

Competition A: Open to all students,**Vectors (Conference Graphing Calculator)**

- SWSC I Vector addition; norm of a vector; scalar multiplication; inner (dot) product; parallel, perpendicular (orthogonal) vectors; no 3-space. Specify form of answer. Vectors will be in form $\langle a, b \rangle$
- SWSC III Include angle between vectors; angle between lines; 3-space $\langle a, b, c \rangle$. Specify form of answer.

Series and Sequences (No Calculator)

- SWSC I Arithmetic, Geometric; nth term, sum of n terms, sum of infinite geometric
- SWSC III add harmonic, recursive, other number patterns derived from combinations of arithmetic and geometric sequences

Competition B: Closed to Seniors**Systems of Equations (No Calculator)**

- SWSC I Literals of 2×2 system; 2 or 3 variables over rationals (rational coefficients and rational solutions); describe system as consistent/dependent, consistent/independent, or inconsistent; no quadratic-linear systems; no word problems; no quadratic-quadratic systems; May include $1/x + 2/y$, etc.
- SWSC III May include quadratic-linear or quadratic-quadratic systems; no word problems.

Right Triangle Geometry General restrictions: NO TRIG **(Conference Graphing Calculator)**

- SWSC I Pythagorean theorem; may use 30-60-90 and 45-45-90 right triangle exact relationships; may use similar triangle problems.
- SWSC III May use other plane figures that can be reduced to a right triangle; may include one simple application.

Competition C: Closed to Juniors and Seniors**Word Problems (Conference Graphing Calculator)**

- SWSC I Stress problem-solving skills using non-routine problems, not formulae; be reasonable; no quadratics; no 3×3 or higher system; no digit problems; questions 1 & 2 should be d=rt, mixture, interest, age. Questions 3 and 4 may be non-routine problem.
- SWSC III Same as SWSC I

Linear Functions (No Calculator)

- SWSC I Be able to write the equation of a line in slope-intercept form; state form desired; know x and y intercepts (values or ordered pairs); may include parallel and perpendicular lines. No vertical lines.
- SWSC III At most one application problem.

Competition D: Open to Freshmen Only**Linear Equations and Inequalities (No Calculator)**

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

Exponents & Radicals (No Calculator)

- SWSC I Integral exponents in numeric cases; illustrate properties of exponents, simplify square roots, addition and subtraction of square roots
- SWSC III Simplify expressions with exponents with variables; no fractional exponents (except $\frac{1}{2}$); add multiplication division of square roots; domain for variables positive reals.

Competition A: Open to all students,

Trigonometric Word Problems (Conference Graphing Calculator)

SWSC II SOH-CAH-TOA; angle of elevation and depression.

SWSC IV Law of Sines, Law of Cosines; at most one bearing or heading problem.

Matrix Algebra (Conference Graphing Calculator)

SWSC II Addition, subtraction, multiplication; inverse (2×2); determinants (2×2); solve simple matrix equations; sum of the dimensions must be ≤ 6 ; original matrix – integers.

SWSC IV Determinant (3×3); inverse (3×3); adjoint; cofactor; transpose (notation for A transpose will be A^T).

Competition B: Closed to Seniors

Ratio/Proportion/Variation (Conference Graphing Calculator)

SWSC II either linear solving or at most 2×2 linear system to solve; at most one application problem

SWSC IV add quadratic equations to solve; 3×3 linear systems which can be solved on graphing calculator, may include applications

Area/Perimeter/Volume (No Calculator)

SWSC II Area and Perimeter only; may include solution via solving a system of equations

SWSC IV add volume.

Competition C: Closed to Juniors and Seniors

Polynomials (No Calculator)

SWSC II Addition, subtraction, multiplication; degree, coefficient, evaluation, number of terms

SWSC IV Add division

Probability (No Calculator)

SWSC II Sample space, dice, coins, boy and girl children or similar to this, keep it simple.

SWSC IV Independent, dependent, no combinations or permutations.

Competition D: Open to Freshmen Only

Linear Word Problems (Conference Graphing Calculator)

SWSC II Age, integer, and coin problems; equations must be linear with integral coefficients and easily solvable; systems are not required for solutions.

SWSC IV May also include one number, simple motion, mixture, or simple perimeter problem; no digit problems; systems are not necessary for solutions.

Graphs (No Calculator)

SWSC II Identify quadrants, x-axis, y-axis, origin; identify coordinates of points; identify x-intercept and y-intercept given the graph of a line

SWSC IV Add identify the slope and equation of a line given its graph; identify the point of intersection given the graphs of two lines.

MATHLETES ORAL TOPICS 2011-2012

CONTESTS 1 & 3

Functions and Their Graphs (jr/sr)

<u>Finite Mathematics w/Applications</u>	1. 3.1-3.3	P. 130-163
Lial, Hungerford, Holcomb	3. 3.4-3.5	P. 163-179
Pearson-Addison Wesley, 2007, 9 th Ed.	5. 3.1-3.5	P. 130-179
ISBN: 0-321-38672-8		

Logic (jr/sr)

<u>Discrete Mathematics</u>	1. 10.1-10.2	pp. 529-546
Dossey, Otto, Spence, Vanden Eynden	3. 10.3	pp. 546-559
Pearson-Addison Wesley, 2006, 5 th Ed.	5. 10.1-10.3	pp. 529-559
ISBN: 0-321-30515-9		

Matrices (fr/so)

<u>Finite Mathematics w/Applications</u>	1. 6.3	P. 325-332
Lial, Hungerford, Holcomb	3. 6.4	P. 333-346
Pearson-Addison Wesley, 2007, 9 th Ed.	5. 6.3-6.4	P. 325-346
ISBN: 0-321-38672-8		

CONTESTS 2 & 4

Mathematics of Finance (jr/sr)

<u>Finite Mathematics w/Applications</u>	2. 5.1-5.2	P. 250-267
Lial, Hungerford, Holcomb	4. 5.3-5.4	P. 268-287
Pearson-Addison Wesley, 2007, 9 th Ed.	5. 5.1-5.4	P. 250-287
ISBN: 0-321-38672-8		

Graph Theory (jr/sr)

<u>Discrete Mathematics</u>	2. 4.1-4.2	pp. 154-181
Dossey, Otto, Spence, Vanden Eynden	4. 4.3-4.4	pp. 181-202
Pearson-Addison Wesley, 2006, 5 th Ed.	5. 4.1-4.4	pp. 154-202
ISBN: 0-321-30515-9		

Equations (fr/so)

<u>Finite Mathematics w/Applications</u>	2. 1.6	P. 45-56
Lial, Hungerford, Holcomb	4. 1.7	P. 56-65
Pearson-Addison Wesley, 2007, 9 th Ed.	5. 1.6-1.7	P. 45-65
ISBN: 0-321-38672-8		