Practice
Solving Equations: Solving Equations Containing Radicals

Answer these problems, then check your answers using the key on the next page. If you missed something, look at the solutions after the answer key, and if you still don't understand, watch the review video again.

#1) Solve: $\sqrt{x+9}=4$

#2) Solve: $\sqrt{9-x}+5=8$

#3) Solve: $3\sqrt{2x+5}-15=0$

#4) Solve: $\sqrt{2x+9} = \sqrt{x} + 3$

#5) Solve: $\sqrt{2x+5} = 3 + \sqrt{x-2}$

#6) Solve: $\sqrt{m-2} + m = 4$

#7) Solve: $\sqrt{5t-9} = 2\sqrt{t}$

Answers:

#1) $x = 7$

#2) $x = 0$

#3) $x = 10$

#4) $x = 0, \quad x = 36$

#5) $x = 2, \quad x = 38$

#6) $m = 4$

#7) $t = 9$

Solutions:

#1) Solve: $\sqrt{x+9}=4$

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

$x+9=16$

$-9 \quad -9$

$\boxed{x=7}$

Check:

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

$\sqrt{16}=4$

$4=4$ ✓

#2) Solve: $\sqrt{9-x}+5=8$

isolate $-5 \quad -5$

$\sqrt{9-x}=3$

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

$9-x=9$

$-9 \quad -9$

$-x=0$

$\boxed{x=0}$

Check:

$\sqrt{9-(0)}+5=8$

$\sqrt{9}+5=8$

$3+5=8$

$8=8$ ✓

#3) Solve: $3\sqrt{2x+5}-15=0$

isolate $+15 \quad +15$

$\frac{3\sqrt{2x+5}}{3}=\frac{15}{3}$

$\sqrt{2x+5}=5$

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

$2x+5=25$

$-5 \quad -5$

$\frac{2x}{2}=\frac{20}{2}$ $\boxed{x=10}$

Check:

$3\sqrt{2(10)+5}-15=0$

$3\sqrt{20+5}-15=0$

$3\sqrt{25}-15=0$

$3(5)-15=0$

$15-15=0$

$0=0$ ✓

#4) Solve: $\sqrt{2x+9}=\sqrt{x}+3$

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

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

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

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

(how isolate this)

$-x \quad -x$

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

$-9 \quad -9$

$x=6\sqrt{x}$

(don't divide by x)

$6\sqrt{x}=x$

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

$36x=x^2$

$-36x \quad -36x$

$0=x^2-36x$

or $x^2-36x=0$

$x(x-36)=0$

$\boxed{x=0}$ $x-36=0$

$\boxed{x=36}$

(both are solutions)

Check:

$x=0$

$\sqrt{2(0)+9}=\sqrt{0}+3$

$\sqrt{9}=0+3$

$3=3$ ✓

$x=36$

$\sqrt{2(36)+9}=\sqrt{36}+3$

$\sqrt{81}=6+3$

$9=9$ ✓

#5) Solve: $\sqrt{2x+5} = 3 + \sqrt{x-2}$

$(\sqrt{2x+5})^2 = (3 + \sqrt{x-2})^2$

$2x+5 = (3+\sqrt{x-2})(3+\sqrt{x-2})$

$2x+5 = 9 + 3\sqrt{x-2} + 3\sqrt{x-2} + x - 2$

$2x+5 = 9 + 6\sqrt{x-2} + x - 2$ (isolate)

$2x+5 = 7 + 6\sqrt{x-2} + x$

$-x \; -7 \quad -7 \quad -x$

$\frac{x-2}{6} = \frac{6\sqrt{x-2}}{6}$

$\frac{x-2}{6} = \sqrt{x-2}$

$\sqrt{x-2} = \frac{x-2}{6}$

$(\sqrt{x-2})^2 = \left(\frac{x-2}{6}\right)^2$

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

$x - 2 = \frac{(x-2)(x-2)}{36}$

$36(x-2) = \left(\frac{x^2-4x+4}{36}\right)36$

$36x - 72 = x^2 - 4x + 4$

$-36x + 72 \quad -36x + 72$

$0 = x^2 - 40x + 76$

$x^2 - 40x + 76 = 0$

Solve by quadratic formula:

$x = \frac{-(-40) \pm \sqrt{(-40)^2 - 4(1)(76)}}{2(1)}$

$x = \frac{40 \pm \sqrt{1600 - 304}}{2} = \frac{40 \pm \sqrt{1296}}{2}$

$x = \frac{40 \pm 36}{2}$ $\boxed{x = 38}$ $\boxed{x = 2}$ (both are solutions)

Check:

$x = 38$

$\sqrt{2(38)+5} = 3 + \sqrt{(38)-2}$

$\sqrt{81} = 3 + \sqrt{36}$

$9 = 3 + 6$

$9 = 9$ ✓

$x = 2$

$\sqrt{2(2)+5} = 3 + \sqrt{(2)-2}$

$\sqrt{9} = 3 + \sqrt{0}$

$3 = 3$ ✓

#6) Solve: $\sqrt{m-2} + m = 4$

isolate $\quad -m \quad -m$

$\sqrt{m-2} = 4 - m$

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

$m - 2 = (4-m)(4-m)$

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

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

$-m + 2 \quad +2 \quad -m$

$0 = 18 - 9m + m^2$

$m^2 - 9m + 18 = 0$ (M: 18, A: −9; −3, −6)

$(m-3)(m-6) = 0$

$\boxed{m = 3}$ ~~$m = 6$~~

Check: $m = 3$

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

$\sqrt{1} + 3 = 4$

$4 = 4$ ✓

$m = 6$

$\sqrt{(6)-2} + (6) = 4$

$\sqrt{4} + 6 = 4$

$8 = 4$ ✗

#7) Solve: $\sqrt{5t-9} = 2\sqrt{t}$

$(\sqrt{5t-9})^2 = (2\sqrt{t})^2$

$5t - 9 = 4t$

$-4t \quad -4t$

$t - 9 = 0$

$+9 \quad +9$

$\boxed{t = 9}$

Check:

$\sqrt{5(9)-9} = 2\sqrt{9}$

$\sqrt{45-9} = 2(3)$

$\sqrt{36} = 6$

$6 = 6$ ✓