Solve Quadratics Using the Quadratic Formula

There are three ways to solve a quadratic (to determine the zeros of a quadratic): Factoring, Completing the Square, and using the **Quadratic Formula**. Of these three options, Factoring sometimes works, completing the square always works (but not always easily), and the Quadratic Formula always works.

Today, we are going to use the Quadratic Formula:

Steps for using the Quadratic Formula:

1st: Determine *a, b & c*

2nd: Plug them into the Formula

3rd: Simplify each part as much as possible

4th: Divide all three terms by the same value (if they have a common factor – if not, skip this step)

5th: Split into two problems

6th: Simplify as much as you can

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| **EXAMPLE**  *Numbers only!*  Copy the formula:  Plug in *a*, *b*, & *c,* then solve:  Zeros:  ~~&~~ | **EXAMPLE**  *Numbers only!*  Copy the formula:  Plug in *a*, *b*, & *c,* then solve:  ***Divide, if possible, from ALL parts:***  ***SPLIT in two:***  Zeros:  & | **EXAMPLE**  *Numbers only!*  Copy the formula:  Plug in *a*, *b*, & *c,* then solve:  ***Divide, if possible, from ALL parts:***  ***SPLIT in two:***  Zeros:    & |
| 1.  *Numbers only!*  *Copy the formula:*  *Plug in a, b, & c, then solve:*  *Zeros:*  & | 2.  *Numbers only!*  *Copy the formula:*  *Plug in a, b, & c, then solve:*  *Zeros:*  & | 3.  *Numbers only!*  *Copy the formula:*  *Plug in a, b, & c, then solve:*  *Zeros:*  & |
| 4.  *Numbers only!*  *Copy the formula:*  *Plug in a, b, & c, then solve:*  *Zeros:*  & | 5.  *Numbers only!*  *Copy the formula:*  *Plug in a, b, & c, then solve:*  *Zeros:*  & | 6.  *Numbers only!*  *Copy the formula:*  *Plug in a, b, & c, then solve:*  *Zeros:*  & |

The Quadratic Formula’s purpose is to determine the zeros of a quadratic, but it can actually be used to find the vertex, as well. If you remove the discriminant, , from the formula, you are left with , which is the x-value of the vertex. From Standard Form: , you can find the **y-intercept** , the **vertex** , & plug in to get . and the **zeros** .

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| **EXAMPLE**  **Y-intercept:**  Formula to find the vertex:  *Numbers only!*  *Plug in a & b, then solve:*  Plug in *x*, and solve for *y*:  **Vertex:** | **EXAMPLE**  **Y-intercept:**  Formula to find the vertex:  *Numbers only!*  *Plug in a & b, then solve:*  Plug in *x*, and solve for *y*:  **Vertex:** | **EXAMPLE**  **Y-intercept:**  Formula to find the vertex:  *Numbers only!*  *Plug in a & b, then solve:*  Plug in *x*, and solve for *y*:  **Vertex:** |
| 7.  **Y-intercept:**  Formula to find the vertex:  *Numbers only!*  *Plug in a & b, then solve:*  Plug in *x*, and solve for *y*:  **Vertex:** | 8.  **Y-intercept:**  Formula to find the vertex:  *Numbers only!*  *Plug in a & b, then solve:*  Plug in *x*, and solve for *y*:  **Vertex:** | 9.  **Y-intercept:**  Formula to find the vertex:  *Numbers only!*  *Plug in a & b, then solve:*  Plug in *x*, and solve for *y*:  **Vertex:** |
| 10.  **Y-intercept:**  Formula to find the vertex:  *Numbers only!*  *Plug in a & b, then solve:*  Plug in *x*, and solve for *y*:  **Vertex:** | 11.  **Y-intercept:**  Formula to find the vertex:  *Numbers only!*  *Plug in a & b, then solve:*  Plug in *x*, and solve for *y*:  **Vertex:** | 12.  **Y-intercept:**  Formula to find the vertex:  *Numbers only!*  *Plug in a & b, then solve:*  Plug in *x*, and solve for *y*:  **Vertex:** |

Now that you know how to use the quadratic formula, determine all 3 important parts of a quadratic:

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|  | Formulas  **Y-intercept:** The last number in the standard form (c)  equation is the *y*-intercept.  **Vertex:**  and solve for *y*.  **Zeros:** |
| Y-intercept:  Vertex:  Zeros: |