

# Course Outline

School Name:	KEEWAYTINOOK INTERNET HIGH SCHOOL
Department Name:	Mathematics
Ministry of Education Course Title:	Principals of Mathematics, Grade 9, Academic
Grade Level:	9
Ministry Course Code:	MPM1D

Teacher's Name: Angela Batsford-Mermans

Developed by: Christine Avgeropoulos Date: October 2009

Revision Date: September 2017

Developed from: Ontario Curriculum, Grades 9 and 10 Mathematics, 2005

Text: Mathpower 9, McGraw-Hill Ryerson, Ontario Edition, 2006

Prerequisite: None

Credits: One

Length: 110 hours

Principal's Name: Kevin Dempsey

Principal's Approval (signature)



Approval Date: September 11, 2017

# Course Description/Rationale

This course enables students to develop an understanding of mathematical concepts related to algebra, analytic geometry, and measurement and geometry through investigation, the effective use of technology, and abstract reasoning. Students will investigate relationships, which they will then generalize as equations of lines, and will determine the connections between different representations of a linear relation. They will also explore relationships that emerge from the measurement of three dimensional figures and two dimensional shapes. Students will reason mathematically and communicate their thinking as they solve multi-step problems.

## Overall Curriculum Expectations

### Number Sense and Algebra

- Demonstrate an understanding of the exponent rules of multiplication and division, and apply them to simplify expressions.
- Manipulate numerical and polynomial expressions, and solve first-degree equations.

### Linear Relations

- Apply data-management techniques to investigate relationships between variables.
- Demonstrate an understanding of the characteristics of a linear relation.
- Connect various representations of a linear relation.

### Analytic Geometry

- Determine the relationship between the form of an equation and the shape of its graph with respect to linearity and non-linearity.
- Determine, through investigation, the properties of the slope and y-intercept of a linear relation.
- Solve problems involving linear relations.

### Measurement and Geometry

- Determine, through investigation, the optimal values of various measurements.
- Solve problems involving the measurements of two-dimensional shapes and the surface areas and volumes of three dimensional figures.
- Verify through investigation facilitated by dynamic geometry software, geometric properties and relationships involving two-dimensional shapes, and apply the results to solving problems.

## Course Content

Unit	Length
Mathematical Processes	13 Hours
Relations	12 Hours
Polynomials	12 Hours
Equations	12 Hours
Modeling with Graphs	12 Hours
Analyze Linear Relationships	13 Hours
Geometric Relationships	12 Hours
Measurement Relationships	12 Hours
Optimizing Measurements	12 Hours
<b>Total</b>	110 hours

# ***Unit Descriptions***

## **Unit 1 - Mathematical Processes**

Problem solving, communicating; connecting; representing; selecting tools and computational strategies; reasoning and proving; reflecting.

## **Unit 2 - Relations**

Hypothesis and sources of data; sampling principles; use of scatter plots to analyze data; trends, interpolation, and extrapolation; linear and non-linear relations, distance-time graphs.

## **Unit 3 - Polynomials**

Build algebraic models using concrete material; work with exponents; discover the exponent laws; communicate with algebra; collect like terms; add and subtract polynomials and distributive property.

## **Unit 4 - Equations**

Solve simple equations; solve multi-step equations; solve equations involving fractions; modeling with formulas; modeling with algebra.

## **Unit 5 - Modeling with Graphs**

Direct variation; partial variation; slope; slope as a rate of change; first differences; connecting variation, slope, and first differences.

## **Unit 6 - Linear Relations**

The equation of a line in slope y-intercept form, the equation of a line in standard form; graph a line using intercepts; parallel and perpendicular lines; find an equation for a line given the slope and appoint; find an equation for a line given two points; linear systems.

## **Unit 7 - Geometric Relationships**

Angle relationships in triangles; angle relationships in quadrilaterals; angle relationships in polygons; midpoints and median in triangles; midpoints and diagonals in quadrilaterals.

## **Unit 8 - Measurement Relationships**

Apply the Pythagorean Theorem; perimeter and are of composite figures, surface area and volume of prisms and pyramids; surface area of a cone; volume of a cone; surface area of a sphere; volume of a sphere.

## **Unit 9 - Optimizing Measurements**

Investigate measurement concepts; perimeter and area relationships of a rectangle; minimize the surface area of a square-based prism; maximize the volume of a square-based prism; maximize the volume of a cylinder; minimize the surface area of a cylinder.

# ***Teaching/Learning Strategies***

This course is organized into an eight-week series of lessons and activities that will be presented to students in remote northern communities via the internet. The eighth week will be used for course consolidation, review and the final examination. Teacher and students will communicate over the internet, while mentors in the classrooms will assume the role of liaison between the teacher and student.

A variety of strategies will be used in the online delivery of this course. Some instructional strategies include

- whole class, small group and individual instruction;
- computer-assisted instruction;
- hands-on learning experiences;
- reinforcing math skills through interactive games;
- review of previously learned material;
- pre-teaching of key vocabulary;
- problem-solving instruction;
- graphic organizers.

Learning goals will be discussed at the beginning of each assignment and success criteria will be provided to students. The success criteria are used to develop the assessment tools in this course, including rubrics, checklists, and exemplars.

# Evaluation

The final grade will be determined as follows (Ontario Ministry of Education, 2010):

- Seventy per cent of the grade will be based on evaluation conducted throughout the course. This portion of the grade should reflect the student's most consistent level of achievement throughout the course, although special consideration should be given to more recent evidence of achievement.
- Thirty per cent of the grade will be based on a final evaluation administered at or towards the end of the course. This evaluation will be based on evidence from one or a combination of the following: an examination, a performance, an essay, and/or another method of evaluation suitable to the course content. The final evaluation allows the student an opportunity to demonstrate comprehensive achievement of the overall expectations for the course (p. 47).

Ontario Ministry of Education. (2010). *Growing success: Assessment, evaluation and reporting in Ontario schools*. Toronto ON: Queen's Printer for Ontario.

Type of Assessment	Category	Details	Weighting (%)
Term Work (70%)	Knowledge/Understanding	Demonstrate an understanding of the exponent rules of multiplication and division, and apply them to simplify expressions. Demonstrate an understanding of the characteristics of a linear relation.	13
	Thinking	Determine the relationship between the form of an equation and the shape of its graph with respect to linearity and non-linearity. Determine, through investigation, the properties of the slope and y-intercept of a linear relation.	19
	Communication	Manipulate numerical and polynomial expressions, and solve first-degree equations. Solve problems involving linear relations.	19
	Application	Determine, through investigation, the optimal values of various measurements. Connect various representations of a linear relation.	19
Final Evaluation (30%)	Culminating Activity (15%)	Knowledge/Understanding	3
		Thinking	4
		Communication	4
		Application	4
	Final Examination (15%)	Knowledge/Understanding	3
		Thinking	4
		Communication	4
		Application	4
<b>TOTAL</b>			<b>100</b>

# Assessment/Evaluation Strategies

A variety of assessment and evaluation methods, strategies and tools are required as appropriate to the expectation being assessed. These include diagnostic, formative and summative within the course and within each unit.

Assessment *for* learning and assessment *as* learning is obtained through a variety of means, including the following:

- Ongoing descriptive feedback on students' assignments
- Conversations with mentor to check for understanding
- Conversations with student/instructor on a regular basis (synchronous and asynchronous)
- Self-assessment from interactive math games

Evidence of student achievement (assessment *of* learning) is collected from various sources, including the following:

- Ongoing observations of most consistent work, with consideration given to most recent work
- Quizzes
- Culminating activity
- Final exam

## Resources

Ontario Ministry of Education. (2007). *First Nation, Métis, and Inuit education policy framework*. Retrieved from <http://www.edu.gov.on.ca/eng/aboriginal/fnmiFramework.pdf>

Ontario Ministry of Education. (2010). *Growing success: Assessment, evaluation and reporting in Ontario schools*. Toronto, ON: Queen's Printer for Ontario.

Ontario Ministry of Education. (2016). *Ontario Schools, Kindergarten to Grade 12: Policy and Program Requirements*. Retrieved from <http://edu.gov.on.ca/eng/document/policy/os/index.html>

Ontario Ministry of Education. (2005). *The Ontario curriculum grades 9 and 10: Mathematics*. Toronto, ON: Queen's Printer for Ontario.

## Program Planning

This course is offered to Indigenous students living in isolated northern Ontario communities which do not have access to regular high school facilities, equipment or teachers associated with secondary education. This course uses the internet for instruction, demonstration and research. It utilizes a student-centered semi-virtual classroom which capitalizes on the strengths of internet program delivery to minimize the disadvantages of geographic remoteness.

Students are presented with 1320 minutes of instruction/activity via the internet over the period of one week. All lessons, assignments, questions and course material is presented in this manner, with approved print materials available as a student resource in each classroom. The student and instructor communicate via the internet, while a classroom mentor (a fully qualified teacher) assists students in completing tasks in a timely manner and provides tutoring as required. Students may also receive support from various programs at KiHS, including the First Nation Student Success Program and the Special Education Program.

Indigenous and local content is used throughout the course to meet students' learning needs. Considerations are made to the learning preferences of the student population and lessons can be adjusted for individual students as required.