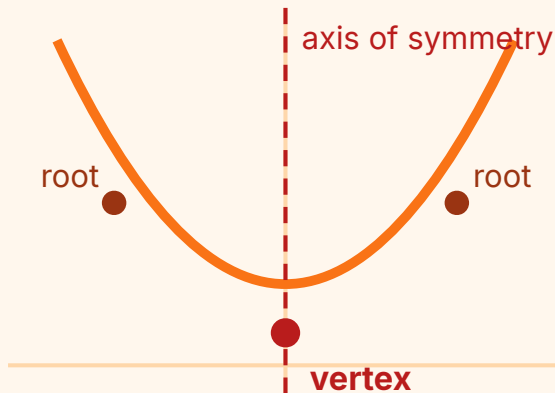


Quadratics

9th Grade

Factoring, the quadratic formula, the discriminant and parabola anatomy.

PARABOLA ANATOMY



$$y = ax^2 + bx + c$$

$a > 0 \rightarrow$ opens up $\cdot a < 0 \rightarrow$ opens down

Axis of symmetry: $x = -b / 2a$

y-intercept is c. Roots are where $y = 0$.

Roots, zeros, solutions and x-intercepts all mean the same thing.

SOLVE BY FACTORING — try this first

$$x^2 + 7x + 12 = 0 \rightarrow (x + 3)(x + 4) = 0 \rightarrow x = -3 \text{ or } -4$$

Find two numbers that multiply to c and add to b. Here: $3 \times 4 = 12$ and $3 + 4 = 7$.

Zero product property: if two things multiply to zero, one of them must be zero.

THE QUADRATIC FORMULA — always works

$$x = (-b \pm \sqrt{b^2 - 4ac}) / 2a$$

Write a, b and c down first, with their signs. Most errors are a lost minus sign.

$$x^2 + 7x + 12: a = 1, b = 7, c = 12.$$

THE DISCRIMINANT $b^2 - 4ac$

positive $\rightarrow$ 2 real roots **zero $\rightarrow$ 1 repeated root** **negative $\rightarrow$ none**

Check it before you factor — it tells you whether factoring will work at all.