Math 8 Honors: Course Syllabus

Website: BCMath.ca

Level: Grade 8 Enrichment / Math Contest Preparation

Curriculum: BC Ministry of Education Math 8 (Enriched)

Course Overview

Math 8 Honors is designed for motivated students who seek a deeper understanding of mathematical principles. While covering the core British Columbia Grade 8 learning standards, this course emphasizes **Number Theory**, **Advanced Algebra**, and **Geometric Problem Solving**. It is specifically tailored to build the critical thinking skills required for national and international math competitions.

Chapter 1: Number Theory and Logical Reasoning

- **Description:** Students move beyond basic arithmetic to explore the DNA of numbers. This unit focuses on the properties of integers and the logic of divisibility, providing the "mental tools" needed for fast-paced contest math.
- **Sections:**
    - 1.1 Basic Operations with Integers
    - 1.2 Perfect Squares and Cubes
    - 1.3 Multiplication Strategies
    - 1.4 Order of Operations (Complex BEDMAS)
    - 1.5 Factors, Prime Factorization, GCF, and LCM
    - 1.6 Divisibility Rules (2 through 12)
    - 1.7 Strategies for Mental Math Mastery

Chapter 2: Algebra and Factoring

- **Description:** This chapter introduces formal algebraic manipulation and the art of factoring. Students learn to translate complex word problems into solvable equations—a key skill for the AMC 8.
- **Sections:**
    - 2.1 Solving Simple and Multi-Step Equations

- 2.2 Equations with Fractions and the Distributive Property
- 2.3 Solving Problems with Equations (Word Problems)
- 2.4 Equations Involving Reciprocals and Square Roots
- 2.5 Multiplying and Dividing Algebraic Terms
- 2.6 Expanding Polynomials
- 2.7 Factoring: GCF and Intro to Trinomials
- 2.8 Difference of Squares

Chapter 3: Percents, Rates, and Ratios

- **Description:** Focusing on proportional reasoning, this unit explores how quantities relate to one another. Students master financial literacy and "Rate of Change" problems commonly found in Math Challengers competitions.
- **Sections:**
  - 3.1 Advanced Percentages (Greater than 100%, Less than 1%)
  - 3.2 Conversions: Fractions, Decimals, and Percentages
  - 3.3 Two-Term and Three-Term Ratios
  - 3.4 Speed, Time, and Distance (S.T.D.) Problems
  - 3.5 Rate of Change and Unit Price Analysis

Chapter 4: Pythagorean Theorem and Mixed Radicals

- **Description:** Moving into geometry, students discover the power of the Pythagorean relationship. The honors component introduces "Mixed Radicals," preparing students for the radical arithmetic they will face in Grade 10.
- **Sections:**
  - 4.1 Understanding Squares and Square Roots
  - 4.2 Pythagorean Theorem and Pythagorean Triples

- 4.3 Applications and Multi-Step Right Triangle Problems
- 4.4 Simplifying Radicals (Mixed vs. Entire)

Chapter 5: Similar Triangles and 2D Shapes

- **Description:** This unit focuses on spatial reasoning. Students use proportions to solve for missing dimensions in similar shapes and explore complex area problems involving quadrilaterals and circles.
- **Sections:**
  - 5.1 Area: Rectangles, Triangles, and Parallelograms
  - 5.2 Area and Circumference of Circles
  - 5.3 Proportionate Lengths and Areas of Triangles
  - 5.4 Similar Triangles: Identification and Proofs
  - 5.5 Problem Solving with 2D Composite Shapes

Chapter 6: 3D Solids: Surface Area and Volume

- **Description:** Students transition to 3D space, calculating the "capacity" and "skin" of various solids. The course includes complex composite solids and the relationship between nets and 3D objects.
- **Sections:**
  - 6.1 Volume of Prisms and Pyramids
  - 6.2 Volume and Surface Area of Cylinders
  - 6.3 Volume and Surface Area of Spheres
  - 6.4 Nets of Solids and 3D Visualization

Chapter 7: Linear Relations and Graphing

- **Description:** This chapter introduces coordinate geometry. Students learn to represent patterns visually, laying the groundwork for the study of linear functions in high school math.
- **Sections:**
    - 7.1 Table of Values (TOV) and Linear Patterns
    - 7.2 Understanding Slopes (Rate of Change)
    - 7.3 Graphing Lines with Intercepts
    - 7.4 Midpoint and Distance Formulas
    - 7.5 Parallel and Perpendicular Lines

Chapter 8: Statistics and Probability

- **Description:** The final chapter covers data analysis and the math of "chance." Honors students are introduced to counting principles (Permutations and Combinations), which are essential for the final questions of any math contest.
- **Sections:**
    - 8.1 Measures of Central Tendency (Mean, Median, Mode)
    - 8.2 Interpreting Data: Bar and Circle Graphs
    - 8.3 Sampling Methods and Bias
    - 8.4 Basic Probability and Independent Events
    - 8.5 Fundamental Counting Principle, Permutations, and Combinations