AMC Preparation Tips

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What is the AMC?

The American Mathematics Competitions are the first of the series of competitions offered by the Mathematical Association of America.

- The AMC 10A/10B is offered to students in 10^{th} grade and below.
- The AMC 12A/12B is offered to students in 12^{th} grade and below.
- The 2020 AMC 10/12A will take place on Thursday, February 4th, from 7:35 AM to 9:35 AM.
- The 2020 AMC 10/12B will take place on Wednesday, February $10^{\rm th},$ from 7:35 AM to 9:35 AM.

On each test, there are 25 multiple-choice questions to be solved in 75 minutes. The problems are generally sorted in increasing difficulty order. Only scratch paper, rulers, compasses, and erasers are allowed during the competition.

- Correct answers are worth 6 points
- Blank answers are worth 1.5 points
- Incorrect answers are worth zero points.

Students who perform well on the AMC 10 or AMC 12 competitions are invited to participate in the American Invitational Mathematics Examination. Cutoff scores are typically between 105 and 120 for the AMC 10 and between 85 and 100 for the AMC 12.

General Tips

- Do practice problems! All past AMC 10 and AMC 12 problems are available on the Art of Problem Solving website for free. Time yourself as well, so you get a feel for what the pacing of a typical AMC test should feel like.
- During the contest, make sure to organize your work neatly. Personally, I usually put scratch work for each problem on its on page and only use one side of the paper so it makes it easier to check my work.
- Don't be afraid to skip problems. For example, Problem 12 on the 2020 AMC 12B was notoriously hard for its placement.
- Most importantly, don't put too much pressure on yourself to do well. Make sure math is something that's fun for you!

Topics

Here are a list topics that frequently show up on the AMC

Algebra

- Sequences and series
 - Arithmetic series
 - Geometric series
 - Arithmetico-geometric sequence
 - Sum of squares and sum of cubes
 - Recurrence relations
 - Telescoping
- Polynomials
 - Quadratic equation
 - Factoring and expansion
 - * Sums and differences of $n^{\rm th}$ powers

- * Binomial theorem
- Vieta's Formulae
- Rational root theorem
- Equations
 - Substitution
 - Systems of equations
 - Ceilings and floors
- Optimization
 - Minimum or maximum of a quadratic
- Logarithms (AMC 12 only)
- Complex numbers (AMC 12 only)

Combinatorics

- Counting
 - Path counting
 - Permutations and combinations
 - Binomial coefficients
 - Pascal's triangle
- Probability
 - Expected Value
 - Conditional probability
- Casework

Geometry

- 30-60-90 and 45-45-90 triangles
- Similar triangles
- Pythagorean theorem and Pythagorean triples
- Area, surface area, and volume formulae
- Inradius and circumradius formulae
- Area ratios and mass points
- Coordinates
 - Shoelace theorem
- Angle bisector theorem
- Stewart's theorem
- Circles
 - Inscribed angle theorem
 - Power of a point
 - Ptolemy's theorem
- Trigonometry (AMC 12 only)
 - Angle sum and difference identities
 - Pythagorean identity
 - Law of sines
 - Law of cosines
- Conics

Number Theory

- Prime factorization
 - Greatest common factor and least common divisor
 - Number of factors
 - Sum of factors
- Modular arithmetic
 - Chinese remainder theorem
 - Euler's totient function and Euler's theorem
 - Fermat's little theorem
- Bases
- Diophantine equations

Miscellaneous

- Memorization
 - Squares, cubes, and perfect powers
 - Prime numbers
 - Fractions to decimals
 - Factorials
 - Square roots
 - Prime factorizations of years
- Statistics
 - Mean, median, mode, and range