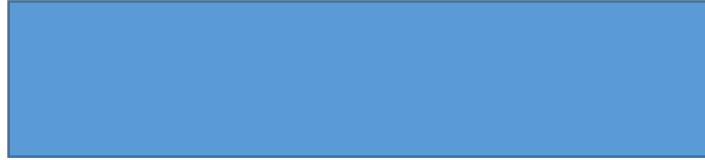
Subtract the constant from both sides to make the equation equal to zero.

Our solution.

Complete Practice Problem 3.

Complex Solutions

EXAMPLE 5 – Find the quadratic equations whose solutions are $4-5i$ and $4+5i$.



Write as one expression equal to x .



Isolate the i term.



Square both sides and simplify.



Subtract the constant from both sides to make the equation equal to zero.
Our solution.

Complete Practice Problem 4.

Work on your homework.

