Course Outline: Grade 4 Mathematics

Course Name: Grade 4 Mathematics
Course Code: MAT4
Credit Value: None. Credits are not issued at the elementary level.
Prerequisite: None
Curriculum Policy Document: The Ontario Curriculum: Grade 4 Mathematics
Course Developer: Virtual Elementary School
Department: Junior
Development Date: 2020

Overview

This course builds on the Grade 3 curriculum to further develop students' understanding of fundamental mathematical concepts by exploring topics related to number, coding, algebra, data, spatial sense, social emotional learning skills in mathematics, and financial literacy.

Throughout the course, students will be encouraged to build their social emotional learning skills by focusing specifically on the interactions and challenges they face in the world around them. They will learn to solve problems using reasoning, cooperation, tools, and a variety of different problem-solving strategies. Students will practice using math language in order to communicate their ideas and solutions in order to tell a story and to cooperate with others.

Regarding numbers, students will learn how to identify, represent, show place value, compose and decompose, compare and order numbers up to 10 000, and learn how to round four-digit numbers. They will also be introduced to reading, writing, and understanding decimal numbers. Students will explore different ways of representing, comparing, counting by, and ordering fractions. They will be able to show equivalent fractions. Students will practice addition and subtraction of four-digit numbers using a variety of tools and strategies. They will also practice multiplying and dividing numbers by 1 through 11, as well as by 100, and 1 000. Students will practice their problem-solving skills by working through real-world problems that require the use of more than one operation to find a solution.

In algebra, students will continue to expand their knowledge of patterning as they create, identify, extend, and predict repeating and increasing patterns. Students will explore the commutative and distributive property of both multiplication and addition. They will also make use of a variety of different tools and strategies in order to help them find missing numbers in equations and to solve inequalities.

In data, students will learn about the differences between qualitative and quantitative data, and primary and secondary sources of data. They will demonstrate an understanding of and the uses of the mean, medians, and modes. They will collect and organize data in order to display it in a variety of different charts and graphs, and then use their charts and graphs to create simple infographics in order to tell a story about data. They will use data, charts, graphs, infographics, and probability experiments in order to read, interpret, compare, predict, and draw conclusions based on applicable data sets.

In spatial sense, students will learn the properties and characteristics of rectangles and learn how to identify, describe, reflect, and translate different angles and shapes. They will learn how to differentiate among acute, right, obtuse, and straight angles, and students will explore lines of symmetry. They will also use shapes to create patterns. While exploring measurement, students will estimate, compare, and determine mass and capacity in a variety of different units and contextual situations. They will also continue to expand their knowledge of time by exploring units of minutes, hours, days, weeks, years, decades, and centuries.

In financial literacy, students will be exposed to the different methods of payment that are used in modern society. They will estimate and calculate costs, make change for cash purchases, and explore the relationships among spending, saving, earning, investing, and donating. They will build good financial sense by practicing how to determine whether purchases are worthwhile.

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 along with characters who connect their learning to real-world contexts and build confidence by instilling a positive attitude towards mathematics. Various opportunities consolidate students' learning through technology and offline activities, including tactile manipulatives, to reinforce essential mathematical strategies and tools. The course has a strong focus on reinforcing number sense and numeracy skills. It also provides various activities for practice throughout. This course prepares students for grade 5 mathematics.

Resources Required

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

- A scanner, smartphone camera, or similar device to digitize handwritten or hand-drawn work
- A smartphone 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
- Scissors, stapler, ruler, glue, baking soda, salt, dish soap, food colouring, vinegar, cardboard, dice, a plastic bottle
- Centimetre grid paper
- Various household items to complete offline activities

Overall Curriculum Expectations

A. Social Emotional Learning Skills in Mathematics	• A1. Social-Emotional Learning (SEL) Skills and the Mathematical Processes: apply, to the best of their ability, a variety of social-emotional learning skills to support their use of the mathematical processes and their learning in connection with the expectations in the other five strands of the mathematics curriculum
B. Number	• B1. Number Sense: demonstrate an understanding of numbers and make connections to the way numbers are used in everyday life

	• B2. Operations: use knowledge of numbers and operations to solve mathematical problems encountered in everyday lifeB2.
C. Algebra	• C1. Patterns and Relationships: identify, describe, extend, create, and make predictions about a variety of patterns, including those found in real-life contexts • C2. Equations and Inequalities: demonstrate an understanding of variables, expressions, equalities, and inequalities, and apply this understanding in various contexts • C3. Coding: solve problems and create computational representations of mathematical situations using coding concepts and skills • C4. Mathematical Modelling: apply the process of mathematical modelling to represent, analyse, make predictions, and provide insight into real-life situations
D. Data	• D1. Data Literacy: manage, analyse, and use data to make convincing arguments and informed decisions, in various contexts drawn from life • D2. Probability: describe the likelihood that events will happen, and use that information to make predictions
E. Spatial Sense	• E1. Geometric and Spatial Reasoning: describe and represent shape, location, and movement by applying geometric properties and spatial relationships in order to navigate the world around them • E2. Measurement: compare, estimate, and determine measurements in various contexts
F. Financial Literacy	• F1. Demonstrate the knowledge and skills needed to make informed financial decisions

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 engages multiple learning styles by utilizing a combination of technology and offline activities that provide opportunities to develop an understanding of skills and concepts in interactive and concrete ways. 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 young 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 in participating in discussion-based activities to assist students in developing communication skills.

Units

Representing Numbers	In the Representing Numbers unit, students learn to read and write numbers up to 10 000, show an understanding of place value up to 10 000, represent, compare, and order numbers up to 10 000. They also round four-digit numbers in real-life situations.
Geometry	In the Geometry unit, students draw lines of symmetry on 2D shapes, and identify, compare, and classify quadrilaterals. They learn how to identify various angles.

	Students identify, perform, and describe reflections and learn to create patterns using reflections.
Addition and Subtraction	In the Addition and Subtraction unit, students add and subtract four-digit numbers using partial sums, add and subtract four-digit numbers vertically,
Multiplication and Division	In the Multiplication and Division unit, students multiply ad multiply and divide numbers from 1 to 10. They multiply and divide by 10, 100, and 1 000 using mental strategies and multiply and divide using a variety of tools. Students solve vertical multiplication equations, divide two-digit and three-digit by one-digit numbers. Students describe relationships using multiplication, and explore multiplication and unit rates. They also solve problems involving more than one operation.
Patterning and Algebra	In the Patterning and Algebra unit, students create and extend patterns, analyze terms and term numbers, create number patterns, and predict terms in a pattern. Students also determine the relationship between multiplication and division, find the missing number in a multiplication problem, and identify the commutative and distributive properties.
Fractions and Decimal Numbers	In the Fractions and Decimal Numbers unit, students represent fractions, identify the fraction of a group, compare and order fractions, show equivalent fractions, and count by halves, thirds, fourths, and tenths. Students also read and write decimal numbers, show place values from 0.1 to 10 000, represent, compare, and order decimal numbers up to tenths, count forward, add and subtract decimal numbers, and explore the relationship between fractions and decimal numbers.
Coding	In this unit, students learn how to write and execute code to draw shapes. They learn the concepts of variables and nested events. Students learn how to debug code with nested events.
Data	In the Data unit, students collect data by conducting a survey and collect and organize data in charts, tables, and graphs. They learn how to create an infographic to represent data. Students read, interpret, and draw conclusions on data, demonstrate an understanding of the median, describe and compare sets of data, and explore probability and probability experiments.
Measurement	In the Measurement unit, students estimate, measure, and record mass. Students investigate grams and kilograms, capacity, millilitres and litres, and volume. They also compare mass and capacity. Students determine elapsed time and solve problems involving years, decades, and centuries.
Financial Literacy	In this unit students identify different methods of payment and learn how to estimate and calculate cost using addition. They calculate the change for a cash purchase. Students explore spending, saving, earning, investing, and donating while exploring the concept of good purchases.

Reporting and The Final Grade (Facilitated)

Reporting

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 of the report 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 and the course median are reported as letter grades. 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 letter 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.

The Final Grade

Student evaluation in this course is based on the student's achievement of curriculum expectations. The final letter 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. Students are not required to write a final exam in this course.

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