Name Key

8A; Algebra 1

Date_____

8A Period_____

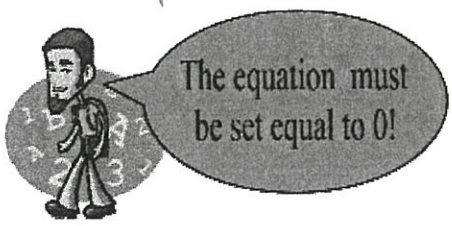
The Quadratic Formula

* used when it says round to the nearest...

Quadratic Formula:

For $ax^2 + bx + c = 0$,

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



The solutions of some quadratic equations, $ax^2 + bx + c = 0$ ($a \neq 0$), are not rational, and cannot be obtained by factoring. For such equations, the most common method of solution is the quadratic formula.

Note: The quadratic formula can be used to solve ANY quadratic equation, even those that can be factored. Be sure you know this very useful formula!!!

I. Steps:

1) Write the equation in standard form (= to 0 & D.P.O.)
2) Write the Quadratic Formula
3) Identify a, b, and c ($ax^2 + bx + c = 0$)
4) Substitute the values in for a, b, and & c
5) Simplify the expression under the radical sign first
6) Simplify the denominator
7) Evaluate the square root
8) See if you can simplify any of the like terms.
9) Separate the two solutions
10) Simplify both solutions

II. Examples: Solve the following by using the Quadratic Formula

1) $x^2 + 2x - 15 = 0$

$a = 1$

$b = 2$

$c = -15$

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

$$x = \frac{-(2) \pm \sqrt{(2)^2 - 4(1)(-15)}}{2(1)}$$

$$x = \frac{-2 \pm \sqrt{4 - 4(1)(-15)}}{2(1)}$$

$$x = \frac{-2 \pm \sqrt{4 + 60}}{2}$$

$$x = \frac{-2 \pm \sqrt{64}}{2}$$

$$x = \frac{-2 \pm 8}{2}$$

$$x = \frac{-2 + 8}{2}$$

$$x = \frac{6}{2}$$

$$x = 3$$

$$x = \frac{-2 - 8}{2}$$

$$x = \frac{-10}{2}$$

$$x = -5$$

$\{-5, 3\}$

- Roots
- Zeros

2 real roots

2) $2x^2 - 10x = -3$

$+3 \quad +3$

$2x^2 - 10x + 3 = 0$

$a = 2$

$b = -10$

$c = 3$

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

$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(2)(3)}}{2(2)}$

$x = \frac{10 \pm \sqrt{100 - 4(2)(3)}}{2(2)}$

$x = \frac{10 \pm \sqrt{100 - 24}}{4}$

$x = \frac{10 \pm \sqrt{76}}{4}$

$\sqrt{76}$

$\sqrt{4} \cdot \sqrt{19}$

$2\sqrt{19}$

$x = \frac{10 \pm 2\sqrt{19}}{4}$

All 3 #'s must have common factors & be simplified

$x = \frac{10 + 2\sqrt{19}}{4}$ | $x = \frac{10 - 2\sqrt{19}}{4}$

$x = \frac{5 + \sqrt{19}}{2}$ | $x = \frac{5 - \sqrt{19}}{2}$

$x = \frac{5 \pm \sqrt{19}}{2}$

2 Real Roots

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3) $x^2 - 6x + 13 = 0$

$a = 1$

$b = -6$

$c = 13$

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

$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(13)}}{2(1)}$

$x = \frac{6 \pm \sqrt{36 - 4(1)(13)}}{2(1)}$

$x = \frac{6 \pm \sqrt{36 - 52}}{2}$

$x = \frac{6 \pm \sqrt{-16}}{2}$

$x = \frac{6 \pm \sqrt{-16}}{2}$ | $x = \frac{6 - \sqrt{-16}}{2}$

Can't simplify the 6 & 2 B/C the $\sqrt{-16}$ doesn't have a common multiple in front of it

$x = \frac{6 \pm \sqrt{-16}}{2}$

NO Real Roots B/C it's imaginary

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4) $x^2 - 10x + 25 = 0$

$a = 1$

$b = -10$

$c = 25$

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

$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(25)}}{2(1)}$

$x = \frac{10 \pm \sqrt{100 - 4(1)(25)}}{2(1)}$

$x = \frac{10 \pm \sqrt{100 - 100}}{2}$

$x = \frac{10 \pm \sqrt{0}}{2}$

$x = \frac{10 \pm 0}{2}$

$x = \frac{10 + 0}{2}$ | $x = \frac{10 - 0}{2}$

$x = \frac{10}{2}$ | $x = \frac{10}{2}$

$x = 5$ | $x = 5$

$\{5\}$

1 real root