



Insight Academy of Canada

Course Outline

Course Title	Principles of Mathematics, Grade 10, Academic (MPM2D)
Grade	10
Course Type	Academic
Course Code	MPM2D
Credit Value	1.0
Curriculum Policy Documents	The Ontario Curriculum, Grades 9 and 10: Mathematics, 2005 (revised) Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools, 2010
Prerequisite(s)	Principles of Mathematics, Grade 9, Academic (MPM1D) or Foundations of Mathematics, Grade 9, Applied (MFM1P) and Mathematics Transfer Course, Grade 9 (MPM1H)

Course Description

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.

Overall Curriculum Expectations

A. Quadratic Relations of the Form $y = ax^2 + bx + c$	
By the end of this course, students will:	
A1	Determine the basic properties of quadratic relations;
A2	Relate transformations of the graph of $y = x^2$ to the algebraic representation $y = a(x - h)^2 + k$;
A3	Solve quadratic equations and interpret the solutions with respect to the corresponding relations;
A4	Solve problems involving quadratic relations.
B. Analytic Geometry	
By the end of this course, students will:	
B1	Model and solve problems involving the intersection of two straight lines;
B2	Solve problems using analytic geometry involving properties of lines and line segments;
B3	Verify geometric properties of triangles and quadrilaterals, using analytic geometry.
C. Trigonometry	
By the end of this course, students will:	
C1	Use their knowledge of ratio and proportion to investigate similar triangles and solve problems related to similarity;
C2	Solve problems involving right triangles, using the primary trigonometric ratios and the Pythagorean theorem;
C3	Solve problems involving acute triangles, using the sine law and the cosine law.

Outline of Course Content

Unit No.	Unit Title	Instructional Time	Overall Expectations
1	Review	8 hours	B1
2	Linear System	15 hours	B1, B2

3	Analytic Geometry	15 hours	B3
4	Properties of Quadratics	14 hours	A1
5	Algebra of Quadratics	15 hours	A3
6	Quadratics: Putting it All Together	15 hours	A2, A4
7	Trigonometry	28 hours	C1, C2, C3
Total Instructional Time		110 HOURS	
8	Final Exam	3 hours	All

Unit Descriptions

The entire course is delivered online

Unit 1: Review

This unit will review prerequisite skills from Grade 9 of exponent laws and simplifying and solving algebraic equations and expressions. Slope and intercepts of a line are reviewed and the equation of line in various forms is also reinforced.

Overall and Specific Expectations: B1

Unit 2: Linear System

Linear systems are modelled with real world applications. Student will explore 3 methods of solving linear systems; graphically, substitution and elimination.

Overall and Specific Expectations: B1, B2

Unit 3: Analytic Geometry

Students will explore the relationship between lines, triangles and circles. Students will explore points, line segments, and circles from an algebraic perspective on the Cartesian plane. Students will develop formulae for the length of a line segment, the coordinates of the midpoint of a line segment, and the equation of a circle centered about the origin. These formulas will be used to verify geometric properties of two-dimensional shapes.

Overall and Specific Expectations: B3

Unit 4: Properties of Quadratics

In this unit, students will explore the parabola as a model to fit to data and also the connections between the graph and equation of a parabola. Quadratics expressions in vertex, standard and factored form are introduced.

Overall and Specific Expectations: A1

Unit 5: Algebra of Quadratics

In this unit student will learn binomial expansion and various factoring methods. Students will learn how to complete the square in order to change to vertex form. Applications of various

quadratics will be explored.

Overall and Specific Expectations: A3

Unit 6: Quadratics: Putting it All Together

Students will model various quadratic problems and develop methods of solving these. The quadratic formula is introduced and factoring methods from previous unit will be used. Transformations of a standard parabola will be illustrated and students will learn how to describe the transformations.

Overall and Specific Expectations: A2, A4

Unit 7: Trigonometry

This unit will introduce right angle trigonometry and trigonometric ratios. Students will use the trigonometric ratios and Pythagorean theorem to solve various application problems. Students will learn cosine law and sine law to solve triangles that are not right angled. Various real life applications will be solved using trigonometry.

Overall and Specific Expectations: C1, C2, C3

Teaching and Learning Strategies

Effective instruction is key to student success and students learn best when they are engaged in a variety of ways of learning. Teachers at Insight Academy of Canada (IAC) provide numerous opportunities and use a variety of instructional, assessment, and evaluation strategies to help students develop skills of inquiry, problem solving, and communication as they investigate and learn fundamental concepts. The activities offered enable students not only to make connections among these concepts throughout the course but also to relate and apply them to relevant societal, environmental, and economic contexts. Opportunities to relate knowledge and skills to these wider contexts will motivate students to learn and to become lifelong learners.

The following seven mathematical process expectations describe a set of skills that support lifelong learning in mathematics and that students need to develop on an ongoing basis, as they work to achieve the expectations outlined within the course.

- Problem Solving: develop, select, apply, compare, and adapt a variety of problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding;
- Reasoning and Proving: develop and apply reasoning skills to make mathematical conjectures, assess conjectures, and justify conclusions, and plan and construct organized mathematical arguments;
- Reflecting: demonstrate that they are reflecting on and monitoring their thinking to help clarify their understanding as they complete an investigation or solve a problem;
- Selecting Tools and Computational Strategies: select and use a variety of concrete, visual, and electronic learning tools and appropriate computational strategies to investigate mathematical ideas and to solve problems;
- Connecting: make connections among mathematical concepts and procedures, and relate mathematical ideas to situations or phenomena drawn from other contexts;

- Representing: create a variety of representations of mathematical ideas, connect and compare them, and select and apply the appropriate representations to solve problems;
- Communicating: communicate mathematical thinking orally, visually, and in writing, using precise mathematical vocabulary and a variety of appropriate representations, and observing mathematical conventions.

Each unit of the course contains a Unit Overview, a number of lessons, a Mid-Unit Quiz, a Unit Test, and a Unit Exit Card. Lessons are delivered through the following format.

- Mind on. Students are introduced to the content through a variety of exploratory and instructional strategies including watching online videos.
- Actions. Students practice and apply their new learning through worked examples, investigation, and exploration. Students are actively engaged in their assessment process as they monitor their own learning to determine their next steps and set individual learning goals.
- Consolidation. Students are provided opportunities to demonstrate what they have learned through independent practice, reflection assignments, and discussion posts (Exit Slip).
- Extension Activities. Students study extra lesson resources, complete homework assignment, and response to teacher’s follow-up questions to expand their learning and prepare for unit test.

A variety of teaching and learning strategies will be used in this course.

<p>Direct Instruction Strategies</p> <ul style="list-style-type: none"> • Online lecture • Video/Animation • Examples of full solutions • Scaffolding • Administering probes and/or prompts • Providing descriptive feedback • Providing pictorial or diagram presentation • Allowing independent practice and individually paced instruction • Teacher modelling • Providing individual instruction • Class activity, practice • Class and 1:1 Discussion/Chat • Student-Teacher Conferences • Q&A • Review, Seminar • Virtual Office Hours 	<p>Independent Learning Strategies</p> <ul style="list-style-type: none"> • Homework Q&A • Handout, Work and Task Sheet • Class Investigations • Independent Study (teacher direction) • Self-Assessment • Self-regulation • Self-reflection • Exit Card • Survey • Learning Log • ePortfolio • Computer-Assisted Instruction • Interactive Online Activity • Student Exploration Tasks • Simulation • Graphing Software
<p>Cooperative Strategies</p> <ul style="list-style-type: none"> • Discussion Boards • Group/Peer Discussion (Think-Pair-Share) • Emails • Peer Conferencing • Peer Assessment • Peer Feedback 	<p>Thinking-Skills Strategies</p> <ul style="list-style-type: none"> • Opinion Sharing/Commentary Offering • Oral Explanation • Presentation • Problem-Based Learning • Problem Solving • Reasoning and Proving • Reflective Thinking • Research Process

Strategies for Assessment & Evaluation of Student Performance

Insight Academy of Canada's (IAC) Assessment and Evaluation policy is aligned with the Ministry of Education's Growing Success policy document which outlines the assessment, evaluation, and reporting policies and practices in Ontario schools.

Basic Considerations

The primary purpose of assessment and evaluation is to improve student learning. Assessment is the process of gathering information from a variety of sources that accurately reflects how well a student is achieving the curriculum expectations in a course. Evaluation refers to the process of judging the quality of student learning on the basis of established performance standards, and assigning a value to represent that quality.

In order to ensure that assessment and evaluation are valid and reliable, and that they lead to the improvement of student learning, IAC teachers will use assessment and evaluation strategies that:

- are fair, transparent, and equitable for all students;
- support all students, including those with special education needs, those who are learning the language of instruction (English or French), and those who are First Nation, Métis, or Inuit;
- are carefully planned to relate to the curriculum expectations and learning goals and, as much as possible, to the interests, learning styles and preferences, needs, and experiences of all students;
- are communicated clearly to students and parents at the beginning of the school year or course and at other appropriate points throughout the school year or course;
- are ongoing, varied in nature, and administered over a period of time to provide multiple opportunities for students to demonstrate the full range of their learning;
- provide ongoing descriptive feedback that is clear, specific, meaningful, and timely to support improved learning and achievement;
- develop students' self-assessment skills to enable them to assess their own learning, set specific goals, and plan next steps for their learning

Evaluation and Reporting of Student Achievement

Insight Academy of Canada's (IAC) will use the Provincial Report Card, Grades 9–12, for formal written reports to students and parents two times a term. The report card provides a record of the student's achievement of the curriculum expectations in the course, at particular points in the school year or term, in the form of a percentage grade. The percentage grade represents the quality of the student's overall achievement of the expectations for the course and reflects the corresponding level of achievement as described in the achievement chart for the discipline.

A final grade is recorded for the course, and a credit is granted and recorded for the course in which the student's grade is 50% or higher. The final grade for the course will be determined as follows:

- Seventy per cent of the grade will be based on evaluations conducted throughout the course. This portion of the grade will reflect the student's most consistent level of achievement

throughout the course, although special consideration will be given to more recent evidence of achievement.

- Thirty per cent of the grade will be based on a final evaluation in the form of an examination and administered at the end of the course.

Assessment and Evaluation Categories and Weights			
Achievement Categories	Percent	Evaluation for Final Grade	Percent
Knowledge/Understanding	25%	Term Work	70%
Inquiry/Thinking	25%		
Communication	25%	Final Evaluation	30%
Application	25%		

Reporting on Demonstrated Learning Skills & Work Habits

The report card provides a record of the learning skills demonstrated by the student in every course, in the following six categories: Responsibility, Organization, Independent Work, Collaboration, Initiative & Self-regulation. These learning skills and work habits are evaluated using a four-point scale (E-Excellent, G-Good, S-Satisfactory, N-Needs Improvement). The separate evaluation and reporting of the learning skills and work habits in these six areas reflect their critical role in students' achievement of the curriculum expectations. To the extent possible, the evaluation of learning skills and work habits, apart from any that may be included as part of a curriculum expectation in a course, should not be considered in the determination of percentage grades.

In order to ensure that assessment and evaluation are valid and reliable, and that they lead to the improvement of student learning, I.A.C teachers use a variety of strategies throughout the course.