

## Study Guide

**The Quadratic Formula and the Discriminant**

The method of completing the square can be used to develop a general formula called the *quadratic formula* that can be used to solve any quadratic equation.

In the quadratic formula, the expression  $b^2 - 4ac$  is called the **discriminant**. The discriminant is used to determine how many real roots there are.

**The Quadratic Formula**

The roots of a quadratic equation of the form  $ax^2 + bx + c = 0$ , where  $a \neq 0$ , are given by:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Nature of Roots of a Quadratic Equation	
Discriminant	Nature of Roots
$b^2 - 4ac > 0$	two distinct real roots
$b^2 - 4ac = 0$	one distinct real root
$b^2 - 4ac < 0$	no real roots

**Find the value of the discriminant and describe the nature of the roots of each quadratic equation.**

1.  $3x^2 + 5x = 2$

2.  $2y^2 + y - 15 = 0$

3.  $r^2 - \frac{3r}{5} + \frac{2}{25} = 0$

4.  $3t^2 - \frac{5}{4}t - \frac{1}{2} = 0$

5.  $m^2 - 8m = -14$

6.  $p^2 + 12p = -4$

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

8.  $-2b^2 + b - 5 = 0$