Name: _____ Date: _____

THE QUADRATIC FORMULA
COMMON CORE ALGEBRA II

We saw in Common Core Algebra I how any quadratic equation could be solved using the process of Completing the Square. This is reviewed in *Exercise* #1.

***Exercise* #1:** Solve the following quadratic equation for all values of x by first completing the square on the quadratic expression. Express your answers in simplest radical form.

$x^2 - 6x + 1 = 0$

Since any quadratic can be rearranged through the process of Completing the Square, a formula can be developed that will solve for the roots of any quadratic equation. This famous formula, known as the **Quadratic Formula,** is shown below. You worked with this as well in Algebra I.

THE QUADRATIC FORMULA

The solutions to the quadratic equation $ax^2 + bx + c = 0$, assuming $a \neq 0$, are given by

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

***Exercise* #2:** Using the quadratic formula shown above, solve the equation from *Exercise* #1. State your answers in simplest radical form.

***Exercise* #3:** Which of the following represents the solutions to the equation $x^2 - 10x + 20 = 0$?

(1) $x = 5 \pm \sqrt{10}$ (3) $x = -5 \pm \sqrt{10}$

(2) $x = -5 \pm \sqrt{5}$ (4) $x = 5 \pm \sqrt{5}$

Although the quadratic formula is most helpful when a quadratic expression is **prime** (not factorable), it can be used as a replacement for the Zero Product Law in cases where the quadratic can be factored.

***Exercise* #4:** Solve the quadratic equation shown below in two different ways – (a) by factoring and (b) by using the quadratic formula.

(a) $2x^2 + 11x - 6 = 0$ by factoring

(b) $2x^2 + 11x - 6 = 0$ by the quadratic formula

The quadratic formula is very useful in algebra - it should be committed to memory with practice.

***Exercise* #5:** Solve each of the following quadratic equations by using the quadratic formula. Some answers will be purely rational numbers and some will involve irrational numbers. Place all answers in simplest form.

(a) $3x^2 + 5x + 2 = 0$

(b) $x^2 - 8x + 13 = 0$

(c) $2x^2 - 2x - 5 = 0$

(d) $5x^2 + 8x - 4 = 0$

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THE QUADRATIC FORMULA
COMMON CORE ALGEBRA II HOMEWORK

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

FLUENCY

1. Solve each of the following quadratic equations using the quadratic formula. Express all answers in simplest form.

(a) $x^2 + 7x - 18 = 0$

(b) $x^2 - 2x - 1 = 0$

(c) $x^2 + 8x + 13 = 0$

(d) $3x^2 - 2x - 3 = 0$

(e) $6x^2 - 7x + 2 = 0$

(f) $5x^2 + 3x - 4 = 0$

2. Which of the following represents all solutions of $x^2 - 4x - 1 = 0$?

(1) $2 \pm \sqrt{5}$ (3) $2 \pm \sqrt{10}$

(2) $-2 \pm \sqrt{5}$ (4) $-2 \pm \sqrt{12}$

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3. Which of the following is the solution set of the equation $4x^2 - 12x - 19 = 0$?

(1) $\frac{5}{2} \pm \sqrt{3}$ (3) $\frac{3}{2} \pm \sqrt{7}$

(2) $-\frac{2}{3} \pm \sqrt{2}$ (4) $-\frac{7}{3} \pm \sqrt{6}$

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4. Rounded to the nearest *hundredth* the larger root of $x^2 - 22x + 108 = 0$ is

(1) 18.21 (3) 6.74

(2) 13.25 (4) 14.61

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5. *Algebraically* find the *x*-intercepts of the quadratic function whose equation is $y = x^2 - 4x - 6$. Express your answers in simplest radical form.

APPLICATIONS

6. A missile is fired such that its height above the ground is given by $h = -9.8t^2 + 38.2t + 6.5$, where t represents the number of seconds since the rocket was fired. Using the quadratic formula, determine, to the nearest *tenth* of a second, when the rocket will hit the ground.