Course Outline

School Name:	KEEWAYTINOOK INTERNET HIGH SCHOOL
Department Name:	Mathematics

Ministry of Education Course Title: Mathematics

Grade Level: 9

Ministry Course Code: MTH1W

Teacher's Name: Ian Vaithilingam

Developed by: Ian Vaithilingam   Date: September 2021

Revision Date: September 2021

Developed from:

Ontario Ministry of Education. (2021). *The Ontario curriculum, grade 9: Mathematics.*
https://www.dcp.edu.gov.on.ca/en/curriculum/secondary-mathematics/courses/mth1w

Text: None

Prerequisite: None

Credits: One

Length: 110 hours

Principal's Name: Angela Batsford-Mermans

Principal's Approval:

Approval Date: September 20, 2021

Course Description/Rationale

This course enables students to consolidate, and continue to develop, an understanding of mathematical concepts related to number sense and operations, algebra, measurement, geometry, data, probability, and financial literacy. Students will use mathematical processes, mathematical modelling, and coding to make sense of the mathematics they are learning and to apply their understanding to culturally responsive and relevant real-world situations. Students will continue to enhance their mathematical reasoning skills, including proportional reasoning, spatial reasoning, and algebraic reasoning, as they solve problems and communicate their thinking.

Overall Curriculum Expectations

Throughout this course, in the context of learning related to the other strands, students will:
Social and Emotional Learning (SEL) Skills in Mathematics
• develop and explore a variety of social-emotional learning skills in a context that supports and reflects this learning in connection with the expectations across all other strands

Throughout this course, in connection with the learning in the other strands, students will:
Mathematical Processes
• apply the mathematical processes to develop a conceptual understanding of, and procedural fluency with, the mathematics they are learning
• make connections between mathematics and various knowledge systems, their lived experiences, and various real-life applications of mathematics, including careers

By the end of this course, students will:
Number
• demonstrate an understanding of the development and use of numbers, and make connections between sets of numbers
• represent numbers in various ways, evaluate powers, and simplify expressions by using the relationships between powers and their exponents
• apply an understanding of rational numbers, ratios, rates, percentages, and proportions, in various mathematical contexts, and to solve problems

Algebra
• demonstrate an understanding of the development and use of algebraic concepts and of their connection to numbers, using various tools and representations
• apply coding skills to represent mathematical concepts and relationships dynamically, and to solve problems, in algebra and across the other strands
• represent and compare linear and non-linear relations that model real-life situations, and use these representations to make predictions
• demonstrate an understanding of the characteristics of various representations of linear and non-linear relations, using tools, including coding when appropriate

Data
• describe the collection and use of data, and represent and analyse data involving one and two variables
• apply the process of mathematical modelling, using data and mathematical concepts from other strands, to represent, analyse, make predictions, and provide insight into real-life situations

Geometry and Measurement
• demonstrate an understanding of the development and use of geometric and measurement relationships, and apply these relationships to solve problems, including problems involving real-life situations

Financial Literacy
• demonstrate the knowledge and skills needed to make informed financial decisions

Course Content

Unit	Length
1. Number Sense	18 hours
2. Algebra	18 hours
3. Linear Relations	18 hours
4. Data Management	18 hours
5. Financial Literacy	18 hours
6. Geometry and Measurement	18 hours
Final Exam	2 hours
Total	110 hours

Unit Descriptions

Unit 1 – Number Sense
In this unit, students will investigate various number systems and the cultural development of number concepts, including real-life applications. In particular, our students will investigate Indigenous number systems. Students will extend their learning about positive fractions, positive decimal numbers, and integers to work with negative fractions and negative decimal numbers. Students also extend their knowledge and skills related to percentages, ratios, rates, and proportions to make further connections to real life.

Unit 2 – Algebra
In this unit, students will develop an understanding of algebra by making connections between algebra and numbers as they generalize relationships with algebraic expressions and equations. Students will extend and apply coding skills to dynamically represent situations, analyse mathematics concepts, and solve problems in various contexts. Students will be introduced to various representations of linear and non-linear relations that they will study in more depth in future secondary mathematics courses. Students develop an understanding of the constant rate of change and initial values of linear relations and solve related real-life problems.

Unit 3 – Linear Relations
This unit will introduce vocabulary such as "slope" and "intercepts" as students investigate linear and non-linear relationships. Students will develop algebraic models of linear relations, and learn how the abstracting relationships using variables can be used to solve relevant problems of local concern. Students will also explore and determine the characteristics of lines and their corresponding equations through the use of spreadsheets, graphing technology, and paper and pencil. To solve problems, students will recognize and model realistic situations that involve constant rates of change. The need for algebraic techniques, numeric skills and the laws of exponents will emerge from problems in context.

Unit 4 – Data Management
In this unit, students will learn to collect, analyze and display data involving one and two variables. Students will apply the process of mathematical modelling, using data and mathematical concepts from other strands, to represent, analyse, make predictions, and provide insight into problems that are relevant to their own First Nation communities.

Unit 5 – Financial Literacy
In this strand, students analyse financial situations to explain how mathematics can be used to understand such situations and inform financial decisions. They extend their financial literacy knowledge to answer questions related to appreciation and depreciation and explain how budgets can be modified based on changes in circumstances. Students compare the effects of different interest rates, down payments, and other factors associated with purchasing goods and services. Students use their learning from other strands to solve financial problems of interest. Emphasis will be placed on financial issues in a First Nations community context.

Unit 6 – Geometry and Measurement

In this unit, students make connections among various geometric properties and their real-life applications. Students analyse and create designs to extend their understanding of geometric relationships to include circle and triangle properties. Students solve problems using different units within and between various measurement systems, examine the relationships between the volume of cones and cylinders and of pyramids and prisms, and solve problems that involve the application of perimeter, area, surface area, and volume.

Teaching/Learning Strategies

This course is organized into an eight-week series of lessons and activities that is presented to students in remote northern communities via the internet. The eighth week is used for course consolidation, review, and the final examination. Teacher and students communicate over the internet through timely activity feedback, emails, messages, video and audio calls. Classroom mentors assume the role of liaison between the teacher and student while also supporting a holistic approach to motivate, engage and support each individual student.

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

- digital interactive activities that provide timely feedback
- computer-assisted instruction, including video lessons
- hands-on learning experiences, including land-based investigations
- reinforcing math skills through interactive games
- review of previously learned material
- pre-teaching of key vocabulary
- emphasis on the problem-solving process
- graphic organizers
- one-on-one video conference tutorials

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 and checklists.

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 percent 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. 41).

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	Evaluation of basic mathematical techniques and skills. For example, adding fractions, graphing relationships, finding slope, etc.	30

	Thinking	Problem-solving that requires critical thinking and extension of basic mathematical techniques.	15
	Communication	Correct mathematical form, including professional display of data in tables and graphs.	15
	Application	Extension of basic mathematical techniques and problem-solving skills by investigating problems of personal or community concern.	10
Final Evaluation (30%)	Culminating Activity (15%)	Knowledge/Understanding	15
		Thinking	
		Communication	
		Application	
	Exam (15%)	Knowledge/Understanding	15
		Thinking	
		Communication	
		Application	
		TOTAL	**100**

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 digital interactive math games and quizzes

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
- Mathematical investigations into issues of local concern
- Culminating activity
- Final exam

The Ministry of Education's 2010 document, *Growing Success*, outlines the seven fundamental principles that guide best practice in the assessment and evaluation of students. KiHS teachers use practices 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 course and at other 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 (p.6).

Resources

MyBlueprint. (2017). *MyBlueprint education planner.* www.myblueprint.ca

Ontario Ministry of Education. (n.d.). *Indigenous education strategy.* http://www.edu.gov.on.ca/eng/aboriginal/

Ontario Ministry of Education. (2010). *Growing success: Assessment, evaluation and reporting in Ontario schools.* http://www.edu.gov.on.ca/eng/policyfunding/growSuccess.pdf

Ontario Ministry of Education. (2021). *The Ontario curriculum, grade 9: Mathematics.* https://www.dcp.edu.gov.on.ca/en/curriculum/secondary-mathematics/courses/mth1w

Ontario Ministry of Education. (2016). *Ontario schools, kindergarten to grade 12: Policy and program requirements.* http://edu.gov.on.ca/eng/document/policy/os/index.html

Toulouse, P.R. (2016). What matters in Indigenous education: Implementing a vision committed to holism, diversity and engagement. https://peopleforeducation.ca/wp-content/uploads/2017/07/MWM-What-Matters-in-Indigenous-Education.pdf

Program Planning

This course is offered to Indigenous students living in isolated, northern Ontario communities. It is offered by qualified teachers in a blended classroom with a balance of academic, wellness, land-based learning, local language and culture to support the success of the whole student. 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 support as required.

Indigenous and local content is used throughout the course to meet students' learning needs. Opportunities for outdoor activities and land-based learning are also incorporated and students are encouraged to use local knowledge in their products. Considerations are made to the learning preferences of the student population and lessons can be adjusted for individual students as required. Opportunities have been provided for students to apply ideas and concepts encountered in this course to their lives as an individual and as a member of a First Nations community. Teachers consult the Ontario Ministry of Education policies, guidelines and important initiatives when planning a comprehensive program in this area.