Principles of Mathematics, Grade 9, Academic

Course Code: MPM1D
Grade: 9
Course Type: Academic
Credit Value: 1.0
Prerequisites: None

Curriculum Document: Mathematics, Revised (2005)
Developed By: Bayfield Design and Christian Virtual School
Department: Mathematics
Development Date: September 2020
Most Recent Revision Date: September 2020

Teacher(s):

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Course Description:

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.

Unit Title and Description	Overall Curriculum Expectations	Time Allocated
Essential Skills Review To begin the course, students start with reviewing essential skills like number systems, the order of operations, and working with decimals, fractions, rational numbers, and percentages. Students will go on to review the concept of rates, ratios, and proportions as well as scientific notation. These skills will be used throughout the course, and this unit ensures students have the foundational skills to move on.	Review	10 Hours
Algebra Students will learn how to add, subtract, multiply, and divide expressions with exponents, and apply these skills to simplify expressions. This will then extend to manipulating numerical and	**Number Sense and Algebra** 1. Demonstrate an understanding of the exponent rules of multiplication and division, and apply them to simplify expressions;	20 Hours

polynomial expressions to solve equations in real-life contexts.	2. Manipulate numerical and polynomial expressions, and solve first-degree equations.	
Linear Equations and Word Problems

Students begin this unit by developing strategies to solve linear equations. They investigate different ways in which relationships can be expressed, and how to translate between these different forms. Students look at a number of involved situations related to their everyday lives and consider the many different ways in which linear equations help find solutions. | **Linear Relations**

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. | 20 Hours |
| **Linear Relations**

Students build on their learning in the previous unit and begin exploring linear equations in the form of a relation. They then utilize the Cartesian plane to graph linear relations and investigate their characteristics. Through a data management project, students explore a linear relation in context and determine how to collect, process, and make conclusions based on their data. | **Linear Relations**

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. | 20 Hours |
| **Analytical Geometry**

In this unit, students explore the concepts of slope and x- and y-intercepts more in depth. They learn the relationship between the slopes of parallel, perpendicular, horizontal, and vertical lines and investigate the important concept of the equation of a line and the forms in which it can be written. | **Analytical Geometry**

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. | 20 Hours |
| **Area, Perimeter, and Volume**

After a review of areas and perimeters of shapes, students take part in a number of interactive activities that encourage the investigations of internal and external angles, optimization of area, dimensional analysis, and patterns created by shapes' diagonals. | **Measurement and Geometry**

1. Determine, through investigation, the optimal values of various measurements;
2. Solve problems involving the measurements of two-dimensional shapes and the | 18 Hours |

	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.	
Final Assessment The final assessment for this course is an online exam worth 30% of the student's final grade.	All	2 Hours

Resources Required:

This course is entirely online and does not require nor rely on any textbook. The materials required for the course are:

- A scanner, smart phone, camera, or similar device to digitize handwritten or hand-drawn work,
- A non-programmable, non-graphing, scientific calculator.

Teaching and Learning Strategies:

The goal for this course is to help students use the language of mathematics skillfully, confidently and flexibly. To accomplish this, a wide variety of instructional strategies are used to provide learning opportunities to accommodate a variety of learning styles, interests, and ability levels. There are seven mathematical processes outlined in the Ontario curriculum that support effective learning in mathematics: problem solving, reasoning and proving, reflecting, selecting tools and computational strategies, connecting, representing, and communicating. These processes are used throughout the course as strategies for teaching and learning. The following list outlines their application further.

- *Problem solving:* The course guides students toward recognizing opportunities to apply knowledge they have gained in previous courses or lessons to solve problems. The course encourages students to persevere in difficult situations, look for patterns, build concrete skills in problem solving, and use logical reasoning to solve new problems.

- *Reasoning and proving:* This course has an emphasis on investigation and critical thinking as students explore new topics. This gives students the chance to make predictions, provide evidence, and explore relationships as they are taught the different mathematical concepts and relationships.

- *Reflecting*: At the end of each unit is a chance for students to reflect on their own learning, determine where their strengths are and where they should review before continuing. This self-reflection is an important skill in mathematics, as it enhances students' problem

solving skills. Students are encouraged to reflect on the reasonableness of their answers, the effectiveness of a chosen strategy, and their conclusions.

- *Selecting tools and computational strategies*: Throughout the course students are exposed to and encouraged to utilize different tools, manipulatives, and strategies that best suit their learning needs.

- *Connecting:* This course connects the concepts taught to real-world applications through the use of word problems, career applications, and investigations.

- *Representing:* Through the use of examples, practice problems, and solution videos, the course models various ways to demonstrate understanding, poses questions that require students to use different representations as they are working at each level of conceptual development – concrete, visual or symbolic, and allows individual students the time they need to solidify their understanding at each conceptual stage.

- *Communicating:* Proper use of symbols, vocabulary, and notations is modeled throughout the course, and students are taught to use the same precision in their communications with their teacher. In addition, through the use of discussions, this course offers students the opportunity to share their understanding both in oral as well as written form with their peers.

Additional Information

Every student attending Christian Virtual School is unique. We believe each student must have the opportunities to achieve success according to their own interests, abilities, and goals. For further information on our assessment and evaluation strategies, as well as our program planning considerations, you can refer to the following documents available for download:

- Christian Virtual School **Assessment and Evaluation Strategies**
- Christian Virtual School **Program Planning Considerations**

These documents can be found online at www.christianvirtualschool.com/additional-information.