

<p>Quadratic Formula</p> $ax^2 + bx + c = 0$ <p>↓</p> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
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We can use the quadratic formula to solve quadratic equations. It's not always the fastest way to solve a quadratic equation, but it always works.

Example 1

Solve $x^2 + 10x + 22 = 0$.

Step 1- Make sure $ax^2 + bx + c$ is on one side of the equation and 0 is on the other side.

This is already done for our equation, so we can go to Step 2.

Step 2- Identify the values of a , b , and c .

$$a = 1 \quad b = 10 \quad c = 22$$

Step 3- Put the values of a , b , and c into the quadratic formula and simplify the right side of the formula.

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

$$x = \frac{-10 \pm \sqrt{12}}{2}$$

$$x = \frac{-(10) \pm \sqrt{(10)^2 - 4(1)(22)}}{2(1)}$$

$$x = \frac{-10 \pm 2\sqrt{3}}{2}$$

$$x = \frac{-10 \pm \sqrt{100 - 88}}{2}$$

$$x = \frac{2(-5 \pm \sqrt{3})}{2}$$

$x = -5 \pm \sqrt{3}$

Example 2Solve $6x^2 - 8x + 3 = 0$.**Step 1-** Make sure $ax^2 + bx + c$ is on one side of the equation and 0 is on the other side.

This is already done for our equation, so we can go to Step 2.

Step 2- Identify the values of a , b , and c .

$$a = 6 \quad b = -8 \quad c = 3$$

Step 3- Put the values of a , b , and c into the quadratic formula and simplify the right side of the formula.

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

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(6)(3)}}{2(6)}$$

$$x = \frac{8 \pm \sqrt{64 - 72}}{12}$$

$$x = \frac{8 \pm \sqrt{-8}}{12}$$

$$x = \frac{8 \pm 2i\sqrt{2}}{12}$$

$$x = \frac{2(4 \pm i\sqrt{2})}{12}$$

$$x = \frac{4 \pm i\sqrt{2}}{6}$$

or

$$x = \frac{2}{3} \pm \frac{i\sqrt{2}}{6}$$

Example 3Solve $-x^2 = 16x + 46$.

Step 1- Make sure $ax^2 + bx + c$ is on one side of the equation and 0 is on the other side.

We will need to move all the stuff on the left over to the right or all the stuff on the right over to the left. Let's move from right to left this time.

$$\begin{aligned} -x^2 &= 16x + 46 \\ -x^2 - 16x - 46 &= 0 \end{aligned}$$

Step 2- Identify the values of a , b , and c .

$$a = -1 \quad b = -16 \quad c = -46$$

Step 3- Put the values of a , b , and c into the quadratic formula and simplify the right side of the formula.

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

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

$$x = \frac{-(-16) \pm \sqrt{(-16)^2 - 4(-1)(-46)}}{2(-1)}$$

$$x = \frac{-2(-8 \pm 3\sqrt{2})}{-2}$$

$$x = \frac{16 \pm \sqrt{256 - 184}}{-2}$$

$$x = -8 \pm 3\sqrt{2}$$

$$x = \frac{16 \pm \sqrt{72}}{-2}$$