

To solve radical equations:

1. Isolate the radical on 1 side of the equation
2. Square both sides of the equation to cancel the square root
3. Finish solving the equation for the variable.

EXAMPLE 1:

$$\begin{aligned}\sqrt{x} + 3 &= 10 \\ -3 \quad -3 & \\ \hline \sqrt{x} &= 7 \\ \sqrt{x}^2 &= 7^2 \\ \boxed{x = 49}\end{aligned}$$

EXAMPLE 2:

$$\begin{aligned}-3\sqrt{x} &= -18 \\ -3 \quad -3 & \\ \hline \sqrt{x} &= 6 \\ x &= 36\end{aligned}$$

Example 3:

$$\begin{aligned}\sqrt{\frac{x}{3}} &= \frac{12}{6} \\ \sqrt{\frac{x}{3}}^2 &= 2^2 \\ \frac{x}{3} &= 4 \cdot 3 \\ x &= 12\end{aligned}$$

Example 4:

$$\begin{aligned}2\sqrt{x} - 5 &= -1 \\ 2\sqrt{x} &= 4 \\ \sqrt{x} &= 2 \\ x &= 4\end{aligned}$$

Example 5:

$$\begin{aligned}\sqrt{x+4} &= \sqrt{2x-1} \\ x+4 &= 2x-1 \\ -x \quad -x & \\ \hline 4 &= x-1 \\ \pm 1 \quad \pm 1 & \\ 5 &= x\end{aligned}$$

Example 6:

$$\sqrt{3x+8} = \sqrt{x+4}$$

$$\begin{array}{r} 3x+8 = x+4 \\ \underline{-x} \quad \underline{-x} \end{array}$$

$$\begin{array}{r} 2x+8 = 4 \\ \underline{-8} \quad \underline{-8} \end{array}$$

$$\frac{2x}{2} = \frac{-4}{2}$$

$$x = -2$$

EXAMPLE 7: Solve the equation. Check for extraneous solutions.

$$x^2 = \sqrt{42-x}$$

is the  $\sqrt{\quad}$  negative

$$\begin{array}{r} x^2 = 42-x \\ -42+x \quad -42+x \end{array}$$

$$x^2 + x - 42 = 0$$

$$(x+7)(x-6) = 0$$

$$\begin{array}{r} -42 \\ 7 \times -6 \\ \hline 1 \end{array}$$

$$(x+7) = 0 \quad x-6 = 0$$

$$x = -7 \quad x = 6$$

Checks

$$\sqrt{42 - (-7)} = \sqrt{49} \quad \checkmark$$
$$\sqrt{42 - 6} = \sqrt{36} \quad \checkmark$$

EXAMPLE 8:

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

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

$$\begin{array}{r|l} x+4 & \\ \hline x & x^2 \quad 4x \\ +4 & 4x \quad 16 \end{array}$$

$$\begin{array}{r} 2-x = x^2+8x+16 \\ \underline{-2+x} \quad \quad \quad \underline{-x-2} \\ 0 = x^2+9x+14 \end{array}$$

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

$$\begin{array}{r} 14 \\ \times 2 \\ \hline 28 \end{array}$$

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

$$\cancel{x=7} \quad \boxed{x=-2}$$

check

$$\sqrt{2-(-7)} = -7+4$$

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

$$3 \neq -3$$

3 does not equal -3  
so -7 is extraneous

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

$$\sqrt{4} = 2$$

$$2 = 2 \quad \checkmark$$

## Algebra 2

Name \_\_\_\_\_

Date \_\_\_\_\_

Period \_\_\_\_\_

## Radical Equations - Day One CW

Solve each equation. Remember to check for extraneous solutions.

$$1) 8^2 = \sqrt{x}$$

$$64 = x$$

$$2) \frac{5\sqrt{v-3}}{5} = \frac{50}{5}$$

$$\sqrt{v-3} = 10^2$$

$$v-3 = 100$$

$$v = 103$$

$$3) -2 = -7 + \sqrt{n}$$

$$\frac{+7}{5} = \frac{+7}{\sqrt{n}}$$

$$25 = n$$

$$4) \sqrt{n} - 2 = 8$$

$$\quad \quad \quad +2 \quad +2$$

$$\sqrt{n} = 10$$

$$n = 100$$

$$5) -1 = \sqrt{3x-5} - 6$$

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

$$25 = 3x-5$$

$$30 = 3x$$

$$10 = x$$

$$6) -18 = -3\sqrt{35n+1}$$

$$6 = \sqrt{35n+1}$$

$$36 = 35n+1$$

$$35 = 35n$$

$$1 = n$$

$$7) 12 = \sqrt{\frac{x}{9}} + 2$$

$$\frac{-2}{10} = \sqrt{\frac{x}{9}} \frac{-2}{2}$$

$$9 \cdot 100 = \frac{x}{9} \cdot 9$$

$$900 = x$$

$$8) 9 = \sqrt{-9-10r}$$

$$81 = -9-10r$$

$$90 = -10r$$

$$-9 = r$$

$$9) \sqrt{21-2x} = \sqrt{12-x}$$

$$21-2x = 12-x$$

$$9 = x$$

$$10) \sqrt{24-2n} = \sqrt{2n-16}$$

$$24-2n = 2n-16$$

$$40 = 4n$$

$$10 = n$$

$$11) \sqrt{1-x} = \sqrt{3x+5}$$

$$1-x = 3x+5$$

$$-4 = 4x$$

$$-1 = x$$

$$12) \sqrt{2x+11} = \sqrt{-9-2x}$$

$$2x+11 = -9-2x$$

$$4x = -20$$

$$x = -5$$

## Radical Equations - Day One HW

Solve each equation. Remember to check for extraneous solutions.

1)  $6 + \sqrt{x} = 7$

$$\sqrt{x} = 1$$

$$x = 1$$

2)  $12 = 2\sqrt{r}$

$$6 = \sqrt{r}$$

$$36 = r$$

3)  $-6 + \sqrt{2m} = -4$

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

$$2m = 4$$

$$m = 2$$

4)  $\sqrt{k} - 1 = 6$

$$\sqrt{k} = 7$$

$$k = 49$$

5)  $40 = 8\sqrt{5m}$

$$5 = \sqrt{5m}$$

$$25 = 5m$$

$$5 = m$$

6)  $-20 = -2\sqrt{-10 - 11v}$

$$10 = \sqrt{-10 - 11v}$$

$$100 = -10 - 11v$$

$$110 = -11v$$

$$-10 = v$$

7)  $12 = \sqrt{2b} + 4$

$$8 = \sqrt{2b}$$

$$64 = 2b$$

$$32 = b$$

8)  $\sqrt{3x+16} - 7 = -5$

$$\sqrt{3x+16} = 2$$

$$3x+16 = 4$$

$$3x = -12$$

$$x = -4$$

9)  $\sqrt{5x} = \sqrt{6x-1}$

$$5x = 6x-1$$

$$-x = -1$$

$$x = 1$$

10)  $\sqrt{3v+2} = \sqrt{4v}$

$$3v+2 = 4v$$

$$2 = v$$

11)  $\sqrt{2a-2} = \sqrt{10-2a}$

$$2a-2 = 10-2a$$

$$4a = 12$$

$$a = 3$$

12)  $\sqrt{2k-1} = \sqrt{2-k}$

$$2k-1 = 2-k$$

$$3k = 3$$

$$k = 1$$