

Exercise A.10.79 Solve $\sqrt{15-2x} = x$.

Solution

We square both sides (and heed the WARNING of Note A.6.B about extraneous roots):

$$(\sqrt{15-2x})^2 = (x)^2 \quad \text{or} \quad 15-2x = x^2$$

$$\text{or} \quad x^2 + 2x - 15 = 0 \quad \text{or} \quad (x+5)(x-3) = 0$$

or: $x = -5$ or $x = 3$. But we have to check for extraneous roots:

(1) $x = -5$ implies $\sqrt{15-2(-5)} = \sqrt{25} = 5 \neq -5$,
 so $x = -5$ is an extraneous root!

(2) $x = 3$ implies $\sqrt{15-2(3)} = \sqrt{9} = 3$.

So the solution is $\boxed{x=3}$. \square