

By the Zero Product Law, we can state
 $3x + 7 = 0$ and $x - 1 = 0$.

Solve these two equations by using the Addition Property of Equality and the Division Property of Equality.

$$3x + 7 = 0 \rightarrow 3x = -7 \rightarrow x = -7/3$$

$$x - 1 = 0 \rightarrow x = 1$$

Solving Quadratic Equations – Method 2 – Extracting Square Roots

Extracting square roots is a very easy way to solve quadratics, provided the equation is in the correct form.

Basically, **Extracting Square Roots** allows you to rewrite $x^2 = k$ as $x = \pm\sqrt{k}$, where k is some real number. Algebraically, we are taking square roots of both sides of the equation as shown below and inserting the $\pm$ to account for both a positive and negative case. Note that the squared quantity must be isolated on one side of $=$ before you can extract the square roots.

Example: Solve $x^2 = 9$ by extracting square roots

$$\begin{array}{ll} x^2 = 9 & \text{Given} \\ \sqrt{x^2} = \pm\sqrt{9} & \text{Extract Square Roots} \\ x = \pm 3 & \text{Simplify Radicals} \end{array}$$

Example: Solve $(2x - 5)^2 + 5 = 3$

$$\begin{array}{ll} (2x - 5)^2 + 5 = 3 & \text{Given} \\ (2x - 5)^2 = -2 & \text{Addition Property of Equality used to add } -5 \text{ to both sides} \\ \sqrt{(2x - 5)^2} = \pm\sqrt{-2} & \text{Extract Square Roots} \\ 2x - 5 = \pm i\sqrt{2} & \text{Simplify Radicals and Apply Definition of "i"} \\ 2x = 5 \pm i\sqrt{2} & \text{Addition Property of Equality} \\ x = (5 \pm i\sqrt{2}) / 2 & \text{Division Property of Equality} \end{array}$$

Solving Quadratic Equations – Method 3 – Completing The Square

This method of solving quadratic equations is straightforward, but requires a specific sequence of steps. Here is the procedure:

Example: Solve $3x^2 + 4x - 7 = 0$ By Completing The Square

1. Isolate the x^2 and x -terms on one side of $=$ by applying the Addition Property of Equality.
 $3x^2 + 4x = 7$
2. Apply the Division Property of Equality to divide all terms on both sides by the coefficient on x^2 .
 $(3x^2)/3 + (4x)/3 = 7/3$
 $x^2 + (4/3)x = 7/3$ *Note: Steps 1 and 2 may be done in either order.*