

Ways you already know how to use to solve quadratic equations include:

- Factoring (only work some of the time) *ch. 6*
- Square root method (only work when $b = 0$ in $ax^2 + bx + c = 0$) *11.1*
- Completing the square (always works, but is challenging) *11.1*
- Quadratic formula (always works, but you have to memorize the formula) *11.2*

OBJECTIVE 1: Solving Quadratic Equation by Using the Quadratic Formula

The quadratic formula ALWAYS works to solve quadratic equations IF you can memorize this formula:

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

Remember these tips:

- Keep "a" positive.
- Before using the formula, make the equation = 0.
- Get rid of fractions by multiplying everything by what would make the "a" = 1.
- Make sure you have the equations in the correct order: $ax^2 + bx + c = 0$.
- Simplify everything or nothing, but notice no 2 was taken from 10 because it is not a 10.
 - $\frac{4 \pm 2\sqrt{10}}{4} = \frac{2(\pm\sqrt{10})}{2 \cdot 2} = \frac{\pm\sqrt{10}}{2}$
- Anything under the radical is not the number it looks like; it is the square root of that.
 - The square root of 4 is not 4 it is 2.

TASK 1: Solve $3x^2 + 16x + 5 = 0$. $a=3$ $b=16$ $c=5$ TASK 2: Solve $3x^2 - 5x - 2 = 0$ $a=3$ $b=-5$ $c=-2$

$$x = \frac{-16 \pm \sqrt{(16)^2 - 4(3)(5)}}{2(3)} = \left[-\frac{1}{3}, -5 \right]$$

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(-2)}}{2(3)} = \frac{5 \pm \sqrt{49}}{6} = \left[2, -\frac{1}{3} \right]$$

TASK 3: Solve $2x^2 - 4x = 3$ $a=2$ $b=-4$ $c=-3$ TASK 4: Solve $3x^2 - 8x = 2$ $a=3$ $b=-8$ $c=-2$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(2)(-3)}}{2(2)} = \frac{4 \pm \sqrt{40}}{4} = \left[\frac{2 \pm \sqrt{10}}{2} \right]$$

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(3)(-2)}}{2(3)} = \frac{8 \pm \sqrt{88}}{6} = \left[\frac{4 \pm \sqrt{22}}{3} \right]$$

TASK 5: Solve $\frac{1}{8}x^2 - \frac{1}{4}x - 2 = 0$

$$x^2 - 2x - 16 = 0$$

$$a=1 \quad b=-2 \quad c=-16$$

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

$$x = \frac{2 \pm \sqrt{68}}{2} = \frac{2 \pm 2\sqrt{17}}{2} = 1 \pm \sqrt{17}$$

TASK 6: Solve $\frac{1}{4}x^2 - x + \frac{1}{2} = 0$

$$x^2 - 4x + 2 = 0$$

$$a=1 \quad b=-4 \quad c=2$$

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

$$x = 2 \pm \sqrt{2}$$

TASK 7: Solve $x = -3x^2 - 3$

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

$$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(3)(3)}}{2(3)}$$

$$x = \frac{-1 \pm \sqrt{-35}}{6}$$

$$x = \frac{-1 \pm i\sqrt{35}}{6}$$

TASK 8: Solve $x = -2x^2 - 2$

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

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

$$x = \frac{-1 \pm \sqrt{17}}{4}$$

$$a=2 \quad b=1 \quad c=2$$

Reminders to myself about the Quadratic Formula:

- under $\sqrt{\quad}$ in calc. first
- simplify all 3 things or none
- always put $x = \frac{\quad}{\quad}$ 2 answers (\pm)

Still need help with: