



## Ontario eSecondary School Course Outline 2023-2024

<b>Ministry of Education Course Title: Foundations for College Mathematics</b>	
<b>Ministry Course Code: MAP4C</b>	
<b>Course Type: College Preparation</b>	
<b>Grade: 12</b>	
<b>Credit Value: 1.0</b>	
<b>Prerequisite(s):</b> Foundations for College Mathematics, Grade 11, College Preparation, or Functions and Applications, Grade 11, University/College Preparation	
<b>Department: Mathematics</b>	
<b>Course developed by:</b> <b>Andrew Lee</b>	<b>Created: September, 1st 2019</b> <b>Revised: October 30th, 2023</b>
<b>Length:</b> <b>One Semester</b>	<b>Hours:</b> <b>110</b>
This course has been developed based on the following Ministry documents: <ol style="list-style-type: none"><li>1. <i>The Ontario Curriculum, Grades 11 and 12 Mathematics, Revised 2007</i></li><li>2. Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools (2010)</li><li>3. <i>Learning for All (2013)</i></li></ol>	

## 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:

- 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:

- Solve problems involving measurement and geometry and arising from real-world applications;
- Explain the significance of optimal dimensions in real-world applications, and determine optimal dimensions of two-dimensional shapes and three-dimensional figures.

### ***Unit 3***

By the end of this course, students will:

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

### ***Unit 4***

By the end of this course, students will:

- Evaluate rational exponents, simplify algebraic expressions involving exponents, and solve problems involving exponential equations graphically and using common bases;
- 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;
- 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 5***

By the end of this course, students will:

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

## COURSE CONTENT

<i>Unit</i>	<i>Length</i>
Unit 1: Trigonometry	20 hours
Unit 2: Geometry	18 hours
Unit 3: Data Management	25 hours
Unit 4: Mathematical Expressions and Functions	25 hours
Unit 5: Financial Mathematics	18 hours
Unit 6: Final Exam	4 hours
<b>Total</b>	<b>110 Hours</b>

## UNIT DESCRIPTIONS

### UNIT 1 and 2: 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 3: 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 4: 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 expression 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 5: 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 involves 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**

**In this course, students will experience the following activities.**

**Presentations with embedded videos** are utilized to outline concepts, explain theory with the use of examples and practice questions, and incorporate multi-media opportunities for students to learn more (e.g. online simulations, quizzes, etc.).

**End of unit conversations** are opportunities for students to express their ideas, problem solving, and thought processes with a teacher who provides timely feedback.

**Reflection** is an opportunity for students to look back at concepts and theories with new eyes, to relate theory to practice, and to align learning with their own values and beliefs.

**Discussions with the instructor** are facilitated through video conferencing, discussing the concepts and skills being studied. This enables two-way communication between the student and the instructor, to share ideas and ask questions in dialogue. This also helps to build a relationship between the student and instructor.

**Instructor demonstrations** (research skills, etc.) are opportunities for the instructor to lead a student through a concept or skill through video conferencing, videos, or emailing with the student.

**Discussion forums** are an opportunity for students to summarize and share their ideas and perspectives with their peers, which deepens understanding through expression. It also provides an opportunity for peer-to-peer feedback.

**Practical extension and application of knowledge** are integrated throughout the course. The goal is to help students make connections between what they learn in the classroom and how they understand and relate to the world around them and their own lives. Learning becomes a dynamic opportunity for students to be more aware that their learning is all around them and enable them to create more meaning in their lives.

**Individual activities/assignments** assessments are completed individually at a student's own pace and are intended to expand and consolidate the learning in each lesson. Individual activities allow the teacher to accommodate interests and needs and to assess the progress of individual students. For this reason, students are encouraged to discuss IEPs (Individual Education Plans) with their teacher and to ask to modify assessments if they have a unique interest that they feel could be pursued in the assessment. The teacher plays an important role in supporting these activities by providing ongoing feedback to students, both orally and in writing.

**Research** is an opportunity to apply inquiry skills to a practical problem or question. Students perform research to gather information, evaluate quality sources, analyze findings, evaluate their analysis, and synthesize their findings into conclusions. Throughout, students apply both creative thinking and critical thinking. New questions are also developed to further learning.

**Writing** as a learning tool helps students to think critically about course material while grasping, organizing, and integrating prior knowledge with new concepts. Good communication skills are important both in and out of the classroom.

**Virtual simulations** are interactive websites that provide students with an opportunity to ask questions, relate variables, and examine relationships.

**Diagrams** are visual representations of mathematical ideas and concepts. They provide another perspective to organize ideas. Visuals are thought to promote cognitive plasticity - meaning, they can help us change our minds or help us to remember an idea.

**Graphs and charts** are visual representations of math concepts and analysis. This helps us to see the relationships within and between sets of data.

**Tables** involve organizing information in terms of categories (rows and columns). This helps us to understand the relationships between ideas and data, as well as highlight trends.

**Practice problems** provide students with a scenario/problem to solve by applying concepts and skills learned in a context. This helps students to understand the relevance of their learning.

## 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. These assessments are not for marks.

- In assessment for learning (AFL), teachers provide students with descriptive feedback and coaching for improvement.
- In assessment as learning (AAL), teachers help students develop their capacity to be independent, autonomous learners who are able to set individual goals, monitor their own progress, determine next steps, and reflect on their thinking and learning.

**Evaluation:** Assessment of Learning (AOL) 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 writing skills also occurs regularly through unobtrusive teacher observation and conferencing.

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. The teacher is encouraged to involve students in the discussion, modification, or creation of rubrics, and teach students to use rubrics as a learning tool.

## ASSESSMENT ACTIVITIES

- ☐ Discussion forums
- ☐ Oral presentations & active listening
- ☐ Quizzes and tests
- ☐ Reflections
- ☐ Graphs - plotting and analyzing
- ☐ Problem solving calculations
- ☐ End of unit conversations (google meets)
- ☐ Diagnostic tests and writing tasks
- ☐ Final exam

## EVALUATION

The final grade will be determined as follows:

- 70% 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.
- 30% of the grade will be based on a final evaluation administered at the end of the course. This evaluation will be based on evidence from a final project and final exam, both comprehensive of the course. The final evaluation is an opportunity for the student 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	
<b>Course Work</b>	<b>70</b>
Knowledge/Understanding (K)	17.5
Thinking/Inquiry (T)	17.5
Communication (C)	17.5
Application (A)	17.5
<b>Final Evaluation</b>	<b>30</b>
Final Exam (7.5K, 7.5T, 7.5C, 7.5A)	30

**TERM WORK EVALUATIONS (70%)**

Evaluation Item	Description	Category
Problem Sets	Problem sets supplement lessons and are used to assess whether or not students are meeting criteria for success.	K, T, C, A
End of Unit Conversation	Unit reflection happens at the end of each unit for both student and teacher to reflect on their process and understanding in the unit.	T, C
Unit Quiz	Each unit has a short quiz on material covered up to the quiz.	K, A
Unit Assignments	Unit assignments are based on curriculum expectations and cover the entirety of each unit.	K, T, C, A

**FINAL EVALUATIONS (30%)**

Evaluation Item	Description	Category
Final Exam	A final, written examination, covering all curriculum expectations for the course.	K, T, C, A

**AAL/AFL/AOL TRACKING SHEET****Units 1 - 5**

AAL	AFL	AOL
Handout Solutions	Lesson Notes	Quiz
	Discussion Forum Post	Unit Assignments
		End of Unit Conversation

**Unit 6: Cumulative Assessment**

AAL	AFL	AOL
		Final Exam

**CONSIDERATION FOR PROGRAM PLANNING****PLANNING PROGRAMS FOR STUDENTS WITH SPECIAL EDUCATION NEEDS**

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 percent 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 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 parents, teachers, administration and external educational assessment reports. 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.
- ☐ **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.
- ☐ 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.