Why

Given a, b, c, find x to solve $ax^2 + bx + c = 0$.

Result

Proposition 1. *Let $a, b, c \in \mathbf{R}$. Then both*

$$\frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad \textit{and} \quad \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

are solutions of

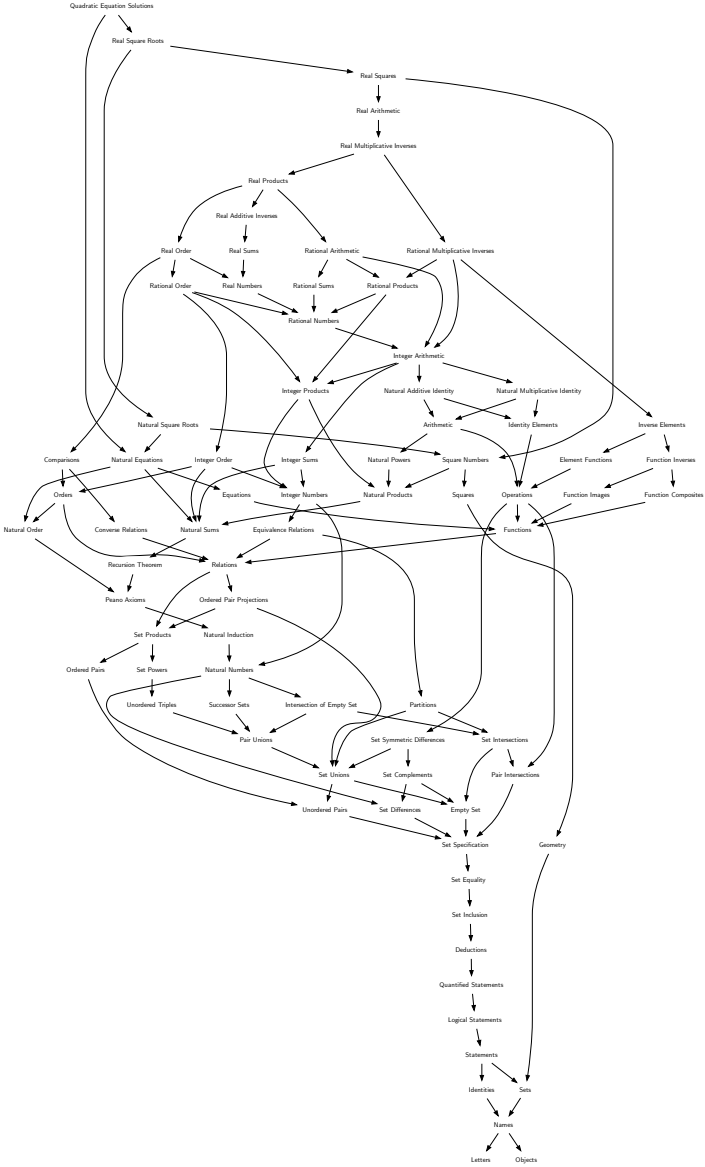
$$ax^2 + bx + c = 0.$$

We call $ax^2 + bx + c = 0$ a *quadratic equation.*[1] The solutions are often writen in short hand

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

which is called the *quadratic formula.*

[1] Future editions will prove via completing the square.


Quadratic Equation Solutions
Real Square Roots
Real Squares
Real Arithmetic
Real Multiplicative Inverses
Real Products
Real Additive Inverses
Real Order
Real Sums
Rational Arithmetic
Rational Multiplicative Inverses
Rational Order
Real Numbers
Rational Sums
Rational Products
Rational Numbers
Integer Arithmetic
Integer Products
Natural Additive Identity
Natural Multiplicative Identity
Arithmetic
Identity Elements
Inverse Elements
Natural Square Roots
Comparisons
Natural Equations
Integer Order
Integer Sums
Natural Powers
Square Numbers
Element Functions
Function Inverses
Orders
Equations
Integer Numbers
Natural Products
Squares
Operations
Function Images
Function Composites
Natural Order
Converse Relations
Natural Sums
Equivalence Relations
Functions
Recursion Theorem
Relations
Peano Axioms
Ordered Pair Projections
Set Products
Natural Induction
Ordered Pairs
Set Powers
Natural Numbers
Unordered Triples
Successor Sets
Intersection of Empty Set
Partitions
Pair Unions
Set Symmetric Differences
Set Intersections
Set Unions
Set Complements
Pair Intersections
Unordered Pairs
Set Differences
Empty Set
Set Specification
Geometry
Set Equality
Set Inclusion
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects