

UNIT 02 / 09 · LEARN & TRY

Equations and growing sequences

Name: _____ Date: _____

Goal: Solve accessible equations and calculate an AP term or sum.

Learn

An equation translates a relationship into symbols. Define each variable before forming a pair of linear equations, and retain the units of the quantities represented. Substitution replaces one variable with an expression in the other; elimination combines equations to cancel a variable. Two straight lines may meet once, be parallel, or coincide, giving one, no, or infinitely many solutions. A quadratic equation has degree two and can have two distinct real roots, one repeated real root, or no real roots. Its discriminant is $b^2 - 4ac$. The quadratic formula is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. A numerical answer must also fit the context: a negative length is not acceptable. An arithmetic progression has a constant difference d . Its n th term is $a + (n - 1)d$ and its first n terms sum to $n[2a + (n - 1)d]/2$.

Worked example

Solve $x + y = 9$ and $x - y = 3$. Add the equations: $2x = 12$, so $x = 6$. Substitute into $x + y = 9$ to obtain $y = 3$. Both original equations are satisfied.

1. Solve $x + y = 8$ and $x - y = 2$. [2 marks]

2. Solve $x^2 - 5x + 6 = 0$ by factorisation. [2 marks]

3. Find the discriminant of $x^2 + 4x + 4 = 0$ and describe its real roots. [2 marks]
