CCSS Advanced Algebra 4 Quadratic Formula Review Name__________________

1. Factor the polynomial $f(x) = x^2 + 8x - 20$ and use the factors to find the x-intercepts of the function.

$(x+10)(x-2)$

$x=-10,\ x=2$

2. Explain why you can't factor $g(x) = x^2 + 8x - 1$. How could you solve the equation $x^2 + 8x - 1 = 0$?

Can't multiply to be -1 & add = 8.
Use "completing the square" (CTS)

3. The Quadratic Formula ($ax^2 + bx + c = 0,\ x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$) is a shortcut for a long process of solving Quadratic Equations that CANNOT BE FACTORED (<u>full mathematics of the shortcut</u>). To use the shortcut, you follow three steps:

- Make the equation to be solved in the form $ax^2 + bx + c = 0$ -- it is essential to have the equation =0.
- Identify the values of a, b and c from the equation (these are the coefficients on the x^2 term, the x term and the constant coefficient.
- Use a calculator to evaluate $x = \frac{-b+\sqrt{b^2-4ac}}{2a}$ and $x = \frac{-b-\sqrt{b^2-4ac}}{2a}$ to determine the solutions.

Use the Quadratic Formula to solve each equation below:

a. $2x^2 + 3x - 7 = 0$

$x = \frac{-3 \pm \sqrt{3^2 - 4(2)(-7)}}{2(2)}$

$\frac{-3 \pm \sqrt{9+56}}{4}$

$\frac{-3 \pm \sqrt{65}}{4}$

b. $x^2 - 4x - 2 = 0$

$x = \frac{4 \pm \sqrt{(-4)^2 - 4(1)(-2)}}{2(1)}$

$\frac{4 \pm \sqrt{16+8}}{2}$

$\frac{4 \pm \sqrt{24}}{2}$

c. $x^2 = 3x + 19$

$x^2 - 3x - 19 = 0$

$x^2 - 3x - 19 = 0$

$x = \frac{3 \pm \sqrt{(-3)^2 - 4(1)(-19)}}{2(1)}$

$\frac{3 \pm \sqrt{9+76}}{2}$

$\frac{3 \pm \sqrt{85}}{2}$

4. All of the above examples, have 2 solutions. Is it possible for a Quadratic Equation to have only 1 solution? Explain why or why not. How could using the Quadratic Formula give you only one solution?

Yes, if $b^2-4ac=0$. The $\sqrt{0}=0$, and $+0=-0$. If $b^2-4ac>0$, there are 2 solutions because of the positive & negative square roots

5. The equation $x^2 + 6x + c = 0$ has only one solution. What must be true about c? How do you know?

$6^2 - 4(1)\cdot c = 0$

$36 - 4c = 0$ → $\frac{36}{4} = \frac{4c}{4}$

$9 = c$

6. Show that $4x^2 + 4x = -1$ has only one solution.

$4x^2+4x+1=0$

$4^2-4(4)(1)$ $b^2-4ac=0$, so only one solution

$16-16=0$

7. Is it possible that a Quadratic Equation has zero real solutions? Explain why or why not. How could using the Quadratic Formula give you no real solutions?

Yes, if $b^2-4ac<0$. Can't take the square root of a negative using real numbers. The solutions are imaginary

8. The equation $x^2 + 6x + c = 0$ has no real solutions. What must be true about c? Be specific.

$6^2-4(1)(c)<0$

$6^2-4c<0$

$36-4c<0$

$\frac{36}{4}<\frac{4c}{4}$

$9<c$

9. For each Quadratic Equation below, determine whether the equation has 2 real solutions, 1 real solution or no real solutions?

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

x^2-7x+2

$(-7)^2-4(1)(2)$

$49-8$

41

2 Solutions

b. $-10x^2 + 60x - 90 = 0$

$60^2-4(-10)(-90)$

$3600-3600$

0

1 Solution

c. $0.25x^2 = 3.11x - 18.2$

$.25x^2-3.11x+18.2$

$3.11^2-4(.25)(18.2)$

$9.6721-18.2<0$

Negative

0 Solutions.

10. Show that the quadratic function $f(x) = x^2 + 1$ has NO REAL ROOTS.

$x^2+1=0$

$x^2=-1$

$x=\pm i \leftarrow$ Not real