Course Outline

School Name: **KEEWAYTINOOK INTERNET HIGH SCHOOL**

Department Name: Mathematics

Ministry of Education Course Title: Foundations for College Mathematics

Grade Level: 11

Ministry Course Code: MBF3C

Teacher's Name: Ian Vaithilingam

Developed by: Erik Tu   Date: September 2016

Revision Date: September 2021

Developed from:
Ontario Ministry of Education. (2007). *The Ontario curriculum, grades 11 and 12: Mathematics.* Toronto ON: Queen's Printer for Ontario.

Text: None

Prerequisite: MFM2P

Credits: One

Length: 110 hours

Principal's Name: Angela Batsford-Mermans

Principal's Approval: *Angela Batsford-Mermans*

Approval Date: September 8, 2021

Course Description/Rationale

This course enables students to broaden their understanding of mathematics as a problem-solving tool in the real world. Students will extend their understanding of quadratic relations; investigate situations involving exponential growth; solve problems involving compound interest; solve financial problems connected with vehicle ownership; develop their ability to reason by collecting, analyzing, and evaluating data involving one variable; connect probability and statistics; and solve problems in geometry and trigonometry. Students will consolidate their mathematical skills as they solve problems and communicate their thinking.

Overall Curriculum Expectations

Mathematical Models
• Make connections between the numeric, graphical, and algebraic representations of quadratic relations, and use the connections to solve problems
• Demonstrate an understanding of exponents, and make connections between the numeric, graphical, and algebraic representations of exponential relations
• Describe and represent exponential relations, and solve problems involving exponential relations arising from real-world applications

Personal Finance
• Compare simple and compound interest, relate compound interest to exponential growth, and solve problems involving compound interest
• Compare services available from financial institutions, and solve problems involving the cost of making purchases on credit
• Interpret information about owning and operating a vehicle, and solve problems involving the associated costs

Geometry and Trigonometry
• Represent, in a variety of ways, two-dimensional shapes and three-dimensional figures arising from real-world applications, and solve design problems
• Solve problems involving trigonometry in acute triangles using the sine law and the cosine law, including problems arising from real-world applications

Data Management
• Solve problems involving one-variable data by collecting, organizing, analyzing, and evaluating data
• Determine and represent probability, and identify and interpret its applications

Course Content

Unit	Length
1. **Data Management**	25 hours
2. **Managing Your Money (Personal Finance)**	25 hours
3. **Geometry and Trigonometry**	30 hours
4. **Mathematical Modelling using Quadratics and Exponential Functions**	30 hours
Total	110 hours

Unit Descriptions

Unit 1 – Data Management
In this unit, students solve problems involving one-variable data by collecting, organizing, analyzing, and evaluating data. Students determine and represent probability, and identify and interpret its applications.

Unit 2 – Personal Finance (It's of INTEREST to You)
Students compare simple and compound interest, relate compound interest to exponential growth, and solve problems involving compound interest. Students compare services available from financial institutions, including financial institutions in their communities, and solve problems involving the cost of making purchases on credit. Students interpret information about owning and operating a vehicle, and solve problems involving the associated costs.

Unit 3 – Geometry and Trigonometry (The Mathematics of Financial Growth)
Students represent, in a variety of ways, two-dimensional shapes and three-dimensional figures arising from real-world applications, and solve design problems. Students solve problems involving trigonometry in acute triangles using the sine law and the cosine law, including problems arising from real-world applications. Emphasis will be placed on those functions which relate to financial growth through investigation with technology, the properties of exponential functions with equations of the form y = ax, and their graphs are analyzed. Students evaluate simple expressions involving natural, rational and integral exponents, with and without the use of technology.

Unit 4 – Mathematical Modeling using Quadratics and Exponential Functions
Students make connections between the numeric, graphical, and algebraic representations of quadratic relations, and use the connections to solve problems. Students demonstrate an understanding of exponents, and make connections between the numeric, graphical, and algebraic representations of exponential relations. Students describe and represent exponential relations, and solve problems involving exponential relations arising from real-world applications.

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.

Teachers will:
- provide students with materials, technological tools and software for use in experiments, demonstrations, and investigations.
- address a variety of learning styles in each unit.
- be accountable to addressing the overall and specific expectations in their planning, and accountable to tracking student progress in the overall expectations, including the most important specific expectations.
- act as guide and facilitator.
- provide many opportunities for students to demonstrate their ability to meet course expectations.
- ensure that the culmination of an activity helps the students to build a solid understanding of the mathematical concepts arising from that activity and sets the stage for future learning.
- use learning/performance tasks that are designed to link several expectations and give the students occasion to demonstrate their optimal levels of achievement through the communication of results, the ability to pose extending questions following an inquiry, and to provide the solution to unfamiliar problems.
- provide regular assessment which provides the feedback that students need in order to improve their achievement.

Students will:
- develop increasing responsibility for their own learning.
- carry out investigations and engage in the inquiry process.
- explore, hypothesize or formulate, manipulate or transform, infer or conclude, and communicate during an inquiry.

- engage in explorations involving the use of technology (e.g., graphing software, dynamic geometric software, databases, the Internet, statistical programs, spreadsheets and multimedia resources) and the collection of data.
- follow examples and Socratic developments of concepts and take notes provided by the teacher.
- pose and answer questions in a context.
- describe the patterns that emerge verbally, algebraically and visually (using tables, graphs and posters).
- demonstrate an understanding of concepts, and ability to select and perform algorithms accurately in. order to solve problems.
- practice prerequisite skills.

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 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. 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	Determine the relationship between the form of an equation and the shape of its graph with respect to linearity and non-linearity Demonstrate an understanding of the exponent rules of multiplication and division, and apply them to simplify expressions		13
	Thinking	Determine, through investigation, the properties of the slope and y-intercept of a linear relation		19
	Communication	Verify, through investigation facilitated by dynamic geometry software, geometric properties and relationships involving two-dimensional shapes, and apply the results to solving problems		19
	Application	Solve problems involving linear relations between two variables		19
Final Evaluation (30%)	Culminating Activity (15%)	Analyse data relating to the farming industry calculate the variance and standard deviation of data from a bar graph Fill a tally chart with data and calculate the mean, median, mode and standard deviation of the data	K/U	3
			T	4
			C	4
			A	4

		Calculate probabilities of cow offspring being a steer or a heifer Identify various aspects on the graph of a quadratic function (vertex, min/max, intercepts)		
	Exam (15%)	Analyse data and calculate the mean, mode, median, and standard deviation Calculate probabilities Compare investment options and make an educated decision Use the sine/cosine law to calculate	K/U	3
			T	4
			C	4
			A	4
			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;
- Self-assessment and evaluation;
- Creation of displays and organizers;
- Open-ended questioning;
- Communication in online forums;
- Mentor observations;
- Quizzes;
- Research and research products;
- Conversations with student on a regular basis to verbalize observations, ask questions, and clarify understanding.

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;
- Tests and quizzes;
- Application of knowledge in real life situations;
- Conversations with students;
- Summative unit activities;
- Culminating activity;
- 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

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

Ontario Ministry of Education. (2007). *The Ontario curriculum, grades 11 and 12: Mathematics.*
http://www.edu.gov.on.ca/eng/curriculum/secondary/math1112currb.pdf

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. (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.