TORONTO WORLD SCHOOL

The World School Network

COURSE OUTLINE

Department: Mathematics

Course Developer: Tyler Flynn

Course Development Date: June 2022

Course Reviser: Tyler Flynn

Revision Date: February 2025

Course Title/Grade/Type: Principles of Mathematics, Grade 10, Academic

Course Code: MPM2D

Credit: 1.00

Total Hours: 110 hours

Policy Document: The Ontario Curriculum Grades 9 and 10 Mathematics, Ministry of Education 2005 (Revised)

Prerequisite: Grade 9 Math, MTH1W (De-streamed)

Course Description

This course enables students to broaden their understanding of relationships and extend their problem-solving and algebraic skills through investigation, the effective use of technology, and abstract reasoning. Students will explore quadratic relations and their applications; solve and apply linear systems; verify properties of geometric figures using analytic geometry; and investigate the trigonometry of right and acute triangles. Students will reason mathematically and communicate their thinking as they solve multi-step problems.

Overall Expectations

Quadratic Relations of the Form $y = ax^2 + bx + c$

By the end of this course, students will:

• determine the basic properties of quadratic relations;

• relate transformations of the graph of $y = x^2$ to the algebraic representation $y = a(x - h)^2 + k$;

• solve quadratic equations and interpret the solutions with respect to the corresponding relations;

• solve problems involving quadratic relations.

Analytic Geometry

By the end of this course, students will:
• model and solve problems involving the intersection of two straight lines;

• solve problems using analytic geometry involving properties of lines and line segments;

• verify geometric properties of triangles and quadrilaterals, using analytic geometry.

Trigonometry

By the end of this course, students will:
• use their knowledge of ratio and proportion to investigate similar triangles and solve problems related to similarity;

• solve problems involving right triangles, using the primary trigonometric ratios and the Pythagorean theorem;

• solve problems involving acute triangles, using the sine law and the cosine law.

UNIT DESCRIPTIONS

UNIT	UNIT DESCRIPTION	HOURS
U1: **Linear Systems**	Linear systems play a crucial role in both everyday decision-making and advanced mathematical applications. They allow us to understand relationships between variables, such as the connection between distance and time when calculating speed or analyzing rates of change in business and economics. This unit builds on the foundational concepts of linear algebra introduced in Grade 9, deepening students' understanding of equations, graphs, and problem-solving	14 (4) Lessons

	techniques. Students will explore multiple representations of linear relationships, develop strategies to manipulate and solve equations, and apply these skills to real-world scenarios. By the end of this unit, students will be able to confidently represent, analyze, and solve linear systems using both algebraic and graphical methods.	
U2: **Analytic Geometry**	Expanding upon the foundation built in the previous unit, students will explore the equations of lines and line segments through analytic geometry. This unit will focus on developing mathematical methods for determining line segment length, midpoint, slope, and perpendicular bisectors. Students will use equations and coordinate geometry to analyze and verify geometric properties, deepening their understanding of the relationships between points, lines, and shapes. The application of these concepts to real-world contexts, such as engineering, design, and navigation, will be emphasized to demonstrate their practical significance.	18 (7) Lessons
U3: **Properties of Quadratic Relations**	In this unit, students will explore quadratic functions, a fundamental class of second-order functions that extend beyond linear relationships. Quadratic functions model real-world scenarios such as projectile motion, economics, and engineering. Students will analyze key characteristics, including domain, range, vertex, and intercepts, and examine how transformations affect their graphs. They will also develop algebraic skills in factoring, completing the square, and solving quadratic equations, gaining a deeper understanding of the mathematical relationships that govern quadratic behavior. By the end of this unit, students will be able to apply these concepts to problem-solving and real-world applications.	23 (9) Lessons
U4: **Application of Quadratic Relations**	In this unit, students will transition from the graphical representations of quadratic functions to algebraic methods for solving quadratic equations. They will explore different techniques, including factoring, completing the square, and using the Quadratic Formula, which are essential for solving real-world problems and will be extensively applied in future math courses. By the end of this unit, students will develop a deeper understanding of how quadratic relations are used to model motion, optimization problems, and structural designs in various fields such as physics, engineering, and economics.	23 (9) Lessons
U5: **Similar Triangles: Trigonometry**	In this unit, students will explore the concepts of similarity and congruence in triangles and how they apply to geometric reasoning. They will investigate the relationships between corresponding sides and angles in both right and non-right triangles, developing strategies to determine unknown measurements. Through the use of trigonometric ratios (sine, cosine, and tangent), the Pythagorean theorem, and proportional reasoning, students will learn to solve real-world problems involving indirect measurement, scaling, and angle calculations. By the end of this unit, students will have a strong foundation in applying trigonometry to various practical and mathematical contexts.	15 (6) Lessons
U6: **Acute Triangle Trigonometry**	Triangles play a fundamental role in mathematics, appearing in physics, engineering, and real-world problem-solving. In this unit, students will explore how right and acute triangles can be analyzed using trigonometric ratios (sine, cosine, and tangent) and extended to more complex problems with the Sine Law and Cosine Law. The unit begins with a review of the Pythagorean Theorem, reinforcing its connection to trigonometry. Students will develop the ability to apply these mathematical tools to determine unknown angles and side lengths in both theoretical and real-world contexts, such as navigation, architecture, and physics.	14 (5) Lessons

Final Evaluation	Students will have time to review and then they will have a student/teacher conference and write their final exam. The exam will cover all curriculum expectations.	3
Total Hours		110

Assessment and Evaluation

Evaluation in this course will be continuous throughout the year and will include a variety of evaluation methods. The tools highlighted in yellow will be used for the three different types of assessments:

Assessment as Learning	Assessment for Learning	Assessment of Learning
Student Product **Journals/Letters/Emails (checklist)** **Learning Logs (anecdotal)** **Learning Goals (Checklist)** **Entrance tickets** **Exit tickets**	**Student Product** **Assignment** **Journals/Letters/Emails (checklist)** **Pre-tests (scale/rubric)** **Peer feedback (anecdotal/checklist)** **Entrance ticket** **Vocabulary notebooks (anecdotal)**	**Student Product** **Assignment** **Journals/Letters/Emails (checklist)** **Tests (scale/rubric)** **Exam** **Reports (rubric)** **Essays (rubric)**
Observation **Whole class discussions (anecdotal)** **Self-proofreading (checklist)**	**Observation** **Class discussions (anecdotal)** **Debate (rubric)** **Performance tasks (anecdotal/scale)**	**Observation** **PowerPoint presentations (rubric)** **Performance tasks (checklist)**
Conversation **Student teacher conferences (checklist)** **Small Group Discussions (checklist)** **Pair work (checklist)**	**Conversation** **Student teacher conferences (checklist)** **Small group discussions (checklist)** **Pair work (anecdotal)** **Peer-feedback (anecdotal)** **Peer-editing (anecdotal)** **Oral pre-tests (scale/rubric)**	**Conversation** **Student teacher conferences (checklist)** **Question and Answer Session (checklist)** **Oral tests (scale/rubric)**

Online Activities (within LMS)	Offline Activities
Watching video lectures Watching additional resource videos Completing interactive activities Communicating with teachers Participating in virtual conferences Completing online quizzes Reviewing peer submissions Submitting all AAL, AFL, & AOL Assessment and Evaluations	Reading materials for the course Reviewing materials for the course Completing assignments Completing practice activities Preparing presentations Reviewing for exams and unit tests Researching topics on the internet Recording and producing presentations Practicing processes and skills Completing proctored unit tests and exams

The Final Grade:

The percentage grade represents the quality of the students' overall achievement of the expectations for the course and reflects the corresponding achievement as described in the achievement chart for Mathematics. The distribution of marks into a grade is based on the departmental assessment and evaluation guide for the course and will reflect the student's most consistent level of achievement where appropriate. Comments on the development of learning skills and contributions to the course will be provided on reports. Term work will be 70% of the overall grade for the course; the final evaluation will be 30% of the overall grade, incorporating a final written examination and question/answer session at the end of the course.

Assessment and Percentage of Final Mark	
(Term) 70%	Unit 1: Test (5**%**) [SP] Unit 1: Student/Teacher Conference (5%) [CONV]
	Unit 2: Test (5**%**) [SP] Unit 2: Student/Teacher Conference (5%) [CONV]
	Unit 3: Student/Teacher Conference (5**%**) [CONV] Unit 3: Test (5%) [SP]
	Unit 4: Presentation (5**%**) [OBS] Unit 4: Test (5%) [SP]
	Unit 5: Test (10%) [SP] Unit 5: Student/Teacher Conference (10%) [CONV]
	Unit 6: Test (10%) [SP]
30%	Final Evaluation: Exam (15**%**) [SP] Final Evaluation: Student/Teacher Conference (15%) [CONV]

Teaching and Learning Strategies

Game	X	Conferencing	X
Oral Presentation	X	Demonstration	X
Stimulation	X	Prompt	X
Survey	X	Review	X
Role Playing	X	Textbook	X
Collaborative	X	Workbook/Worksheets	X
Discussion	X	Homework	X
Interview	X	Independent Study	X
Peer Practice	X	Memorization	X
Peer Teaching	X	Note Taking	X
Reflection	X	Questioning Process	X
Inquiry Process	X	Research Process	X
Communication Applications	X	Classifying	X
Email Applications	X	Expressing Another Point of View	X
Media Presentation	X	Graphing	X
Media Production	X	Metacognitive	X
Multimedia Applications	X	Oral Explanation	X
Brainstorming	X		

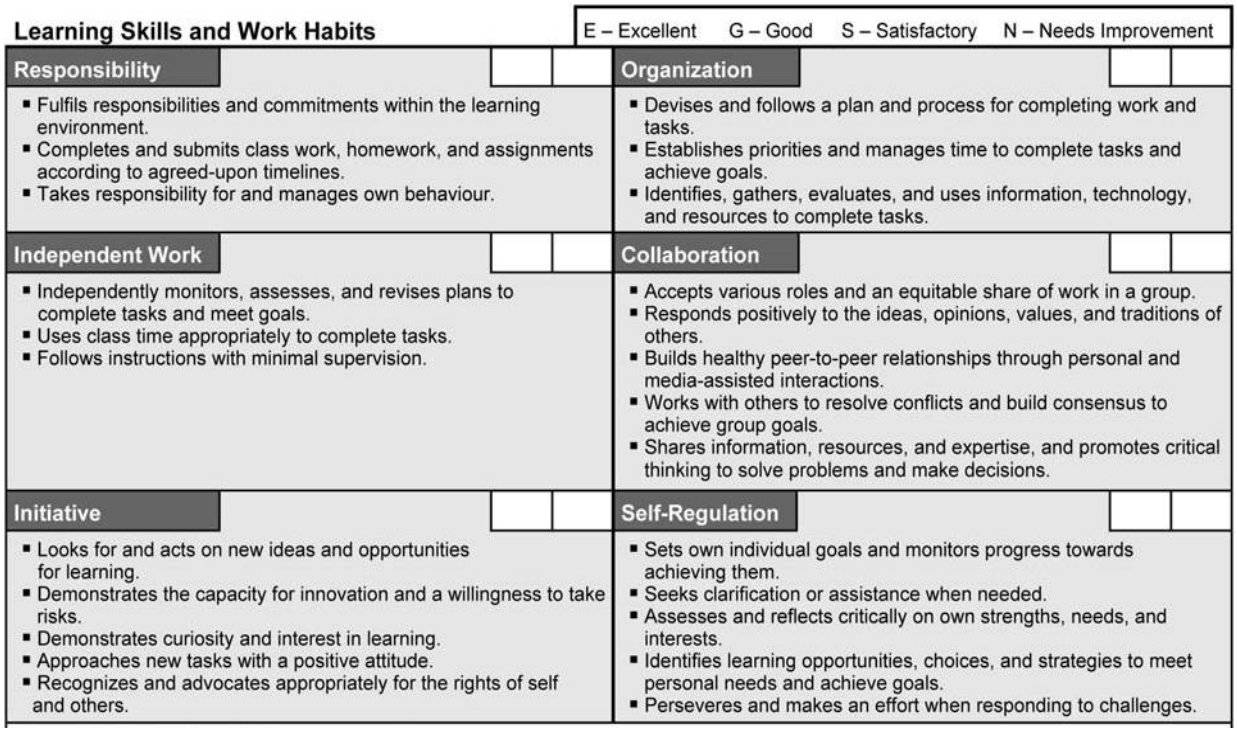
Achievement Category	Weight	Criteria
Knowledge/Understanding	30	Subject-specific content acquired in each course (knowledge), and the comprehension of its meaning and significance (understanding). Examples: Forms of text, strategies used when listening, speaking, reading, writing and viewing, literary concepts, ideas, opinions and relationships.
Thinking	20	The use of critical and creative thinking skills and/or processes, which include planning, processing, critical/creative thinking processes. Examples: generating ideas, organizing information, drawing inferences, interpreting, analyzing, synthesizing, evaluating, critical analysis, metacognition)
Application	30	The conveying of meaning through various oral, written, and visual forms. Examples: clear expression, logical organization, use of appropriate style, voice and point of view, proper use of conventions (grammar, spelling, punctuation, usage) vocabulary and terminology
Communication	20	The use of knowledge and skills to make connections within and between various contexts. Examples: Literary strategies and processes, literary terminology, concepts and theories, and making connections between the text, personal knowledge and experience, other texts and the world outside of school)

A Summary Description of Achievement in Each Percentage Grade Range and Corresponding Level of Achievement		
Percentage Grade Range	**Achievement Level**	**Summary Description**
80-100%	Level 4	A very high to outstanding level of achievement. Achievement is *above* the provincial standard.
70-79%	Level 3	A high level of achievement. Achievement is *at* the provincial standard.
60-69%	Level 2	A moderate level of achievement. Achievement is *below, but approaching,* the provincial standard.
50-59%	Level 1	A passable level of achievement. Achievement is *below* the provincial standard.
below 50%	Level R	Insufficient achievement of curriculum expectations. A credit will not be granted.

Assessment of Learning Skills & Work Habits:

The following learning skills and work habits will be fostered throughout this course and assessed on the report card: responsibility, organization, independent work, collaboration, initiative, self-regulation. These skills will not be included as part of the final mark unless they are identified in the provincial curriculum expectations for the course. However, it is important to remember that the development of these skills is critical to daily academic success and individual growth.

The following chart indicates the skills and look-fors for each student.



Learning Skills and Work Habits	E – Excellent G – Good S – Satisfactory N – Needs Improvement			
Responsibility			**Organization**	
▪ Fulfils responsibilities and commitments within the learning environment. ▪ Completes and submits class work, homework, and assignments according to agreed-upon timelines. ▪ Takes responsibility for and manages own behaviour.			▪ Devises and follows a plan and process for completing work and tasks. ▪ Establishes priorities and manages time to complete tasks and achieve goals. ▪ Identifies, gathers, evaluates, and uses information, technology, and resources to complete tasks.	
Independent Work			**Collaboration**	
▪ Independently monitors, assesses, and revises plans to complete tasks and meet goals. ▪ Uses class time appropriately to complete tasks. ▪ Follows instructions with minimal supervision.			▪ Accepts various roles and an equitable share of work in a group. ▪ Responds positively to the ideas, opinions, values, and traditions of others. ▪ Builds healthy peer-to-peer relationships through personal and media-assisted interactions. ▪ Works with others to resolve conflicts and build consensus to achieve group goals. ▪ Shares information, resources, and expertise, and promotes critical thinking to solve problems and make decisions.	
Initiative			**Self-Regulation**	
▪ Looks for and acts on new ideas and opportunities for learning. ▪ Demonstrates the capacity for innovation and a willingness to take risks. ▪ Demonstrates curiosity and interest in learning. ▪ Approaches new tasks with a positive attitude. ▪ Recognizes and advocates appropriately for the rights of self and others.			▪ Sets own individual goals and monitors progress towards achieving them. ▪ Seeks clarification or assistance when needed. ▪ Assesses and reflects critically on own strengths, needs, and interests. ▪ Identifies learning opportunities, choices, and strategies to meet personal needs and achieve goals. ▪ Perseveres and makes an effort when responding to challenges.	

The report card will therefore focus on two distinct but related aspects of student achievement; the achievement of curriculum expectations and the development of learning skills. The report card will contain separate sections for the reporting of these two aspects.

Program Planning Considerations:

English language learners: As our school can have multilingual student population, special accommodation will be made to bring a rich diversity of background knowledge and experience to the classroom.
TWS courses can provide a wide range of options to address the needs of ESL/ELD students. Assessment and evaluation exercises will help ESL students in mastering the English language. In addition, since all occupations require employees with a wide range of English skills and abilities, many students will learn how the operation of their own physical world can contribute to their success in their social world. The student whose first language is not English enters Ontario Secondary schools with diverse linguistic and cultural backgrounds. All of these students bring a rich array of background knowledge and experience to the classroom, and all teachers must share in the responsibility for their English-language development. Teachers must incorporate appropriate strategies for instructions and assessment to facilitate the success of the English language learners in their classrooms. These strategies include:

- modification of some or all of the course expectations so that they are challenging but attainable for the learner at his or her present level of English proficiency, given the necessary support from the teacher;
- use of a variety of instructional strategies (e.g., extensive use of visual cues, scaffolding, manipulatives, pictures, diagrams, graphic organizers; attention to clarity of instructions);
- modelling of preferred ways of working in English; previewing of textbooks; pre-teaching of key vocabulary; peer tutoring; strategic use of students' first languages);
- use of a variety of learning resources (e.g., visual material, simplified text, bilingual dictionaries, materials that reflect cultural diversity);
- use of assessment accommodations (e.g., granting of extra time; simplification of language used in problems and instructions; use of oral interviews, learning logs, portfolios, demonstrations, visual representations, and tasks requiring completion of graphic organizers or cloze sentences instead of tasks that depend heavily on proficiency in English).

Literacy education: Communication skills are fundamental to the development of literacy. Fostering students' communication skills is an important part of the teacher's role in the curriculum. When students read they need to understand vocabulary and terminology. Students are encouraged to use language with care and precision in order to communicate effectively. Students are encouraged to ask questions to their peers/teachers and to also be proactive with solving their own questions.

The role of information and communications technology: Information and communication technologies (ICT) provide a range of tools that can significantly extend and enrich teachers' instructional strategies and support students' learning. Teachers can use ICT tools and resources both for whole-class instruction and to design programs that meet diverse student needs. Technology can help to reduce the time spent on routine tasks, allowing students to devote more of their efforts to thinking and concept development. Information technology is considered a learning tool that must be accessed by students when the situation is appropriate. As a result, students will develop transferable skills through their experience with word processing, internet research, and presentation software, as would be expected in any environment.
Technology also makes possible simulations of complex systems that can be useful for problem-solving purposes or when field studies on a particular topic are not feasible.
Information and communications technologies can be used in the classroom to connect students to other schools, at home and abroad, and to bring the global community into the local classroom. Although the Internet is a powerful electronic learning tool, there are potential risks attached to its use. All students must be made aware of issues of Internet privacy, safety, and responsible use, as well as of the ways in which

this technology is being abused – for example, when it is used to promote hatred.
Teachers, too, will find the various ICT tools useful in their teaching practice, both for whole class instruction and for the design of curriculum units that contain varied approaches to learning to meet diverse student needs.

Equity and Inclusive Education: The TWS equity and inclusive education strategy focuses on respecting diversity, promoting inclusive education, and identifying and eliminating discriminatory biases, systemic barriers, and power dynamics that limit the ability of students to learn, grow, and contribute to society. In an environment based on the principles of inclusive education, all students, parents, caregivers, and other members of the school community - regardless of ancestry, culture, ethnicity, sex, physical or intellectual ability, race, religion, gender identity, sexual orientation, socio-economic status, or other similar factors - are welcomed, included, treated fairly, and respected. Diversity is valued, and all members of the TWS community feel safe, comfortable, and accepted. Every student is supported and inspired to succeed in a culture of high expectations for learning. In an inclusive education system, all students see themselves reflected in the curriculum, their physical surroundings, and the broader environment, so that they can feel engaged in and empowered by their learning experiences. In addition, TWS differentiates the instruction and assessment strategies to take into account the background and experiences, as well as the interests, aptitudes, and learning needs, of all students.

First Nation, Métis and Inuit Education Policy Framework
The new First Nation, Métis and Inuit Education Policy Framework is a key part of the strategy. The framework includes approaches for schools and school boards that will boost Aboriginal student achievement, help close the gap in achievement between Aboriginal an non-Aboriginal students, and improving students' literacy and numeracy skills, training teachers in teaching methods that are appropriate for Aboriginal students, and encouraging more parents to get involved in their children's education or school. The framework also sets out strategies to integrate First Nations, Métis and Inuit cultures, histories and perspectives throughout the Ontario curriculum. This will increase knowledge and awareness among all students.

Plagiarism/Cheating:

Any incident of plagiarism or cheating will result in a resubmission/rewrite of that particular assignment/test at the end of the course on the student's own time and at his/her own expense to pay for the creation and marking of a new assessment. The incident will be documented in the office. A second incident of plagiarism or cheating in any course will result in a mark of zero for that assignment. For example, if you cheat on a math test and then plagiarize an English essay, you will receive a zero on the essay.

Missed and Late Assignment Policy:

Teachers will make it Clear to the students and parents/guardian early in the school year that they are responsible not only for their behaviour in the classroom/school but also for providing evidence of their achievement of the overall expectations within the time frame specified by the teacher and in a form approved by the teacher. Students must understand that there will be consequences for not completing assignments for evaluation or for submitting those assignments late. Where in the teacher's professional judgment it is appropriate to do so, a number of strategies will be used to encourage the student to modify his/her behaviour. Some of these may include:

- Asking the student to clarify the reason for not completing the assignment taking into consideration legitimate reasons for missed deadlines
- Maintaining ongoing communication with students and/or parents about due dates and late assignments, and scheduling conferences with parents if the problem persists
- Setting up a student contract

- Providing alternative assignments or tests/exams where, in the teacher's professional judgment, it is reasonable and appropriate to do so
- Deducting marks for late assignments, up to and including the full value of the assignment

Students and parent/guardians will be informed in a timely fashion via phone call, face to face conference, e-mail and if need be a formal letter about the importance of submitting assignments for evaluation when they are due and about the consequences for students who submit assignments late or fail to submit assignments. **If the above measures have been put into place and the behaviour of the student has no provided sufficient evidence, then 0 will be inserted as the mark for the missed assignment.**

Resources

Principles of Mathematics 10, Nelson, 2010
Principles of Mathematics 10, Teacher's Resource CD-ROM, McGraw-Hill Ryerson 2007.

Growing Success: Assessment Evaluation and Reporting in Ontario Schools, First Edition Covering Grades 1-12

Attendance Policy:

Consistent log-in is crucial to a student's success in Toronto World School's online program. The guidelines of the Ministry of Education require that students receive at least 110 hours of scheduled instruction time for each credit course. Attendance patterns will be monitored to ensure a student is actively logging into their course. Students who have not completed the course within 12 months of enrolment will be automatically removed from the course. Only under extenuating circumstances, with proper documentation and the permission of the Principal, can a student be reinstated.

Acceptable Online Use Policy

Toronto World School uses the ConnectED Integrated Learning Platform and is intended for educational purposes only. The use of this program or any tools within TWS systems, other than for educational purposes, is strictly prohibited. The inappropriate uses include, but are not limited to, criminal, obscene, commercial, cyber-bullying or illegal purposes.
The administration has the right to review all student work in order to determine the appropriateness of computer use. If TWS online programs are deemed to be used inappropriately, the Administration will levy consequences which may include suspensions and/or removal from the program. In some cases, further action may be taken including contacting day schools, legal representation or the police.
Students need to be very vigilant in order to prevent them getting into a situation where they may be suspected for inappropriate use.
Therefore, students are reminded to

- Always protect their passwords and not share them with anyone
- Always inform their teachers of suspicious messages or other incidents that they encounter
- Always only access content that is intended for educational use.

Hardware/software requirements:

Hardware:

- PC running Windows 8 or higher
- Mac running Apple OS X or higher
- Chromebook running Chrome OS

High speed internet is recommended with access to a computer with the following:

- A processor of 2GHz or faster
- 4 GB RAM or greater
- A high speed internet connection of 1.5 MB/s or faster
- Keyboard and mouse
- Headphone/Speakers/Microphone/Camera

Recommended Software:

- Adobe Reader, Shockwave, Flash Player, Java, Office suite

Browser:

- Mozilla Firefox4 or higher, Internet Explorer 7 or higher, Safari 5 or higher, Google Chrome 11 or higher