

Solving Radical Equations

Solving equations radical equations:

- 1) Isolate radical on one side
- 2) Square or cube both sides
- 3) Solve

Example: Solve each radical equation.

$$1) \begin{array}{r} 2 + \sqrt{3x-2} = 6 \\ -2 \quad -2 \\ \hline (\sqrt{3x-2})^2 = (4)^2 \\ 3x-2 = 16 \\ +2 \quad +2 \\ \hline 3x = 18 \\ \boxed{x=6} \end{array}$$

$$2) \begin{array}{r} \sqrt{5x+1} - 6 = 0 \\ +6 \quad +6 \\ \hline (\sqrt{5x+1})^2 = (6)^2 \\ 5x+1 = 36 \\ -1 \quad -1 \\ \hline 5x = 35 \\ \boxed{x=7} \end{array}$$

$$3) \begin{array}{r} 5\sqrt{x+2} = 12 \\ -2 \quad -2 \\ \hline 5\sqrt{x} = 10 \\ \div 5 \quad \div 5 \\ \hline (\sqrt{x})^2 = (2)^2 \\ \boxed{x=4} \end{array}$$

$$4) \begin{array}{r} (\sqrt{3x-4}) = (2)^3 \\ 3x-4 = 8 \\ +4 \quad +4 \\ \hline 3x = 12 \\ \boxed{x=4} \end{array}$$

$$5) \begin{array}{r} \sqrt[3]{4x+3} = 15 \\ \div 5 \quad \div 5 \\ \hline (\sqrt[3]{4x+3})^3 = (3)^3 \\ 4x+3 = 27 \\ -3 \quad -3 \\ \hline 4x = 24 \\ \boxed{x=6} \end{array}$$

WARNING: If a variable is outside the radical, you have to check for extraneous solutions!

$$6) \begin{array}{r} \sqrt{x-3} + 5 = x \\ -5 \quad -5 \\ \hline (\sqrt{x-3})^2 = (x-5)^2 \\ x-3 = (x-5)(x-5) \\ x-3 = x^2 - 5x - 5x + 25 \\ x-3 = x^2 - 10x + 25 \\ -x+3 \quad -x+3 \\ \hline 0 = x^2 - 11x + 28 \\ 0 = (x-7)(x-4) \\ \boxed{x=7} \end{array}$$

$$7) \begin{array}{r} \sqrt{x+1} - x = 1 \\ +x \quad +x \\ \hline (\sqrt{x+1})^2 = (x+1)^2 \\ x+1 = (x+1)(x+1) \\ x+1 = x^2 + 2x + 1 \\ -x-1 \quad -x-1 \\ \hline 0 = x^2 + x \\ 0 = x(x+1) \\ \boxed{x=0, -1} \end{array}$$

$$8) \begin{array}{r} (\sqrt{2x+1})^2 = (\sqrt{5-2x})^2 \\ 2x+1 = 5-2x \\ +2x \quad +2x \\ \hline 4x+1 = 5 \\ -1 \quad -1 \\ \hline 4x = 4 \\ \boxed{x=1} \end{array}$$

$$9) \sqrt{2x+14} = x+3$$

$$10) \sqrt{-9x+28} = -x+4$$