

Summary of Methods for Solving Quadratic Equations

Factor

If it is easy to factor do so, otherwise try one of the other methods.

Solving by Factoring

- 1.) Write the equation in Standard Form so that one side equals 0, $ax^2 + bx + c = 0$.
- 2.) Factor completely. All linear factors must be found. (See Polynomial Factoring)
- 3.) Set each linear factor to zero, contains 1 variable to the 1st degree.
- 4.) Solve the resulting equations for the variable.
 - a. The solution to each factor is also a solution to the polynomial.
- 5.) Check all solutions in the original equation.
 - a. If solving a word problem, does the value make sense?

Take the Square Root

If $b = 0$, we have $ax^2 + c = 0$. Solve for the x^2 term, so we have $x^2 = -\frac{c}{a}$ and take the square root of both sides. Keep in mind that there are 2 solutions when you take the square root, the positive & the negative solution.

The special factoring formulas will also be useful, such as the Perfect Square Trinomials, and from these comes the Completing the Square Method.

Complete the Square

- 1.) Write the equation with the x terms on one side & the constant term on the other, $ax^2 + bx = -c$

$$x^2 + \frac{b}{a}x = -\frac{c}{a}$$

- 2.) Divide through by a ,

$$\left(\frac{1}{2} \cdot \frac{b}{a}\right)^2$$

- 3.) Add $\left(\frac{1}{2} \cdot \frac{b}{a}\right)^2$ to both sides of the equation to complete the square

- 4.) Now you can factor the left side using the perfect square trinomial formula (see Special

$$\left(x + \frac{b}{2a}\right)^2 = -\frac{c}{a} + \left(\frac{b}{2a}\right)^2$$

Factoring with Polynomials),

- 5.) Take the square root of both sides

- 6.) Solve for x

- 7.) Check solutions, some may not work...

Quadratic Formula

If a , b , & c are real numbers and $a \neq 0$, the quadratic equation, $ax^2 + bx + c = 0$, has solutions:

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

I recommend using the Quadratic Formula whenever it is not easy to see

factoring and you are not required to use any other method.

If no other method is easy to use, the Quadratic Formula will always work.