

C10L4 Notes

Solving Radical Equations

Solve each equation. Remember to check for extraneous solutions.

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

$$(\sqrt{2-2m})^2 = (\sqrt{-1-3m})^2$$

$$\begin{array}{r} 2-2m = -1-3m \\ +3m \qquad +3m \end{array}$$

$$\begin{array}{r} 2+m = -1 \\ -2 \qquad -2 \end{array}$$

$$m = -3$$

2. $\sqrt{3k-20} = \sqrt{20-k}$

$$(\sqrt{3k-20})^2 = (\sqrt{20-k})^2$$

$$\begin{array}{r} 3k-20 = 20-k \\ +k \qquad +k \end{array}$$

$$\begin{array}{r} 4k-20 = 20 \\ +20 \qquad +20 \end{array}$$

$$4k = 40$$

$$k = 10$$

3. $\sqrt{-8-2b} = 2$

$$(\sqrt{-8-2b})^2 = (2)^2$$

$$\begin{array}{r} -8-2b = 4 \\ +8 \qquad +8 \end{array}$$

$$-2b = 12$$

$$b = -6$$

CHECK FOR EXTR. SOL

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

$$\sqrt{2+6} = \sqrt{-1+9}$$

$$\sqrt{8} = \sqrt{8}$$

✓

$$\sqrt{3(10)-20} = \sqrt{20-10}$$

$$\sqrt{30-20} = \sqrt{10}$$

$$\sqrt{10} = \sqrt{10}$$

✓

$$\sqrt{-8-2(-6)} = 2$$

$$\sqrt{-8+12} = 2$$

$$\sqrt{4} = 2$$

$$2 = 2$$

✓

$$4. 10 = \sqrt{14p + 2}$$

$$(10)^2 = (\sqrt{14p + 2})^2$$

$$100 = 14p + 2$$

$$\begin{array}{r} 100 = 14p + 2 \\ -2 \qquad -2 \\ \hline 98 = 14p \end{array}$$

$$98 = 14p$$

$$p = 7$$

$$10 = \sqrt{14(7) + 2}$$

$$10 = \sqrt{98 + 2}$$

$$10 = \sqrt{100}$$

$$10 = 10$$

$$5. 5 = \sqrt{25x}$$

$$(5)^2 = (\sqrt{25x})^2$$

$$25 = 25x$$

$$x = 1$$

$$5 = \sqrt{25(1)}$$

$$5 = \sqrt{25}$$

$$5 = 5$$

$$6. \sqrt{\frac{x}{6}} = 5$$

$$\left(\sqrt{\frac{x}{6}}\right)^2 = (5)^2$$

$$\frac{x}{6} = 25$$

$$6 \cdot \frac{x}{6} = 25 \cdot 6$$

$$x = 150$$

$$\sqrt{\frac{150}{6}} = 5$$

$$\sqrt{25} = 5$$

$$5 = 5$$

$$7. \sqrt{20-p} = p$$

$$(\sqrt{20-p})^2 = (p)^2$$

$$\begin{array}{r} 20-p = p^2 \\ +p \quad +p \end{array}$$

$$\begin{array}{r} 20 = p^2 + p \\ -20 \quad -20 \end{array}$$

$$0 = p^2 + p - 20$$

$$0 = (p+5)(p-4)$$

$$p+5=0 \quad p-4=0$$

$$p = \cancel{-5}, 4$$

$$\boxed{p=4}$$

$$8. m = \sqrt{63+2m}$$

$$(m)^2 = (\sqrt{63+2m})^2$$

$$\begin{array}{r} m^2 = 63 + 2m \\ -2m \quad -2m \end{array}$$

$$\begin{array}{r} m^2 - 2m = 63 \\ -63 \quad -63 \end{array}$$

$$m^2 - 2m - 63 = 0$$

$$(m-9)(m+7) = 0$$

$$m-9=0 \quad m+7=0$$

$$m = 9, \cancel{-7}$$

$$\boxed{m=9}$$

$$\sqrt{20-(-5)} = -5$$

$$\sqrt{25} = -5$$

$$5 \neq -5$$

NO

$$\sqrt{20-4} = 4$$

$$\sqrt{16} = 4$$

$$4 = 4$$

✓

$$9 = \sqrt{63+2(9)}$$

$$9 = \sqrt{63+18}$$

$$9 = \sqrt{81}$$

$$9 = 9$$

✓

$$-7 = \sqrt{63+2(-7)}$$

$$-7 = \sqrt{63-14}$$

$$-7 = \sqrt{49}$$

$$-7 \neq 7$$

NO

$$9. n = \sqrt{-36 + 13n}$$

$$(n)^2 = (\sqrt{-36 + 13n})^2$$

$$\begin{array}{r} n^2 = -36 + 13n \\ -13n \quad -13n \\ \hline \end{array}$$

$$\begin{array}{r} n^2 - 13n = -36 \\ +36 \quad +36 \\ \hline \end{array}$$

$$n^2 - 13n + 36 = 0$$

$$(n-4)(n-9) = 0$$

$$n-4=0 \quad n-9=0$$

$$n = 4, 9$$

$$4 = \sqrt{-36 + 13(4)}$$

$$4 = \sqrt{-36 + 52}$$

$$4 = \sqrt{16}$$

$$4 = 4$$

✓

$$9 = \sqrt{-36 + 13(9)}$$

$$9 = \sqrt{-36 + 117}$$

$$9 = \sqrt{81}$$

$$9 = 9$$

✓

$$10. \sqrt{-1 - 2r} = r$$

$$(\sqrt{-1 - 2r})^2 = (r)^2$$

$$\begin{array}{r} -1 - 2r = r^2 \\ +2r \quad +2r \\ \hline \end{array}$$

$$\begin{array}{r} -1 = r^2 + 2r \\ +1 \quad +1 \\ \hline \end{array}$$

$$0 = r^2 + 2r + 1$$

$$0 = (r+1)(r+1)$$

$$r+1=0$$

$$\cancel{r = -1}$$

NO SOLUTION.

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

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

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

$$1 \neq -1$$

NO

$$11. n = \sqrt{-7n - 10}$$

$$(n)^2 = (\sqrt{-7n - 10})^2$$

$$n^2 = -7n - 10$$

$$+7n \quad +7n$$

$$n^2 + 7n = -10$$
$$+10 \quad +10$$

$$n^2 + 7n + 10 = 0$$

$$(n+2)(n+5) = 0$$

$$n+2=0 \quad n+5=0$$

$$n = \cancel{-2, -5}$$

NO SOLUTION

$$-2 = \sqrt{-7(-2) - 10}$$

$$-5 = \sqrt{-7(-5) - 10}$$

$$-2 = \sqrt{14 - 10}$$

$$-5 = \sqrt{35 - 10}$$

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

$$-5 = \sqrt{25}$$

$$-2 \neq 2$$

$$-5 \neq 5$$

NO

NO