Keeper #2 Name:_____

Solving Quadratics

Vocabulary

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

Discriminant: The **discriminant** is the name given to the expression that appears under the square root (radical) sign in the quadratic formula. The **discriminant** tells you about the "nature" of the roots of a quadratic equation given that a, b and c are rational numbers. Discriminant = $b^2 - 4ac$

3 "natures" of roots (solutions, or zeros) of a quadratic equation

If $b^2 - 4ac > 0$, you will have two(2) REAL solutions.

If $b^2 - 4ac < 0$, you will have two(2) Complex solutions.(Always in pairs, conjugates)

If $b^2 - 4ac = 0$, you will have one(1) real solution.

3 ways we will solve quadratic equations

Perfect squares $x^2 = 49$

1. Square root both sides. $\sqrt{x^2} = \sqrt{49}$

2. Remember that squares and square roots cancel each other out. $\sqrt{x^2} = \sqrt{7^2}$

   And that there is always a positive and a negative answer. $x = \pm 7$

Solve by Factoring $3x^3 + 9x^2 - 30x = 0$

1. Factor out the GCF if there is one other than 1. $3x(x^2 + 3x - 10) = 0$

2. Factor the trinomial into two binomials using the box method.

	x	5
X	x^2	5x
-2	-2x	-10

Complete factorization: $3x(x-2)(x+5) = 0$

3. Set each factor equal to zero. $3x = 0$ $x - 2 = 0$ $x + 5 = 0$

4. Solve for the variable $\frac{3x}{3} = \frac{0}{3}$ $x - 2 + 2 = 0 + 2$ $x + 5 - 5 = 0 - 5$

$x = 0$ $x = 2$ $x = -5$

Solve Non-factorable quadratics by using the Quadratic Formula $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

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

1. Identify the a, b, c — a = 1 b = -2 c = 2

2. Plug the a, b, c into the quadratic formula $x = \frac{-(-2) \pm \sqrt{(-2)^2-4(1)(2)}}{2(1)}$

3. Simplify the answer $x = \frac{2 \pm \sqrt{4-8}}{2}$

$x = \frac{2 \pm \sqrt{-4}}{2}$

$x = \frac{2 \pm 2i}{2} = \frac{2}{2} \pm \frac{2i}{2} = 1 \pm i$

Remember that all complex numbers come in pairs(conjugates) x = 1+*i,* 1-*i*

Note this method works for ALL quadratics.

Practice:

1. $x^2 = -16$ **2.** $x^2 - 25 = 0$ **3.** $4x^2 - 16x - 84 = 0$ **(Hint: divide by GCF)**

4. $x^2 - 7x + 5 = 0$ **5.** $2x^2 + 2x + 3 = 0$ **6.** $x^2 + 16x + 64 = 0$