

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

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

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

Check:

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

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

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

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

Check:

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

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