**Check for false solutions. Remember that you can never take the square root of a negative number!**

\( \frac{1}{2} x^2 = \sqrt{x} \)

In general:

**STEP 1:** Isolate radical expression

**STEP 2:** Square both sides of the equation

**STEP 3:** Solve for \( x \)

**STEP 4:** Check for false solutions; only real number solution-no imaginary solutions

**Equation Type #1:** Square root one side of the equation, constant on the other

Solve: \( \sqrt{x - 3} + 4 = 9 \)

You Try: 1) \( \sqrt{x+1} = -5 \)

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

\[ \begin{align*}
\frac{-4 - 1}{2} & = 1 \\
\frac{x + 1}{2} & = -7 \\
\frac{x + 1}{2} & = -1 \\
\sqrt{x+4} & = \frac{-1}{2} \\
\sqrt{x+4} & = -1 \\
x + 4 & = 1 \\
-4 & = -4 \\
x & = 4 \\
\end{align*} \]

No solution

**Equation Type #2:** Square root both sides of the equation

The expressions under the radical must be the same when solved

Solve: \( \sqrt{2x + 3} = \sqrt{3x - 13} \)

You Try: 5) \( \sqrt{4x} = \sqrt{2x + 9} \)

\[ \begin{align*}
2x + 3 & = 3x - 13 \\
-2x & = -16 \\
x & = 8 \\
\end{align*} \]

\[ \begin{align*}
4x & = 2x + 9 \\
-2x & = -2x \\
\frac{4x - 9}{2} & = \_\_ \_ \\
\end{align*} \]
Equation Type #3: Square root one side of the equation, variable on the other

\( x = \sqrt{x+1} \) + \( \frac{2}{5} \)

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

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

\(x^2 - 5x - 5x + 25 = x + 1\)

\(x^2 - 10x + 25 = \frac{x + 1}{-\frac{x}{25}} - \frac{x}{25}\)

\(x^2 - 11x + 24 = 0\)

\(x = \sqrt{x+6}\)

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

\(-x - 6 - x = x + \sqrt{x+6}\)

\(x^2 - x - 6 = 0\)

\(-x = (x+6)^2\)

\(x^2 - x - 6 = 0\)

\((x-3)(x+2) = 0\)

\(x = 3, -2\)

\((x-8)(x+8) = 0\)

\(x = 8\)