Common Core ALGEBRA 2 Period _____ MS.SHIN NAME: ______________________________

Solving Radical Equations - Solutions

Solve radical equations and check for extraneous solution

We Do #1: Solve

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

What value makes this sentence true?

Check it:

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

$\therefore x=25$ is a solution.

We Do #2:

$$\sqrt{x}=-7$$
$$\left(\sqrt{x}\right)^2=(-7)^2$$
$$x=49$$

Check it:

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

False, so x = 49 is not a solution.

We Do #3: Solve

$$\sqrt{x+2}=3$$
$$\left(\sqrt{x+2}\right)^2=(3)^2$$
$$x+2=9$$
$$x=7$$

Check it:

$$\sqrt{(7)+2}=3$$
$$\sqrt{9}=3$$
$$3=3 \text{ True}$$

$\therefore x=7$

You Try #1:

$$\sqrt{x-9}=4$$
$$\left(\sqrt{x-9}\right)^2=(4)^2$$
$$x-9=16$$
$$x=25$$

Check it:

$$\sqrt{(25)-9}=4$$
$$\sqrt{16}=4$$
$$4=4 \text{ True}$$

$\therefore x=25$

We Do #4:

$$\sqrt{x-1}=x-7$$
$$\left(\sqrt{x-1}\right)^2=(x-7)^2$$
$$x-1=(x-7)(x-7)$$
$$x-1=x^2-14x+49$$
$$0=x^2-15x+50$$
$$0=(x-10)(x-5)$$
$$x=10 \text{ and } x=5$$

Check:

$$\sqrt{(10)-1}=(10)-7 \qquad \sqrt{(5)-1}=(5)-7$$
$$\sqrt{9}=3 \qquad \sqrt{4}=-2$$
$$3=3 \text{ True} \qquad 2=-2 \text{ False}$$

$\therefore x=10$ is a solution.
There is an extraneous root at $x=5$

You Try #2:

$$\sqrt{x+1}=x-1$$
$$\left(\sqrt{x+1}\right)^2=(x-1)^2$$
$$x+1=(x-1)(x-1)$$
$$x+1=x^2-2x+1$$
$$0=x^2-3x$$
$$0=x(x-3)$$
$$x=0 \text{ and } x=3$$

Check:

$$\sqrt{(0)+1}=(0)-1 \qquad \sqrt{(3)+1}=(3)-1$$
$$\sqrt{1}=-1 \qquad \sqrt{4}=2$$
$$1=-1 \text{ False} \qquad 2=2 \text{ True}$$

$\therefore x=3$ is a solution.
There is an extraneous root at $x=0$

Teamwork:

1.

$$\sqrt{n+9}=2$$
$$\left(\sqrt{n+9}\right)^2=(2)^2$$
$$n+9=4$$
$$n=-5$$

Check:

$$\sqrt{(-5)+9}=2$$
$$\sqrt{4}=2$$
$$2=2 \text{ True}$$

$\therefore n=-5$ is a solution.

2.

$$3=\sqrt{4m}$$
$$(3)^2=\left(\sqrt{4m}\right)^2$$
$$9=4m$$
$$\frac{9}{4}=\frac{4m}{4}$$
$$\frac{9}{4}=m$$

Check:

$$3=\sqrt{4\left(\frac{9}{4}\right)}$$
$$3=\sqrt{\frac{36}{4}}$$
$$3=\sqrt{9}$$
$$3=3 \text{ True}$$

$\therefore m=\frac{9}{4}$ is a solution.

3.

$$\sqrt{12-r}=r$$
$$\left(\sqrt{12-r}\right)^2=(r)^2$$
$$12-r=r^2$$
$$0=r^2+r-12$$
$$0=(x+4)(x-3)$$
$$x=-4 \text{ and } x=3$$

Check:

$$\sqrt{12-(-4)}=(-4)$$
$$\sqrt{16}=-4$$
$$4=-4 \text{ False}$$

$$\sqrt{12-(3)}=(3)$$
$$\sqrt{9}=3$$
$$3=3 \text{ True}$$

$\therefore x=3$ is a solution.
There is an extraneous root at $x=-4$

4.

$$w=\sqrt{-4+4w}$$
$$(w)^2=\left(\sqrt{-4+4w}\right)^2$$
$$w^2=-4+4w$$
$$w^2-4w+4=0$$
$$(w-2)(w-2)=0$$
$$x=2$$

Check:

$$(2)=\sqrt{-4+4(2)}$$
$$2=\sqrt{-4+8}$$
$$2=\sqrt{4}$$
$$2=2 \quad \text{True}$$

$\therefore x=2$ is a solution.

5. Hint: Subtract 5 from both sides to isolate the radical.

$$\sqrt{x-4}+5=12$$
$$\sqrt{x-4}=7$$
$$\left(\sqrt{x-4}\right)^2=(7)^2$$
$$x-4=49$$
$$x=53$$

Check:

$$\sqrt{(53)-4}+5=12$$
$$\sqrt{49}+5=12$$
$$7+5=12$$
$$12=12 \text{ True}$$

$\therefore x=53$ is a solution.

6. Hint: Cube each side (raise to the third power) to undo the cube root.

$$\sqrt[3]{x-3}=2$$
$$\left(\sqrt[3]{x-3}\right)^3=(2)^3$$
$$x-3=8$$
$$x=11$$

Check:

$$\sqrt[3]{(11)-3}=2$$
$$\sqrt[3]{8}=2$$
$$2=2 \text{ True}$$

$\therefore x=11$ is a solution.