Name: ___________________________________ Date: _________________

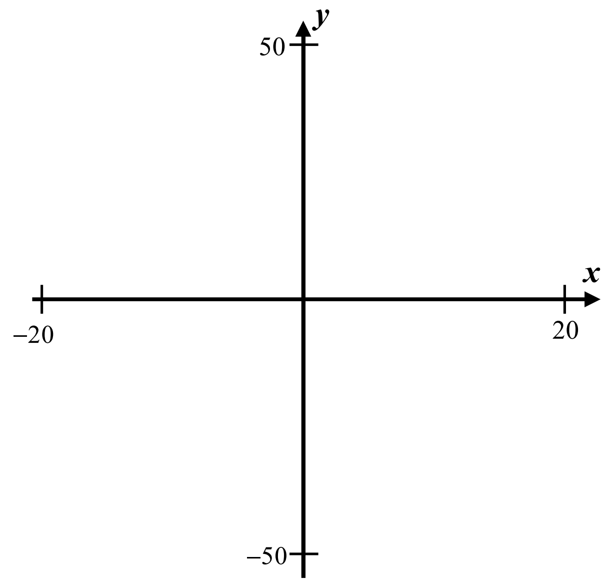
More Work with the Quadratic Formula
Common Core Algebra II

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

In the last lesson we learned and practiced use of the quadratic formula (shown above). This formula is extremely useful because it allows us to solve quadratic equations, whether they are prime or factorable. In this lesson, we will get more practice using this formula.

***Exercise* #1:** Consider the quadratic function $f(x) = x^2 - 4x - 36$.

(a) Algebraically determine this function's x-intercepts using the quadratic formula. Express your answers in simplest radical form.



(b) Express the x-intercepts of the quadratic to the nearest *hundredth*.

(c) Using your calculator, sketch a graph of the quadratic on the axes given. Use the ZERO command on your calculator to verify your answers from part (b). Label the zeros on the graph.

***Exercise* #2:** Which of the following sets represents the x-intercepts of $y = 3x^2 - 19x + 6$?

(1) $\left\{\frac{1}{2}, \frac{7}{3}\right\}$

(2) $\left\{\frac{1}{6} + \frac{\sqrt{17}}{2}, \frac{1}{6} - \frac{\sqrt{17}}{2}\right\}$

(3) $\left\{2 - \sqrt{5}, 2 + \sqrt{5}\right\}$

(4) $\left\{\frac{1}{3}, 6\right\}$

____

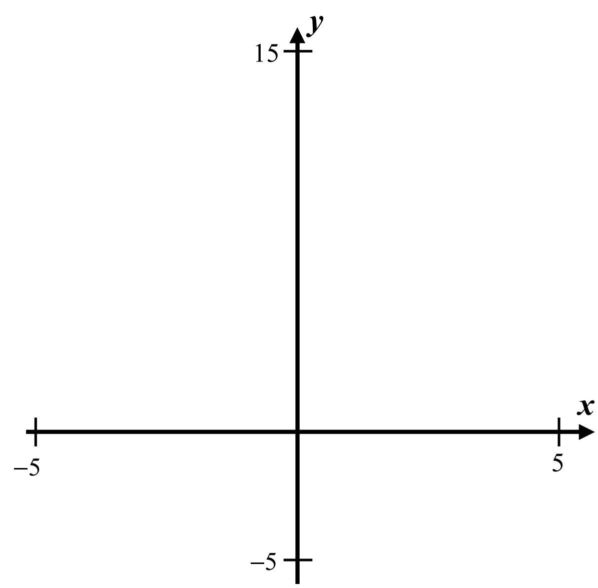
***Exercise* #3:** (Revisiting the Crazy Carmel Corn Company) – Recall that the Crazy Carmel Corn company modeled the percent of popcorn kernels that would pop, P, as a function of the oil temperature, T, in degrees Fahrenheit using the equation

$$P=-\frac{1}{250}T^2+2.8T-394$$

The company would like to find the range of temperatures that ensures that at least 50% of the kernels will pop. Write an inequality whose result is the temperature range the company would like to find. Solve this inequality with the help of the quadratic formula. Round all temperatures to the nearest tenth of a degree.

***Exercise* #4:** Find the intersection points of the linear-quadratic system shown below *algebraically*. Then, use your calculator to help produce a sketch of the system. Label the intersection points you found on your graph.

$y=4x^2-6x+2$ and $y=6x-3$



Note: The fact that the solutions to this system were rational numbers indicates that the quadratic equation in *Exercise* #4 could have been solved using factoring and the Zero Product Law.

Name: ____________________________________ Date: _________________

MORE WORK WITH THE QUADRATIC FORMULA
COMMON CORE ALGEBRA II HOMEWORK

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

FLUENCY

1. Which of the following represents the solutions to $x^2 - 4x + 12 = 6x - 2$?

   (1) $x = 4 \pm \sqrt{7}$ (3) $x = 5 \pm \sqrt{22}$

   (2) $x = 5 \pm \sqrt{11}$ (4) $x = 4 \pm \sqrt{13}$

   ____

2. The smaller root, to the nearest *hundredth*, of $2x^2 - 3x - 1 = 0$ is

   (1) -0.28 (3) 1.78

   (2) -0.50 (4) 3.47

   ____

3. The x-intercepts of $y = 2x^2 + 7x - 30$ are

   (1) $x = \frac{-7 \pm \sqrt{191}}{2}$ (3) $x = -6$ and $\frac{5}{2}$

   (2) $x = -3$ and 5 (4) $x = -3 \pm \sqrt{131}$

   ____

4. Solve the following equation for all values of x. Express your answers in simplest radical form.

$$4x^2 - 4x - 5 = 8x + 6$$

5. Solve the following equation for all values of x. Express your answers in simplest radical form.

$$9x^2 = 6x + 4$$

6. Algebraically solve the system of equations shown below. Note that you can use either factoring or the quadratic formula to find the x-coordinates, but the quadratic formula is probably easier.

$y=6x^2+19x-15$ and $y=-12x+15$

APPLICATIONS

7. The Celsius temperature, C, of a chemical reaction increases and then decreases over time according to the formula $C(t)=-\frac{1}{2}t^2+8t+93$, where t represents the time in minutes. Use the Quadratic Formula to help determine the amount of time, to the nearest tenth of a minute, it takes for the reaction to reach 110 degrees Celsius.

REASONING

8. For every quadratic there are two roots (or zeroes or x-intercepts). They are always given by

$$x_1=\frac{-b-\sqrt{b^2-4ac}}{2a} \text{ and } x_2=\frac{-b+\sqrt{b^2-4ac}}{2a}$$

Determine a formula, in terms of b and a for the sum of these two roots.