

# **Canterbury High School**

Ottawa-Carleton District School Board

## **Mathematics Department**

Semester I – 2010 / 11 – Course Outline

<b>Course Title: Principles of Mathematics</b>	<b>Grade Level: 10</b>
<b>Course Code: MPM2D</b>	<b>Credit Value: 1.0</b>
<b>Prerequisite: MPM1D</b>	

**Teachers:** M. Corrigan, K. Evans, D. Hughson, L. Lithwick

### **Course Overview** 110 hours

This course enables students to broaden their understanding of relationships and extend their problem-solving and algebraic skills through investigation, the effective use of technology, and abstract reasoning. Students will explore quadratic relations and their applications; solve and apply linear systems; verify properties of geometric figures using analytic geometry; and investigate the trigonometry of right and acute triangles. Students will reason mathematically and communicate their thinking as they solve multi-step problems.

### **Strands:**

#### **Course Expectations**

As students work through the course they will develop a set of skills that will support lifelong learning in mathematics. These skills are a set of seven mathematical processes that are embedded throughout all of the course expectations; they are, problem-solving, reasoning and proving, reflecting, selecting tools and computational strategies, connecting, representing, and communicating. This course will provide students with rich problem-solving opportunities that will help the student develop and apply these processes.

#### **A. Quadratic Relations**

By the end of the course, students will:

1. determine the basic properties of quadratic relations;
2. relate transformations of the graph of  $y = x^2$  to the algebraic representation  $y = a(x - h)^2 + k$ ;
3. solve quadratic equations and interpret the solutions with respect to the corresponding relations;
4. solve problems involving quadratic relations.

#### **B. Analytic Geometry**

By the end of the course, students will:

1. model and solve problems involving the intersection of two straight lines;
2. solve problems using analytic geometry involving properties of lines and line segments;
3. verify geometric properties of triangles and quadrilaterals, using analytic geometry.

## C. Trigonometry

By the end of the course, students will:

1. use their knowledge of ratio and proportion to investigate similar triangles and solve problems related to similarity;
2. solve problems involving right triangles, using the primary trigonometric ratios and the Pythagorean theorem;
3. solve problems involving acute triangles, using the sine law and the cosine law.

### **Units of Study**

1. Linear Systems (~3 weeks)  
Linear systems are introduced and methods such as graphing, substitution, and elimination are used to find solutions. Word problems are modelled then solved for topics such as solutions, number, money, and distance-speed-time.
2. Analytic Geometry (~3 weeks)  
Equations for the midpoint and length of a line segment are developed and used. The equation for a circle centred at (0, 0) is examined and calculations are done to find the radius when given the equation and vice versa. Geometric properties are verified using the slope, midpoint, and length of a line segment (e.g., verify that the diagonals of a square bisect each other).
3. Algebra (~3 weeks)  
Adding and subtracting algebraic expressions are reviewed. Expanding and simplifying second-degree polynomials as well as factoring expressions are studied.
4. Quadratic Relations (~3 weeks)  
Quadratic relations are investigated and graphed using a table of values. Key features of a quadratic function are studied and first and second differences are used to distinguish linear from quadratic functions. Transformations are investigated for  $y=a(x-h)^2 + k$  and the functions are sketched.
5. Solving Quadratic Equations (~2 weeks)  
Quadratic equations are solved by graphing, factoring, and using the quadratic formula. Determine the connection between factors of a quadratic expression and the x-intercepts for a graph. Completing the square is studied to convert from standard form to vertex form. Real world applications are examined and solved.
6. Trigonometry (~3 weeks)  
Investigate ratios in similar triangles. Learn about the primary trigonometric ratios and use them to solve problems with right triangles. Investigate and learn the sine and cosine law, solving problems with acute triangles.

## **Teaching Strategies**

Students will have the opportunity to learn in a variety of ways; individually, cooperatively, investigative, teacher directed class discussion and notes.

## **Assessment and Evaluation Strategies**

Student achievement will be monitored through the use of formative assessments in the form of quizzes, assignments, observations. Feedback on these assessments will provide the student with information to determine their level of understanding of the concepts. Student achievement will be recorded through the use of quizzes, tests, assignments/tasks. The percentage grade will represent the quality of the student's overall achievement of the expectations for the course and reflect the corresponding level of achievement as described in the achievement chart.

## **Evaluation Summary**

Term Evaluation (70%) comprised of:

- |    |  |         |
|----|--|---------|
| a) | <u>Knowledge and Understanding</u><br>(Understand the concepts and computational skills of specific expectations)  | - 24.5% |
| b) | <u>Application</u><br>(Knowing when and how to use appropriate tools and concepts to solve problems)   | - 24.5% |
| c) | <u>Thinking, Inquiry, Problem Solving</u><br>(Being able to use critical and creative thinking skills to solve problems, connect ideas from other strands) | - 10.5% |
| d) | <u>Communication</u><br>(Reflect and express through writing a mathematical solution or concept)   | - 10.5% |

Summative Evaluation (30%) comprised of:

- |    |                                   |       |
|----|-----------------------------------|-------|
| a) | <u>Summative Task</u> (Boardwide) | - 10% |
| b) | <u>Examination</u> (Boardwide)    | - 20% |

## **References**

[www.edu.gov.on.ca/eng/curriculum/secondary/math910curr.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/math910curr.pdf)

## **Student Resources / Texts**

1. Mathpower 10, McGraw-Hill Ryerson, 2000.