Curriculum Map
Mathematics
Grade 7

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Introduction

This curriculum map was created as part of PED 4141 - Curriculum Planning, Assessment, and Evaluation Pt II, from September-December 2023. Originally, the task was posed as the creation of a curriculum map through the division of a chosen curriculum into units of study. Based on my own practicum experience, professional development I have participated in, and the Ministry's of Education's provision of and push for instructional practices such as thinking classrooms, spiraling curriculum, and the ways teachers in Ontario are rethinking assessment and evaluation, I chose to instead attempt to build a cycled model of the grade 7 Ontario Mathematics curriculum.

At first glance, this seemed a simple enough task. This wasn't the case, but after spending considerable time and energy breaking down and building back this curriculum, I believe I've created a comprehensive plan for implementing this curriculum in a way that allows for the building of a learning community, and places emphasis on the student as a math learner, rather than solely assessment focused teaching. Grade 7 is a particularly crucial time for students in math – particularly students who belong to identity groups that are underrepresented in STEM fields. As they move through the intermediate grades, students begin to set their sights on pathways they may take through their secondary and postsecondary education. Ontario has de-streamed grade 9 math (and is working on grade 10), but we know that even with this measure, there are a myriad of ways that students (particularly students who are not white, upper-class, neurotypical, males) are discouraged from pursuing STEM pathways. I don't believe that this curriculum map solves that issue. But I do believe that having a robust, student-centred curriculum that encourages perseverance, problem solving, collaboration, and critical thinking is fundamental if we as teachers want to begin to dismantle those barriers. Students need to see themselves in their curriculum, and they need to learn how to be mathematicians – they do not just need to learn one unit, dump the information in a written test, and move onto the next piece. There is less need for people who can do mental math than there is need for community members who are skilled and practiced in coming up against a problem that they have not seen before, and using their experience, knowledge, and problem solving skills to figure it out. I believe this curriculum map allows for a learning environment that encourages students to make connections across strands, apply their learning to their everyday lives, and see how math is an essential skill not because you will one day need to know the quadratic formula by heart, but because every day you will need to know how to persevere in the face of problems.

On the note of moving away from past models of teaching mathematics, I want to highlight some key parts of this map that I believe need explicit explanations, in order to avoid misinterpretation.

While there are essentially 4 cycles created for a year-long course, each cycle is much too large and expansive to be treated as a discrete unit of study. Each cycle should be treated as a lens for approximately 25% of the time spent in the classroom – allowing students to move from foundational skills to high-level thinking and mathematical processes in an iterative process that emphasizes critical thinking, flow, and increasingly complex modes of engagement (see Lilejdahl, *Building Thinking Classrooms in Mathematics*, ch. 9, for more on this). This map is in no way intended to silo math skills or discretize curriculum expectations; however, in order to provide some more structure to these (intentionally) broad cycles, as well as to highlight where these skills will be applied outside of the math classroom context, each cycle contains 2 'clusters' of materials: "Understanding Our World: Algebraic and Spatial Skills" and "Everyday Math: Financial Literacy and Understanding Data". The former collects the skills and expectations mostly found within strands C (Algebra) and E (Spatial Sense), while the latter is intended for those skills & expectations within strands D (Data) and F (Financial Literacy). Strands B (Number) and A(Social-Emotional Learning Skills and the Mathematical Processes) are not segmented in this way. This is not meant to suggest that there is no overlap between strands outside of these clusters within each cycle (and even across the cycles), but simply to group those that most closely relate, and to find places where learning and assessment can be done in an efficient manner.

When considering assessment, there should be care taken when considering and implementing this model. Assessment should be built into this framework in a way that reflects the learning model itself: i.e. "unit tests" and summative assessment meant to encapsulate a discrete module of study have no place here. Assessment, like the framework below, should be cyclical, iterative, and interdisciplinary (both in terms of curriculum strands and cross curriculum).

With that in mind, I do believe that this framework would be an excellent model in order to implement the grade 7 Ontario mathematics curriculum. It is built broad and flexible on purpose: change/remove/reorganize the cycles/clusters as needed. Create entry and assessment points wherever possible. I've done my best to create a robust template for the mathematics curriculum, but math is unique in its demand for skill blending, adaptation, and perseverance in the face of new challenges and unfamiliar situations, and this framework should be treated in much the same way.

Curriculum Expectations and Program Goals

[Grade 7 Mathematics Ontario Curriculum Doc]

Overall Expectations

A. Social Emotional Learning Skills in Mathematics and the Mathematical Processes
A1. 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. demonstrate an understanding of numbers and make connections to the way numbers are used in everyday life **B2.** use knowledge of numbers and operations to solve mathematical problems encountered in everyday life
C. Algebra
C1. identify, describe, extend, create, and make predictions about a variety of patterns, including those found in real-life contexts **C2.** demonstrate an understanding of variables, expressions, equalities, and inequalities, and apply this understanding in various contexts **C3.** solve problems and create computational representations of mathematical situations using coding concepts and skills
D. Data
D1. manage, analyse, and use data to make convincing arguments and informed decisions, in various contexts drawn from real life **D2.** describe the likelihood that events will happen, and use that information to make predictions
E. Spatial Sense
E1. describe and represent shape, location, and movement by applying geometric properties and spatial relationships in order to navigate the world around them **E2.** compare, estimate, and determine measurements in various contexts
F. Financial Literacy
F1. demonstrate the knowledge and skills needed to make informed financial decisions

Program Aims and Key Takeaways

The math curriculum focus is on empowering the student to become a confident mathematics learner and see themselves as mathematically skilled. Mathematics is a part of the everyday world, and will be necessary for students to make informed decisions with regards to their life outside of and after their school career. More than that, skills and success in mathematics allow students to build a foundation of skills with understanding and adapting to new ideas, working on their own or with others to approach challenges, communicate effectively, and think creatively & critically, both in math and in other disciplines. Making those connections—between math and other STEM subjects, digital humanities, and trade skills—is an integral part of this curriculum. In addition to the subject matter, the skills students learn in mathematics include learning to cope with stress and anxiety, persevere and learn from their mistakes, work collaboratively with others towards a shared goal, value deep thinking and making connections, and become capable and confident learners.

Specific to this curriculum, students will engage with six distinct strands: number sense / operations, algebra, data, spatial sense, and financial literacy, with social-emotional learning skills (such as identifying/managing emotions, maintaining motivation/persevering, building relationships, and so on) and mathematical processes (problem solving, reasoning/proving, reflecting, communicating, and more) imbued throughout the first five. As they move through these strands and build their portfolio of mathematical ability, it is critical that their confidence is built as learners. In order to do so, all students must feel connected to the curriculum: they must see themselves in what is taught, why it is taught, and how it is taught. They need to see how their learning applies to their lives and to the world around them. How mathematics is contextualized, positioned, promoted, discussed, taught, learned, evaluated, and applied affects all students, and all students should leave this course confident learners equipped with the necessary skills to engage with mathematics for the rest of their lives.

Horizontal and Vertical Mapping

Horizontal Mapping

The skills learned in math classrooms are ones that are applicable across curricula. The mathematical processes are: problem solving, reasoning, reflecting, connecting, communicating, representing, and selecting tools and strategies. It should not be hard to see how using and developing these processes in mathematics would ease the ability to use and develop these processes in other subject areas. I don't believe there is a need to draw out exactly which expectations align with that of mathematics for each and every curricula that students will engage with in grade 7. Mathematical processes are present in every aspect of our lives. Math is present in every aspect of our lives. Drawing these connections out shouldn't need direct and explicit lines connecting these dots. This curriculum map is designed to de-silo math from itself–in this mindset, it should be a natural transition to de-siloing math from other subjects.

Vertical Mapping

As mentioned in the introduction, grade 7 mathematics is a critical time for students to engage with math. The foundations for higher-level concepts are introduced in this curriculum, and it is essential to understand where students are entering the classroom with, and what they will need to take with them when they leave. The Ministry of Education has multiple documents explicitly detailing these connections. As educators, however, we know that students do not come to our classrooms with exactly the same experiences, knowledge, and skills as what is outlined in Ministry documents and curricula. This is why the first cycle in this map focuses solely on establishing what students know, and filling in those potential gaps, or allowing time to make a plan to meet them farther ahead in their abilities.

Grade 7 Math Strand Overviews Grade 1-8
Mathematics grades 7-8-9 alignment chart

Timeline

Timeline Outline

	Cycle Title	Cluster	Time	Brief Description
0.	Cycle 0: Review + Problem Solving	N/A	2-3 weeks ~10-15 classes ~8-12 hours	Foundational skills, essential concepts from previous grades' curriculums, and time for non-curricular activities to set up classroom routine.
1.	Cycle 1: Understanding	Cluster 1: Understanding Our World: Algebraic and Spatial Skills	3-4 weeks ~15-20 classes, ~12-18 hours	This cycle should focus on the foundational skills needed for students to move forward in the curriculum: understanding, recognizing, and making sense of math concepts. These concepts include: number sense & basic operations, patterning, shapes (properties and classes thereof) units of measurement, data, and finance. Students will be introduced to and become familiar and comfortable with seeing, understanding, and using the concepts and ideas presented above.
		Cluster 2: Everyday Math: Financial Literacy & Understanding Data	3-4 weeks ~15-20 classes, ~12-18 hours	
2.	Cycle 2: Representing	Cluster 1: Understanding Our World: Algebraic and Spatial Skills	4-5 weeks ~ 20-25 classes, ~ 18-24 hours	This cycle draw from and build on the the previous one. Now that we know what these concepts are, and we can recognize/use them, how can we represent/communicate them? This will include translating/reflecting/otherwise changing shapes, converting between units of measurement, changing representations of patterns, communicating information through data representation, identifying, understanding, & evaluating numbers and operations in a variety of representations, and examining the different ways financial information is communicated.
		Cluster 2: Everyday Math: Financial Literacy & Understanding Data	4-5 weeks ~ 20-25 classes, ~ 18-24 hours	

3.	Cycle 3: Analyzing	Cluster 1: Understanding Our World: Algebraic and Spatial Skills	5-6 weeks ~ 25-30 classes, ~ 24-30 hours	Again, this cycle will build on the previous concepts and skills: now that we know what these concepts are, and we can understand them and use them in a variety of representations and situations, what more can we find out about them? Topics will include: performing higher-order operations, extending, predicting, and comparing patterns, extrapolating information from data, finding relationships between the properties of shapes, using data to make decisions, reading/ understanding budgets, and thinking about financial factors in the real world.
		Cluster 2: Everyday Math: Financial Literacy & Understanding Data	5-6 weeks ~ 25-30 classes, ~ 24-30 hours	
4.	Cycle 4: Understanding	Cluster 1: Understanding Our World: Algebraic and Spatial Skills	5-6 weeks ~ 25-30 classes, ~ 24-30 hours	All topics and skills from cycles 0-3 should combine for this final cycle. Now that we recognize and understand these concepts, communicate them in different ways, and analyze and use them for higher-level thinking and decision making, we can now solve problems and create our own using all of these concepts. Topics will include: solving multi-step problems, solving and creating pattern rules, solving and graphing inequalities, finding missing properties in shapes, creating shapes from properties & to solve problems in a variety of contexts, telling stories through data collection, representation, and communication, creating, tracking and adjusting budgets, and identifying real-world contexts for & impacts on finances.
		Cluster 2: Everyday Math: Financial Literacy & Understanding Data	5-6 weeks ~ 25-30 classes, ~ 24-30 hours	

Rationale

There has been a **lot** of time spent figuring out how to structure this curriculum in a way that makes sense, allows for spiralling, and groups concepts together logically and in a logical sequence. The introduction to this document goes into a large part of why and how these are organized, but in essence, this sequence of cycles allows for students to engage with the curriculum concepts from the floor up: moving from understanding to communicating to thinking to application, as per the categories from the achievement chart standards (*Growing Success,* pg 16). Each cycle uses the concepts from the previous one – math is not a siloed, discretized curriculum (few are), and as such, this map and sequence reflects that. Students move not only through the achievement chart standards, but through increasingly complex modes of engagement: doing, justifying, explaining, teaching, and creating, as per Liljedahl's model (*Building Thinking Classrooms in Mathematics*, ch 9, pg 159). The timeline presented above reflects this process somewhat: as the skill level needed to achieve the expectations increases alongside the complexity of the tasks the students will be asked to complete, so does the time spent on the cycle/cluster.

As explained in the introduction to this document, any timeline is likely not one that can/will be followed, nor is it one that best translates the intentions of a spiraled curriculum. This curriculum map is designed in order to be as flexible and as broad as possible, so for me to then segment each cluster in each cycle into discrete time periods does not reflect the learning process at the heart of spiraling, nor of the student-centred classroom. Obviously this is all an estimation that will depend on class, student, environment, and teacher, but the timeline should give an idea of the emphasis placed on each cluster (though I hesitate to use the word emphasis–all cycles are critical for learning, that is the nature of a spiraled curriculum, thus each cycle should be equally emphasized). The fact remains, however, that a spiraled curriculum allows for practice of skills from beginning to end of the course, meaning that the skills from cycle 1 will actually have the most amount of time spent on them, despite what the timeline presented above may seem to imply.

In addition to this, it may be that the clusters outlined will not actually take the time allotted – I determined a rough estimate for each cycle, and simply split that in half for each cluster. However, the scope of these clusters varies quite a bit, and as such, the time needed for them will also vary. This is again simply because of the nature of the framework created for this curriculum. The expectations in each cluster overlap somewhat, and each cycle has specific expectations that are not segmented into either of the

clusters, and are instead intended for the cycle at large; meaning that even though the curriculum has been broken down into cycles and clusters, there is overlap between nearly every single piece, and estimating the time spent on specific ones is not an easy or even comprehensible task.

Regardless of all of this, the way to interpret the timeline above is with a grain of salt: in reality, all strands of study and (nearly) all expectations are being taught and practiced throughout the entire course. The only real information to take away from this timeline is the sequence of skill building, and to allow more time for more complex situations/contexts in which students are applying their learning, which is hopefully clear in the curriculum map itself.

Curriculum Map Outline

Cycle Title	**Overall Expectation**	**Essential Questions & Ideas**	**Evaluation Criteria**	**Assessment Evidence** (For, As, Of learning)
Cycle 0: Review + Problem Solving	A1	Establishing foundational skills, working on classroom routine & expectations, and transitioning to new skills	See Cycle Map for in-depth essential questions, overall expectations, evaluation criteria, and more. Evaluation criteria also available as visual representation: Visual Cycle Maps	AFL: ● Check-ins, review activities, observation notes, exit cards AAL: ● Self-assessment of skills
Cycle 1: Understanding Cluster 1: Understanding Our World: Algebraic and Spatial Skills Cluster 2: Everyday Math: Financial Literacy & Understanding Data	A1,C4, B1, B2 Cluster 1: C1, C2, E1, E2 Cluster 2: D1,F1	Identifying, recognizing, and making sense of math concepts	See Cycle Map for in-depth essential questions, overall expectations, evaluation criteria, and more. Evaluation criteria also available as visual representation: Visual Cycle Maps	AFL: ● Pre-cycle knowledge activities, observation notes, exit card check-ins AAL: ● Small group activities, check your understanding questions AOL: ● Observation notes, in-class activities, graphic organizers / notes, periodic and iterative quizzes/tests
Cycle 2: Representing Cluster 1: Understanding Our World: Algebraic and Spatial Skills Cluster 2: Everyday Math: Financial Literacy & Understanding Data	A1,C4, B1, B2 Cluster 1: C1, C2, C3, E1, E2 Cluster 2: D1,D2,F1, E2	Communicating, changing, converting, and depicting math concepts	See Cycle Map for in-depth essential questions, overall expectations, evaluation criteria, and more. Evaluation criteria also available as visual representation: Visual Cycle Maps	AFL: ● Pre-cycle knowledge activities, observation notes, exit card check-ins AAL: ● Small group activities, check your understanding questions AOL: ● Observation notes, in-class activities, graphic organizers / notes, periodic and iterative quizzes/tests

Cycle Title	**Overall Expectation**	**Essential Questions & Ideas**	**Evaluation Criteria**	**Assessment Evidence** (For, As, Of learning)
Cycle 3: Analyzing Cluster 1: Understanding Our World: Algebraic and Spatial Skills Cluster 2: Everyday Math: Financial Literacy & Understanding Data	A1,C4, B1, B2 Cluster 1: C1, C2, C3, E1, E2 Cluster 2: D1,D2,F1	Extending, explaining, translating, predicting, and investigating math concepts	See Cycle Map for in-depth essential questions, overall expectations, evaluation criteria, and more. Evaluation criteria also available as visual representation: Visual Cycle Maps	AFL: ● Pre-cycle knowledge activities, observation notes, exit card check-ins AAL: ● Small group activities, check your understanding questions AOL: ● Observation notes, in-class activities, graphic organizers / notes, periodic and iterative quizzes/tests
Cycle 4: Solving Cluster 1: Understanding Our World: Algebraic and Spatial Skills Cluster 2: Everyday Math: Financial Literacy & Understanding Data	A1,C4, B1, B2 Cluster 1: C1, C2, C3, E1, E2 Cluster 2: D1,D2,F1	Determining, creating, justifying, and solving math concepts	See Cycle Map for in-depth essential questions, overall expectations, evaluation criteria, and more. Evaluation criteria also available as visual representation: Visual Cycle Maps	AFL: ● Pre-cycle knowledge activities, observation notes, exit card check-ins AAL: ● Small group activities, check your understanding questions AOL: ● Observation notes, in-class activities, graphic organizers / notes, periodic and iterative quizzes/tests

Cycle Map

Cycle 0: Review + Problem Solving

Overall Expectation	**Essential Questions**	**Evaluation Criteria** (Specific Expectations, Achievement Chart categories) *K/U, T, C, A*
A1 Social-Emotional Learning (SEL) Skills and the Mathematical Processes	Establishing foundational skills, working on classroom routine & expectations, and transitioning to new skills	

Cycle 1: Understanding

Cycle Title	**Overall Expectation**	**Essential Questions**	**Evaluation Criteria** (Specific Expectations, Achievement Chart categories) *K/U, T, C, A*
Cycle 1: Understanding Cluster 1: Understanding Our World: Algebraic and Spatial Skills Cluster 2: Everyday Math: Financial Literacy & Understanding Data	A1 Social-Emotional Learning (SEL) Skills & the Mathematical Processes C4 Mathematical Modelling B Number B1 Number Sense B2 Operations Cluster 1: C Algebra C1 Patterns & Relationships C2 Equations & Inequalities E Spatial Sense E1 Geometric & Spatial Reasoning E2 Measurement	Identifying, recognizing, and making sense of math concepts • How do we use and understand numbers? Cluster 1: • How do we recognize patterns? • How can we make patterns? • What properties do shapes have? • What is the same/diff. between units of measurement? Cluster 2: • What is data? How do we use it? • Where do we learn about finances? • What is the CAD?	B1.1 represent and compare whole numbers up to and including one billion, including in expanded form using powers of ten, and describe various ways they are used in everyday life B1.5 generate fractions and decimal numbers between any two quantities B1.6 round decimal numbers to the nearest tenth, hundredth, or whole number, as applicable, in various contexts B2.1 use the properties and order of operations, and the relationships between operations, to solve problems involving whole numbers, decimal numbers, fractions, ratios, rates, and percents, including those requiring multiple steps or multiple operations B2.2 understand and recall commonly used percents, fractions, and decimal equivalents B2.4 use objects, diagrams, and equations to represent, describe, and solve situations involving addition and subtraction of integers B2.5 add and subtract fractions, including by creating equivalent fractions, in various contexts B2.6 determine the greatest common factor for a variety of whole numbers up to 144 and the lowest common multiple for two and three whole numbers B2.8 multiply and divide fractions by fractions, using tools in various contexts B2.9 multiply and divide decimal numbers by decimal numbers, in various contexts Cluster 1: C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing patterns on the basis of their constant rates and initial values C1.4 create and describe patterns to illustrate relationships among integers C2.1 add and subtract monomials with a degree of 1 that involve whole numbers, using tools E1.1 describe and classify cylinders, pyramids, and prisms according to their geometric properties, including plane and rotational symmetry

Cycle Title	Overall Expectation	Essential Questions	Evaluation Criteria (Specific Expectations, Achievement Chart categories) *K/U, T, C, A*
	Cluster 2: D Data D1 Data Literacy F Financial Literacy F1 Money & Finances		E1.2 draw top, front, and side views, as well as perspective views, of objects and physical spaces, using appropriate scales E2.1 describe the differences and similarities between volume and capacity, and apply the relationship between millilitres (mL) and cubic centimetres (cm3) to solve problems Cluster 2: D1.1 explain why percentages are used to represent the distribution of a variable for a population or sample in large sets of data, and provide examples D1.2 collect qualitative data and discrete and continuous quantitative data to answer questions of interest, and organize the sets of data as appropriate, including using percentages F1.1 identify and compare exchange rates, and convert foreign currencies to Canadian dollars and vice versa F1.2 identify and describe various reliable sources of information that can help with planning for and reaching a financial goal

Cycle 2: Representing

Title	Overall Expectation	Essential Questions	Evaluation Criteria (Specific Expectations, Achievement Chart categories) *K/U, T, C, A*
Cycle 2: Representing Cluster 1: Understanding Our World: Algebraic and Spatial Skills Cluster 2: Everyday Math: Financial Literacy & Understanding Data	A1 Social-Emotional Learning (SEL) Skills and the Mathematical Processes C4 Mathematical Modelling B Number B1 Number Sense B2 Operations Cluster 1: C Algebra C1 Patterns & Relationships C2 Equations & Inequalities C3 Coding	Communicating, changing, converting, and depicting math concepts • How do we order and represent numbers? Cluster 1: • How can we use patterns to communicate information? • How do we create different representations of the same pattern? • How can we evaluate	B1.1 represent and compare whole numbers up to and including one billion, including in expanded form using powers of ten, and describe various ways they are used in everyday life B1.2 identify and represent perfect squares, and determine their square roots, in various contexts B1.3 read, represent, compare, and order rational numbers, including positive and negative fractions and decimal numbers to thousandths, in various contexts B1.4 use equivalent fractions to simplify fractions, when appropriate, in various contexts B1.6 round decimal numbers to the nearest tenth, hundredth, or whole number, as applicable, in various contexts B1.7 convert between fractions, decimal numbers, and percents, in various contexts B2.1 use the properties and order of operations, and the relationships between operations, to solve problems involving whole numbers, decimal numbers, fractions, ratios, rates, and percents, including those requiring multiple steps or multiple operations B2.2 understand and recall commonly used percents, fractions, and decimal equivalents B2.3 use mental math strategies to increase and decrease a whole number by 1%, 5%, 10%, 25%, 50%, and 100%, and explain the strategies used B2.4 use objects, diagrams, and equations to represent, describe, and solve situations involving addition and subtraction of integers B2.7 evaluate and express repeated multiplication of whole numbers using exponential notation, in various contexts B2.10 identify proportional and non-proportional situations and apply proportional reasoning to solve problem Cluster 1:

Title	Overall Expectation	Essential Questions	Evaluation Criteria (Specific Expectations, Achievement Chart categories) *K/U, T, C, A*
	E Spatial Sense E1 Geometric & Spatial Reasoning E2 Measurement Cluster 2: D Data D1 Data Literacy D2 Probability E Spatial Sense E2 Measurement F Financial Literacy F1 Money & Finances	expressions with mixed representations? • What are the relationships in a circle? • How can we represent/ change shapes? • How do we represent or convert units of measurement? Cluster 2: • What does data say? • How do we best communicate information using data? • What are ind/dep events? • What are interest rates/fees?	C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing patterns on the basis of their constant rates and initial values C1.2 create and translate repeating, growing, and shrinking patterns involving whole numbers and decimal numbers using various representations, including algebraic expressions and equations for linear growing patterns C1.4 create and describe patterns to illustrate relationships among integers C2.1 add and subtract monomials with a degree of 1 that involve whole numbers, using tools C2.2 evaluate algebraic expressions that involve whole numbers and decimal numbers C3.1 solve problems and create computational representations of mathematical situations by writing and executing efficient code, including code that involves events influenced by a defined count and/or subprogram and other control structures E1.1 describe and classify cylinders, pyramids, and prisms according to their geometric properties, including plane and rotational symmetry E1.2 draw top, front, and side views, as well as perspective views, of objects and physical spaces, using appropriate scales E1.3 perform dilations and describe the similarity between the image and the original shape E1.4 describe and perform translations, reflections, and rotations on a Cartesian plane, and predict the results of these transformations E2.2 solve problems involving perimeter, area, and volume that require converting from one metric unit of measurement to another E2.4 construct circles when given the radius, diameter, or circumference E2.5 show the relationships between the radius, diameter, and area of a circle, and use these relationships to explain the formula for measuring the area of a circle and to solve related problems E2.6 represent cylinders as nets and determine their surface area by adding the areas of their parts Cluster 2: E2.1 describe the differences and similarities between volume and capacity, and apply the relationship between millilitres (mL) and cubic centimetres (cm3) to solve problems D1.2 collect qualitative data and discrete and continuous quantitative data to answer questions of interest, and organize the sets of data as appropriate, including using percentages D1.3 select from among a variety of graphs, including circle graphs, the type of graph best suited to represent various sets of data; display the data in the graphs with proper sources, titles, and labels, and appropriate scales; and justify their choice of graphs D1.4 create an infographic about a data set, representing the data in appropriate ways, including in tables and circle graphs, and incorporating any other relevant information that helps to tell a story about the data D1.5 determine the impact of adding or removing data from a data set on a measure of central tendency, and describe how these changes alter the shape and distribution of the data D2.1 describe the difference between independent and dependent events, and explain how their probabilities differ, providing examples F1.1 identify and compare exchange rates, and convert foreign currencies to Canadian dollars and vice versa F1.2 identify and describe various reliable sources of information that can help with planning for and reaching a financial goal F1.3 create, track, and adjust sample budgets designed to meet longer-term financial goals for various scenarios F1.6 compare interest rates and fees for different accounts and loans offered by various financial institutions, and determine the best option for different scenarios

Cycle 3: Analyzing

Title	Overall Expectation	Essential Questions	Evaluation Criteria (Specific Expectations, Achievement Chart categories) *K/U, T, C, A*
Cycle 3: Analyzing Cluster 1: Understanding Our World: Algebraic and Spatial Skills Cluster 2: Everyday Math: Financial Literacy & Understanding Data	A1 Social-Emotional Learning (SEL) Skills and the Mathematical Processes C4 Mathematical Modelling B Number B1 Number Sense B2 Operations Cluster 1: C Algebra C1 Patterns & Relationships C2 Equations & Inequalities C3 Coding E Spatial Sense E1 Geometric & Spatial Reasoning E2 Measurement Cluster 2: D Data D1 Data Literacy D2 Probability F Financial Literacy F1 Money & Finances	Extending, explaining, translating, predicting, and investigating math concepts • How can we use numbers & operations to predict/evaluate math problems? Cluster 1: • What is the same/diff in different patterns? • How can we extend or create patterns? • What is an inequality? • How do the properties of shapes help us solve math problems? • What relationships in shape can help us determine missing properties? Cluster 2: • What can affect how we collect, communicate, and understand data? • How do we use data to make decisions and form	B1.1 represent and compare whole numbers up to and including one billion, including in expanded form using powers of ten, and describe various ways they are used in everyday life B1.2 identify and represent perfect squares, and determine their square roots, in various contexts B1.3 read, represent, compare, and order rational numbers, including positive and negative fractions and decimal numbers to thousandths, in various contexts B1.4 use equivalent fractions to simplify fractions, when appropriate, in various contexts B1.5 generate fractions and decimal numbers between any two quantities B1.6 round decimal numbers to the nearest tenth, hundredth, or whole number, as applicable, in various contexts B1.7 convert between fractions, decimal numbers, and percents, in various contexts B2.1 use the properties and order of operations, and the relationships between operations, to solve problems involving whole numbers, decimal numbers, fractions, ratios, rates, and percents, including those requiring multiple steps or multiple operations B2.2 understand and recall commonly used percents, fractions, and decimal equivalents B2.3 use mental math strategies to increase and decrease a whole number by 1%, 5%, 10%, 25%, 50%, and 100%, and explain the strategies used B2.4 use objects, diagrams, and equations to represent, describe, and solve situations involving addition and subtraction of integers B2.5 add and subtract fractions, including by creating equivalent fractions, in various contexts B2.6 determine the greatest common factor for a variety of whole numbers up to 144 and the lowest common multiple for two and three whole numbers B2.7 evaluate and express repeated multiplication of whole numbers using exponential notation, in various contexts B2.8 multiply and divide fractions by fractions, using tools in various contexts B2.9 multiply and divide decimal numbers by decimal numbers, in various contexts B2.10 identify proportional and non-proportional situations and apply proportional reasoning to solve problem Cluster 1: C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing patterns on the basis of their constant rates and initial values C1.2 create and translate repeating, growing, and shrinking patterns involving whole numbers and decimal numbers using various representations, including algebraic expressions and equations for linear growing patterns C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns involving whole numbers and decimal numbers, and use algebraic representations of the pattern rules to solve for unknown values in linear growing patterns C2.1 add and subtract monomials with a degree of 1 that involve whole numbers, using tools C2.2 evaluate algebraic expressions that involve whole numbers and decimal numbers C2.3 solve equations that involve multiple terms, whole numbers, and decimal numbers in various contexts, and verify solutions C3.2 read and alter existing code, including code that involves events influenced by a defined count and/or subprogram and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code

Title	Overall Expectation	Essential Questions	Evaluation Criteria (Specific Expectations, Achievement Chart categories) *K/U, T, C, A*
		opinions about our world? • What impacts decisions involving money? • How do interest rates affect us? • What can a budget tell us?	E1.1 describe and classify cylinders, pyramids, and prisms according to their geometric properties, including plane and rotational symmetry E1.3 perform dilations and describe the similarity between the image and the original shape E1.4 describe and perform translations, reflections, and rotations on a Cartesian plane, and predict the results of these transformations E2.1 describe the differences and similarities between volume and capacity, and apply the relationship between millilitres (mL) and cubic centimetres (cm3) to solve problems E2.3 use the relationships between the radius, diameter, and circumference of a circle to explain the formula for finding the circumference and to solve related problems E2.5 show the relationships between the radius, diameter, and area of a circle, and use these relationships to explain the formula for measuring the area of a circle and to solve related problems E2.6 represent cylinders as nets and determine their surface area by adding the areas of their parts E2.7 show that the volume of a prism or cylinder can be determined by multiplying the area of its base by its height, and apply this relationship to find the area of the base, volume, and height of prisms and cylinders when given two of the three measurements Cluster 2: D1.5 determine the impact of adding or removing data from a data set on a measure of central tendency, and describe how these changes alter the shape and distribution of the data D1.6 analyse different sets of data presented in various ways, including in circle graphs and in misleading graphs, by asking and answering questions about the data, challenging preconceived notions, and drawing conclusions, then make convincing arguments and informed decisions D2.1 describe the difference between independent and dependent events, and explain how their probabilities differ, providing examples D2.2 determine and compare the theoretical and experimental probabilities of two independent events happening and of two dependent events happening F1.2 identify and describe various reliable sources of information that can help with planning for and reaching a financial goal F1.4 identify various societal and personal factors that may influence financial decision making, and describe the effects that each might have F1.5 explain how interest rates can impact savings, investments, and the cost of borrowing to pay for goods and services over time F1.6 compare interest rates and fees for different accounts and loans offered by various financial institutions, and determine the best option for different scenarios

Cycle 4: Solving

Title	Overall Expectation	Essential Questions	Evaluation Criteria (Specific Expectations, Achievement Chart categories) *K/U, T, C, A*
Cycle 4: Solving Cluster 1: Understanding Our World: Algebraic and Spatial Skills Cluster 2: Everyday Math: Financial Literacy & Understanding Data	A1 Social-Emotional Learning (SEL) Skills and the Mathematical Processes C4 Mathematical Modelling B Number B1 Number Sense B2 Operations Cluster 1: C Algebra C1 Patterns & Relationships C2 Equations & Inequalities C3 Coding E Spatial Sense E1 Geometric & Spatial Reasoning E2 Measurement Cluster 2: D Data D1 Data Literacy D2 Probability F Financial Literacy F1 Money & Finances	Determining, creating, justifying, and solving math concepts • How can we use numbers/operations to solve math problems? Cluster 1: • How can we solve and create pattern rules? • How do we solve and graph inequalities? • How can computers help us solve math problems? • What relationships in shape can help us solve for missing properties? • What information do we need to create shapes? • Where do we use our spatial skills in our lives? Cluster 2: • How do we use data to tell a story? • How do we find out and use the probability of an event happening? • How do we create and use a budget?	B1.1 represent and compare whole numbers up to and including one billion, including in expanded form using powers of ten, and describe various ways they are used in everyday life B1.2 identify and represent perfect squares, and determine their square roots, in various contexts B1.3 read, represent, compare, and order rational numbers, including positive and negative fractions and decimal numbers to thousandths, in various contexts B1.4 use equivalent fractions to simplify fractions, when appropriate, in various contexts B1.5 generate fractions and decimal numbers between any two quantities B1.6 round decimal numbers to the nearest tenth, hundredth, or whole number, as applicable, in various contexts B1.7 convert between fractions, decimal numbers, and percents, in various contexts B2 Operations B2.1 use the properties and order of operations, and the relationships between operations, to solve problems involving whole numbers, decimal numbers, fractions, ratios, rates, and percents, including those requiring multiple steps or multiple operations B2.2 understand and recall commonly used percents, fractions, and decimal equivalents B2.3 use mental math strategies to increase and decrease a whole number by 1%, 5%, 10%, 25%, 50%, and 100%, and explain the strategies used B2.4 use objects, diagrams, and equations to represent, describe, and solve situations involving addition and subtraction of integers B2.5 add and subtract fractions, including by creating equivalent fractions, in various contexts B2.6 determine the greatest common factor for a variety of whole numbers up to 144 and the lowest common multiple for two and three whole numbers B2.7 evaluate and express repeated multiplication of whole numbers using exponential notation, in various contexts B2.8 multiply and divide fractions by fractions, using tools in various contexts B2.9 multiply and divide decimal numbers by decimal numbers, in various contexts B2.10 identify proportional and non-proportional situations and apply proportional reasoning to solve problems Cluster 1: C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns involving whole numbers and decimal numbers, and use algebraic representations of the pattern rules to solve for unknown values in linear growing patterns C1.4 create and describe patterns to illustrate relationships among integers C2.3 solve equations that involve multiple terms, whole numbers, and decimal numbers in various contexts, and verify solutions C2.4 solve inequalities that involve multiple terms and whole numbers, and verify and graph the solutions C3.1 solve problems and create computational representations of mathematical situations by writing and executing efficient code, including code that involves events influenced by a defined count and/or subprogram and other control structures E1.3 perform dilations and describe the similarity between the image and the original shape

Title	Overall Expectation	Essential Questions	Evaluation Criteria (Specific Expectations, Achievement Chart categories) *K/U, T, C, A*
		• How can we be best informed about our finances?	E1.4 describe and perform translations, reflections, and rotations on a Cartesian plane, and predict the results of these transformations E2.2 solve problems involving perimeter, area, and volume that require converting from one metric unit of measurement to another E2.3 use the relationships between the radius, diameter, and circumference of a circle to explain the formula for finding the circumference and to solve related problems E2.5 show the relationships between the radius, diameter, and area of a circle, and use these relationships to explain the formula for measuring the area of a circle and to solve related problems E2.7 show that the volume of a prism or cylinder can be determined by multiplying the area of its base by its height, and apply this relationship to find the area of the base, volume, and height of prisms and cylinders when given two of the three measurements Cluster 2: D1.2 collect qualitative data and discrete and continuous quantitative data to answer questions of interest, and organize the sets of data as appropriate, including using percentages D1.4 create an infographic about a data set, representing the data in appropriate ways, including in tables and circle graphs, and incorporating any other relevant information that helps to tell a story about the data D2.2 determine and compare the theoretical and experimental probabilities of two independent events happening and of two dependent events happening F1.3 create, track, and adjust sample budgets designed to meet longer-term financial goals for various scenarios F1.5 explain how interest rates can impact savings, investments, and the cost of borrowing to pay for goods and services over time F1.6 compare interest rates and fees for different accounts and loans offered by various financial institutions, and determine the best option for different scenarios

Appendix

Resources used in the creation of this document:

- *Building Thinking Classrooms* by Peter Liljedahl
- Long-Range Plan: Intermediate Division: Grades 7-8, Mathematics, Organized by Question
- Long-Range Plan: Intermediate Division: Grades 7-8, Mathematics, Organized by Topic
- Simcoe County District School Board Scope & Sequence (Grade 7)
- District School Board of Niagara Mathematics Scope & Sequence (Grade 7)
- *High-Impact Instructional Practices in Mathematics*
- *Growing Success*
- Grade 7 Math Strand Overviews Grade 1-8
- Mathematics Grades 7-8-9 Alignment chart