

Competition A: Open to all Students**Complex Numbers (No Calculator)**

- Contest I Bar notation for conjugate; all rectangular . . . no trig;
 Contest III Trig-rectangular; DeMoivre's Theorem; cosine and sine of 30-45-60 degree angles and their multiples

Exponential and Logarithmic Functions (Conference Graphing Calculator)

- Contest I Definition of logarithmic, exponential functions, domain, range, roots, asymptotes, properties and log equations.
 Contest III Will include natural logs ($\ln$), change of base, exponential equations, and at most one application problem.

Competition B: Closed to Seniors**Functions and Graphs (No Calculator)**

- Contest I Polynomials only; given function choose graph; given graph choose function; vertex of quadratic function; composite functions and evaluation of functions at particular values
 Contest III add piecewise function; add reasonable rational functions

Volume and Surface Area (Conference Graphing Calculator)

- Contest I Volume and surface area of prisms and cylinders; no applications.
 Contest III Add surface area and volume of sphere, pyramid, and cone; may include one application problem.

Competition C: Closed to Juniors and Seniors**Truth Tables (No Calculator)**

- Contest I Limit to use of 2 statements p & q ; know disjunction ($\vee$), conjunction ($\wedge$), tautology ($\equiv$), conditional ($\rightarrow$), biconditional ($\leftrightarrow$), and negation ($\sim$).
 Contest III At most one problem with three statements p , q , & r .

Complementary and Supplementary Angles (No Calculator)

- Contest I Basic concepts, all equations developed will be one variable
 Contest III may include quadratic solving, 2×2 system of equations, extraneous answer(s)

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.

Percents (No Calculator)

- Contest I Basic concepts, format of answer specified. All problems require solving a linear equation or evaluation
 Contest III may include at most one mixture type problem which requires the solving of a 2×2 system of equations

Competition A: Open to all Students**Solving Triangles (Conference Graphing Calculator)**

- Contest II Know 30-60-90 and 45-45-90 ratios. Solve right triangles for angles and or sides. Rounding of angles may be decimal or to the nearest minute; no system necessary to solve; no word problems
- Contest IV Include law of sines and law of cosines may include ambiguous case of the law of sines; may require system to solve; no word problems

Asymptotes (No Calculator)

- Contest II horizontal and vertical of algebraic functions.
- Contest IV add logarithmic, exponential, trigonometric functions, slant asymptotes

Competition B: Closed to Seniors**Coordinate Geometry (Conference Graphing Calculator)**

- Contest II Plane figures only; know midpoint, distance, and slope formulas and relationship of slopes of parallel/perpendicular lines; write equations of line and circle; exclude locus; no conics. Form of answer will be stated in question.
- Contest IV Add areas; coordinatizing quadrilaterals and triangles.

Fractional Equations (No Calculator)

- Contest II Denominators are linear or easily factorable; Proportions are acceptable; No systems, no applications, and no complex fractions; quadratic formula or factoring may be required to solve.
- Contest IV may include one problem with complex fractions, may include one literal in the original equation

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

- Contest II No literals; No extraneous solutions; square roots only; may include one problem requiring knowledge of conjugate.
- Contest IV No literals; Square roots only; may include extraneous solutions, may include use of conjugate to solve;

Matrices and Determinants (No Calculator)

- Contest II Add, subtract, and multiply matrices with integral entries; no dimensions larger than three; equal matrices; no systems and no word problems.
- Contest IV Solve simple matrix equations; 2×2 and 3×3 determinants and 2×2 inverses; no systems and no word problems; may include reasonable rational entries.

Competition D: Open to Freshmen Only**Sets and Venn Diagrams (No Calculator)**

- Contest II Universal set, subsets, empty set, union, intersection, complement (A'). No more than two non-empty intersecting subsets of the universal set.
- Contest IV No more than three non-empty intersecting subsets of the universal set. No DeMorgan's Laws in any contest.

Factoring (No Calculator)

- Contest II Greatest common factor; difference of squares; trinomials.
- Contest IV Add sum and difference of cubes
- Contest V (if selected) Grouping 2 and 2

MATHLETES ORAL TOPICS
2010-2011

CONTESTS 1 & 3

Matrix Algebra (jr/sr)

<u>Finite Mathematics w/Applications</u>	1. 6.3, 6.4	P. 325-346
Lial, Hungerford, Holcomb	3. 6.5	P. 347-359
Pearson-Addison Wesley, 2007, 9 th Ed. ISBN: 0-321-38672-8	5. 6.3-6.5	P. 325-359

Sets, Relations, and Functions (jr/sr)

<u>Discrete Mathematics</u>	1. 2.1,2.2-2.4	pp. 41-76
Dossey, Otto, Spence, Vanden Eynden	3. 2.5-2.6	pp. 76-93
Pearson-Addison Wesley, 2006, 5 th Ed. ISBN: 0-321-30515-9	5. 2.1, 2.2-2.6	pp. 41-93

Probability (fr/so)

<u>Finite Mathematics w/Applications</u>	1. 8.3	pp. 461-469
Lial, Hungerford, Holcomb	3. 8.4	pp. 469-480
Pearson-Addison Wesley, 2007, 9 th Ed ISBN: 0-321-38672-8	5. 8.3-8.4	pp. 461-480

CONTESTS 2 & 4

Linear Programming (jr/sr)

<u>Finite Mathematics w/Applications</u>	2. 7.1-7.3	pp. 368-391
Lial, Hungerford, Holcomb	4. 7.4-7.6	pp. 391-422
Pearson-Addison Wesley, 2007, 9 th Ed ISBN: 0-321-38672-8	5. 7.1-7.6	pp. 368-422

Probability (jr/sr)

<u>Discrete Mathematics</u>	2. 8.3-8.4	pp. 416-428
Dossey, Otto, Spence, Vanden Eynden	4. 8.5-8.6	pp. 428-445
Pearson-Addison Wesley, 2006, 5 th Ed. ISBN: 0-321-30515-9	5. 8.3-8.6	pp. 416-445

Sets (fr/so)

<u>Finite Mathematics w/Applications</u>	2. 8.1	pp. 442-451
Lial, Hungerford, Holcomb	4. 8.2	pp. 451-461
Pearson-Addison Wesley, 2007, 9 th Ed ISBN: 0-321-38672-8	5. 8.1-8.2	pp. 442-461