

Solving Radical Equations

Warm UP

Solve.

1. $2(a + 9) = 10$

2. $6 - t = t - 3$

3. $y^2 + 4y = 0$

4. $m^2 - 2m - 15 = 0$

5. $x^2 + 2x = 4x + 7$

6. $\frac{2}{x-1} + \frac{x}{x+1} = \frac{4}{x^2-1}$

Principle of Powers

If $a = b$ and n is a positive integer, then
 $a^n = b^n$.

Solve each problem and check your solutions.

$$\frac{2\sqrt{(x+5)}}{2} = \frac{8}{2}$$

$$\sqrt{x+5} = 4$$

$$x+5 = 16$$

$$x = 11$$

$$\frac{12}{4} = \frac{4\sqrt{(2x+1)}}{4}$$

$$3 = \sqrt{2x+1}$$

$$9 = 2x+1$$

$$8 = 2x$$

$$4 = x$$

$$\left(\sqrt[3]{x-5}\right)^3 = \left(\sqrt[3]{7-x}\right)^3$$

$$x-5 = 7-x$$

$$2x = 12$$

$$x = 6$$

$$\left(\sqrt[3]{9x+1}\right)^3 = \left(\sqrt[3]{11+8x}\right)^3$$

$$9x+1 = 11+8x$$

$$x = 10$$

Try These:

$$\sqrt[3]{(2x-1)} = 6$$

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

$$2x-1 = 4$$

$$2x = 5$$

$$x = \frac{5}{2}$$

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

$$x+2 = 5-2x$$

$$3x = 3$$

$$x = 1$$

$$\sqrt{(x+1)} + 3 = 2x$$

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

$$x+1 = 4x^2 - 12x + 9$$

$$0 = 4x^2 - 13x + 8$$

quad form

$$x = \frac{13 \pm \sqrt{41}}{8}$$

$$x \approx 2.43$$

$$x \approx .82$$

$$\sqrt{(4x+2)} - 3x = 1$$

$$\sqrt{4x+2} = (3x+1)^2$$

$$4x+2 = 9x^2 + 6x + 1$$

$$0 = 9x^2 + 2x - 1$$

quad form

$$x \approx .24$$

~~$$x \approx -0.44$$~~

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

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

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

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

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

$$4x = x^2$$

$$0 = x^2 - 4x$$

$$0 = x(x-4)$$

$$x=0$$

$$x=4$$

$$\sqrt{10} = \sqrt{4} - 2 \quad \pm dx$$

$$\pm 4 \quad \sqrt{3x+4} = \sqrt{x} - 2$$

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

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

$$4x^2 = 16x$$

$$4x^2 - 16x = 0$$

$$4x(x-4) = 0$$

$$x=0$$

$$x=4$$

Try These:

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

$$x-1 = x^2 - 4x + 4$$

$$0 = x^2 - 5x + 5$$

$$x \approx 3.62$$

$$x \approx 1.38$$

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

$$9x + 12\sqrt{x} + 4 = 3x$$

$$12\sqrt{x} = -6x - 4$$

$$144x = 36x^2 + 48x + 16$$

$$0 = 36x^2 - 96x + 16$$

$$0 = 4(9x^2 - 24x + 4)$$

Summary

Solving Radical Equations

1. To solve a radical equation, follow these steps:
2. If possible, write the equation with the radical expression isolated on one side.
3. Raise the expression on each side of the equation to the appropriate power.
4. Repeat steps 1 and 2 as needed to obtain an equation with no radical expressions. Solve this equation.
5. Check your solutions and discard extraneous solutions.

Communication

Describe the algebraic strategy that you would use to solve the

equation $\sqrt{x-1} = \sqrt{x+1} - 1$.

Assign Solving Radical Equations Worksheet.