

**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  $ax^2 + bx + c$

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

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

## Practice problems

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

$$5x^2 - 13 = 0$$
$$a=5 \quad b=0 \quad c=-13$$

$$x = \frac{0 \pm \sqrt{(0)^2 - 4(5)(-13)}}{2(5)}$$

$$x = \frac{0 \pm 2\sqrt{65}}{10}$$

$$x = \frac{0 \pm \sqrt{65}}{5}$$

or

$$(x-4)^2 - 5 = 0$$

$$x^2 - 8x + 16 - 5$$

$$x^2 - 8x + 11 = 0$$

$$a=1 \quad b=-8 \quad c=11$$

$$x = \frac{8 \pm \sqrt{(-8)^2 - 4(1)(11)}}{2(1)}$$

$$x = \frac{8 \pm 2\sqrt{5}}{2}$$

$$x = 4 \pm \sqrt{5}$$

$$5x^2 - 4x - 13 = 0$$

$$a=5 \quad b=-4 \quad c=-13$$

$$x = \frac{4 \pm \sqrt{(-4)^2 - 4(5)(-13)}}{2(5)}$$

$$x = \frac{4 \pm 2\sqrt{69}}{10}$$

$$x = \frac{2 \pm \sqrt{69}}{5}$$

$$2x^2 + 3x - 14 = 0$$

$$a=2 \quad b=3 \quad c=-14$$

$$x = \frac{-3 \pm \sqrt{(3)^2 - 4(2)(-14)}}{2(2)}$$

$$x = \frac{-3 \pm 11}{4}$$

$$x = \frac{-3+11}{4}$$

$$x = \frac{-3-11}{4}$$

$$x = 2$$

$$x = -\frac{7}{2}$$

$$2x^2 - 11x - 1 = 5$$

$$-5 \quad -5$$

$$2x^2 - 11x - 6 = 0$$

$$a=2 \quad b=-11 \quad c=-6$$

$$x = \frac{11 \pm \sqrt{(-11)^2 - 4(2)(-6)}}{2(2)}$$

$$x = \frac{11 \pm 13}{4}$$

$$x = \frac{11+13}{4}$$

$$x = \frac{11-13}{4}$$

$$x = 6$$

$$x = -\frac{1}{2}$$

$$4x^2 + 9x + 3 = 0$$

$$a=4 \quad b=9 \quad c=3$$

$$x = \frac{-9 \pm \sqrt{(9)^2 - 4(4)(3)}}{2(4)}$$

$$x = \frac{-9 \pm \sqrt{33}}{8}$$