

Sec 1.6.2 Solving Equations with Square Roots

-Steps-

1. Isolate radical (if possible).
2. Raise to a power
3. Solve remaining equation
4. Check for extraneous solutions.*
even power

*when raising equations to powers extra solutions often "pop up"....they're called extraneous, and not truly solutions.

$$\begin{aligned}3\sqrt{x} - 4 &= 0 \\3\sqrt{x} &= 4 \\(\sqrt{x} = 4/3)^2 & \\x &= 16/9\end{aligned}$$

$$\begin{aligned}3\sqrt{16/9} - 4 &= 0 \\3(4/3) - 4 &= 0 \checkmark\end{aligned}$$

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

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

$$2x-1 = x^2 - 4x + 4$$

$$0 = x^2 - 6x + 5$$

$$0 = (x-5)(x-1)$$

$$x = 5 \text{ \& \cancel{1}}$$

$$\begin{array}{l} \sqrt{2x-1} + 2 = x \\ \sqrt{9} + 2 = 5 \\ \quad \quad \quad \downarrow \\ \text{~~~~~} \end{array} \left\{ \begin{array}{l} \sqrt{1} + 2 = 1 \\ 1 + 2 \\ 3 \neq 1 \end{array} \right.$$

$$\sqrt{3x+2} - 2\sqrt{x} = 0$$
$$(\sqrt{3x+2})^2 = (2\sqrt{x})^2$$

$$3x+2 = 4x$$

$$\boxed{2 = x} \text{ solution}$$

$$\sqrt{8} - 2\sqrt{2} = 0$$

decimal - decimal

What is different?

Two radicals...

Therefore, we cannot isolate like previously.

So....

Set them **OPPOSITE** each other.

$$\sqrt{8} = \sqrt{4 \cdot 2}$$
$$= 2\sqrt{2}$$



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

$$x^2 - 8x + 16 = 2x$$

$$x^2 - 10x + 16 = 0$$

$$(x-8)(x-2) = 0$$

$$x = 8 \text{ and } \cancel{x = 2}$$

$$8-4 = \sqrt{16}$$

↓

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

$$\cancel{-2 = 2}$$

$$\sqrt{3x+1} - \sqrt{x+4} = 1 \rightarrow \sqrt{16} - \sqrt{9} = 1$$

$$4 - 3 = 1$$

$$(\sqrt{3x+1})^2 = (\sqrt{x+4})^2$$

$$3x+1 = 1 + 2\sqrt{x+4} + 4$$

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

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

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

$$x^2 - 5x = 0$$

$$x(x-5) = 0$$

$$x = 0 \text{ \& } 5$$

extraneous?

our only solution

Suggested Practice

Sec 1.6
page 178
11-25 odds

~~Algebra III- stop at 21 and also try the below~~

~~Solve $\sqrt{2x+3} - \sqrt{x+2} = 2$ $\sqrt{3x-5} = 2 - \sqrt{x-1}$~~

11. 6

21. 12

13. 6

23. 8

15. -6

25. ~~8~~

originally
 $x=9$

17. 10

19. -5

27. ~~8~~

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

$(\sqrt{3x-5})^2 = (2 - \sqrt{x-1})^2$

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

