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*

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

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.*

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[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

Natural Fractions

Integer Arithmetic

Integer Products

Natural Additive Identity

Natural Multiplicative Identity

Natural Arithmetic

Identity Elements

Inverse Elements

Natural Square Roots

Comparisons

Integer Order

Integer Sums

Natural Equations

Natural Powers

Element Functions

Function Inverses

Square Numbers

Orders

Integer Numbers

Equations

Natural Products

Operations

Function Composites

Function Images

Squares

Converse Relations

Equivalence Relations

Natural Order

Natural Sums

Functions

Relations

Recursion Theorem

Ordered Pair Projections

Peano Axioms

Set Products

Natural Induction

Ordered Pairs

Set Powers

Natural Numbers

Partitions

Intersection of Empty Set

Unordered Triples

Successor Sets

Set Intersections

Pair Unions

Set Symmetric Differences

Set Unions

Set Complements

Pair Intersections

Unordered Pairs

Empty Set

Set Differences

Set Specification

Geometry

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Identities

Sets

Names

Letters

Objects