

LESSON #8: SOLVING RADICAL EQUATIONS (DAY 2)

NOW:

a. Expand: $(x-1)^2$

$$\begin{array}{r} (x-1)(x-1) \\ x^2 - x - x + 1 \\ \hline x^2 - 2x + 1 \end{array}$$

b. $\sqrt{4} \cdot \sqrt{4}$

4

c. $\sqrt{x} \cdot \sqrt{x}$

x

d. Which equation does not have a solution? Explain your answer. (You don't have to solve them!)

$$\begin{array}{r} \sqrt{x-1} + 3 = 4 \\ -3 \quad -3 \\ \hline \sqrt{x-1} = +1 \end{array}$$

$$\begin{array}{r} \sqrt{x+1} + 3 = 4 \\ -3 \quad -3 \\ \hline \sqrt{x+1} = 1 \end{array}$$

$$\begin{array}{r} \sqrt{x-2} + 7 = 10 \\ -7 \quad -7 \\ \hline \sqrt{x-2} = 3 \end{array}$$

$$\begin{array}{r} \sqrt{x+2} + 7 = 4 \\ -7 \quad -7 \\ \hline \sqrt{x+2} = -3 \end{array}$$

cannot = a neg. #!

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

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

$$\begin{array}{r} (x+3)(x+3) \\ x^2 + 3x + 3x + 9 \end{array}$$

$$\begin{array}{r} x^2 + 6x + 9 = 16x \\ -16x \quad -16x \\ \hline \end{array}$$

$$x^2 - 10x + 9 = 0$$

$$\begin{array}{r} (x-9)(x-1) = 0 \\ 9 \quad 1 \end{array}$$

check:

$$\boxed{x=9}$$

$$\begin{array}{l} 3 = 4\sqrt{9} - 9 \\ 3 = 4(3) - 9 \\ 3 = 12 - 9 \\ 3 = 3 \checkmark \end{array}$$

$$\boxed{x=1}$$

$$\begin{array}{l} 3 = 4\sqrt{1} - 1 \\ 3 = 4(1) - 1 \\ 3 = 4 - 1 \\ 3 = 3 \checkmark \end{array}$$

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

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

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

$$= 9 + 3\sqrt{x} + 3\sqrt{x} + x$$

$$\begin{array}{r} x-3 = 9 + 6\sqrt{x} + x \\ -x \quad -9 \quad -9 \quad -x \\ \hline \end{array}$$

$$(-12)^2 = (6\sqrt{x})^2$$

$$\frac{144}{36} = \frac{36x}{36}$$

$$x = 4$$

$$\text{check: } \sqrt{4-3} - \sqrt{4} = 3$$

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

$$1 - 2 \neq 3$$

3. The solution set of the equation $\sqrt{x+2}+4=x$ is

a) {2,7}

b) {2}

c) {7}

d) {}

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

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

$$x+2 = (x-4)(x-4)$$

$$x+2 = x^2 - 4x - 4x + 16$$

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

$$-x-2 \quad -x \quad -2$$

$$x^2 - 9x + 14 = 0$$

$$(x-7)(x-2) = 0$$

7	2
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check:

$$\sqrt{7+2} + 4 = 7$$

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

$$3+4 = 7 \checkmark$$

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

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

$$2+4 \neq 2 \times$$

Practice: Solve for x. Justify your solutions.

4. $\sqrt{x^3+48}+x=8$

$$-x \quad -x$$

$$x=1$$

$$(\sqrt{x^3+48})^2 = (8-x)^2$$

$$x^3+48 = (8-x)(8-x)$$

$$64 - 8x - 8x + x^2$$

$$x^3+48 = x^2 - 16x + 64$$

$$-64 \quad -x^2 + 16x - 64$$

$$x^3 - x^2 + 16x - 64 = 0$$

$$x^2(x-1) + 16(x-1)$$

$$(x^2+16)(x-1) = 0$$

NOT DOTS!

+1 ✓

6. $(\sqrt{4x-1})^2 = (2-2x)^2$

$$4x-1 = (2-2x)(2-2x)$$

$$= 4 - 8x + 4x^2$$

$$= 4 - 8x + 4x^2$$

$$4x-1 = 4x^2 - 8x + 4$$

$$-4x+1$$

$$-4x^2 + 1$$

$$4x^2 - 12x + 5$$

$$4x^2 - 2x - 10x + 5$$

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

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

$$2x+2=0$$

$$-2 \quad -2$$

$$2x = -2$$

$$x = -1$$

$$2x-1=0$$

$$+1 \quad +1$$

$$2x = 1$$

$$x = \frac{1}{2}$$

check:

$$x = -1$$

$$\sqrt{4(-1)-1} = 2-2(-1)$$

$$\sqrt{-5} \neq 4x$$

$$x = \frac{1}{2}$$

$$\sqrt{4(\frac{1}{2})-1} = 2-2(\frac{1}{2})$$

$$1 = 1 \checkmark$$

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

$$(x-4)(x+1) = 0$$

$$x=4$$

check: $\sqrt{4+5} = 4-1$

$$\sqrt{9} = 3 \checkmark$$

$$\sqrt{-1+5} = -1-1$$

$$\sqrt{4} \neq -2 \text{ NO!}$$