

Quadratic Equations

A solution to a polynomial is also called a **root**. It is where the polynomial equals zero, or where the graph crosses the x-axis.

A Quadratic Equation in **standard form** is $ax^2 + bx + c = 0$, where a, b, and c are Real Numbers, with $a \neq 0$.

The Principle of Zero Products (or Zero Factor Property)

For c & d real numbers, if $cd = 0$, then $c = 0$ or $d = 0$ (or both). This is also true with linear factors of polynomials.

To write a quadratic equation given the solutions “work backwards”.

- 1.) Set x equal to each solution, $x = a$ & $x = b$.
 - a. If a &/or b are fractions, clear the fractions.
- 2.) Set the Equations equal to zero, $x - a = 0$ & $x - b = 0$
- 3.) These are the 2 factors for the quadratic equation, so $(x - a)(x - b) = 0$
- 4.) Then multiply (FOIL) to put the equation in standard form.

Example:

Find the quadratic equation with solutions 3 & -2.

- 1) $x = 3$ & $x = -2$
- 2) $x - 3 = 0$ & $x + 2 = 0$ so the left hand side of each equation is a linear factor for the quadratic equation.
- 3) $(x - 3)(x + 2) = 0$ is the quadratic equation
- 4) $x^2 + 2x - 3x - 6 = 0 \rightarrow x^2 - x - 6 = 0$ in standard form.

Equations that are **Quadratic in Form** are any equation that can be written as $au^2 + bu + c = 0$, where u is a variable expression. (U Substitution)