

The Discriminant

9th Grade

One calculation that counts the solutions before you look for them.

The discriminant $b^2 - 4ac$ is the part under the root. Its sign tells you how many real solutions exist.

$$\Delta = b^2 - 4ac$$

$$\Delta > 0$$

The parabola crosses the x-axis twice.

two real solutions

$$\Delta = 0$$

The parabola just touches the axis.

one repeated solution

$$\Delta < 0$$

The parabola never reaches the axis.

no real solutions

Δ is a perfect square

Rational solutions, so factoring will work.

it factors nicely

A negative discriminant does not mean 'no answer' — it means the solutions are complex.