Determining the **Zeros** of a Quadratic

*…aka the “****roots****,” “****zeros****,” “****solutions****,” or “****x-intercepts****”*

The **zeros** *(roots/solutions/x-intercepts)* of a quadratic are simply the *x*-values when . This means that to find them, you have to plug in .

**EXAMPLE**: Determine the solutions of .

Okay, we did that…now how do we solve for *x*? Well, there are three options:

|  |  |  |
| --- | --- | --- |
| FACTORING  ***(Sometimes works)***  *What #’s multiply to c and add to b?* | COMPLETING THE SQUARE  ***(Sometimes works easily)***  *Use the magic step* | QUADRATIC FORMULA  ***(ALWAYS works)*** |
| |  |  |  | | --- | --- | --- | | Steps: | |  | |  | 1. If is not 1,  factor out  ***(If not easily divisible, STOP!!! Use an easier way)***  2. Puzzle out what 2 numbers multiply to a*c* and add to *b*  ***(If not possible, STOP!!! You have to use another way)***  3. Group & factor  4. Set it equal to zero  5. Set up two equations:  *or*  6. Solve for your two *x*’s | | | |  |  |  | | --- | --- | --- | | Steps: | |  | |  | 1. Set the problem = 0  2. Kick out *c*  3. If is not 1,  factor out  ***(If not divisible, STOP!!! Use another easier way)***  4. Insert  ***(If b is not divisible by 2, STOP!!! Use an easier way)***  5. Simplify.  6. MAGIC FACTORING!!!  7. Solve for *x* | | | |  |  |  | | --- | --- | --- | | Steps: | |  | |  | 1. Determine *a*, *b*, & *c*.  2. Plug them into the equation:  3. Simplify to determine *x*. | | |
| **EXAMPLE:** Determine the **solutions**  of .  (-2)(-4) = 12 & -2 + -4 = -7  *Use -2x & -4x*  🡨FACTORS  *or*  *or*  🡨SOLUTIONS | **EXAMPLE:** Determine the **zeros** of  .      *or*  *or*  🡨SOLUTIONS | **EXAMPLE:** Determine the **x-intercepts** of .  *SO…split it into two equations!*  🡨SOLUTIONS |
| **EXAMPLE:** Determine the **roots** of  .      (1)(-5) = -5, but 1 + -52  (-1)( 5) = -5, but -1 + 52  **NOT POSSIBLE—STOP!** | **EXAMPLE:** Determine the **solutions.**  . | **EXAMPLE:** Determine the **zeros** of  . |
| 1a. Determine the **roots** of | 1b. Determine the **x-intercepts** of | 1c. Determine the **solutions** of |
| 2a. Determine the **zeros** of | 2b. Determine the **roots** of | 2c. Determine the **x-intercepts** of |
| 3a. Determine the **solutions** of | 3b. Determine the **zeros** of | 3c. Determine the **roots** of |
| 4a. Determine the **x-intercepts** of | 4b. Determine the **solutions** of | 4c. Determine the **zeros** of |
| 5a. Determine the **roots** of | 5b. Determine the **x-intercepts** of | 5c. Determine the **solutions** of |
| 6a. Determine the **zeros** of | 6b. Determine the **roots** of | 6c. Determine the **x-intercepts** of |
| 7a. Determine the **solutions** of | 7b. Determine the **zeros** of | 7c. Determine the **roots** of |
| 8a. Determine the **x-intercepts** of | 8b. Determine the **solutions** of | 8c. Determine the **zeros** of |
| 9a. Determine the **roots** of | 9b. Determine the **x-intercepts** of | 9c. Determine the **solutions** of |
| 10a. Determine the **zeros** of | 10b. Determine the **roots** of | 10c. Determine the **x-intercepts** of |

You can also determine solutions (zeros/roots/x-intercepts) in vertex form: . All you have to do is set the problem equal to 0 and solve for *x*.

|  |  |  |
| --- | --- | --- |
| **EXAMPLE:** Determine the **roots** of | 11. Determine the **solutions** of | 12. Determine the **zeros** of |
| **EXAMPLE:** Determine the **x-intercepts** of | 13. Determine the **zeros** of | 14. Determine the **x-intercepts** of |