Name: Date: Period:

The Quadratic Formula

The general form of any quadratic equation is $ax^2 + bx + c = 0$ where $a \neq 0$. The quadratic formula can be used for finding the roots of any quadratic equation.

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

(1) Always make sure your equation is in standard form
(2) Identify a, b and c.
(3) Substitute into the formula and solve. (Be careful of integer signs AND **USE PARENTHESIS**!!!!!!!)
(4) Write the two roots as **separate** answers (Not as an ordered pair).

**For irrational answers, leaving the $\pm$ is acceptable. For example, $x = \frac{5 \pm \sqrt{7}}{6}$ would be an accepted answer.

Solve each example on the back using the quadratic formula. Write your answers in simplest radical form.

1. Solve $x^2 + 2x - 1 = 0$ by using the quadratic formula.	2. Solve $x^2 - 5x - 36 = 0$ by using the quadratic formula.
3. Solve $3x^2 + 2x - 3 = 0$ by using the quadratic formula.	4. Solve $2x^2 + 7x = 9$ by using the quadratic formula.

The Discriminant

By evaluating the part of the quadratic formula under the radical sign, $b^2 - 4ac$, called the discriminant, you can determine the number of real solutions a quadratic equation will have. A quadratic can have two, one or no real solutions.

If $b^2 - 4ac > 0$, the equation has **2** real solutions	If $b^2 - 4ac = 0$, the equation has **1** real solution	If $b^2 - 4ac < 0$, the equation has **no** real solutions
$x^2 - 4x + 3 = 0$ a = 1 b = -4 c = 3 $b^2 - 4ac$ $(-4)^2 - 4(1)(3)$ $16 - 12 = 4$ Since $b^2 - 4ac > 0$, the equation will have 2 real solutions (2 real solutions means the parabola will intercept the x-axis at **2 different points**)	$x^2 + 2x + 1 = 0$ a = 1 b = 2 c = 1 $b^2 - 4ac$ $(2)^2 - 4(1)(1)$ $4 - 4 = 0$ Since $b^2 - 4ac = 0$, the equation will have 1 real solution. (1 real solution means the parabola will intercept the x-axis only **ONCE**)	$x^2 - 2x + 2 = 0$ a = 1 b = -2 c = 2 $b^2 - 4ac$ $(-2)^2 - 4(1)(2)$ $4 - 8 = -4$ Since $b^2 - 4ac < 0$, the equation will have no real solutions. (0 real solution means the parabola will **NOT** intercept the x-axis)