CANADA WORLD
EDUCATION

FUNCTIONS MCR3U

COURSE OUTLINE

Course Title	FUNCTIONS
Grade level	11
Ministry Course Code	MCR3U
Course Type	University Preparation
Credit Value	1
Credit Hours	110.0
Course Developer	Jean-Francois Michaud
Development Date	March 2019
Course Reviser	Jean-Francois Michaud
Revision Date	June 2019
Department	Mathematics
Policy Documents	● The Ontario Curriculum Grades 11 and 12 Mathematics, 2007. ● Growing Success – Assessment, Evaluation and Reporting in Ontario Schools-2010 ● Learning for All – A Guide to Effective Assessment and Instruction for All Students, Kindergarten to Grade 12, 201
Prerequisite	Principles of Mathematics, Grade 10, Academic
Resources:	Functions, Grade 11, Academic, Nelson ● Graphing calculators and computer software
Resources required by student	● Internet connectivity ● either of: smartphone camera or scanner to digitize handwritten and/or hand-drawn work or practical projects

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Course Description

This course introduces the mathematical concept of the function by extending students' experiences with linear and quadratic relations. Students will investigate properties of discrete and continuous functions, including trigonometric and exponential functions; represent functions numerically, algebraically, and graphically; solve problems involving applications of functions; investigate inverse functions; and develop facility in determining equivalent algebraic expressions. Students will reason mathematically and communicate their thinking as they solve multi-step problems.

Overall Curriculum Expectations and Strands

Strand	**Overall Expectations**
A. CHARACTERISTICS OF FUNCTIONS	1. demonstrate an understanding of functions, their representations, and their inverses, and make connections between the algebraic and graphical representations of functions using transformations; 2. determine the zeros and the maximum or minimum of a quadratic function, and solve problems involving quadratic functions, including problems arising from real - world applications; 3. demonstrate an understanding of equivalence as it relates to simplifying polynomial, radical, and rational expressions.
B. EXPONENTIAL FUNCTIONS	1. evaluate powers with rational exponents, simplify expressions containing exponents, and describe properties of exponential functions represented in a variety of ways; 2. make connections between the numeric, graphical, and algebraic representations of exponential functions; 3. identify and represent exponential functions, and solve problems involving exponential functions, including problems arising from real - world applications
C. DISCRETE FUNCTIONS	1. demonstrate an understanding of recursive sequences, represent recursive sequences in a variety of ways, and make connections to Pascal's triangle; 2. demonstrate an understanding of the relationships involved in arithmetic and geometric sequences and series, and solve related problems; 3. make connections between sequences, series, and financial applications, and solve problems involving compound interest and ordinary annuities.
D. TRIGONOMETRIC FUNCTIONS	1. determine the values of the trigonometric ratios

	for angles less than 360o; prove simple trigonometric identities; and solve problems using the primary trigonometric ratios, the sine law, and the cosine law; 2. demonstrate an understanding of periodic relationships and sinusoidal functions, and make connections between the numeric, graphical, and algebraic representations of sinusoidal functions; 3. identify and represent sinusoidal functions, and solve problems involving sinusoidal functions, including problems arising from real - world applications

Outline of Course Content

Units listed in the sequence of delivery

Unit	Unit Title	Unit Description	Hours
1	CHARACTERISTICS OF FUNCTIONS	This unit will demonstrate an understanding of functions, their representations, and their inverses, and make connections between the algebraic and graphical representations of functions using transformations. And determining the zeros and the maximum or minimum of a quadratic function, and solve problems involving quadratic functions, including problems arising from real - world applications. In addition, this unit will demonstrate an understanding of equivalence as it relates to simplifying polynomial, radical, and rational expressions.	35
2	EXPONENTIAL FUNCTIONS	This unit will explain evaluation powers with rational exponents, simplify expressions containing exponents, and describe properties of exponential functions represented in a variety of ways. Also make connections between the numeric, graphical, and algebraic representations of exponential functions. In addition, students will identify and represent exponential functions, and solve problems involving exponential functions, including problems arising from real - world applications.	20
3	DISCRETE FUNCTIONS	This unit will demonstrate an understanding of recursive sequences, represent recursive sequences in a variety of ways, and make connections to Pascal's triangle. Also this unit will	20

		demonstrate an understanding of the relationships involved in arithmetic and geometric sequences and series, and solve related problems. In addition, make connections between sequences, series, and financial applications, and solve problems involving compound interest and ordinary annuities.	
4	TRIGONOMETRIC FUNCTIONS	This unit will determine the values of the trigonometric ratios for angles less than 360o; prove simple trigonometric identities; and solve problems using the primary trigonometric ratios, the sine law, and the cosine law. This unit will demonstrate an understanding of periodic relationships and sinusoidal functions, and make connections between the numeric, graphical, and algebraic representations of sinusoidal functions as well. In addition, this unit will identify and represent sinusoidal functions, and solve problems involving sinusoidal functions, including problems arising from real - world applications.	35
		Total:	110

MATHEMATICAL PROCESS EXPECTATIONS

The mathematical processes are to be integrated into student learning in all areas of this course. Throughout this course, students will:

Problem Solving develop, select, apply, compare, and adapt a variety of problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding;

Reasoning and Proving develop and apply reasoning skills (e.g., use of inductive reasoning, deductive reasoning, and counter-examples; construction of proofs) to make mathematical conjectures, assess conjectures, and justify conclusions, and plan and construct organized mathematical arguments;

Reflecting demonstrate that they are reflecting on and monitoring their thinking to help clarify their understanding as they complete an investigation or solve a problem (e.g., by assessing the effectiveness of strategies and processes used, by proposing alternative approaches, by judging the reasonableness of results, by verifying solutions);

Selecting Tools and Computational Strategies select and use a variety of concrete, visual, and electronic learning tools and appropriate computational strategies to investigate mathematical ideas and to solve problems;

Connecting make connections among mathematical concepts and procedures, and relate Mathematical ideas to situations or phenomena drawn from other contexts (e.g., other curriculum areas, daily life, current events, art and culture, sports);

Representing create a variety of representations of mathematical ideas (e.g., numeric, geometric, algebraic, graphical, pictorial representations; onscreen dynamic representations), connect and compare them, and select and apply the appropriate representations to solve problems;

Communicating communicate mathematical thinking orally, visually, and in writing, using precise mathematical vocabulary and a variety of appropriate representations, and observing mathematical conventions.

COURSE TEACHING AND LEARNING STRATEGIES

Teacher will utilize instruction that both responds to the characteristics of a diverse group of students and is precisely tailored to the unique strengths and needs of each student can be achieved using the principles and guidelines associated with three instructional approaches: 1) Universal Design for Learning (UDL), 2) differentiated instruction, and 3) the tiered approach to prevention and intervention. (Learning for All, Kindergarten to Grade 12: For more info please see http://www.edu.gov.on.ca/eng/general/elemsec/speced/LearningforAll2013.pdf)

What are UDL-aligned strategies? https://goalbookapp.com/toolkit/strategies

• UDL-aligned strategies are instructional methods and tools used by teachers to ensure that ALL students have an equal opportunity to learn. All of our strategies are aligned with Universal Design for Learning (UDL) guidelines. These guidelines help you to select strategies that remove barriers in instruction so that all students can achieve their learning goals.

• Differentiated Instruct ion is based on the idea that because students differ significantly in their interests, learning styles, and readiness to learn, it is necessary to adapt instruction to suit these differing characteristics. Teachers can differentiate one or a number of the following elements in any classroom learning situation (Tomlinson, 2004): the content of learning (what students are going to learn, and when); the process of learning (the types of tasks and activities); the products of learning (the ways in which students demonstrate learning); the affect/environment of learning (the context and environment in which students learn and demonstrate learning). (http://edugains.ca/newsite/di/index.html)

Teaching and learning strategies adopted should be appropriate to the course type and should reflect an appropriate balance of theoretical components, practical applications for the course and appropriate to the range of student learning.

Examples of teaching strategies:

Brainstorming • Be the teacher • Case Studies • Computer technology – reports, spreadsheets, flow charts , data bases, electronic presentation; • Conferences • Documentaries/Videos /Ted Talks/Video critique • Flexible Grouping • Focus Groups–Informal discussions based on focus questions • Formal Debates/Informal debates • Graphic Organizers • Group critique • Group Discussions • Independent Study • Informal Debates • Internet Based Research/Investigation • Interview • Investigative and inquiry questions	• Media Presentation • Peer feedback • Planning and writing analytical pieces of work • Provide specialized vocabulary • Reading: read for meaning • Reading: to develop the ability to use specialized vocabulary • Research Project –individual • Research Project-group • Role-play • Seminar • Skype interviews • Socratic Teaching • Structured discussion • Think-Pair Share • UDL-Aligned Strategies (see https://goalbookapp.com/toolkit/strategies) Write or give a personal perspective in discussions

ASSESSMENT& EVALUATION

Assessment is the process of gathering information that accurately reflects how well a student is achieving the curriculum expectations in a subject or course. The primary purpose of assessment is to improve student learning.

Assessment and evaluation practices in this course follows the Ministry of Education's Growing Success document, and it is our firm belief that doing so is in the best interests of students. The primary purpose of assessment and evaluation is to improve student learning. (For a full explanation, please refer to Growing Success: http://www.edu.gov.on.ca/eng/policyfunding/growsuccess.pdf)

The assessment practices and procedures are used in a way that:

▪ are fair, transparent, and equitable for all students;

▪ support all students, including those with special education needs, those who are learning the language of instruction (English or French), and those who are First Nation, Métis, or Inuit;

▪ are carefully planned to relate to the curriculum expectations and learning goals and, as of all students;

▪ are communicated clearly to students and parents at the beginning of the school year or course and at other appropriate points throughout the school year or course;

▪ are ongoing, varied in nature, administered over a period of time to provide multiple opportunities for students to demonstrate the full range of their learning;

▪ provide ongoing descriptive feedback that is clear, specific, meaningful, and timely to support improved learning and achievement;

▪ develop students' self-assessment skills to enable them to assess their own learning, set specific goals, and plan next steps for their learning.

Assessment information will be obtained from a variety of means, which may include formal and informal observations, discussions, learning conversations, questioning, conferences, homework, tasks done in groups, demonstrations, projects, portfolios, developmental continua, performances, peer and self-assessments, self-reflections, essays, and tests. Assessment for learning and as learning practices will include:

• Developing learning goals: students and teachers will share a common understanding of what is being learned. Learning goals clearly identify what students are expected to know and be able to do, in language that students can readily understand.

• Identifying success criteria: students and teachers will share a common understanding of what constitutes success in learning. Success criteria describe in specific terms what successful attainment of the learning goals looks like.

• Eliciting information about student learning: a variety of assessment strategies to elicit information about student learning will be used. These strategies will be triangulated to include observation, student-teacher conversations, and student products.

• Providing descriptive feedback: students will be provided with information about what they are doing well, what needs improvement, and what specific steps they can take to improve.

• Developing student self-assessment and peer-assessment skills: the emphasis on student self-assessment represents a fundamental shift in the teacher-student relationship, placing the primary responsibility for learning with the student.

• Developing individual goal setting: as a result of developing self-assessment skills, students learn to identify specific actions they need to take to improve, and to plan next steps. Examples of Assessment for and As learning. (May involve utilizing checklists/rubrics/ratings/anecdotal notes...)

Examples of Assessment for and As learning

	Task/ Strategy	As/for	Conversation	Product	Observation
Possible Assessment As & for Learning	Journals/Letters/Writing tasks	As/for		X	x
	Class Discussions	As/for	X	X	X
	Student-Teacher Conferences	As/for	X		

	Entrance Tickets	As/for		X	
	Exit Tickets	As/for		X	
Diagnostics -Self and peer assessment -Formative assessment	Conference	As/for	X		X
	Role Play	As/for	X		X
	Self-Assessments/Peer assessments	As/for			
	Individual/group work	As/for	X		X
	Informal debate	As/for	X		X
	Essay Draft/Outline	As/for	X	X	
	Presentations/demonstrations	As/for		X	X
	Homework tasks	As/for	X	X	X
	Quiz/survey/digital quiz Games	As/for		X	

Examples of Assessment for and As using checklists, rubrics and anecdotal notes

Assessment as Learning	Assessment for Learning
Student Product • Entrance tickets • Graphic organizers-KWL • Journal • Peer assessment • Peer editing checklist • Pre-tests/Diagnostic tests • Quizzes • Reflections • Rough drafts • Self assessment • Self-proofreading using a checklist	**Student Product** 3-Minute Pause • Assignments • Diagnostic Assessment • Exit tickets • Graphic organizers • Homework • Journals/Letters/Emails • KWL • Learning Logs • Presentation (PPT/Przei..) • Problem solving • Quiz/problem solving • Vocabulary notebook
Observation • Checklist/Feedback for group discussion • Peer rating on presentations • Teacher anecdotal feedback • Teacher feedback for a task • Teacher rating for a task • Whole class discussion	**Observation** • Class discussions • Demonstrations • Informal debate • Performance tasks • Presentations • Role Play

Conversation • Student teacher conversations • Questioning • Moderated group discussions • Peer-Oral feedback	**Conversation** •Brainstorming • Debate • Focused Conversations • Oral pre-tests • Oral quizzes • Interviews • Pair work • Group work • Portfolio conferencing • Student teacher conferences

EVALUATION

Evidence of Student Achievement for Evaluation

Evaluation refers to the process of judging the quality of student learning on the basis of established performance and assigning as value to represent that quality. Evaluation accurately summarizes and communicates to parents, other teachers, employers, institutions of further education, and students themselves what students know and can do with respect to the overall curriculum expectations. Evaluation is based on assessment of learning that provides evidence of student achievement at strategic times throughout the grade/course, often at the end of a period of learning

Evidence of student achievement for evaluation is collected over time from three different sources – observations, conversations, and student products—using multiple sources of evidence increases the reliability and validity of the evaluation of student learning. Student products" may be in the form of tests or exams and/or assignments for evaluation. Assignments for evaluation may include rich performance tasks, demonstrations, projects, and/or essays. To ensure equity for all students, assignments for evaluation and tests or exams are to be completed, whenever possible, under the supervision of a teacher. Assignments for evaluation must not include ongoing homework that students do in order to consolidate their knowledge and skills or to prepare for the next class. Assignments for evaluation may involve group projects as long as each student's work within the group project is evaluated independently and assigned an individual mark, as opposed to a common group mark.

The subject-specific Achievement Charts in the curriculum documents as the framework for assessing, evaluating and reporting student achievement of the curriculum expectations.

CATEGORIES OF KNOWLEDGE AND SKILLS

• Knowledge and Understanding: Subject-specific content acquired in each grade/course (knowledge), and the comprehension of its meaning and significance (understanding)

• Thinking: The use of critical and creative thinking skills and/or processes

• Communication: The conveying of meaning through various forms

• Application: The use of knowledge and skills to make connections within and between various contexts

The Final Grade: The evaluation for this course is based on the student's achievement of curriculum expectations and the demonstrated skills required for effective learning. The final percentage grade represents the quality of the student's overall achievement of the expectations for the course and reflects the corresponding level of achievement as described in the achievement chart for the discipline. A credit is granted and recorded for this course if the student's grade is 50% or higher. The final grade will be determined as follows:

70% of the grade will be based upon evaluations conducted throughout the course.

This portion of the grade will reflect the student's most consistent level of achievement throughout the course, although special consideration will be given to more recent evidence of achievement.

• **30% of the grade will be based on final evaluations administered at the end of the course**.

The final assessment may be a final exam, a final project, or a combination of both an exam and a project.

LEVELS OF ACHIEVEMENT

The achievement chart also identifies four levels of achievement, defined as follows:

• Level 1 (50 - 59%) represents achievement that falls much below the provincial standard. The student demonstrates the specified knowledge and skills with limited effectiveness. Students must work at significantly improving learning in specific areas, as necessary, if they are to be successful in the next grade/course

• Level 2 (60 - 69%) represents achievement that approaches the provincial standard. The student demonstrates the specified knowledge and skills with some effectiveness. Students performing at this level need to work on identified learning gaps to ensure future success.

• Level 3 (70 - 79%) represents the provincial standard for achievement. The student demonstrates the specified knowledge and skills with considerable effectiveness. Parents of students achieving at level 3 can be confident that their children will be prepared for work in subsequent grades/courses.

• Level 4 (80 – 100%) identifies achievement that surpasses the provincial standard. The student demonstrates the specified knowledge and skills with a high degree of effectiveness. However, achievement at level 4 does not mean that the student has achieved expectations beyond those specified for the grade/course.

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STUDENTS' RESPONSIBILITIES

It must be made clear to students early in the school year that they are responsible not only for their behaviour in the classroom and the school but also for providing evidence of their achievement of the overall expectations within the time frame specified by the teacher, and in a form approved by the teacher. Students are responsible for providing evidence of their learning within established timelines; there are consequences for cheating, plagiarizing, not completing work, and submitting work late. (Please see Course Calendar that includes Code of Conduct and Academic Honesty Policy)

CHEATING AND PLAGIARISM

Students must understand that the tests/exams they complete and the assignments they submit for evaluation must be their own work and that cheating and plagiarism will not be condoned.

STRATEGIES FOR ASSESSMENT AND EVALUATION OF STUDENT PERFORMANCE Note:

Some assessment tools may be modified based on student needs, interests, learning styles and teacher professional judgment.

EVALUATION CONDUCTED THROUGHOUT THE COURSE				70%
Unit	**Assessment Tool/Task**	**Conversation Observation Product**	**Four Categories KU/T/C/A**	**% Weight**
Unit 1	Unit quizzes	Product	KU/T/C/A	%3
	Chapter tests	Product	KU/T/C/A	%4
	Problem Solving-Conversation /Observation	Product	KU/T/C/A	%2
	Project/Assignment	Product	KU/T/C/A	% 2
	Unit Test	Product	KU/T/C/A	% 7
Unit 2	Unit quizzes	Product	KU/T/C/A	%3
	Chapter tests	Product	KU/T/C/A	%4
	Problem Solving-Conversation /Observation	Product	KU/T/C/A	%2
	Project/Assignment	Product	KU/T/C/A	%2
	Unit Test	Product	KU/T/C/A	%6
Unit 3	Unit quizzes		KU/T/C/A	%3
	Chapter tests		KU/T/C/A	%4

	Problem Solving-Conversation /Observation		KU/T/C/A	%2
	Project/Assignment		KU/T/C/A	%2
	Unit Test		KU/T/C/A	%6
Unit 4	Unit quizzes		KU/T/C/A	%3
	Chapter tests		KU/T/C/A	%4
	Problem Solving-Conversation /Observation		KU/T/C/A	%2
	Project/Assignment		KU/T/C/A	%2
	Unit Test		KU/T/C/A	%7
FINAL EXAMINATION **Final evaluations administered at the end of the course**		Conversation Observation Product	KU/T/C/A	30%

Final Grade **100%**

70% of the grade will be based upon evaluations conducted throughout the course
30% of the grade will be based on final evaluations administered at the end of the course

EVALUATING THE DEVELOPMENT OF LEARNING SKILLS AND WORK HABITS

The learning skills and work habits are evaluated and reported as follows:

E – Excellent

G – Good

S – Satisfactory

N – Needs Improvement

Learning Skills and Work Habits	Sample Behaviours
Responsibility	The student: • fulfils responsibilities and commitments within the learning environment; • completes and submits class work, homework, and assignments according to agreed upon timelines; • takes responsibility for and manages their own behaviour.
Organization	The student: • devises and follows a plan and process for completing work and tasks;

	• establishes priorities and manages time to complete tasks and achieve goals; • identifies, gathers, evaluates, and uses information, technology, and resources to complete tasks.
Independent Work	The student: • independently monitors, assesses, and revises plans to complete tasks and meet goals; • uses class time appropriately to complete tasks; • follows instructions with minimal supervision. Collaboration The student: • accepts various roles and an equitable share of work
Collaboration	The student: • accepts various roles and an equitable share of work in a group; • responds positively to the ideas, opinions, values, and traditions of others; • builds healthy peer-to-peer relationships through personal and media-assisted interactions; • works with others to resolve conflicts and build consensus to achieve group goals; • shares information, resources, and expertise and promotes critical thinking to solve problems and make decisions.
Initiative	The student: • looks for and acts on new ideas and opportunities for learning; • demonstrates the capacity for innovation and a willingness to take risks; • demonstrates curiosity and interest in learning; • approaches new tasks with a positive attitude; • recognizes and advocates appropriately for the rights of self and others.
Self -regulation	The student: • sets own individual goals and monitors progress towards achieving them; • seeks clarification or assistance when needed; • assesses and reflects critically on own strengths, needs, and interests; • identifies learning opportunities, choices, and strategies to meet personal needs and achieve goals; • perseveres and makes an effort when responding to challenges.

CONSIDERATIONS FOR PROGRAM PLANNING

INSTRUCTIONAL APPROACHES

Effective instruction is key to student success. To provide effective instruction, teachers need to consider what they want students to learn, how they will know whether students have learned it, how they will design instruction to promote the learning, and how they will respond to students who are not making progress. When planning what students will learn, teachers identify the main concepts and skills described in the curriculum expectations, consider the contexts in which students will apply the learning, and determine students' learning goals. Instructional approaches should be informed by the findings of current research on instructional practices that have proved effective in the classroom.

A well-planned instructional program should always be at the student's level, but it should also push the student towards his or her optimal level of challenge for learning, while providing the support and anticipating and directly teaching the skills that are required for success.

A Differentiated Approach to Teaching and Learning:

An understanding of students' strengths and needs, as well as of their backgrounds and life experiences, can help teachers plan effective instruction and assessment. Teachers continually build their awareness of students' learning strengths and needs by observing and assessing their readiness to learn, their interests, and their learning styles and preferences. As teachers develop and deepen their understanding of individual students, they can respond more effectively to the students' needs by differentiating instructional approaches – adjusting the method or pace of instruction, using different types of resources, allowing a wider choice of topics, even adjusting the learning environment, if appropriate, to suit the way their students learn and how they are best able to demonstrate their learning.

• **Lesson Design**: Effective lesson design involves several important elements. Teachers engage students in a lesson by activating their prior learning and experiences, clarifying the purpose for learning, and making connections to contexts that will help them see the relevance and usefulness of what they are learning. Teachers select instructional strategies to effectively introduce concepts, and consider how they will scaffold instruction in ways that will best meet the needs of their students. At the same time, they consider when and how to check students' understanding and to assess their progress towards achieving their learning goals. Teachers provide multiple opportunities for students to apply their knowledge and skills and to consolidate and reflect on their learning. A three-part lesson design (e.g., "Minds On, Action, and Consolidation") is often used to structure these elements.

PLANNING FOR STUDENTS WITH SPECIAL EDUCATION NEEDS

Classroom teachers are the key educators of students with special education needs. They have a responsibility to help all students learn. Classroom teachers commit to assisting every student to prepare for living with the highest degree of independence possible.

Learning for All: A Guide to Effective Assessment and Instruction for All Students, Kindergarten to Grade 12, describes a set of beliefs, based in research that should guide program planning for students with special education needs in all disciplines. Teachers planning need to pay particular attention to these beliefs, which are as follows:

• All students can succeed.

• Each student has his or her own unique patterns of learning.

• Successful instructional practices are founded on evidence-based research, tempered by experience.

• Universal design and differentiated instruction are effective and interconnected means of meeting the learning or productivity needs of any group of students.

• Classroom teachers are the key educators for a student's literacy and numeracy development.

• Classroom teachers need the support of the larger community to create a learning environment that supports students with special education needs.

• Fairness is not sameness.

In any given classroom, students may demonstrate a wide range of strengths and needs. Teachers plan programs that recognize this diversity and give students performance tasks that respect their particular accommodate a diversity of learning needs.

PROGRAM CONSIDERATIONS FOR ENGLISH LANGUAGE LEARNERS

English language learners arrive in Ontario as newcomers from other countries; they may have experience of highly sophisticated educational systems, or they may have come from regions where access to formal schooling was limited.

When they start school in Ontario, many of these students are entering a new linguistic and cultural environment. All teachers share in the responsibility for these students' English-language development.

English language learners (students who are learning English as a second or additional language in English-language schools) bring a rich diversity of background knowledge and experience to the classroom. These students' linguistic and cultural backgrounds not only support their learning in their

new environment but also become a cultural asset in the classroom community. Teachers will find positive ways to incorporate this diversity into their instructional programs and into the classroom environment.

ENVIRONMENTAL EDUCATION

Acting Today, Shaping Tomorrow: A Policy Framework for Environmental Education in Ontario Schools outlines an approach to environmental education that recognizes the needs of all Ontario students and promotes environmental responsibility in the operations of all levels of the education system. The three goals outlined in Acting Today, Shaping Tomorrow are organized around the themes of teaching and learning, student engagement and community connections, and environmental leadership. The first goal is to promote learning about environmental issues and solutions. The second is to engage students in practising and promoting environmental stewardship, both in the school and in the community. The third stresses the importance of having organizations and individuals within the education system provide leadership by implementing and promoting responsible environmental practices throughout the system so that staff, parents, community members, and students become dedicated to living more sustainably. There are many opportunities to integrate environmental education and encourage exploring a range of environmental issues.

HEALTHY RELATIONSHIPS

Every student is entitled to learn in a safe, caring environment, free from violence and harassment. Research has shown that students learn and achieve better in such environments. A safe and supportive social environment in a school is founded on healthy relationships – the relationships between students, between students and adults, and between adults. Healthy relationships are based on respect, caring, empathy, trust, and dignity, and thrive in an environment in which diversity is honoured and accepted. Healthy relationships do not tolerate abusive, controlling, violent, bullying/harassing, or other inappropriate behaviours. To experience themselves as valued and connected members of an inclusive social environment, students need to be involved in relationships with their peers, teachers, and other members of the school community.

A climate of cooperation, collaboration, respect, and open-mindedness is vital in the classroom. These attitudes and attributes enable students to develop an awareness of the complexity of a range of issues. Moreover, in examining issues from multiple perspectives, students develop not only an understanding of various positions on these issues but also a respect for different points of view.

EQUITY AND INCLUSIVE EDUCATION

The Ontario equity and inclusive education strategy focuses on respecting diversity, promoting inclusive education, and identifying and eliminating discriminatory biases, systemic barriers, and power dynamics that limit the ability of students to learn, grow, and contribute to society. Antidiscrimination education continues to be an important and integral component of the strategy.

In an environment based on the principles of inclusive education, all students, parents, caregivers, and other members of the school community – regardless of ancestry, culture, ethnicity, sex, physical or ability, race, religion, gender identity, sexual ,socio-economic status, or similar factors – are welcomed, included, treated fairly, and respected. Diversity is embedded in education so that all students see themselves reflected in the curriculum, their physical surroundings, and the broader environment, so that they can feel engaged in and empowered by their learning experiences. The implementation of antidiscrimination principles in education influences all aspects of school life

Teachers can give students a variety of opportunities to learn about diversity and diverse perspectives. By drawing attention to the contributions of women, the perspectives of various ethno cultural, religious, and racial communities, and the beliefs and practices of First Nations, Métis, and Inuit peoples, teachers enable students from a wide range of backgrounds to see themselves reflected in the curriculum. It is essential that learning activities and materials used to support the curriculum reflect the diversity of Ontario society. In addition, teachers should differentiate instruction and assessment strategies to take into account the background and experiences, as well as the interests, aptitudes, and learning needs, of all students.

It is important that teachers create an environment that will foster a sense of community where all students feel included and appreciated. It is imperative that students see themselves reflected in the choices of issues, examples, materials, and resources selected by the teacher.

FINANCIAL LITERACY

The document A Sound Investment: Financial Literacy Education in Ontario Schools, 2010 (p. 4) sets out the vision that: Ontario students will have the skills and knowledge to take responsibility for managing their personal financial well-being with confidence, competence, and a compassionate awareness of the world around them.

There is a growing recognition that the education system has a vital role to play in preparing young people to take their place as informed, engaged, and knowledgeable citizens in the global economy. Financial literacy education can provide the preparation Ontario students need to make informed decisions and choices in a complex and fast-changing financial world.

A resource document – The Ontario Curriculum, Grades 9–12: Financial Literacy Scope and Sequence of Expectations, 2011 – has been prepared to assist teachers in bringing financial literacy into the classroom. This document identifies the curriculum expectations and related examples and prompts, in disciplines across the Ontario curriculum, through which students can acquire skills and knowledge related to financial literacy. The document can also be used to make curriculum connections to school-wide initiatives that support financial literacy. This publication is available on the Ministry of Education's website, at www.edu.gov.on.ca/eng/document/policy/FinLitGr9to12.pdf.

LITERACY, MATHEMATICAL LITERACY, AND INQUIRY SKILLS

Literacy involves a range of critical-thinking skills and is essential for learning across the curriculum. Literacy instruction takes different forms of emphasis in different subjects, but in all subjects, literacy needs to be explicitly taught.

Literacy, mathematical literacy, and inquiry/research skills are critical to students' success in all subjects of the curriculum and in all areas of their lives. Activities and tasks that students undertake in the curriculum should involve the literacy skills relating to oral, written, and visual communication.

The Ministry of Education has facilitated the development of materials to support literacy instruction across the curriculum. Helpful advice for integrating literacy instruction may be found in the following resource materials:

• Me Read? And How! Ontario Teachers Report on How to Improve Boys' Literacy Skills, 2009

• Think Literacy: Cross-Curricular Approaches, Grades 7–12, 2003

CRITICAL THINKING AND CRITICAL LITERACY

Critical thinking is the process of thinking about ideas or situations in order to understand them fully, identify their implications, make a judgement, and/or guide decision making. Critical thinking includes skills such as questioning, predicting, analysing, synthesizing, examining opinions, identifying values and issues, detecting bias, and distinguishing between alternatives. Students who are taught these skills become critical thinkers who can move beyond superficial conclusions to a deeper understanding of the issues they are examining. They are able to engage in an inquiry process in which they explore complex and multifaceted issues, and questions for which there may be no clear-cut answers.

Students approach critical thinking in various ways. Some students find it helpful to discuss their thinking, asking questions and exploring ideas. Other students may take time to observe a situation or consider a text carefully before commenting; they may prefer not to ask questions or express their thoughts orally while they are thinking.

Another aspect of critical thinking is metacognition, which involves developing one's thinking skills by reflecting on one's own thought processes. Metacognitive skills include the ability to monitor one's own learning. Acquiring and using metacognitive skills has emerged as a powerful approach for promoting a focus on thinking skills in literacy and across all disciplines.

Outside of the inquiry and skill development strand, students are given many opportunities to reflect on and monitor their learning. As they develop hands-on practical skills related to daily life, as well as relationship skills, communication skills, and critical-thinking skills, students are given opportunities to reflect on their strengths and needs and to monitor their progress. In addition, they are encouraged to advocate for themselves to get the support they need in order to achieve their goals.

THE ROLE OF THE SCHOOL LIBRARY

The school library program can help build and transform students' knowledge in order to support learning.

The school library program enables students to:

• develop a love of reading for learning and for pleasure texts produced in Canada and around the world;

• obtain access to programs, resources, and integrated technologies that support all curriculum areas;

• understand and value the role of public library systems as a resource for lifelong learning.

The school library program plays a key role in the development of information literacy and research skills. Teacher-librarians, where available, collaborate with classroom or content-area teachers to design, teach, and provide students with authentic information and research tasks that foster learning, including the ability to:

• access, select, gather, process, critically evaluate, create, and communicate information;

• use the information obtained to explore and investigate issues, solve problems, make decisions, build knowledge, create personal meaning, and enrich their lives;

• communicate their findings to different audiences, using a variety of formats and technologies;

• use information and research with understanding, responsibility, and imagination.

Teachers need to discuss with students the concept of ownership of work and the importance of copyright in all forms of media.

THE ROLE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Information and communications technology (ICT) provides a range of tools that can significantly extend and enrich teachers' instructional strategies and support student learning. ICT tools include multimedia resources, databases, websites, digital cameras, and word-processing programs. Tools such as these can help students to collect, organize, and sort the data they gather and to write, edit, and present reports on their findings. ICT can also be used to connect students to other schools, at home and abroad, and to bring the global community into the local classroom.

Whenever appropriate, students should be encouraged to use ICT to support and communicate their learning.

Although the Internet is a powerful learning tool, there are potential risks attached to its use. All students must be made aware of issues related to Internet privacy, safety, and responsible use, as well as of the potential for abuse of this technology, particularly when it is used to promote hatred.

ICT tools are also useful for teachers in their teaching practice, both for whole-class instruction and for the design of curriculum units that contain varied approaches to learning in order to meet diverse student needs.

THE ONTARIO SKILLS PASSPORT: MAKING LEARNING RELEVANT AND BUILDING SKILLS

The Ontario Skills Passport (OSP) is a free, bilingual, web-based resource that provides teachers and students with clear descriptions of the "Essential Skills" and work habits important in work, learning, and life. Teachers planning programs can engage students by using OSP tools and resources to show how what they learn in class can be applied in the workplace and in everyday life. The Essential Skills identified in the OSP are:

• Reading Text

• Writing

• Document Use

• Computer Use

• Oral Communication

• Numeracy: Money Math; Scheduling or Budgeting and Accounting; Measurement and Calculation; Data Analysis; and Numerical Estimation

• Thinking Skills: Job Task Planning and Organization; Decision Making; Problem Solving; and Finding Information

Included in the OSP are videos and databases that focus on everyday tasks and occupation specific workplace tasks and that teachers can use to connect classroom learning to life outside of school. Teachers can also consult A Guide to Linking Essential Skills and the Curriculum, 2009, which illustrates how to integrate explicit references to Essential Skills into classroom activities as well as how to give feedback to learners when they demonstrate these skills.

For further information on the Ontario Skills Passport, including the Essential Skills and work habits, visit http://ontario.ca/skillspassport.

EDUCATION AND CAREER/LIFE PLANNING

The goals of the Kindergarten to Grade 12 education and career/life planning program are to:

▪ ensure that all students develop the knowledge and skills they need to make informed education and career/life choices;

▪ provide classroom and school-wide opportunities for this learning; and

▪ engage parents and the broader community in the development, implementation, and evaluation of the program, to support students in their learning.

The framework of the program is a four-step inquiry process based on four questions linked to four areas of learning: (1) knowing yourself – Who am I?; (2) exploring opportunities – What are my opportunities?; (3) making decisions and setting goals – Who do I want to become?; and, (4) achieving goals and making transitions – What is my plan for achieving my goals?

Classroom teachers support students in education and career/life planning by providing them with learning opportunities, filtered through the lens of the four inquiry questions, that allow them to apply subject-specific knowledge and skills to work-related situations; explore subject-related education and career/life options; and become competent, self-directed planners.

HEALTH AND SAFETY

As part of every course, students must be made aware that health and safety are everyone's responsibility – at home, at school, and in the workplace. Teachers must model safe practices at all times and communicate safety requirements to students in accordance with school board and Ministry of Education policies and Ministry of Labour regulations.

ETHICS

The curriculum provides varied opportunities for students to learn about ethical issues and to explore the role of ethics in both public and personal decision making. During the inquiry process, students may need to make ethical judgements when evaluating evidence and positions on various issues, and when drawing their own conclusions about issues, developments, and events. Teachers may need to help students in determining appropriate factors to consider when making such judgements. In addition, it is crucial that teachers provide support and supervision to students throughout the inquiry process, ensuring that students engaged in an inquiry are aware of potential ethical concerns and address them in acceptable ways. If students are conducting surveys and/or interviews, teachers must supervise their activities to ensure that they respect the dignity, privacy, and confidentiality of their participants. Teachers should ensure that they thoroughly address the issue of plagiarism with students. In a digital world in which we have easy access to abundant information, it is very easy to copy the words of others and present them as one's own. Students need to be reminded, even at the secondary level, of the ethical issues surrounding plagiarism, and the consequences of plagiarism should be clearly discussed before students engage in an inquiry.

Resources: Math Grade 11, Functions, Nelson, Math Grade 10, Nelson and other books in math.