# Using Radicals to Solve Equations

1. Find the positive value of $x$ that makes the equation true.

$$\left(\frac{1}{2}x\right)^2 - 3x = 7x + 8 - 10x$$

2. Find the positive value of $x$ that makes the equation true.

$$11x + x(x - 4) = 7(x + 9)$$

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$$\left(\frac{1}{2}x\right)^2 - 3x = 7x + 8 - 10x$$

$$\left(\frac{1}{2}x\right)^2 - 3x = 7x + 8 - 10$$
$$x\frac{1}{4}x^2 - 3x = -3x + 8\frac{1}{4}$$
$$x^2 - 3x + 3x = -3x + 3x + 8\frac{1}{4}$$
$$x^2 = 84\left(\frac{1}{4}\right)$$
$$x^2 = 8(4)$$
$$x^2 = 32$$
$$\sqrt{x^2} = \sqrt{32}$$
$$x = \sqrt{2^5}$$
$$x = \sqrt{2^2} \cdot \sqrt{2^2} \cdot \sqrt{2}$$
$$x = 4\sqrt{2}$$

*Check:*

$$\left(\frac{1}{2}(4\sqrt{2})\right)^2 - 3(4\sqrt{2}) = 7(4\sqrt{2}) + 8 - 10(4\sqrt{2})$$
$$\frac{1}{4}(16)(2) - 3(4\sqrt{2}) = 7(4\sqrt{2}) - 10(4\sqrt{2}) + 8$$
$$\frac{32}{4} - 3(4\sqrt{2}) = 7(4\sqrt{2}) - 10(4\sqrt{2}) + 8$$
$$8 - 3(4\sqrt{2}) = (7 - 10)(4\sqrt{2}) + 8$$
$$8 - 3(4\sqrt{2}) = -3(4\sqrt{2}) + 8$$
$$8 - 8 - 3(4\sqrt{2}) = -3(4\sqrt{2}) + 8 - 8$$
$$-3(4\sqrt{2}) = -3(4\sqrt{2})$$

2. Find the positive value of $x$ that makes the equation true.

$$11x + x(x - 4) = 7(x + 9)$$

$$11x + x(x - 4) = 7(x + 9)$$
$$11x + x^2 - 4x = 7x + 63$$
$$7x + x^2 = 7x + 63$$
$$7x - 7x + x^2 = 7x - 7x + 63$$
$$x^2 = 63$$
$$\sqrt{x^2} = \sqrt{63}$$
$$x = \sqrt{(3^2)(7)}$$
$$x = \sqrt{3^2} \cdot \sqrt{7}$$
$$x = 3\sqrt{7}$$

*Check:*

$$11(3\sqrt{7}) + 3\sqrt{7}(3\sqrt{7} - 4) = 7(3\sqrt{7} + 9)$$
$$33\sqrt{7} + 3^2(\sqrt{7})^2 - 4(3\sqrt{7}) = 21\sqrt{7} + 63$$
$$33\sqrt{7} - 4(3\sqrt{7}) + 9(7) = 21\sqrt{7} + 63$$
$$33\sqrt{7} - 12\sqrt{7} + 63 = 21\sqrt{7} + 63$$
$$(33 - 12)\sqrt{7} + 63 = 21\sqrt{7} + 63$$
$$21\sqrt{7} + 63 = 21\sqrt{7} + 63$$
$$21\sqrt{7} + 63 - 63 = 21\sqrt{7} + 63 - 63$$
$$21\sqrt{7} = 21\sqrt{7}$$