

Competition A: Open to all Students

Permutations, Combinations, and Probability (Conference Graphing Calculator)

- Contest I Permutations and combinations only (may include circular permutations)
- Contest III Probability. Finite, Independent, and mutually exclusive events.
- Contest V (if selected) Expectations, repeated trials and conditional probability are acceptable.

Conic Sections (No Calculator)

- GENERAL No degenerate forms or rotations; specify standard form or general quadratic form of answer in question; be able to find vertices, foci, and centers (by completing the square); major, minor, transverse, and conjugate axes.
- Contest I Parabola (including latus rectum (focal chord) and directrix), and ellipse only.
- Contest III Hyperbola (including equations of asymptotes) and eccentricity are included.

Competition B: Closed to Seniors

Circles (Conference Graphing Calculator)

- Contest I Non-coordinate approach. Include measures and properties of angles, arc measures, chords, secants, and tangents.
- Contest III Segments, sectors, arc lengths, area and circumference; may include one coordinatized question.

Arithmetic & Geometric Progressions (Conference Graphing Calculator)

- Contest I nth terms; ratio and difference; finite sums and infinite sums; means; no application problems
- Contest III may include one application problem.

Competition C: Closed to Juniors and Seniors

Systems of Equations (No Calculator)

- Contest I 2 x 2 linear systems only with integral coefficients and rational solutions; describe type of system: consistent/independent, consistent/dependent, or inconsistent; No applications
- Contest III 2 x 2 linear systems with rational coefficients and solutions; only one 2 x 2 literal is acceptable; 3 x 3 with integral coefficients and reasonable rational solutions.

Factoring (No Calculator)

- Contest I Greatest common factor; difference of two squares; sum and difference of cubes; general trinomials; at most one of which is impossible (write original polynomial or write "prime"); no grouping.
- Contest III Grouping (4 terms: 2 & 2, 1 & 3, 3 & 1); trinomials and cube square decision; no missing term; no grouping over four terms.

Competition D: Open to Freshmen Only

Linear Equations and Inequalities (No Calculator)

- Contest I May include rational coefficients, but not necessarily. No literals; answers should be in simplified form. Avoid excessive fractions.
- Contest III May include at most one literal equation; simple common factoring in an equation; no literals in inequalities.

Order of Operations/Evaluations (No Calculator)

- Contest I addition, subtraction, multiplication, division of rational numbers; evaluation of expressions with degree no greater than 3; may include square roots; no negative exponents
- Contest III add negative exponents, uniquely defined operations

Competition A: Open to all Students**Functions and Limits (Conference Graphing Calculator)**

GENERAL No need to rationalize limits

Contest II Evaluation of algebraic functions, comparison of graphs [$f(x + 2)$ vs $f(x)$], basic limits (substitution, factor/cancel, infinite), include piecewise functions

Contest IV Left-hand/right-hand limits; "no limit" problems acceptable ("does not exist" – DNE); Include trigonometric, logarithmic, and transcendental functions.

Trigonometric Equations (Conference Graphing Calculator)GENERAL Specify answers in radians ($0 \leq x < 2\pi$) or degrees ($0^\circ \leq x < 360^\circ$); linear equations and factorable quadratic equations are acceptable; no applications

Contest II Reciprocal identities, Pythagorean identities. Even-odd properties.

Contest IV Double and Half-angle formulas.

Competition B: Closed to Seniors**Right Triangle Trigonometry (Conference Graphing Calculator)**

Contest II Pythagorean Theorem; Include exact values for 30-60-90 and 45-45-90, or give sine, cosine, or tangent ratio of one angle; similarity; no tables

Contest IV include trig values of angles evaluated by calculator (degrees only); Other plane figures that can be partitioned into right triangles; may include one application.

Congruence and Similarities (Conference Graphing Calculator)

Contest II No applications; no volume; include areas; Pythagorean Theorem; 30-60-90 and 45-45-90 ratios

Contest IV May include one application problem; include volume..

Competition C: Closed to Jrs and Srs**Quadratic Equations (No Calculator)**

Contest II Quadratic formula, factoring, and rational coefficients; no complex roots

Contest IV May include sums/products of roots; no complex roots and only rational coefficients.

Inequalities (No Calculator)

Contest II First-degree; basic absolute value; second-degree factorable; conjunctions; disjunctions

Contest IV Rational terms; higher degrees in factored form

Competition D: Open to Freshmen Only**Charts, Graphs, & Data (No Calculator)**

Contest II Graphs may include histograms, bar graphs, circle graphs, scatter plot, and line plots.

Contest IV Add mean, median, and mode of a reasonable set of data; also stem and leaf, box & whiskers, outliers.

Systems of Equations (No Calculator)Contest II Linear over integers; 2×2 systems only; no literals, no word problems; no specific method of solution; answer sheet should look like: $x = \underline{\hspace{1cm}}$, $y = \underline{\hspace{1cm}}$.Contest IV Include 3×3 ; but no 3×3 literal systems. 3×3 systems must have integral coefficients and answers; basic 2×2 literals with monomial coefficients; no word problems.

MATHLETES ORAL TOPICS 2012-2013

CONTESTS 1 & 3

Exponential and Logarithmic Equations/Applications (jr/sr)

<u>Finite Mathematics w/Applications</u>	1. 4.1-4.2	pp. 206-222
Lial, Hungerford, Holcomb	3. 4.3-4.4	pp. 222-246
Pearson-Addison Wesley, 2007, 9 th Ed	5. 4.1-4.4	pp. 206-246
ISBN: 0-321-38672-8		

Combinatorics (jr/sr)

<u>Discrete Mathematics</u>	1. 8.1-8.2	pp. 402-415
Dossey, Otto, Spence, Vanden Eynden	3. 8.3-8.4	pp. 416-428
Pearson-Addison Wesley, 2006, 5 th Ed.	5. 8.1-8.4	pp. 402-428
ISBN: 0-321-30515-9		

Equations of Lines (fr/so)

<u>Finite Mathematics w/Applications</u>	1. 2.2	pp. 83-95
Lial, Hungerford, Holcomb	3. 2.3	pp. 96-107
Pearson-Addison Wesley, 2007, 9 th Ed	5. 2.2-2.3	pp. 83-107
ISBN: 0-321-38672-8		

CONTESTS 2 & 4

Taxicab Geometry (jr/sr)

<u>Taxicab Geometry</u>	2. Ch. 1-2	pp. 1-20
Eugene F. Krause	4. Ch. 3-6 *	pp. 21-62
Dover Publications, 1986	5. Ch. 1-6 *	pp. 1-62
ISBN: 0-486-25202-7		

* Taxicab Geometry topics only (NO Euclidean Geometry questions will be asked)

Recurrence Relations (jr/sr)

<u>Discrete Mathematics</u>	2. 9.1-9.2	pp. 458-481
Dossey, Otto, Spence, Vanden Eynden	4. 9.3	pp. 482-505
Pearson-Addison Wesley, 2006, 5 th Ed.	5. 9.1-9.3	pp. 458-505
ISBN: 0-321-30515-9		

Rational Expressions, Exponents, and Radicals (fr/so)

<u>Finite Mathematics w/Applications</u>	2. 1.4	pp. 26-32
Lial, Hungerford, Holcomb	4. 1.5	pp. 32-45
Pearson-Addison Wesley, 2007, 9 th Ed	5. 1.4-1.5	pp. 26-45
ISBN: 0-321-38672-8		