MTH1W Ontario Ministry Expectations and Rock Your Class Math Minutes Connections

Overview

The Grade 9 mathematics course builds on the elementary program and is based on the same fundamental principles.

The overall aim of the Grade 9 mathematics course is to ensure that all students can access any secondary mathematics course they need in order to pursue future studies and careers that are of interest to them.

This course is designed to be inclusive of all students in order to facilitate their transition from the elementary grades to the secondary level. It offers opportunities for all students to build a solid foundation in mathematics, broaden their knowledge and skills, and develop their mathematical identity. This approach allows students to make informed decisions in choosing future mathematics courses based on their interests, and in support of future plans for apprenticeship training, university, college, community living, or the workplace.

Similar to the elementary curriculum, the Grade 9 course adopts a strong focus on the processes that best enable students to understand mathematical concepts and learn related skills. Attention to the mathematical processes is considered essential to a balanced mathematics program. The seven mathematical processes identified in the curriculum include *problem solving*, *reasoning and proving*, *reflecting*, *connecting*, *communicating*, *representing*, and *selecting tools and strategies*.

Throughout the course, students actively participate in the learning of mathematics by making connections to their lived experiences and to real-life applications. They continue to develop critical consciousness of how socio-cultural structures within systems impact individual experiences and opportunities, and to shape their identities as mathematics learners.

Teachers implement the curriculum through effective assessment and instructional practices that are rooted in Culturally Responsive and Relevant Pedagogy. Teachers utilize a variety of assessment and instructional approaches that provide students with multiple entry points to access mathematics learning and multiple opportunities to demonstrate their achievement in mathematics.

This course continues the learning from Grade 8 and prepares students for success in all senior secondary mathematics courses in all pathways moving forward. Students who successfully complete the Grade 9 mathematics course may proceed to a mathematics course in Grade 10.

The following section is in effect for the 2021–22 school year and will be updated as the secondary mathematics program is revised. The 2005 Mathematics curriculum for Grade 10 and the 2007 Mathematics curriculum for Grades 11–12 remain in effect. All references to Grade 9 that appear in *The Ontario Curriculum, Grades 9 and 10: Mathematics, 2005* and *The*

Ontario Curriculum, Grades 11 and 12: Mathematics, 2007 have been superseded by the section below.

Courses in Mathematics, Grades 9 to 12

Grade	Course Name		Course Type	Course Code	Credit Value	Prerequisite
9	Mathematics		De-streamed	MTH1W	1.0	None

Locally Developed Compulsory Credit Courses (LDCCs)

School boards may offer up to two locally developed compulsory credit courses in mathematics – a Grade 9 course and/or a Grade 10 course – that may be used to meet the compulsory credit requirement in mathematics for one or both of these grades. The locally developed Grade 9 and/or Grade 10 compulsory credit courses prepare students for success in the Grade 11 and Grade 12 workplace preparation courses.

Half-Credit Courses

The course outlined in this curriculum is designed to be offered as a full-credit course. However, it may also be delivered as two half-credit courses. Half-credit courses, which require a minimum of fifty-five hours of scheduled instructional time, must adhere to the following conditions:

- The two half-credit courses created from a full course must together contain all of the expectations of the full course.
- The expectations for each half-credit course must be divided in a manner that best enables students to achieve the required knowledge and skills in the allotted time.
- A course that is a prerequisite for another course in the secondary curriculum may be offered as two half-credit courses, but students must successfully complete both parts of the course to fulfil the prerequisite. (Students are not required to complete both parts unless the course is a prerequisite for another course they wish to take.)
- The title of each half-credit course must include the designation Part 1 or Part 2. A half credit (0.5) will be recorded in the credit-value column of both the report card and the Ontario Student Transcript.

Boards will ensure that all half-credit courses comply with the conditions described above, and will report all half-credit courses to the ministry annually in the School October Report.

Curriculum Expectations for the Grade 9 Mathematics Course

The expectations identified for this course describe the knowledge, concepts, and skills that students are expected to acquire, demonstrate, and apply in their class work and tasks, on tests, in demonstrations, and in various other activities on which their achievement is assessed and evaluated.

Mandatory learning is described in the overall and specific expectations of the curriculum.

Two sets of expectations – overall expectations and specific expectations – are listed for each *strand*, or broad area of the curriculum. The strands in this course are lettered AA and A through F.

The *overall expectations* describe in general terms the knowledge and skills that students are expected to demonstrate by the end of the course. The *specific expectations* describe the expected knowledge, concepts, and skills in greater detail. The specific expectations are grouped under numbered subheadings, each of which indicates the strand and the overall expectation to which the group of specific expectations corresponds (e.g., "B2" indicates that the group relates to overall expectation 2 in strand B). This organization is not meant to imply that the expectations in any one group are achieved independently of the expectations in the other groups, nor is it intended to imply that learning the expectations happens in a linear, sequential way. The numbered headings are used merely as an organizational structure to help teachers focus on particular aspects of knowledge, concepts, and skills as they develop various lessons and learning activities for students. In the mathematics curriculum, additional subheadings are used within each group of expectations to identify the topics addressed in the strand.

The knowledge and skills described in the expectations in Strand A: Mathematical Thinking and Making Connections apply to all areas of course content and must be developed in conjunction with learning in strands B through F. Teachers should ensure that students develop the mathematics knowledge and skills in appropriate ways as they work to achieve the curriculum expectations in strands B through F. Students' application of the knowledge and skills described in Strand A must be assessed and evaluated as part of their achievement of the overall expectations in strands B through F.

Note: Strand AA: Social-Emotional Learning (SEL) Skills in Mathematics is an exception. It has a single overall expectation that is to be included in classroom instruction throughout the course, *but not in assessment, evaluation, or reporting*.

Teacher Supports

The expectations are accompanied by "teacher supports", which may include examples, key concepts, teacher prompts, instructional tips, and/or sample tasks. These elements are intended to promote understanding of the intent of the specific expectations and are offered as illustrations for teachers. *The teacher supports do not set out requirements for student learning; they are optional, not mandatory*.

"Examples" are meant to illustrate the intent of the expectation, the kind of knowledge, concepts, or skills, the specific area of learning, the depth of learning, and/or the level of complexity that the expectation entails.

"Key concepts" identify the central principles and mathematical ideas that underpin the learning in that specific expectation.

"Teacher prompts" are sample guiding questions and considerations that can lead to discussions and promote deeper understanding.

“Instructional tips” are intended to support educators in delivering instruction that facilitates student learning related to the knowledge, concepts, and skills set out in the expectations.

“Sample tasks” are developed to model appropriate practice for the course. They provide possible learning activities for teachers to use with students and illustrate connections between the mathematical knowledge, concepts, and skills. Teachers can choose to draw on the sample tasks that are appropriate for their classrooms, or they may develop their own approaches that reflect a similar level of complexity and high-quality mathematical instruction. Whatever the specific ways in which the requirements outlined in the expectations are implemented in the classroom, they must, wherever possible, be inclusive and reflect the diversity of the student population and the population of the province. When designing inclusive learning tasks, teachers reflect on their own biases and incorporate their deep knowledge of the curriculum, as well as their understanding of the diverse backgrounds, lived experiences, and identities of students. Teachers will notice that some of the sample tasks address the requirements of the expectation they are associated with and incorporate mathematical knowledge, concepts, or skills described in expectations in other strands of the course. Some tasks are cross-curricular in nature and will cover expectations in other disciplines in conjunction with the mathematics expectations.

The Mathematical Processes

Students learn and apply the mathematical processes as they work to achieve the expectations outlined in the curriculum. All students are actively engaged in applying these processes throughout the course.

The mathematical processes that support effective learning in mathematics are as follows:

- problem solving
- reasoning and proving
- reflecting
- connecting
- communicating
- representing
- selecting tools and strategies

The mathematical processes can be understood as the processes through which all students acquire and apply mathematical knowledge, concepts, and skills. These processes are interconnected. Problem solving and communicating have strong links to all of the other processes. A problem-solving approach encourages students to reason their way to a solution or a new understanding. As students engage in reasoning, teachers further encourage them to pose questions, make conjectures, and justify solutions, orally and in writing. The communication and reflection that occur before, during, and after the process of problem solving support students as they work to articulate and refine their thinking and to examine the problem they are solving from different perspectives. This opens the door to recognizing the range of strategies that can be used to arrive at a solution. By understanding how others solve a problem, students can begin to reflect on their own thinking (a process known as

"metacognition") and the thinking of others, as well as their own language use (a process known as "metalinguistic awareness"), and to consciously adjust their own strategies in order to make their solutions as efficient and accurate as possible.

The mathematical processes cannot be separated from the knowledge, concepts, and skills that students acquire throughout the course. All students problem solve, communicate, reason, reflect, and so on, as they develop the knowledge, the understanding of mathematical concepts, and the skills required in all strands.

Problem Solving

Problem solving is central to doing mathematics. By learning to solve problems and by learning *through* problem solving, students are given, and create, numerous opportunities to connect mathematical ideas and to develop conceptual understanding. Problem solving forms the basis of effective mathematics programs that place all students' experiences and queries at the centre of mathematical learning. Therefore, problem solving should be the foundation of mathematical instruction. It is considered an essential process through which all students are able to achieve the expectations in mathematics and is an integral part of the Ontario mathematics curriculum.

Problem solving:

- increases opportunities for the use of critical thinking skills (e.g., selecting appropriate tools and strategies, estimating, evaluating, classifying, assuming, recognizing relationships, conjecturing, posing questions, offering opinions with reasons, making judgements) to develop mathematical reasoning;
- supports all students in developing their own mathematical identity;
- allows all students to use the varied mathematical knowledge and experiences they bring to school;
- supports all students in making connections among mathematical knowledge, concepts, and skills, and between situations inside and outside the classroom;
- has the potential to promote the collaborative sharing of ideas and strategies, and promotes talking about and interacting with mathematics;
- empowers students to use mathematics to address issues relevant to their lived realities;
- facilitates the use of creative-thinking skills when developing solutions and approaches;
- supports students in finding enjoyment in mathematics and becoming more confident in their ability to do mathematics.

Most importantly, when problem solving is done in a mathematical context relevant to students' experiences and/or derived from their own problem posing, it furthers their understanding of mathematics and develops their mathematical agency.

Problem-Solving Strategies. Problem-solving strategies are methods that can be used to solve problems of various types. Common problem-solving strategies include the following: simulating; making a model, picture, or diagram; using concrete materials; looking for a pattern; guessing and checking; making an organized list; making a table or chart; solving a **simpler version of the problem**; working backwards; and using logical reasoning. Teachers can support all students as they develop their use of these strategies by engaging with solving various kinds of problems – instructional problems, routine problems, and non-routine problems. As students

develop their repertoire over time, they become more confident in posing their own questions, more mature in their problem-solving skills, and more flexible in using appropriate strategies when faced with new problem-solving situations.

Reasoning and Proving

Reasoning and proving are integral to mathematics and involve students using their understanding of mathematical knowledge, concepts, and skills to justify their thinking. Proportional reasoning, algebraic reasoning, spatial reasoning, statistical reasoning, and probabilistic reasoning are all forms of mathematical reasoning. Students also use their understanding of numbers and operations, geometric properties, and measurement relationships to reason through solutions to problems. Students develop algebraic reasoning by generalizing understanding of numbers and operations, properties, and relationships between quantities. They develop functional thinking by generalizing patterns and non-numeric sequences and using inverse operations. Students may need to identify assumptions in order to begin working on a solution. Teachers can provide all students with learning opportunities where they must form mathematical conjectures and then test or prove them to verify whether they hold true. Initially, students may rely on the viewpoints of others to justify a choice or an approach to a solution. As they develop their own reasoning skills, they will begin to justify or prove their solutions by providing evidence.

Reflecting

Students reflect when they are working through a problem to monitor their thought process, to identify what is working and what is not working, and to consider whether their approach is appropriate or whether there may be a more effective approach. Students also reflect after they have solved a problem by considering the reasonableness of their answer and whether adjustments need to be made. Teachers can support all students as they develop their reflecting and metacognitive skills by asking questions that have them examine their thought processes. In an inclusive learning environment, students also reflect on their peers' thinking processes to further develop deep understanding. Students can also reflect on how their new knowledge can be applied to past and future problems in mathematics.

Connecting

Experiences that allow all students to make connections – to understand, for example, how knowledge, concepts, and skills from one strand of mathematics are related to those from another – will support students in grasping general mathematical principles. Through making connections, students learn that mathematics is more than a series of isolated skills and concepts and that they can use their learning in one area of mathematics to understand another, and to understand other disciplines. Recognizing the relationships between representations, concepts, and procedures also supports the development of deeper mathematical understanding. In addition, making connections between the mathematics they learn at school and its significance in their everyday lives supports students in deepening their understanding of mathematics and allows them to understand how useful and relevant it is in the world beyond the classroom.

Communicating

Communication is an essential process in learning mathematics. Students communicate for various purposes and for different audiences, such as the teacher, a peer, a group of students, the whole class, a community member or group, or their family. They may use oral, visual, written, or gestural communication. Students also acquire the language of mathematics and develop their communication skills, which includes expressing, understanding, and using appropriate mathematical terminology, symbols, conventions, and models, through meaningful interactions with each other.

For example, teachers can ask students to:

- illustrate their mathematical understanding in various ways, such as with diagrams and representations;
- share and clarify their ideas, understandings, and solutions;
- create and defend mathematical arguments;
- provide meaningful descriptive feedback to peers;
- pose and ask relevant questions.

Communication also involves active listening and responding mindfully with an awareness of socio-cultural contexts. Using Culturally Responsive and Relevant Pedagogy, teachers provide opportunities for all students to contribute to discussions about mathematics in the classroom. Effective classroom communication requires a supportive and inclusive environment in which all members of the class are invited to participate and are valued when they speak and when they question, react to, and elaborate on the statements of their peers and the teacher.

Representing

Students represent mathematical ideas and relationships and model situations using tools, pictures, diagrams, graphs, tables, numbers, words, and symbols. Some students may also be able to use other languages and/or digital and multimodal resources. Teachers recognize and value the variety of representations that students use, as each student may have different prior access to and experiences with mathematics. While encouraging student engagement and affirming the validity of their representations, teachers support students in reflecting on the appropriateness of their representations and refining them. Teachers support students as they make connections among various representations that are relevant to both the student and the audience they are communicating with, so that all students can develop a deeper understanding of mathematical concepts and relationships. All students are supported in using the different representations appropriately and as needed to model situations, solve problems, and communicate their thinking.

Selecting Tools and Strategies

Students develop the ability to select appropriate tools, technology, and strategies to perform particular mathematical tasks, to investigate mathematical ideas, and to solve problems.

Tools. All students should be encouraged to select and use tools to illustrate mathematical ideas. Students come to understand that making their own representations is a powerful means of building understanding and of explaining their thinking to others. Using tools supports students as they:

- identify patterns and relationships;
- make connections between mathematical concepts and between concrete and abstract representations;
- test, revise, and confirm their reasoning;
- remember how they solved a problem;
- communicate their reasoning to others, including by gesturing.

Technology. A wide range of technological and digital tools can be used in many contexts for students to interact with as they learn and extend concepts, and do mathematics.

Students can use:

- computers, calculators, probes, and computer algebra systems to perform complex operations; create graphs; and collect, organize, and display data;
- digital tools, apps, and social media to investigate mathematical concepts and develop an understanding of mathematical relationships;
- statistical software to manipulate, analyse, represent, sort, and communicate real-life data sets of all sizes;
- coding software to better understand the structures and relationships of mathematics;
- dynamic geometry software and online geometry tools to develop spatial sense;
- computer programs to represent and simulate mathematical situations (i.e., mathematical modelling);
- communications technologies to support and communicate their thinking and learning;
- computers, tablets, and mobile devices to access mathematical information available on the websites of organizations around the world in the language of instruction and/or other languages and to develop information literacy.

Developing the ability to perform mental computations is an important aspect of student learning in mathematics. Students must, therefore, use technology with discretion, when it makes sense to do so. When students use technology in their mathematics learning, they should apply mental computation, reasoning, and estimation skills to predict and check the reasonableness of answers.

Strategies. Problem solving often requires students to select an appropriate strategy. Students learn to use more efficient ways to reach a conclusion. For example, students can solve problems involving a linear relationship by extending a pattern using pictures, creating a table of values, or developing a general case and solving an equation. The selection of an appropriate strategy may also be based on feasibility. For example, students may choose to collect their own samples of data or access data collected in large amounts via computer programs.

Social-Emotional Learning (SEL) Skills in Grade 9 Mathematics

Building social-emotional learning (SEL) skills in a secondary classroom involves continuing the development of students' self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. In this course, the focus is on the mathematical context and giving students the tools they need for success in their future mathematical learning, as they learn the skills for:

- recognizing and identifying emotions that support mathematical learning;
- recognizing sources of stress that present challenges to mathematical learning;

- identifying resources and supports that aid perseverance in mathematical learning;
- building healthy relationships and communicating effectively in mathematics;
- developing a healthy mathematical identity through building self-awareness;
- developing critical and creative mathematical thinking.

In an anti-racist and anti-discriminatory learning environment, explicit instruction, practice, modelling, self-reflection, and reinforcement both inside and outside the classroom make a difference in development of these skills. As with all instruction, continual consideration must be given to how educational systems and institutions can communicate and understand more inclusive perspectives on experiencing and displaying emotions, respect, and professionalism. SEL skills cannot be taught without the context of systemic oppression and racism that many Ontario students navigate daily. Research has shown that educator bias can negatively affect the evaluation of social-emotional learning skills in relation to particular groups of students; for example, Indigenous students; Black and other racialized students; students with special education needs and disabilities; and students otherwise marginalized.

At the same time, there is strong evidence that teaching transformational social-emotional learning skills at school, when implemented in an anti-racist and anti-discriminatory, culturally responsive and relevant way, can contribute to students' overall health and well-being and to successful academic performance. Developing social-emotional learning skills also supports positive mental health, as well as students' ability to learn and experience academic success. Learning related to the overall expectation in this strand occurs in the context of learning related to the other six strands, and the focus is on intentional instruction only, not on assessment, evaluation, or reporting.

In order for SEL to be effective, teaching and learning approaches must consider and address the lived realities of students, including the ways in which educator biases affect students' experiences in the classroom. Approaches to support SEL instruction must be mediated through authentic and respectful conversations about students' lived realities. These realities may include the inequities students negotiate inside and outside the classroom, educator biases that perpetuate systemic racism, historical and intergenerational trauma related to the education system, institutional and interpersonal discrimination, and harassment.

Human rights principles and the Education Act identify the importance of creating a climate of understanding of, and mutual respect for, the dignity and worth of each person, so that each person can contribute fully to the development and well-being of their community. Human rights law guarantees a person's right to equal treatment in education. It requires educators and school leaders to actively prevent all discrimination and harassment and respond appropriately when they do occur, to create an inclusive environment, to remove barriers that limit the ability of students, and to provide accommodations where necessary.

Intentional Instruction

Social-emotional learning skills can be developed across all subjects of the curriculum – including mathematics – as well as during various school activities, at home, and in the community. These skills support students in understanding and applying mathematical thinking and making connections across the course that are key to learning and doing mathematics. They support all

students – and indeed all learners, including educators and parents – as they develop confidence, cope with challenges, and think critically. This in turn enables students to improve and demonstrate mathematics knowledge, concepts, and skills in a variety of situations. Social-emotional learning skills support every student in developing a healthy identity as a capable mathematics learner.

Educator self-reflection on their own socio-cultural awareness is an essential component in the instruction of SEL in Ontario schools. Self-reflection is an important part of understanding oneself, one's identity and worldview, one's own beliefs, one's unconscious biases, one's privilege, and one's responses to these. For educators, self-awareness and self-reflection help to interrogate and understand their own position, as well as provide some grounding principles that can be used to support all students in enhancing their social-emotional learning skills while teaching in a way that is culturally responsive. Ensuring a culturally responsive and reflective approach that supports students in developing social-emotional learning skills begins with educator reflection and consideration of the learning environment. Educators reflect on instructional strategies, classroom climate, and the cultural context in which they teach, and consider making adjustments in any of these areas to more effectively support student learning and well-being for all students. SEL skills are developed within a learning context and with consideration of the individual student, and of their relationships to the classroom teacher, peers, other educators, the larger school community, and the world beyond.

Working with students to identify their personal learning goals related to SEL skills ensures that the intended learning is clear and transparent to all students and that all lived experiences are recognized. For example, when teachers are explicitly teaching skills for healthy relationships during problem-solving in mathematics, students and teachers work together to identify what these skills can look like and sound like. This may include recognizing different approaches to problem-solving that may be used in the students' homes or communities and in a variety of cultures; using encouraging words when communicating; and listening to each other about using different problem-solving approaches if the first one doesn't succeed. Educators model and teach these skills during instruction. Students may show their understanding of these skills in a variety of ways and reflect on their own progress individually.

Social-Emotional Learning Skills: Key Components and Sample Strategies

The chart below provides information about social-emotional learning skills, including key components and sample strategies in the context of mathematics learning.

Skills *What are the skills? How do they help? What do they look like in mathematics?*	**Key Components and Sample Strategies**
Recognizing and Identifying Emotions That Support Mathematical Learning	• Recognizing a range of emotions in self and others

Students often experience a range of emotions over the course of their day at school. They may feel happy, sad, angry, frustrated, or excited, or any number of emotions in combination. Students may struggle to identify and appropriately express their feelings. Learning to recognize different emotions can support students in interacting with mathematical content and within mathematical learning communities in healthy ways. When students understand the influence of thoughts and emotions on behaviour, they can improve the quality of their interactions and are better able to respond to themselves and others in ways that are compassionate and caring, and that honour their own social and emotional needs. In mathematics, as they learn new mathematics concepts and interact with others while problem solving, students have many opportunities to develop awareness of their emotions and to use communication skills to express their feelings and to respond with care when they recognize emotions in others.	• Understanding connections between thoughts, feelings, and actions and the impacts of each of these on the others
	• Recognizing that new or challenging learning may involve a sense of excitement or an initial sense of discomfort
	• Applying strategies such as:
	  ○ identifying, naming, and reasoning through the cause of particular emotions
	  ○ using language such as "I'm feeling frustrated because…"
	  ○ using tools (e.g., pictures) and language to gauge intensity of emotion

Recognizing Sources of Stress That Present Challenges to Mathematical Learning
 	
Every day, students are exposed to a range of challenges that can contribute to feelings of stress. As they learn stress management and coping skills, they come to recognize that stress is a part of learning and life and that it can be managed. While taking steps to dismantle systemic barriers to student well-being and success, educators can support students as they learn ways to respond to challenges in mathematics learning that enable them to "bounce back" and, in this way, build resilience in the face of life's obstacles. Over time, with support, practice, feedback, reflection, and experience, students begin to build a set of personal coping strategies that they can carry with them through life. In mathematics, students work through challenging problems, understanding that their resourcefulness in using coping strategies strengthens their personal resilience.
	• Seeking support from peers, teachers, family, or their extended community
	• Applying strategies such as:
	  ○ "chunking" a task or problem into manageable components and tackling one piece at a time
	  ○ thinking of a similar problem
	  ○ engaging in guided imagery and visualization
	  ○ stretching
	  ○ pausing and reflecting
	  ○ using an iterative approach to solve a problem, including reframing questions, trying out different methods, estimating, and guessing and checking solutions

Identifying Resources and Supports That Aid Perseverance in Mathematical Learning
 	
In a supportive and inclusive environment, students have regular opportunities to practise and apply perseverance skills as they solve mathematical problems and develop an appreciation for learning from mistakes as a part of the mathematics learning process. Educators can support students in approaching challenges in life with an understanding that there is struggle in most successes and that accessing the right support can lead to success. To that end, students need to identify and access educators as key resources. Through regular interactions, students and educators can build relationships based on trust and respect. Educators can also support students in noticing and naming harmful classroom interactions such as microaggressions and discrimination, and can support them when they report incidents of harm. While building skills for perseverance can have an impact on an individual student level, it is important to recognize the critical role educators play when they actively take steps to acknowledge and address systemic barriers at all levels (in the classroom, in the school, across the system, in the community) that hinder mathematical learning for students.
	• Embracing mistakes as a necessary and helpful part of learning
	• Noticing strengths and positive aspects of experiences, appreciating the value of practice
	• Creating a list of supports and resources, including people, that can aid them in persevering
	• Applying strategies such as:
	  ○ supporting peers by encouraging them to keep trying if they make a mistake
	  ○ using personal affirmations like "I can do this."

Building Healthy Relationships and Communicating Effectively in Mathematics
 	
Healthy relationships are at the core of developing and maintaining physically and mentally safe, healthy, equitable, caring school and classroom communities. When students interact in meaningful ways with others, mutually respecting diversity of thought and expression, their sense of belonging within the school and community is enhanced. Learning healthy relationship skills helps students establish patterns of effective communication and inspires healthy, cooperative relationships. These skills include the ability to understand and appreciate another person's perspective, to empathize with others, to listen attentively, and to resolve conflict in healthy ways. In mathematics, students have opportunities to develop and practise skills that support healthy interaction with others as they work together in small groups or in pairs to solve math problems and confront challenges. Developing these skills helps students to communicate with teachers, peers, and family about
	• Recognizing and understanding the impact of one's emotions and actions on others
	• Listening attentively
	• Considering other ideas and perspectives
	• Practicing empathy and care
	• Using conflict-resolution skills
	• Using cooperation and collaboration skills
	• Applying strategies such as:
	  ○ seeking opportunities to help others
	  ○ working as part of a team and playing different roles (e.g., leader, scribe or illustrator, data collector, observer)

mathematics with an appreciation of the beauty and wonder of mathematics.	that contribute to outcomes in different ways

Developing a Healthy Mathematical Identity Through Building Self-Awareness
 	
Knowing who we are and having a sense of purpose and meaning in our lives enables us to function in the world as self-aware individuals. Our sense of identity enables us to make choices that support our well-being and allows us to connect with and have a sense of belonging in various cultural and social communities. Educators should note that for First Nations, Métis, and Inuit students, the term "sense of identity and belonging" may also mean belonging to and identifying with a particular community and/or nation. Self-awareness and identity skills supports students in exploring who they are – their strengths, preferences, interests, values, and ambitions – and how their social and cultural contexts have influenced them. This exploration is grounded in affirming cultural heritage, considering social identities, and assessing the impact of beliefs and biases. In mathematics, as they learn new skills, students use self-awareness skills to monitor their progress and identify their individual strengths and gifts; in the process, they build their identity as mathematics learners who are capable of actualizing their individual pathways.
	• Knowing oneself
	• Caring for oneself
	• Having a sense of mattering and of purpose
	• Identifying personal strengths
	• Having a sense of belonging and community
	• Communicating their thinking and feelings about mathematics
	• Applying strategies such as:
	  ○ building their identity as a math learner as they learn independently as a result of their efforts and challenges
	  ○ monitoring progress in skill development
	  ○ reflecting on strengths and accomplishments and sharing these with peers or caring adults

Developing Critical and Creative Mathematical Thinking
 	
Critical and creative thinking skills enable us to make informed judgements and decisions on the basis of a clear and full understanding of ideas and situations, and their implications, in a variety of settings and contexts. Students learn to question, interpret, predict, analyse, synthesize, detect bias, and distinguish between alternatives. They practise making connections, setting goals, creating plans, making and evaluating decisions, and analysing and solving problems for which there may be no clearly defined answers. In all aspects of the mathematics curriculum, students have opportunities to develop critical and creative thinking skills. Students have opportunities to build on prior learning, go deeper, and make personal connections through real-life applications.
	• Making connections
	• Making decisions
	• Evaluating choices, reflecting on and assessing strategies
	• Communicating effectively
	• Managing time
	• Setting goals and making plans
	• Applying organizational skills
	• Applying strategies such as:
	  ○ determining what is known and what needs to be found
	  ○ using various webs, charts, diagrams, and representations to help identify

	○ connections and interrelationships ○ using organizational strategies and tools, such as planners, trackers, and goal-setting frameworks

The Strands in the Grade 9 Mathematics Course

The Grade 9 mathematics course is designed to be inclusive of all students in order to facilitate their transition to learning at the secondary level by offering opportunities to broaden their knowledge and skills in mathematics. This approach allows students to make informed decisions in choosing future mathematics courses based on their interests and on requirements for future jobs, trades, and professions.

The Grade 9 mathematics course is organized into seven strands. Strand AA: Social-Emotional Learning (SEL) Skills in Mathematics focuses on a set of skills to be developed in the context of learning across all other strands. Strand A focuses on developing mathematical thinking and making connections to students' lived experiences as well as connecting curriculum to real-life applications as students acquire the mathematical concepts and skills set out in strands B through F. The remaining strands cover the interrelated content areas of number, algebra, data, geometry and measurement, and financial literacy. The Grade 9 mathematics course consolidates learning from the elementary grades and sets a foundation for learning in future secondary mathematics courses. The strands of the elementary mathematics program are closely aligned with those of the Grade 9 mathematics course, as shown in the following chart.

Elementary Mathematics	Grade 9 Mathematics
	AA. Social-Emotional Learning (SEL) Skills in Mathematics
A. Social-Emotional Learning (SEL) Skills in Mathematics and the Mathematical Processes	A. Mathematical Thinking and Making Connections
B. Number	B. Number

C. Algebra	C. Algebra
D. Data	D. Data
E. Spatial Sense	E. Geometry and Measurement
F. Financial Literacy	F. Financial Literacy

Strands in Grade 9 Mathematics

Strand AA: Social-Emotional Learning (SEL) Skills in Mathematics

Strand A: Mathematical Thinking and Making Connections

- Mathematical processes
- Making connections

Strand B: Number

- Development and use of numbers
- Number sets
- Powers
- Rational numbers
- Applications

Strand C: Algebra

- Development and use of algebra
- Algebraic expressions and equations
- Coding
- Application of linear and non-linear relations
- Characteristics of linear and non-linear relations

Strand D: Data

- Application of data
- Representation and analysis of data
- Application of mathematical modelling
- Process of mathematical modelling

Strand E: Geometry and Measurement

- Geometric and measurement relationships

Strand F: Financial Literacy

- Financial decisions

Strand AA: Social-Emotional Learning (SEL) Skills in Mathematics

This strand comprises a single overall expectation that is to be included in classroom instruction throughout the course, but not in assessment, evaluation, or reporting. Students are supported in exploring social-emotional learning skills in mathematics.

Strand A: Mathematical Thinking and Making Connections

Throughout the course, students apply the mathematical processes to develop conceptual understanding and procedural fluency while they engage in learning related to strands B through F. They also make connections between the mathematics they are learning and their lived experiences, various knowledge systems, and real-life applications, including employment and careers.

Strand B: Number

In this strand, students continue to make connections among various number systems, the cultural development of number concepts, and real-life applications. They will extend their learning about positive **fractions**, positive **decimal numbers**, and **integers** to work with **negative** fractions and **negative** decimal numbers. Students also extend their knowledge and skills related to **percentages**, **ratios**, **rates**, and **proportions** to make further connections to real life.

Strand C: Algebra

In this strand, students continue to develop an understanding of **algebra** by making connections between **algebra** and **numbers** as they generalize relationships with algebraic expressions and **equations**. Students will extend and apply **coding** skills to dynamically represent situations, analyse **mathematics** concepts, and solve **problems** in various contexts. Students will be introduced to various representations of **linear** and non-linear relations that they will study in more depth in future secondary mathematics courses. Students develop an understanding of **constant** **rate** of change and initial values of linear relations, and solve related real-life problems.

*Strand D: **Data***

In this strand, students extend their **data** literacy skills to examine the collection, representation, and use of data, as well as their implications in various contexts. Students consolidate and extend their understanding of data involving one and two **variables** and its connections to real life. Using data, students continue to apply the process of mathematical modelling to analyse real-life situations.

*Strand E: **Geometry** and **Measurement***

In this strand, students make connections among various geometric properties and their real-life applications. Students analyse and create designs to extend their understanding of geometric relationships to include **circle** and **triangle** properties. Students solve **problems** using different units within and between various **measurement** systems, examine the relationships between

the **volume** of cones and cylinders and of pyramids and **prisms**, and solve problems that involve the application of **perimeter**, **area**, **surface area**, and **volume**.

Strand F: Financial Literacy

In this strand, students analyse financial situations to explain how mathematics can be used to understand such situations and inform financial decisions. They extend their financial literacy knowledge to answer questions related to appreciation and depreciation, and explain how budgets can be modified based on changes in circumstances. Students compare the effects of different interest rates, down payments, and other factors associated with purchasing goods and services. Students use their learning from other strands to solve financial problems of interest.

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