

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

- Contest I Bar notation for conjugate; all rectangular . . . no trig;
 Contest III Trig-Rect or Rect-Trig; DeMoivre's Theorem; cosine and sine of 30-45-60 degree angles and their multiples; problems/answers may be in degrees or radians

Exponential and Logarithmic Functions (No Calculator)

- Contest I Definition of logarithmic, exponential functions, domain, range, roots, asymptotes, and properties
 Contest III May include natural logs (ln), change of base, exponential equations, logarithmic 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 functions and rational functions which may include hole(s).

Volume and Surface Area (No 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

Special Directions – For this competition, 1 will be used for true and 0 will be used for false.

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 x 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. No literals.
 Contest III May include at most one literal equation; at most one equation which 'reduces' to a linear equation; no literals in inequalities.

Percents (No Calculator)

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

Competition A: Open to all Students**Solving Triangles (No Calculator)**

- Contest II Know 30-60-90 and 45-45-90 ratios. Solve right triangles for angles and or sides. no system necessary to solve; no applications; answers may be an expression in terms of a trig function.
- 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 applications; one problem will involve manipulation of a, b, and c to avoid issue of radians and degrees

Asymptotes (No Calculator)

- Contest II horizontal and vertical of algebraic functions; include the x and/or y-coordinates of holes in a graph
- 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 composite shapes.

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; sum of dimensions no greater than eight; equal matrices; no systems and no word problems.
- Contest IV Solve simple matrix equations; 2 x 2 and 3 x 3 determinants and 2 x 2 inverses; no systems and no word problems

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
2019-2020

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.	5. 6.3-6.5	P. 325-359
ISBN: 0-321-38672-8		

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.	5. 2.1, 2.2, 2.4-2.6	pp. 41-93
ISBN: 0-321-30515-9		

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	5. 8.3-8.4	pp. 461-480
ISBN: 0-321-38672-8		

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	5. 7.1-7.6	pp. 368-422
ISBN: 0-321-38672-8		

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.	5. 8.3-8.6	pp. 416-445
ISBN: 0-321-30515-9		

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	5. 8.1-8.2	pp. 442-461
ISBN: 0-321-38672-8		