

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: Lorne Goring

Developed by: Laurette Tsun Date: October 2008

Revised: October 2009

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

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

Text:

Prerequisite: Foundations of Mathematics, Grade 10, Applied

Credits: 1.0

Length: 110 hours

Principal's Name: Darrin Potter

Principal's Approval (signature) _____

Approval Date:

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, analysing, 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	Titles	Length (Hours)
Unit 1	Data Management	20
Unit 2	Managing Your Money (Personal Finance)	20
Unit 3	Geometry and Trigonometry	30
Unit 4	Mathematical Modeling using Quadratics and Exponential Functions.	30
Unit 5	Summative; Culminating Activities	10
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.

Unit 8: Summative Assessment

Students will use the knowledge and skills acquired throughout the course to solve a problem involving all of the mathematics learned in this course.

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:

- **include a balance of student-centered and teacher-directed activities.**
- **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.**
- **assume a variety of roles in the classroom, including guide, facilitator, and director of learning.**
- **act as guide and facilitator in the classroom.**
- **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.**
- **provide verbal instruction to accompany written procedures to avoid the frustration and uncertainty that so often undermine the learning opportunities afforded by a complex task.**
- **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, informal 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.
- practise prerequisite skills.

Evaluation

The student's final grade for the course will be determined as outlines in Program Planning and Assessment 2000 (p.15).

Seventy per cent (70%) of the grade will be based on evaluations conducted throughout this course. This portion of the grade should reflect the students' *most consistent level of achievement* throughout the course, although special consideration should be given to the more recent evidence of achievement.

Thirty per cent (30%) of the grade will be based on a final evaluation in the form of an examination, performance, essay and /or other method of evaluation suitable to the course content and administered towards the end of the course.

Type of Assessment	Category	Details	Weighting (%)
Formative (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/ Inquiry	-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%
Summative (30%)	Culminating Activity	Knowledge/Understanding	3%
		Thinking/Inquiry	4%
		Communication	4%
		Application	4%
	Final Exam	Knowledge/Understanding	3%
		Thinking/Inquiry	4%
		Communication	4%
		Application	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 methods:

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

Knowledge/ Understanding	Thinking/Inquiry	Communication	Application/Making Connections
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<ul style="list-style-type: none"> • Quizzes • Paper and Pencil • Tests • Matching Columns • Short Answer • Essays • Written Examinations (open-ended questioning) • Organizers (tables, graphs, charts) • Communication • Technology Journals • Question and Answer by Discussion Board 	<ul style="list-style-type: none"> • Tests • Examinations (open-ended questioning) • Essays • Research • Creation of Communication Products and Displays • Self Evaluation. 	<ul style="list-style-type: none"> • Open Ended Questions • Tests • Exams • Essays • Organizers (webs) • Creation of Communication Products and Displays • Interviews • Portfolios 	<ul style="list-style-type: none"> • Open Ended Questions Allowing for Knowledge to be Applied to a New Situation/Problem • Essays • Design Projects • Portfolio • Rubrics • Computer Programs • Creation of Communication Products and Displays
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Resources

Other Text

Mathematical and Educational Websites
Gateway to Educational Materials
Kathy Schrock's Guide for Educators

<http://www.thegateway.org/>

<http://discoveryschool.com/schrockguide/>

MED Web Index
OAME

<http://www.edu.gov.on.ca/eng/webmap.html>

<http://www.oame.on.ca/main/index1/php>

Software
Graphcalc, Quattro pro, Geometer's Sketchpad and Calculator

Program Planning

This course is offered to 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 uses a student centered semi-virtual classroom which capitalizes on the strengths of the internet program delivery to minimize the disadvantages of geographic remoteness.

Students are presented with 800 minutes of instruction/activity via the internet over a 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. The student and instructor communicate via the internet, and there are regular, interactive, internet-based lessons during which the instructor presents key information to the class, and students have an opportunity to interact verbally with their instructor. A classroom mentor (a fully qualified teacher) assists students in completing tasks in a timely manner and provides tutoring as required.