**Written Topics for 2013-2014**

* At Meets #3 and #4, calculators will be allowed only for the candy bar contest and the orals.
* All symbolic manipulators, including HP's and the TI-Nspire CAS, are prohibited for the freshmen and sophomore levels at all meets.
* At Meets #1, #2, and #5, any calculator will be allowed at the junior and senior levels.
* Laptops, PDAs, phones, and other non-calculating devices are not allowed.

**Freshmen**

1. Ratios, Proportion and Percent: May include money, interest, discounts, unit conversions, percents of increase decrease and error, and direct variations. It should not require knowledge of advanced algebra. While questions should not be trivial, they should be approachable to most contestants.
2. Counting Basics and Simple Probability: Includes tree type problems, combinations, and permutations, with the emphasis on organized thinking, not using formulas.
3. **NO CALCULATOR**. Linear Equations and Inequalities: Includes word problems leading to linear equations and inequalities, as well as simple absolute value equations and inequalities.
4. **NO CALCULATOR**. Number Theory and Divisibility: May include patterns (such as trailing zeros), factors, primes, divisibility rules, unique factorization, LCM, GCD, and their relationships.

**Sophomores**

1. Perimeter, Area, and Surface Area: including squares, triangles, rectangles, circles, and shapes made from these, including the Pythagorean Theorem.
2. Geometric Probability: emphasis on the concept of geometric probability rather than on difficult geometry problems. Students are not required to have a comprehensive knowledge of geometry.
3. **NO CALCULATOR**. Right Triangles: All things fun about right triangles. May include Pythagorean Theorem (and triples), altitude to hypotenuse, related circles and centers, special right triangles, right triangle trigonometry.
4. **NO CALCULATOR**. Advanced Geometry Topics Restricted to: Brahmagupta’s formula, point to line distance formula, area of a triangle given vertices, Stewart’s Theorem, Ptolemy’s Theorem, Mass points, inradius and circumradius, Ceva’s Theorem, and Theorem of Menelaus. A good reference would be Geometry by Rhoad, Milauskas, and Whipple, Chapter 16.

**Juniors**

1. Systems of Linear Equations and Inequalities with Applications: May include absolute value, intersections, area and/or perimeter of a region, corner points, slopes, distances, types of systems.
2. Probability: the standard treatment of probability. It may include combinations, permutations, mutually exclusive events, dependent and independent events, and conditional probability. It should not include binomial distribution nor expected value.
3. **NO CALCULATOR**. Logarithms and Exponents: May include domain and range, graphing, logarithms with positive bases including natural and common logs, emphasis on properties, exponential logarithmic growth and decay, and applications. No complex numbers.
4. **NO CALCULATOR**. Sequences and Series: Including, but not restricted to, sequences and series defined by recursion, iteration, or pattern; may include arithmetic, geometric, telescoping, and harmonic sequences and series. No calculus.

**Seniors**

1. Geometric Transformations Using Matrices on a Plane: In two dimensions. Includes reflections, rotations, translations, dilations, shears, and compositions. Standard treatment using Algebra 2 texts. For shears refer to Mathematics of Matrices, by Phillip Davis. Ginn and Co., 1965, Library of Congress: 64-24818. Pages 125-161
2. Probability: may include combinations, permutations, mutually exclusive events, dependent and independent events, conditional probability, Bayes Theorem, binomial distribution, expected value, and some simple geometric probability.
3. **NO CALCULATOR**. Algebra of Complex Numbers: Simplifying and factoring, solving linear and quadratic equations with complex coefficients, solving linear systems with complex coefficients, vectors, polars, and powers of pure imaginary numbers, including DeMoivre's Theorem.
4. **NO CALCULATOR**. Conics: including locus definitions, eccentricity, and focus/directrix properties. No parametrics, no polar, and no rotations.

**Oral Topics for 2013-2014**

* Meet 1: **Voting Methods**. For All Practical Purposes, by COMAP. Chapters 12 (Social Choice) and 13 (Weighted Voting Systems) in edition 6. These are chapters 11 and 12 in the 4th edition..
* Meet 2: **Theory of Congruences**. Elementary Number Theory, by David Burton. Chapter 4.
* Meet 3: **Parametric Equations**. Anayltic Geometry, by Gordon Fuller and Dalton Tarwater. Chapter 8.
* Meet 4: **I will send out as soon as test writers come up with the topic and resourse** .