

Solve the following: $n - \sqrt{5-n} = -7$

$$-\sqrt{5-n} = -7 - n \quad \text{OR} \quad (n+7)^2 = (\sqrt{5-n})^2$$

Quadratic Equation
 $3^2 + 7^2 = 10^2$

~~$9 + 49 = 100$~~

$$n^2 + 14n + 49 = 5 - n$$

$$n^2 + 15n + 44 = 0$$

$$\begin{cases} 11 \cdot 4 = +44 \\ 11 + 4 = +15 \end{cases}$$

$$(n+11)(n+4) = 0$$

OR ...

$$n = \frac{-15 \pm \sqrt{15^2 - 4(1)(44)}}{2(1)}$$

$$n = \frac{-15 \pm \sqrt{225 - 176}}{2}$$

$$n = \frac{-15 \pm \sqrt{49}}{2}$$

$$n = \frac{-15 \pm 7}{2}$$

$$n = \frac{-8}{2} \quad \left\{ \begin{array}{l} n = \frac{-22}{2} \\ n = \frac{-11}{2} \end{array} \right.$$

$$n+11=0 \quad \text{OR} \quad n+4=0$$
 ~~$n=-11$~~

$$n = -4$$

Verify:
 ~~$n = -11$~~

$$n - \sqrt{5-n} = -7$$

extraneous Root

$\underline{L.S}$	$\underline{R.S}$
$-11 - \sqrt{16}$	-7
$-11 - 4$	
-15	
$\underline{L.S}$	$\underline{R.S}$

$$n = -4$$

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

$$-4 - 3 = -7$$

$$-7 = -7 \quad \text{L.S} = \text{R.S}$$

Something strange should happen here...

$$10 + \sqrt{4x - 7} = 7$$

$$(\sqrt{4x - 7})^2 = (-3)^2$$

$$4x - 7 = 9$$

$$\frac{4x}{4} = \frac{16}{4}$$

$$x = 4 \text{ extraneous}$$

Verify:

LS	RS
$10 + \sqrt{9}$	7
13	
LS = RS	

⇒ No possible solutions

Let's see if we can bring everything together??

$$(2\sqrt{x+4})^2 = (1 + \sqrt{2x+9})^2$$

$$4(x+4) = 1 + 2\sqrt{2x+9} + 2x+9$$

$$4x+16-1-2x-9 = 2\sqrt{2x+9}$$

$$\underline{2x+6} = \underline{2\sqrt{2x+9}}$$

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

$$x^2+6x+9 = 2x+9$$

$$x^2+4x = 0$$

$$\underline{x(x+4)} = 0$$

$$\rightarrow a=1, b=4, c=0$$

$x=0$ $x=-4$ ← extraneous root

Verify:

$$2\sqrt{x+4} = 1 + \sqrt{2x+9}$$

$2\sqrt{x}$	$1 + \sqrt{9}$	}	$2\sqrt{0}$	$1 + \sqrt{1}$
x	4		0	2
$LS=RS$			$LS \neq RS$	

Try another...should be starting to get a little easier.

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

$$3x+1 = 9 + 6\sqrt{x-4} + x-4$$

$$3x+1-9-x+4 = 6\sqrt{x-4}$$

$$\underline{2x-4} = \underline{6\sqrt{x-4}}$$

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

$$x^2 - 4x + 4 = 9(x-4)$$

$$x^2 - 13x + 40 = 0$$

$$(\underline{x-8})(\underline{x-5}) = 0$$

$$x=8 \text{ OR } x=5$$

Verify:

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

$$\underline{x=8}$$

$$\sqrt{25} - \sqrt{4} \quad | \quad 3$$
$$5 - 2$$
$$3$$

$$\left. \begin{array}{l} \underline{x=5} \\ \sqrt{16} - \sqrt{1} \quad | \quad 3 \\ 4 - 1 \\ 3 \end{array} \right\}$$

Another good example...

$$\left(\sqrt[3]{x^3 + 26}\right)^3 = (x + 2)^3$$

$$x^3 + 26 = x^3 + 6x^2 + 12x + 8$$

$$x^3 + 26 - x^3 - 6x^2 - 12x - 8 = 0$$

$$-6x^2 - 12x + 18 = 0$$

$$(x+2)(x+2)(x+2)$$

$$(x+2)^2(x+2)$$

$$(x^2 + 4x + 4)(x+2)$$

$$= x^3 + 2x^2 + 4x^2 + 8x + 4x + 8$$

Practice Problems: Pages 300 - 303

4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 18, 21