

Course Outline

School Name: Keewaytinook Internet High School

Department Name: Mathematics

Ministry of Education Course Title: Foundations of College Mathematics

Grade Level: 11

Ministry Course Code: MBF3C

Teacher's Name: Zafer Erol

Developed by: Erik Tu Date: September 2016

Revision Date: September 2017

Developed from: The Ontario Curriculum, Grades 11 and 12:
Mathematics, 2007

Text: None

Prerequisite: Foundations of Mathematics, Grade 10, Applied

Credits: 1.0

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 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

- 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.
- 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.
- 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.
- 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 hr.
2. Managing Your Money (Personal Finance)	25 hr.
3. Geometry and Trigonometry	30 hr.
4. Mathematical Modeling using Quadratics and Exponential Functions	30 hr.
TOTAL	110

Unit Descriptions

Unit 1: Data Management

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, 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 $y = a^x$, 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

Only through the use of a wide variety of teaching, learning, and assessment strategies and tools can the wide range of expectations in this course be addressed.

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, data bases, 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.

Evaluation

The final grade will be determined as follows:

- 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).

Growing Success: Assessment, Evaluation and Reporting in Ontario Schools. Ontario Ministry of Education Publication, 2010, p. 41

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 Assessment (30%)	Culminating Activity	-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 -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)	K/U	3%
			T	4%
			C	4%
			A	4%
	Final Exam	-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 distances	K/U	3%
			T	4%
			C	4%
			A	4%
TOTAL			100%	

Assessment/Evaluation Strategies

Assessment strategies and tools must address the variety of teaching and learning styles as well as the variety of expectations. High quality assessment can measure individual and group performance, and individual performance within a group. A balanced assessment program will include the following assessment methods:

- Understanding of Conceptual and Procedural Knowledge/Understanding: tests, quizzes, and observation of performance tasks.
- Thinking/Inquiry/Problem Solving, and Application in unfamiliar settings: performance assessment, observation, and conferencing.
- Communication: journals, portfolios, performance assessments, observations and presentations
- Application in familiar settings: tests, quizzes, performance assessments
- Learning Skills and to set goals: journals, portfolios, observations and conferencing

Where possible, assessment tasks are designed in “real world” contexts so that students see the learning in Principles of Mathematics as meaningful and relevant and are motivated to apply their learning in an assessment situation.

The four major categories of assessment/evaluation will be incorporated into the design of the various assessment strategies used in the course, as illustrated in the following table.

K/U	Thinking	Communications	Applications
<ul style="list-style-type: none"> • Quizzes • Paper and Pencil Tests • Matching Columns Short Answer • Written Examinations (open-ended questioning) • Organizers (tables, graphs, charts) • Communication (online forums) 	<ul style="list-style-type: none"> • Tests • Examinations (open-ended questioning) • Research • Creation of Communication Products and Displays • Self-Evaluation 	<ul style="list-style-type: none"> • Open-Ended Questions • Tests • Exams • Organizers (webs) • Creation of Communication Products and Displays 	<ul style="list-style-type: none"> • Open-Ended Questions • Allowing for Knowledge to be Applied to a New Situation/Problem • Computer Programs • Creation of Communication Products and Displays

Resources

Course Profile: Mathematics of Personal Finance, Grade 11, College Preparation, Public

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 (2017). Indigenous Education Strategy. Retrieved from <http://www.edu.gov.on.ca/eng/aboriginal/>

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

Software:

Graphcalc, Excel, Geometer's Sketchpad and Calculator

Program Planning

This course is offered to indigenous students living in 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.