Section 10.2

Solving Quadratic Equations by Completing the Square

# Objective 1: Solving by Completing the Square

In the last section, we used the square root property to solve quadratic equations such as $\left(x+1\right)^{2}=5$. Notice that one side of the equation is a quantity squared and the other side is a constant.

Consider the equation $x^{2}+2x=4$. In order to solve this equation by using the square root property, we need the left side of the equation to be a perfect square trinomial, meaning it can be written as a binomial squared. We can do this by adding $1$ to both sides of the equation.

$$x^{2}+2x=4$$

$$x^{2}+2x+1=4+1$$

$$\left(x+1\right)^{2}=5$$

The process of rewriting the equation so that one side is a perfect square trinomial is called **completing the square**. By completing the square, a quadratic equation can be solved by using the square root property.

$x+1=\sqrt{5}$ or $x+1=-\sqrt{5}$

$x=-1+\sqrt{5}$ or $x=-1-\sqrt{5}$

These two solutions can also be expressed using the symbol $\pm $. The solutions to the equation are $-1\pm \sqrt{5}$.

Solve by completing the square. Give the answers in exact form using simplified radicals as needed. Rationalize all denominators.

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| --- | --- |
| a. $x^{2}+10x=-7$ | b. $x^{2}-6x+6=0$ |

|  |  |
| --- | --- |
| c. $x^{2}=x+9$ | d. $9x^{2}-36x-13=0$ |