



Course Outline: Grade 8 Mathematics

Course Name: Grade 8 Mathematics

Course Code: MAT8

Credit Value: None. Credits are not issued at the elementary level.

Prerequisite: None

Curriculum Policy Document: [*The Ontario Curriculum Grades 1-8: Mathematics, 2005 \(revised\)*](#)

Course Developer: Virtual Elementary School

Department: Intermediate

Development Date: 2019

Course Description

This course builds on the Grade 7 curriculum to further develop students' understanding of fundamental mathematical concepts by exploring topics related to number sense and numeration, measurement, geometry and spatial sense, patterning and algebra, and data management and probability. Students represent and order rational numbers, represent numbers using exponential notation, and solve multi-step problems involving whole numbers and decimals. Students multiply and divide fractions and integers, multiply and divide decimals by powers of ten, and apply order of operations in expressions with brackets and exponents. Students solve problems involving percents to one decimal place and percents greater than 100, and solve problems involving rates and proportions. Students convert between cubic centimetres and cubic metres and between millilitres and cubic centimetres. Students develop circumference and area relationships for a circle, develop and apply the formula for the volume of a cylinder, and determine and apply surface-area relationships for cylinders. Students sort quadrilaterals by geometric properties involving diagonals, construct circles, investigate relationships among similar shapes, and determine and apply angle relationships for parallel and intersecting lines. Furthermore, students relate the number of faces, edges, and vertices of a polyhedron, determine and apply the Pythagorean relationship geometrically, and plot the image of a point on the coordinate plane after applying a transformation. Students represent the general term in a linear sequence, use one or more algebraic expressions, translate statements, and use algebraic equations. Students find the term number in a pattern algebraically when given any term, and solve linear equations involving one-variable terms with integer solutions using a "balance" model. Students collect categorical, discrete, and continuous data, organize data into intervals, display data using histograms and scatter plots, and use measures of central tendency to compare sets of data. Students compare two attributes using data management tools, compare experimental and theoretical probabilities, and calculate the probability of complementary events. Throughout the course, students reinforce the mathematical processes of problem-solving, reasoning and proving, reflecting, selecting tools and computational strategies, connecting, representing, and communicating.

Through investigation of real-life problems, students develop a strong foundation of mathematical knowledge and skills. Students apply mathematical processes and build transferrable critical-thinking skills in varied teaching and consolidation activities that appeal to diverse learning styles. Students participate in engaging storylines that connect their learning to real-world contexts and build confidence through facilitating a positive attitude towards mathematics. Various opportunities are provided to consolidate student learning through technology and offline activities, including using tactile manipulatives, to reinforce essential mathematical strategies and tools. The course has a strong focus on reinforcing number sense and numeracy skills and provides various activities for practice throughout. This course prepares students for Grade 9 mathematics.

Resources Required by the Student

This course is entirely online and does not require nor rely on any textbook. Students will require the following resources:

- A scanner, smart phone camera, or similar device to digitize handwritten or hand-drawn work
- A smart phone camera or similar device to take pictures of student work
- A device to record audio
- A printer
- A physical binder, folder, or notebook for offline activities
- Calculator
- Protractor
- Compass
- Ruler with centimetres
- Various household items to complete offline activities

Overall Curriculum Expectations

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Number Sense and Numeration	<ul style="list-style-type: none"> • Represent, compare, and order equivalent representations of numbers, including those involving positive exponents. • Solve problems involving whole numbers, decimal numbers, fractions, and integers by using a variety of computational strategies. • Solve problems by using proportional reasoning in a variety of meaningful contexts.
Measurement	<ul style="list-style-type: none"> • Research, describe, and report on applications of volume and capacity measurement. • Determine the relationships among units and measurable attributes, including the area of a circle and the volume of a cylinder.
Geometry and Spatial Sense	<ul style="list-style-type: none"> • Demonstrate an understanding of the geometric properties of quadrilaterals and circles and the applications of geometric properties in the real world.

	<ul style="list-style-type: none"> • Develop geometric relationships involving lines, triangles, and polyhedra, and solve problems involving lines and triangles. • Represent transformations using the Cartesian coordinate plane, and make connections between transformations and the real world.
Patterning and Algebra	<ul style="list-style-type: none"> • Represent linear growing patterns (where the terms are whole numbers) using graphs, algebraic expressions, and equations. • Model linear relationships graphically and algebraically, and solve and verify algebraic equations, using a variety of strategies, including inspection, guess and check, and using a “balance” model.
Data Management and Probability	<ul style="list-style-type: none"> • Collect and organize categorical, discrete, or continuous primary data and secondary data and display the data using charts and graphs, including frequency tables with intervals, histograms, and scatter plots. • Apply a variety of data management tools and strategies to make convincing arguments about data. • Use probability models to make predictions about real-life events.

Teaching and Learning Strategies

Through a balance of problem-solving and direct instruction, students develop a strong foundation of mathematical processes, knowledge, and skills to apply in real-world contexts. The course utilizes a combination of technology and offline activities, providing opportunities to develop an understanding of skills and concepts in interactive and concrete ways and engage multiple learning styles. The lessons feature a variety of intriguing storylines, videos, graphics, and interactive games to reinforce students’ learning. The activities also build a foundation of mathematical models and strategies that students will use throughout the elementary grades.

The course relies on the assistance of a learning coach to support students moving through the content. The learning coach will be involved in facilitating technical aspects of the course (e.g. printing and scanning printable activities) and participating in discussion-based activities to assist students in developing communication skills.

Reporting (Courses with Qualified Teacher)

Student achievement will be communicated formally to students via progress reports and official report cards. A progress report is provided after completion of the first unit in the course. The progress report is not an evaluation of the student’s achievement. Rather, the purpose is to give students and parents early and specific feedback regarding the student’s general progress during the first unit of study.

Report cards are issued at the midterm point in the course as well as upon completion of the course. Each report card will focus on two distinct but related aspects of student achievement. First, the achievement of curriculum expectations is reported as a percentage. Additionally, the course median is reported as a percentage. The teacher will also provide written comments concerning the student's strengths, areas for improvement, and next steps.

Second, the learning skills are reported as percentage grades representing four levels of accomplishment. Upon completion of a course, VES will send a copy of the report card to the student's home school (if in Ontario) where the course will be added to the ongoing list of courses on the student's Ontario Student Record (OSR). The report card will also be sent to the student's home address.

Units

Unit	Description
Representing Numbers	In the Representing Numbers unit, students investigate exponential notation, expanded form using powers of ten, prime factorization, and translating between decimal numbers, fractions, and percentages. Students also represent, compare, and order rational numbers.
Geometry	In the Geometry unit, students sort and classify quadrilaterals, construct circles, and explore applications of geometric properties. Students investigate and solve problems associated with area, perimeter, side length, angle relationships, and line relationships. Students explore the Pythagorean theorem, examine polyhedron relationships, graph on the Cartesian coordinate plane, and investigate real-world movements.
Operations	In the Operations unit, students multiply and divide decimal numbers by decimal numbers and solve problems involving whole numbers and decimal numbers, percentages, and percentages over 100. Students multiply and divide decimal numbers by powers of ten, explore positive square roots, and multiply and divide integers. Students solve problems involving integers and utilize order of operations.
Fractions	In the Fractions unit, students add and subtract fractions and solve problems involving fraction addition and subtraction. Students multiply and divide fractions and solve problems involving fraction multiplication and division.
Proportional Reasoning	In the Proportional Reasoning unit, students explore real-life proportional relationships and solve problems involving proportional relationships, proportions by using variables, percentages, and rates.
Data Management and Probability	In the Data Management and Probability unit, students understand census, samples, and population. They also collect and organize data and investigate histograms and scatter plots. Students select the appropriate graph, explore measures of central tendency, and compare data using scatter plots and different tools and strategies. Students analyze data and develop an understanding of theoretical and experimental probability and probability of complementary events.
Patterning and Algebra	In the Patterning and Algebra unit, students develop an understanding of the general term, represent linear patterns graphically, determine a term value, and explore algebra in real life. Students model linear relationships, evaluate algebraic expressions, and solve equations using inspection, guess and check, and a balance model.

Measurement	In the Measurement unit, students convert units of area, volume, and capacity, investigate circumferences and areas of circles, and measure the surface area and volume of a cylinder.
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The Final Grade (Courses with Qualified Teacher)

Student evaluation in this course is based on the student's achievement of curriculum expectations. The final percentage grade represents the quality of the student's overall fulfillment of the expectations for the course and reflects the corresponding level of achievement as described in the achievement chart for the discipline. The final grade reflects the student's most consistent level of achievement across all units in the course, although special consideration is given to more recent evidence of achievement. There is no final assessment, such as an exam, in this course.