Ontario eSecondary School
Course Outline
2020-2021

Ministry of Education Course Title: Principles of Mathematics, Grade 9	
Ministry Course Code: MPM1D	
Course Type: Academic	
Grade: 9	
Credit Value: 1.0	
Prerequisite(s): None	
Department: Mathematics	
Course developed by: **Asif Sami Haque**	**Date: June 2017**
Length: **One Semester**	**Hours:** **110**
This course has been developed based on the following Ministry documents: 1. *The Ontario Curriculum, Grades 9 and 10 Mathematics, Revised 2005*	

COURSE DESCRIPTION/RATIONAL

This course enables students to develop an understanding of mathematical concepts related to algebra, analytic geometry, and measurement and geometry through investigation, the effective use of technology, and abstract reasoning. Students will investigate relationships, which they will then generalize as equations of lines, and will determine the connections between different representations of a linear relation. They will also explore relationships that emerge from the measurement of three-dimensional figures and two-dimensional shapes. Students will reason mathematically and communicate their thinking as they solve multi-step problems. Throughout the course, students will engage in the following processes: Problem Solving, Reasoning and Proving, Reflecting, Selecting Tools and Computational Strategies, Connecting, Representing, Communicating.

OVERALL CURRICULUM EXPECTATIONS

Number Sense and Algebra

By the end of this course, students will:

1. Demonstrate an understanding of the exponent rules of multiplication and division, and apply them to simplify expressions;
2. Manipulate numerical and polynomial expressions, and solve first-degree equations.

Linear Relations

By the end of this course, students will:

1. Apply data-management techniques to investigate relationships between two variables;
2. Demonstrate an understanding of the characteristics of a linear relation;
3. Connect various representations of a linear relation.

Analytic Geometry

By the end of this course, students will:

1. Determine the relationship between the form of an equation and the shape of its graph with respect to linearity and non-linearity;
2. Determine, through investigation, the properties of the slope and *y*-intercept of a linear relation;
3. Solve problems involving linear relations.

Measurement and Geometry

By the end of this course, students will:

1. Determine, through investigation, the optimal values of various measurements;
2. Solve problems involving the measurements of two-dimensional shapes and the surface areas and volumes of three-dimensional figures;
3. Verify, through investigation facilitated by dynamic geometry software, geometric properties and relationships involving two-dimensional shapes, and apply the results to solving problems.

COURSE CONTENT

Unit	*Length*
Unit 1: Review	18 hours
Unit 2: Algebra	18 hours
Unit 3: Relations	20 hours
Unit 4: Linear Equations and Word Problems	16 hours
Unit 5 Analytical Geometry	21 hours
Unit 6: Area/Perimeter/Volume	16 hours
Final Exam	3 hours
Total	***110 hours**
	***Plus 3-Hour exam**

UNIT DESCRIPTIONS

UNIT 1: REVIEW

Today, there are a variety of number systems that mathematicians use for a variety of applications. The unit begins by reviewing these. Number sense is not the ability to count, but the ability to recognize that something has changed in a small collection and this is the second topic for review. Applying the rules for order of operations as well as those for manipulating fractions, changing decimals to percent and vice-versa, ratios and laws for exponents are all reviewed in this unit.

UNIT 2: ALGEBRA

Algebraic expressions and how to add, subtract, multiply and divide them are the substance of Unit two as students acquire the skills for simplifying algebraic expressions.

UNIT 3: RELATIONS

The unit begins with Cartesian planes and the graphing of ordered pairs; the two quantities (x and y) are related in some way and form a relationship. The values that change in this relationship are called variables. Next we look at the relation y = mx + b. To graph this type of relation, several techniques can be used. Then kinds of surveys, terminology like interpolation and extrapolation are explained. The final topics involve determining if a set of data will display a relationship, determining central tendency and the three possible scenarios when two relations are graphed on the same set of axes.

UNIT 4: LINEAR EQUATIONS AND WORD PROBLEMS

This unit takes time to develop a step by step procedure to solve linear equations. This procedure uses the concept of opposite operations to isolate for the given variable. Addition and subtraction are opposite operations and multiplication and division are the second set of opposite operations. We will always use the opposite operation to that which is given in the linear equation to solve for the variable. We review the distributive law then attack word problems for solving linear equations.

UNIT 5: ANALYTICAL GEOMETRY

We launch our discussion of slope with distance time graphs. The concepts of slope, x and y intercepts, the slopes of parallel, perpendicular, horizontal and vertical lines will prepare students for the important concept of the equation of a line and the forms in which it can be written.

UNIT 6: AREA/PERIMETER/VOLUME

This unit opens with problems involving the Pythagorean Theorem then after reviewing areas and perimeters of polygons we will move right into calculated areas of composite shapes where the total area of the shape is equal to the combination of the individual areas of the shapes that make up the composite shape. Determining surface areas of right prisms and pyramids, cylinders cones and spheres concludes the unit.

TEACHING AND LEARNING STRATEGIES

The students will experience a variety of activities:

Whole-Class Activities

Whole class activities are designed to introduce concepts and skills that are directly applicable to the workplace and to build on the content being studied during small group and individual activities. These activities include the following:

Class discussions that are facilitated through video conferencing and telephone conversations with their subject teacher or discussions with other students concerning the concepts and skills being studied. This is done with the use of Socratic circles for discussions.

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:

Paired or small group research activities students are able to share their work online with not only their teachers, but their classmates too. Students are able to share resources through online chat and video conferencing. The ability to learn from each other, work on teamwork skills, and practice communication are valued and encouraged throughout the course.

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.

Reflective/Comparative analysis for students working in their portfolios, giving them an opportunity for self-reflection on their accomplishments, skills, and concepts learned over the year. This can be accomplished with student and teacher conferences as well.

We grow up thinking of reading and writing as two of the classic 'three Rs", and once we learn how to do them well, many assume that there's no need to think more of them. However, there are nuances to both.

This course explores what writers have known for centuries: there are many, many ways to write and read

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
- ❑ Reports
- ❑ 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	30

TERM WORK EVALUATIONS (70%):

Evaluation Item	Description	Category
Review Assignment	This unit allowed for students to brush up on concepts acquired in previous grades. Testing them out in this phase allows them to see if they need more practice or if they are ready for Grade 9 concepts	K,C,A
Unit 2 Assignment	An assessment on the algebraic skills of the student, this is a stepping stone for further mathematics courses in the high school curriculum.	K,I,C,A
Conversation on mathematical relations	Demonstrate an understanding of concepts by explaining them verbally.	K,I,C,A
Unit 2 Student	Student created review of homemade questions	

created Handout	and answers	
Unit 3 Assignment	Student explore how 2 things are related and show their understanding of these concepts.	K,I,C,A
Unit 4 Assignment	Student shows how they can solve word problems that can be solved using linear equations.	K,I,C,A
Infographic on Math Concepts	Student choose concepts that they need to digest and show in an infographic to an audience that is not familiar with Grade 9 Math	K,I,C,A
Unit 5 Assignment	Students show their acumen in analytical geometry.	K,I,C,A
Screencast Presentation	Screencast presentation on Linear Systems	K,C,A
TinkerCAD Assignment	Exploring 3D drawing software to enforce math learning of geometric figures	K,I,C,A

FINAL EVALUATIONS (30%):

Evaluation Item	Description	Category
Final Exam	Competency of Grade 9 concepts tested to see if student can perform in an examination setting.	K,I,C,A

AFL/AAL/AOL Tracking sheet:

Unit 1: Review – 18 hours

AAL	**AFL**	**AOL**
Lesson 1.3 Review Quiz	Diagnostic Quiz	Conversation and Observation Math
Lesson 1.4 Assignment	Lesson 1.2 Review Quiz	Unit 1 Assignment

Unit 2: Algebra – 18 hours

AAL	**AFL**	**AOL**
2.6 Simplifying Polynomials Handout		Unit 1 and 2 Student Created Problem Set
		Unit 2 Assignment

Unit 3: Relations – 20 hours

AAL	**AFL**	**AOL**
Practicing Questions About Linear Relations		Conversation and Observation Math
		Relations Unit 3 Assignment
		Unit 3 Assignment

Unit 4: Linear Equations and Word Problems – 16 hours

AAL	AFL	AOL
Lesson 4.3-4.5 Notes Submission		Infographic Project
		Unit 4 Assignment

Unit 5: Analytical Geometry – 21 hours

AAL	AFL	AOL
Lesson 5.8 Data Analysis	Lesson 5.5 Application of POI Assignment	Lesson 5.8 Data Analysis Worksheet
		Unit 5 Analytical Geometry Assignment

Unit 6: Area/Perimeter/Volume – 18 hours

AAL	AFL	AOL
Lesson 6.3 Minimizing Perimeter worksheet	Lesson 6.1 Interior Angles Worksheet	Lesson 6.4 TinkerCAD Assignment
Lesson 6.6 SA and Volume of Cones and Pyramids Notes Submission	Lesson 6.2 Parallel Lines Review	Unit 6 Assignment
Unit 6 Practice Submission		

Finals

AOL
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.