



# MATH OLYMPIAD

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## Course Description:

This course is designed to focus on mathematical thinking and problem-solving strategies. In class, students will be given 10 to 20 problems to solve and discuss. This helps students to learn and practice the critical thinking skills needed to analyze, solve, and explain complex math problems.

## Pre-requisite

The students need solid knowledge and understanding in Number Theory, Algebra, Geometry, Counting and Basic Probability. The course is recommended for current and upcoming middle school students.

## Expectation:

Students are expected to come to class keen to learn with focus and give their best efforts during class time.

## Curriculum:

Focusing on Problem-Solving Strategies: Reverse engineering, look for a pattern, draw a picture, make a list, etc

- Week 1-5: Focusing on Number Theory: Fundamental theorem of arithmetic. Focusing on but not limited to Primes and Composites, Prime factorization, base numbers, introduction to modular arithmetic, divisibility rules, number sense, etc.
- Week 6-15: Focusing on Algebra: Algebra thinking and expression, focusing on but not limited to exponents, logarithms, complex numbers, linear and quadratic equations, factorizations and manipulations, sequences and series, polynomials, self-similarity, etc.
- Week 16-20: Focusing on Counting & Probability: Data analysis, Proportional reasoning. Focusing on but not limited to Basic and Complex counting techniques, Combination and Permutation, Geometry probability, Pascal's triangle, Hockey Stick Identity, Binomial Theorem.
- Week 21-30: Focusing on Geometry: Problem solving strategies such as the extra line strategy, assigning variables, etc. Focusing on but not limited to Triangles, Quadrilaterals, Polygons, Circles, Three-dimensional geometry, curved surfaces and Analytic Geometry.

## Materials:

Students are expected to bring appropriate materials to the class.

- Students need to have a notebook specific to this class
- Students need to do all the tasks in pencils
- Students recommend to bring a school calculator (no smartphones or iPads)

## Classroom Rules:

School policies are followed as outlined in the school-wide Student Code of Conduct. Rules are based on a foundation of Respect & Accountability.

## Websites to visit:

- Math Counts - <https://www.mathcounts.org/>
- Challenge 24 practice - <https://www.4nums.com/>
- The International Mathematical Olympiad (IMO) - <https://www.imo-official.org/>