

NMT TOPICS

GRADE LEVEL QUESTIONS: Each grade level set includes the topics from the grades below that level. No calculators are permitted. Each set consists of 15 questions to be answered in 45 minutes.

GRADE 9: All topics taught in Algebra I Common Core and Geometry Common Core, especially: Geometry: areas, perimeters, volumes, Pythagorean Theorem, coordinate geometry (lines), supplementary and complementary angles, angles of a triangle. Algebra: solving linear and quadratic equations; systems of linear equations; solving linear inequalities; radicals, factoring, function notation. Probability: dice rolling, coin flipping, choosing objects. Number theory: prime factorization applications, digit powers and multiples, etc. Verbal Problems: consecutive (odd, even) integer, rate-time-distance, age, percentage, etc.

GRADE 10: All topics taught in Algebra I and II Common Core and Geometry Common Core, especially: Geometry: regular polygons, special right triangles, right triangle trig, circles, similarity, coordinate geometry of polygons and conics, transformations. Algebra: complex fractions, operations with rational expressions, sum and product of the roots of a quadratic equation, solving polynomial (factorable), radical, absolute value, and rational equations, solving quadratic inequalities, arithmetic and geometric sequences and series.

GRADE 11: Geometry: asymptotes and intercepts of algebraic and transcendental functions. Algebra: function operations and transformations; radical expressions; solving absolute value equations and inequalities; solving rational and radical inequalities; expressions, equations and inequalities using logs and exponents; complex number operations. Trigonometry: basic graphs and transformations, trig formulas and relationships, trig equations, laws of sines and cosines. Probability: permutations and combinations, Bernoulli experiment, binomial expansion, counting principles.

GRADE 12: Geometry: graphs of polar coordinates and equations, conics, asymptotes. Algebra: function composition and inverse, solving higher-degree polynomial equations, infinite geometric series, parametric equations. Trigonometry: polar and rectangular coordinate systems, polar forms of complex numbers, DeMoivre's Theorem. Calculus: limits, derivatives, equation of tangent line, function optimization.

MATHLETICS This section consists of 10 grade independent questions to be answered in 30 minutes. Calculators are required to answer some of the questions. These questions are similar in difficulty to the NCIML contests and include topics from algebra, geometry, trigonometry, number theory, and probability.

TEAM PROBLEM SET Each team of five students will submit one set of answers for the 20 questions. They are given 60 minutes for this section. These problems are similar to the Mathletics questions but often require more than one concept to solve.