Name: ____________________________________ Date: __________________

FINAL WORK WITH QUADRATIC EQUATIONS
COMMON CORE ALGEBRA I

You now have a large variety of ways to solve quadratic equations, i.e. polynomial equations whose highest powered term is x^2. These techniques include **factoring**, **Completing the Square,** and the **Quadratic Formula**. In each application, it is essential that the equation that we are solving is equal to zero. If it isn't, then some minor manipulation might be needed.

***Exercise* #1:** Solve each of the following quadratic equations using the required method. First, arrange the equations so that they are set equal to zero.

(a) Solve by factoring:

$x^2+5x-12=8x-2$

(b) Solve by Completing the Square.

$x^2-15x+24=-3x+4$

(c) Solve using the Quadratic Formula
Express answers to the nearest tenth.

$x^2-3x+16=5x+15$

(d) Solve using the Quadratic Formula
Express answers in simplest radical form.

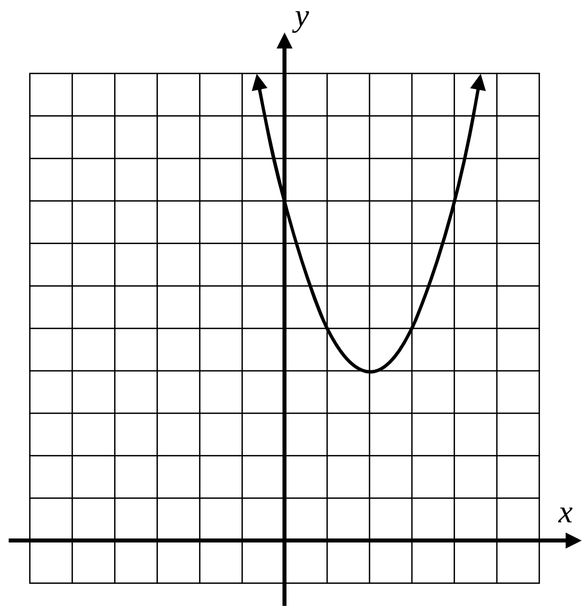
$x^2+4x+2=-2x+7$

Our final look at quadratic equations comes as a tie between their zeroes (where the functions cross the *x*-axis) and the algebraic solutions to find them.

***Exercise* #2:** The quadratic $f(x)=(x-h)^2+k$ is shown graphed on the grid below.

(a) What are the values of h and k ?

(b) What happens when you try to solve for the zeroes of f given the values of h and k from part (a)? Why can't you find solutions?



(c) How doess what you found in part (b) show up in the graph to the right?

If you think about the graphs of parabolas, they can certainly "miss" the *x*-axis. When this happens **graphically** then when we solve for the **zeroes algebraically** we won't be able to find any **real solutions** (although perhaps we will find some **imaginary ones** in Algebra II).

***Exercise* #3:** Which of the following three quadratic functions has no real zeroes (there may be more than one). Determine by using the Quadratic Formula. Verify each answer by graphing in the standard viewing window.

$y=x^2+7x+1$ $\qquad$ $y=3x^2+2x+4$ $\qquad$ $y=5x^2+2x-3$

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FINAL WORK WITH QUADRATIC EQUATIONS
COMMON CORE ALGEBRA I HOMEWORK

FLUENCY

1. Solve each of the following equations using the method described. Place your final answers in the from asked for.

(a) Solve by factoring:
(Answers are exact)

$2x^2 - 2x + 1 = 4x + 1$

(b) Solve by factoring:
(Answers are exact)

$2x^2 + 5x + 3 = x^2 + 9x + 15$

(c) Solve by Completing the Square
(Round answers to the nearest *tenth*)

$x^2 + 10x + 2 = 2x + 5$

(d) Solve using the Quadratic Formula
(Express answers in simplest radical form)

$2x^2 + 3x - 3 = -3x - 4$

2. Which of the following represents the zeroes of the function $f(x) = x^2 - 4x + 2$?

(1) $\{-1, 2\}$

(2) $\{2 - 2\sqrt{2},\ 2 + 2\sqrt{2}\}$

(3) $\{2 - \sqrt{2},\ 2 + \sqrt{2}\}$

(4) $\{-1, 4\}$

APPLICATIONS

3. The percent of popcorn kernels that will pop, P, is modeled using the equation:

$$P = -0.03T^2 + 25T - 3600 \text{, where } T \text{ is the temperature in degrees Fahrenheit.}$$

Determine the two temperatures, to the nearest degree Fahrenheit, that result in zero percent of the kernels popping. Use the Quadratic Formula. Show work that justifies your answer. The numbers here will be messy. Use your calculator to help you and carefully write out your work.

REASONING

4. Find the zeroes of the function $y = x^2 - 4x - 16$ by Completing the square. Express your answers in simplest radical form. Graph the parabola using a standard window to see the irrational zeroes.

5. Explain how you can tell that the quadratic function $y = x^2 + 6x + 15$ has no real zeroes *without* graphing the function.

6. Use the Quadratic Formula to determine which of the two functions below would have real zeroes and which would not, then verify by graphing on your calculator using the **STANDARD VIEWING WINDOW**.

$y = 2x^2 + 3x - 1$ $\qquad\qquad$ $y = x^2 + 2x + 3$