Ontario eSecondary School
Course Outline
2022-2023

Ministry of Education Course Title: Foundations for College Mathematics	
Ministry Course Code: MAP4C	
Course Type: College Preparation	
Grade: 12	
Credit Value: 1.0	
Prerequisite(s): Foundations for College Mathematics, Grade 11, College Preparation, or Functions and Applications, Grade 11, University/College Preparation	
Department: Mathematics	
Course developed by: **Muhammad Fauzail Thakur**	**Date: October 1, 2018**
Length: **One Semester**	**Hours:** **110**
This course has been developed based on the following Ministry documents: 1. *The Ontario Curriculum, Grades 11 and 12 Mathematics, Revised 2007*	

COURSE DESCRIPTION/RATIONALE

This course enables students to broaden their understanding of real-world applications of mathematics. Students will analyse data using statistical methods; solve problems involving applications of geometry and trigonometry; solve financial problems connected with annuities, budgets, and renting or owning accommodation; simplify expressions; and solve equations. Students will reason mathematically and communicate their thinking as they solve multi-step problems. This course prepares students for college programs in areas such as business, health sciences, and human services, and for certain skilled trades..

OVERALL CURRICULUM EXPECTATIONS

Unit 1

By the end of this course, students will:

1. solve problems involving measurement and geometry and arising from real-world applications;
2. explain the significance of optimal dimensions in real-world applications, and determine optimal dimensions of two-dimensional shapes and three-dimensional figures;
3. solve problems using primary trigonometric ratios of acute and obtuse angles, the sine law, and the cosine law, including problems arising from real-world applications, and describe applications of trigonometry in various occupations.

Unit 2

By the end of this course, students will:

1. collect, analyse, and summarize two-variable data using a variety of tools and strategies, and interpret and draw conclusions from the data;
2. demonstrate an understanding of the applications of data management used by the media and the advertising industry and in various occupations.

Unit 3

By the end of this course, students will:

1. evaluate powers with rational exponents, simplify algebraic expressions involving exponents, and solve problems involving exponential equations graphically and using common bases;
2. describe trends based on the interpretation of graphs, compare graphs using initial conditions and rates of change, and solve problems by modelling relationships graphically and algebraically;
3. make connections between formulas and linear, quadratic, and exponential relations, solve problems using formulas arising from real-world applications, and describe applications of mathematical modelling in various occupations

Unit 4

By the end of this course, students will:

1. demonstrate an understanding of annuities, including mortgages, and solve related problems using technology;
2. gather, interpret, and compare information about owning or renting accommodation, and solve problems involving the associated costs;
3. design, justify, and adjust budgets for individuals and families described in case studies, and describe applications of the mathematics of personal finance.

COURSE CONTENT

Unit	*Length*
Unit 1: Geometry and Trigonometry	25 hours
Unit 2: Data Management	24 hours
Unit 3: Mathematical Expressions and functions	29 hours
Unit 4: Financial Mathematics	25 hours
Culminating Activity	4 hours
Final Exam	3 hours
Total	**110 Hours**

UNIT DESCRIPTIONS

UNIT 1: GEOMETRY AND TRIGONOMETRY

In this unit students will perform required conversions between the imperial system and the metric system. Solve application problems involving the areas of rectangles, triangles, and circles, and of related composite shapes and solve problems involving the volumes and surface areas of rectangular prisms, triangular prisms, and cylinders, and of related composite figures. In addition, recognize and explain the significance of optimal perimeter, area, surface area, and volume in various applications. Then in trigonometry students will solve application problems by determining the measures of the sides and angles of right triangles using the primary trigonometric ratios, and of acute triangles using the sine law and the cosine law. Followed by making connections between primary trigonometric ratios of obtuse angles and of acute angles. Determine the values of the sine, cosine, and tangent of obtuse angles. Solve problems involving oblique triangles, using the sine law and cosine law. Gather, interpret, and describe information about applications of trigonometry in occupations, and about college programs that explore these applications.

UNIT 2: DATA MANAGEMENT

This unit is designed to help students analyze data and trends. They are to distinguish situations requiring one-variable and two-variable data analysis, describe the associated numerical summaries and graphical summaries, and recognize questions that each type of analysis addresses. Also, describe characteristics of an effective survey and design questionnaires or experiments for gathering data. Then they will collect data from primary sources, through experimentation involving observation or measurement, or from secondary sources, and organize and store the data. They will create a graphical summary of the data using a scatter plot and determine algebraic equations of the variables that appear to be linearly related. In addition, students will describe possible interpretations of the line of best fit of a scatter plot and reasons for misinterpretations. They will recognize and interpret statistical terms and expressions used in the media and describe examples. Students will interpret statistics presented in the media, and explain how the media, the advertising industry, and others use and misuse statistics to promote a certain point of view. They will then assess the validity of conclusions presented in the media by examining sources of data, including Internet sources, methods of data collection, and possible sources of bias, and by questioning the analysis of the data. Finally, they will gather, interpret, and describe information about applications of data management in occupations, and about college programs that explore these applications.

UNIT 3:MATHEMATICAL EXPRESSIONS AND FUNCTIONS

This unit will have students interpret graphs to describe a relationship and use the trends to make predictions or justify decisions. Students will recognize that graphs and tables of values communicate information about rate of change, and use a given graph or table of values for a relation. They will identify when the rate of change is zero, constant, or changing, given a table of values or a graph of a relation, and

compare two graphs by describing the rate of change. Additionally, Recognize properties of a linear and an exponential model and select a model to represent the relationship between numerical data graphically and algebraically. Students will make connections between formulas and linear, quadratic, and exponential functions. In the next part students will determine, through investigation, the exponent laws for multiplying and dividing algebraic expressions and the exponent law for simplifying algebraic expressions involving a power of a power. Followed by simplifying algebraic expressions containing integer exponents using the exponent laws. Solve exponential equations in one variable by determining a common base. Select models (i.e., linear, quadratic, exponential) to represent the relationship between numerical data graphically and algebraically and solve related problems. Using a formula drawn from an application make connections between formulas and linear, quadratic, and exponential functions. Lastly, gather, interpret, and describe information about applications of mathematical modelling in occupations, and about college programs that explore these applications.

UNIT 4: FINANCIAL MATHEMATICS

Students will gather and interpret information about annuities, describe the key features of an annuity, and identify real-world applications. Solve problems, using technology, that involve the amount, the present value, and the regular payment of an ordinary simple annuity. Investigate the advantages of starting deposits earlier when investing in annuities gather and interpret information, describe and compare mortgages. Read, interpret, and generate an amortization table for a mortgage, calculate the total interest paid over the life of a mortgage, and compare the total interest with the original principal. Determine the effects of varying/regular payment periods and interest rates on the length of time needed to pay off a mortgage. Students will then gather and interpret information about the procedures and costs involved in owning and in renting accommodation. Compare renting accommodation with owning accommodation. Gather, interpret, and describe information about living costs, and estimate the living costs of different households in the local community. Design, explain, and justify a monthly budget suitable for an individual or family described in a given case study that provides the specifics of the situation. Identify and describe the factors to be considered in determining the affordability of accommodation in the local community, and consider the affordability of accommodation under given circumstances and make adjustments to a budget to accommodate changes in circumstances.

TEACHING AND LEARNING STRATEGIES

The students will experience a variety of activities:

Teacher demonstrations (research skills, etc.) through video conferencing, email, or telephone conversations with subject teacher, or videos provided of a teacher or student demonstrating the concepts and skills being studied. This helps the student and teacher create an atmosphere of trust and respect to aid in the online learning environment.

Video presentations and technological aids (research) with videos embedded to enrich the course content and clarify concepts and skills being studied. Also the use of online pre-approved quizzes and games to help a student become more familiar with the concepts and skills being studied.

Diagnostic and review activities (audio and video taping) can be student-lead or teacher lead to work as a review for students through audio and video made to share among each other to help reinforce the concepts and skills being studied.

Brainstorming, charts and graphs are a great way for students to demonstrate their knowledge of subject matter through graphic organizers, pictures, and texts. This is communicated through assignments in Moodle.

Small Group Activities

The teacher sets up small group activities to provide opportunities for active and oral learning as well as to bolster practical communication and teamwork skills. The teacher plays a critical role during group activities by monitoring group progress as well as answering questions that arise and

using questions to assist students in their understanding. In this way, the teacher also facilitates student understanding of effective learning, communication, and team building during group activities.

The small group activities include the following:

Comparison and evaluation of written work is very important in this course. This course focuses on giving many examples of correct work, and helping students build the skills needed to peer-correct and self-correct. Students are given a variety of texts to read through embedded links, to make comparisons with different texts, real life situations, and their own writing.

Practical extension and application of knowledge is used as an effective learning strategy in this course because it allows the students to read and listen to the texts and stories and reflect back with connections to themselves, other texts and the world. Students are encouraged to share their understandings through work submitted each day, phone conversations about course work, or videoconferencing.

Oral presentations in an online environment we have the equipment to have student either live video conference oral presentations, or make videos and submit them for their oral presentations. These oral presentations can be viewed by fellow students (when appropriate) and the teacher. Students can learn from one another, and from their teacher. Such activities include dramatic readings and performances.

Charts and graphs are used to present effective learning opportunities of concepts and skills to students who would benefit from visual objects to learn. Every student learns differently, and it is used to help students discover another way to present their information such as graphic organizers, lists, and pictures.

Individual Activities

The teacher should provide a variety of individual assignments to expand and consolidate the learning that takes place in the whole-class and small group activities. Individual activities allow the teacher to accommodate interests and needs and to access the progress of individual students. The teacher plays an important role in supporting these activities through the provision of ongoing feedback to the students, both orally and in writing. Teachers are encouraged to include individual activities such as the following in the course:

Research is completed in an online environment by teaching the students first about plagiarism rules and giving examples of good sources to use. The students are not only limited to the online search for information, but have resources available by links on the Moodle page of information that has been scanned and uploaded.

Individual assignments are worked on at a student's own pace. The teacher can support the student in these activities with ongoing feedback.

Oral presentations are facilitated through the use of video conferencing and video recording.

Practical extension and application of knowledge helps students develop their own voice, and gives them the ability to make personal connections, and connections to the world throughout their course. Students are given a variety or reading and viewing texts to give them many chances to apply their new concepts, skills, and knowledge.

Ongoing project work is something that is valued in the earning of an English credit. The ongoing project can be submitted to the teacher for ongoing feedback in both written and oral work.

Reading students are able to read a variety of texts online. The students may print out the reading material to use it to highlight, take notes, and have with them when a computer is not available.

Written assignments are used to allow students to develop their skills in writing, comprehension, and communication. With the online format students submit their work, and have a chance to get feedback from the teacher, and submit their best work. This can be demonstrated with reading responses, personal writing, report writing, essay writing, script writing, business and technical writing, and individual research assignments.

Journals are used in which the student can self-reflect on their subject matter, and see their progress over time. It allows students a different medium of presenting their thoughts and skills learned.

ASSESSMENT, EVALUATION, AND REPORTING

Assessment: The process of gathering information that accurately reflects how well a student is achieving the identified curriculum expectations. Teachers provide students with descriptive feedback that guides their efforts towards improved performance.

Evaluation: Assessment of Learning focuses on Evaluation which is the process of making a judgement about the quality of student work on the basis of established criteria over a limited, reasonable period of time.

Reporting: Involves communicating student achievement of the curriculum expectations and Learning Skills and Work Habits in the form of marks and comments as determined by the teacher's use of professional judgement.

STRATEGIES FOR ASSESSMENT

Assessment practices can nurture students' sense of progress and competency and information instruction. Many diagnostic tools, e.g. checklists and inventories, are used at regular intervals throughout the units to encourage students' understanding of their current status as learners and to provide frequent and timely reviews of their progress. Assessment of student acquisition of listening and talking, reading and viewing and writing skills also occurs regularly through unobtrusive teacher observation and conferencing.

Units conclude with performance tasks, e.g., interviews and from essays that build towards and prepare students for the end-of-course culminating task in Unit Five. Teachers are encouraged to share goals with students early in the course and to connect unit learning experiences frequently and explicitly with big ideas, overall expectations, and performance tasks, i.e. check bricks; teacher-adapted generic rubrics available in many sources, including the *Ontario Secondary School Literacy Course (OSSLC) Profile,* so that they are more task-specific. The teacher might ask: "What does the criteria look like for this particular task?" Or "What does limited effectiveness look like?" The teacher could involve students in the discussion, modification, or creation of rubrics, and teach students to use rubrics as a learning tool that can support the writing process and practice.

ASSESSMENT ACTIVITIES

- ❑ Homework assignments
- ❑ Individual conference meetings
- ❑ Discussion Forums
- ❑ Diagnostic tests and writing tasks
- ❑ Free-writing journals/blogs
- ❑ Outlining and planning sheets
- ❑ Completed Templates & Graphic Organizers
- ❑ Editing Checklists
- ❑ Reflections
- ❑ Oral presentations & Active Listening
- ❑ Tests & Exam
- ❑ Essay Writing
- ❑ Evaluations

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

Weightings	
Course Work	**70**
Knowledge/Understanding	25
Thinking/Inquiry	10
Communication	15
Application	20
Final	**30**
Final Exam	20
Culminating Activity	10

TERM WORK EVALUATIONS (70%):

Evaluation Item		Category
Teacher Observation and conversation	Unit 1: Students are to conference with the teacher. Teacher will select one question from the problem set in this unit and will ask student to display their problem solving skills in regards to the question.	K,I,C,A
Unit Test(s)	Unit 1 Test on Geometry and Trigonometry	K,I,C,A
Projects and/or assignments	Unit 1: Research projects on Careers that use Geometry and Trigonometry in their fields of work.	K,I,C,A
Teacher Observation and conversation	Unit 2: Students are to conference with the teacher. Teacher will select one question from the problem set in this unit and will ask student to display their problem solving skills in regards to the question.	K,I,C,A
Unit Test(s)	Unit 2 Test on Data management	K,I,C,A
Teacher Observation and conversation	Unit 3: Students are to conference with the teacher. Teacher will select one question from the problem set in this unit and will ask student to display their problem solving skills in regards to the question.	K,I,C,A

Unit Test(s)	Unit 3 Test on Mathematical Expressions and Functions	K,I,C,A
Teacher Observation and conversation	Unit 4: Students are to conference with the teacher. Teacher will select one question from the problem set in this unit and will ask student to display their problem solving skills in regards to the question.	K,I,C,A
Unit Test(s)	Unit 4 Test on Financial Mathematics	K,I,C,A
Projects and/or assignments	Unit 4: Research projects on Financial Mathematics (careers and/or personal finance project)	K,I,C,A

FINAL EVALUATIONS (30%):

Evaluation Item		Category
Final Exam	Final exam on the following units: Geometry and Trigonometry, Data Management, Functions and expressions and Financial Mathematics.	K,I,C,A

AFL/AAL/AOL Tracking sheet:

Unit 1: Geometry and Trigonometry – 25 hours

AAL	AFL	AOL
Lesson 1.1.2 Volume Worksheet	Lesson 1.1.1 Area Problem Set Worksheet	Lesson 1.1.5 Video Conference
Lesson 1.1.3 Surface Area Worksheet	Lesson 1.1.4 Optimizing Perimeter and Area Worksheet	Unit 1 Test
Lesson 1.1.5 Optimizing Volume and Surface Area Worksheet	Lesson 1.2.3 Sine and Cosine Law Worksheet	
Lesson 1.2.1 Trigonometry Worksheet		
Lesson 1.2.2 Trigonometric Ratios with Obtuse Angles Worksheet		
Lesson 1.2.4 Applications of Trigonometry Worksheet		

Unit 2: Data Management – 25 hours

AAL	AFL	AOL
Lesson 2.3.1 Two-Variable Data Set Worksheet	Lesson 2.3.5 Analysis and Conclusions Worksheet	Lesson 2.3.4 The Line of Best Fit Worksheet
Lesson 2.3.2 Effective Surveys Worksheet	Lesson 2.4.2 Statistical Indices Worksheet	Lesson 2.3.4 Video Conference
Lesson 2.3.3 Collect and Organize Data Worksheet		Unit 2 Assignment
Lesson 2.6 Geometric Distributions Forum		

Lesson 2.4.1 Statistical Measures Worksheet		
Lesson 2.4.3 Interpret Statistics in Media Worksheet		

Unit 3: Mathematical Expressions and Functions – 32 hours

AAL	AFL	AOL
Lesson 3.5.2 Quadratic Models Worksheet	Lesson 3.5.1 Linear Models Worksheet	Section 5 Assignment
Lesson 3.5.3 Exponential Models Worksheet	Lesson 3.5.4 Analyze Graphical Models Worksheet	Unit 3 Test
Lesson 3.5.5 Select a Mathematical Model Worksheet	Lesson 3.6.2 Radical Exponents Submission Box	
Lesson 3.6.1 Exponent Laws Worksheet	Lesson 3.6.5 Construct and Apply Exponential Models Worksheet	
Lesson 3.6.3 Represent Exponential Expressions Worksheet		
Lesson 3.6.4 Tools and Strategies to Solve Equations Involving Exponents Worksheet		

Unit 4: Financial Mathematics – 25 hours

AAL	AFL	AOL
Lesson 4.7.1 Annuities Worksheet	Lesson 4.7.3 Mortgages and Amortization Worksheet	Lesson 4.7.4 The Conditions of a Mortgage Worksheet
Lesson 4.7.2 The Conditions of an Annuity Worksheet	Lesson 4.8.2 The Cost of Renting a Home Worksheet	Lesson 4.7.4 Video Conference
Lesson 4.8.1 Savings Plans Worksheet		
Lesson 4.5 Notes and Problems Sets Assignment		
Lesson 4.8.3 The Cost of Owning a Home Worksheet		
Lesson 4.8.4 Living Expenses Worksheet		

Finals

AOL
Culminating Project
Final Exam

CONSIDERATION FOR PROGRAM PLANNING

Students learn best when they are engaged in a variety of ways of learning. Guidance and career education courses lend themselves to a wide range of approaches in that they require students to research, think critically, work cooperatively, discuss relevant issues, and learn through practice in a variety of settings.

Helping students become self-directed, lifelong learners is a fundamental aim of the guidance and career education curriculum. When students are engaged in active and experiential learning strategies, they tend to retain knowledge for longer periods and develop meaningful skills. Active and experiential learning strategies also enable students to apply their knowledge and skills to real-life issues and situations.

ANTIDISCRIMINATION EDUCATION IN GUIDANCE AND CAREER EDUCATION

Classroom teachers are the key educators of students who have special education needs. They have a responsibility to help all students learn, and they work collaboratively with special education teachers, where appropriate, to achieve this goal. Special Education Transformation: The Report of the Co-Chairs with the Recommendations of the Working Table on Special Education, 2006 endorses a set of beliefs that should guide program planning for students with special education needs in all disciplines. Those beliefs are as follows: All students can succeed. Universal design and differentiated instruction are effective and interconnected means of meeting the learning or productivity needs of any group of students. Successful instructional practices are founded on evidence-based research, tempered by experience.

PROGRAM CONSIDERATIONS FOR ENGLISH LANGUAGE LEARNERS

Ontario schools have some of the most multilingual student populations in the world. The first language of approximately 20 per cent of the students in Ontario's English language schools is a language other than English. Ontario's linguistic heritage includes several Aboriginal languages; many African, Asian, and European languages; and some varieties of English, such as Jamaican Creole. Many English language learners were born in Canada and raised in families and communities in which languages other than English were spoken, or in which the variety of English spoken differed significantly from the English of Ontario classrooms. Other English language learners arrive in Ontario as newcomers from other countries; they may have experience of highly sophisticated educational systems, or they may have come from regions where access to formal schooling was limited. When they start school in Ontario, many of these students are entering a new linguistic and cultural environment.

THE ROLE OF TECHNOLOGY IN THE ENGLISH PROGRAM

Information and communications technologies (ICT) provide a range of tools that can significantly extend and enrich teachers' instructional strategies and support students' language learning. ICT tools include multimedia resources, databases, Internet websites, digital cameras, and word-processing programs. Tools such as these can help students to collect, organize, and sort the data they gather and to write, edit, and present reports on their findings. Information and communications technologies can also be used to connect students to other schools, at home and abroad, and to bring the global community into the local classroom. Whenever appropriate, therefore, students should be encouraged to use ICT to support and communicate their learning.

ACCOMMODATIONS

Accommodations will be based on meeting with parent, teachers, administration and external educational assessment report. The following three types of accommodations may be provided:

- ***Instructional accommodations:*** such as changes in teaching strategies, including styles of presentation, methods of organization, or use of technology and multimedia.
- ***Environmental accommodations:*** such as preferential seating or special lighting.
- ***Assessment accommodations:*** such as allowing additional time to complete tests or assignments or permitting oral responses to test questions.

Other examples of modifications and aids, which may be used in this course, are:

- Provide step-by-step instructions.
- Help students create organizers for planning writing tasks.
- Record key words on the board or overhead when students are expected to make their own notes.

- ❑ Allow students to report verbally to a scribe (teacher/ student) who can help in note taking.
- ❑ Permit students a range of options for reading and writing tasks.
- ❑ Where an activity requires reading, provide it in advance.
- ❑ Provide opportunities for enrichment.