

The Quadratic Formula: This magic formula will solve ANY QUADRATIC EQUATION. No. Matter. What. When in doubt of which method to use, you can always use the quadratic formula

The standard form of a quadratic equation is $ax^2 + bx + c$

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

Example 1: The radical will NOT SIMPLIFY	Example 2: The radical WILL SIMPLIFY	Example 3: The radical is a PERFECT SQUARE!
<p>$3x^2 + 5x + 1 = 0$ $a=3$ $b=5$ $c=1$</p> <p>$x = \frac{-5 \pm \sqrt{(5)^2 - 4(3)(1)}}{2(3)}$</p> <p>Now multiply the square root in the calculator</p> <p>$x = \frac{-5 \pm \sqrt{13}}{6}$</p> <p>NOTHING ELSE SIMPLIFIES THIS IS THE FINAL ANSWER. SOMETIMES IS WRITTEN AS <u>2</u> SEPERATE FRACTIONS</p> <p>AND $x = \frac{-5 + \sqrt{13}}{6}$ AND $x = \frac{-5 - \sqrt{13}}{6}$</p>	<p>$4x^2 + 4x - 14 = 0$ $a=4$ $b=4$ $c=-14$</p> <p>$x = \frac{-4 \pm \sqrt{(4)^2 - 4(4)(-14)}}{2(4)}$</p> <p>$x = \frac{-4 \pm 4\sqrt{15}}{8}$</p> <p>SINCE THE SQUARE ROOT SIMPLIFIED (NUMBER OUT FRONT OF SQUARE ROOT) WE NEED TO SIMPLIFY THE DENOMINATOR WITH THE TOP NUMBERS THE "4"</p> <p>$x = \frac{-1 \pm \sqrt{15}}{2}$ OR $x = \frac{-1 + \sqrt{15}}{2}$ AND $x = \frac{-1 - \sqrt{15}}{2}$</p>	<p>$3x^2 + 5x - 12 = 0$ $a=3$ $b=5$ $c=-12$</p> <p>$x = \frac{-5 \pm \sqrt{(5)^2 - 4(3)(-12)}}{2(3)}$</p> <p>$x = \frac{-5 \pm 13}{6}$</p> <p>NO SQUARE ROOTS! SEPERATE INTO TWO FRACTIONS AND GET EXACT ANSWERS</p> <p>$x = \frac{-5 + 13}{6}$ AND $x = \frac{-5 - 13}{6}$</p> <p>$x = \frac{4}{3}$ AND $x = -3$</p>

Practice problems

Solve each quadratic expression, some you may have to put into standard form FIRST by multiplying

$5x^2 - 13 = 0$ $a=5 \quad b=0 \quad c=-13$ $x = \frac{0 \pm \sqrt{(0)^2 - 4(5)(-13)}}{2(5)}$ $x = \frac{\pm 2\sqrt{65}}{10} \quad \text{or } 4$ $x = \frac{\pm \sqrt{65}}{5}$	$(x-4)^2 - 5 = 0$ $x^2 - 8x + 16 - 5$ $x^2 - 8x + 11 = 0$ $a=1 \quad b=-8 \quad c=11$ $x = \frac{8 \pm \sqrt{(-8)^2 - 4(1)(11)}}{2(1)}$ $x = \frac{8 \pm 2\sqrt{5}}{2}$ $x = 4 \pm \sqrt{5}$	$5x^2 - 4x - 13 = 0$ $a=5 \quad b=-4 \quad c=-13$ $x = \frac{4 \pm \sqrt{(-4)^2 - 4(5)(-13)}}{2(5)}$ $x = \frac{4 \pm 2\sqrt{69}}{10}$ $x = \frac{2 \pm \sqrt{69}}{5}$
$2x^2 + 3x - 14 = 0$ $a=2 \quad b=3 \quad c=-14$ $x = \frac{-3 \pm \sqrt{(3)^2 - 4(2)(-14)}}{2(2)}$ $x = \frac{-3 \pm 11}{4}$ $x = \frac{-3+11}{4} \quad x = \frac{-3-11}{4}$ $x = 2 \quad x = -\frac{7}{2}$	$2x^2 - 11x - 1 = 5$ $-5 \quad -5$ $2x^2 - 11x - 6 = 0$ $a=2 \quad b=-11 \quad c=-6$ $x = \frac{11 \pm \sqrt{(-11)^2 - 4(2)(-6)}}{2(2)}$ $x = \frac{11 \pm 13}{4}$ $x = \frac{11+13}{4} \quad x = \frac{11-13}{4}$ $x = 6 \quad x = -\frac{1}{2}$	$4x^2 + 9x + 3 = 0$ $a=4 \quad b=9 \quad c=3$ $x = \frac{-9 \pm \sqrt{(9)^2 - 4(4)(3)}}{2(4)}$ $x = \frac{-9 \pm \sqrt{33}}{8}$