9.2 The Quadratic Formula

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OBJECTIVES

- **Derive the quadratic formula.**
- **Solve quadratic equations by using the quadratic formula.**
- **Use the discriminant to determine the number and types of solutions.**

The Quadratic Formula

Quadratic Formula

The solutions of the equation $ax^2 + bx + c = 0$ (with $a \neq 0$) are given by

Example 1

Solve. $4x^2 - 11x - 3 = 0$

Example 2

Solve. $2x^2 + 19 = 14x$

Example 3

Solve. $(x-5)(x-1)=-10x$

The Discriminant

The **discriminant** of $ax^2 + bx + c = 0$ is

The Discriminant

The discriminant of $ax^2 + bx + c = 0$ is $\boldsymbol{b^2 - 4ac}$. If $a, b,$ and c are integers, then the number and type of solutions are determined as follows.

Discriminant	Number and Type of Solutions

Example 4

Find each discriminant. Use it to predict the number and type of solutions for each equation. Tell whether the equation can be solved by factoring or whether the quadratic formula should be used.

$$10x^2 - x - 2 = 0$$

Example 4 (continued)

$$3x^2 - x = 7$$

Example 4 (continued)

$$16x^2 + 25 = 40x$$

Example 5

Find k so that the equation will have exactly one rational solution.

$$x^2 - kx + 64 = 0$$