

Nelson High School MCR3U1 Course Outline

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I am usually available for math help during lunch. You can find me in rm 222 or in the math office (rm219).

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.

In this course, you will be expected to provide evidence that you can:

Process Expectations

- be actively engaged in the following seven processes which are integrated into all areas of the course: *problem solving, reasoning and proving, reflecting, selecting tools and computational strategies, connecting, representing, and communicating.*

Characteristics of Functions

- demonstrate an understanding of functions, their representations, and their inverses, and make connections between the algebraic and graphical representations of functions using transformations;
- determine the zeros and the maximum or minimum of a quadratic function, and solve problems involving quadratic functions, including those arising from real-world applications;
- demonstrate an understanding of equivalence as it relates to simplifying polynomial, radical, and rational expressions.

Exponential Functions

- evaluate powers with rational exponents, simplify expressions containing exponents, and describe properties of exponential functions represented in a variety of ways;
- make connections between the numeric, graphical, and algebraic representations of exponential functions;
- identify and represent exponential functions, and solve problems involving exponential functions, including those arising from real-world applications.

Discrete Functions

- demonstrate an understanding of recursive sequences, represent recursive sequences in a variety of ways, and make connections to Pascal's triangle;
- demonstrate an understanding of the relationships involved in arithmetic and geometric sequences and series, and solve related problems;
- make connections between sequences, series, and financial applications, and solve problems involving compound interest and ordinary annuities.

Trigonometric Functions

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

You will be expected to demonstrate your understanding of these key learnings through your knowledge, thinking, communication and application skills.

<p>Knowledge Emphasizes the ability to recall factual information, recognize fundamental concepts and the foundational skills of the subject/discipline.</p>	20%	Knowledge of content (e.g., facts, terms, procedural skills, use of tools) and understanding of mathematical concepts. These may be assessed through quizzes, tests, oral questions and answers, practice question assignments, etc.
<p>Thinking Emphasizes the thinking skills used in thinking processes to demonstrate the student’s understanding of information they have processed.</p>	20%	Use of <i>planning skills</i> : understanding the problem (e.g., formulating and interpreting the problem, making conjectures) and making a plan for solving the problem. Use of <i>processing skills</i> : carrying out a plan (e.g., collecting data, questioning, testing, revising, modeling, solving, inferring, forming conclusions) and looking back at the solution (e.g., evaluating reasonableness, making convincing arguments, reasoning, justifying, proving, reflecting). Use of <i>critical/creative thinking processes</i> (e.g., problem solving, inquiry). These may be assessed through open-ended investigations, inquiry tasks, oral interview, projects, verbal defense, observation of process, etc.
<p>Communication Emphasizes the clear, precise and effective use of oral, written and visual language to communicate the student’s understanding of information and ideas.</p>	10%	<i>Expression and organization of mathematical thinking</i> (e.g., clarity of expression, logical organization), using oral, visual, and written forms (e.g., pictorial, graphic, dynamic, numeric, algebraic forms; concrete materials). <i>Communication for different audiences</i> (e.g., peers, teachers) and <i>purposes</i> (e.g., to present data, justify a solution, express a mathematical argument) in oral, visual, and written forms. <i>Use of conventions, vocabulary, and terminology</i> of the discipline (e.g., terms, symbols) in oral, visual, and written forms. These may be assessed through journals, written explanations or reports, teacher-student conferences, solution presentations, problem form scores, etc.
<p>Application Emphasizes the application and integration of knowledge, skills, processes and techniques to produce evidence of the student’s understanding.</p>	20%	Application of knowledge and skills in familiar contexts and transfer of knowledge and skills to new contexts. Making connections within and between various contexts (e.g., connections between concepts, representations, and forms within mathematics; connections involving use of prior knowledge and experience; connections between mathematics, other disciplines, and the real world). These may be assessed with rich tasks, open-ended problems, real-world projects and applications, etc.
<p>70% of your learning will be assessed through:</p>	<i>Formative and Summative Evaluations</i>	See 70% breakdown above.
<p>30% of your learning will be assessed at the end of the course (last four weeks of the semester)through:</p>	<i>Final Evaluation 20 %</i>	FINAL EXAMINATION (20%) consisting of a variety of question types (e.g. short answer, multiple choice, extended tasks) sampling all strands and categories of 2.5 hours duration or less.
	<i>Final Evaluation 10 %</i>	INQUIRY PERFORMANCE TASK (10%) consisting of a mathematical investigation or contextual, open-ended problematic situation suited to a variety of approaches including use of technology where appropriate.

	What are you expected to learn?	How will you demonstrate what you've learned?	
<i>Units</i>	<i>Key Learnings Focus</i>	<i>Your learning will be demonstrated by what you say, write and do.</i>	<i>Texts, Materials & Learning Opportunities</i>
1 <i>Introduction to Functions</i>	Recognize functions in various representations, use function notation, apply transformations to basic functions, investigate inverse of a linear function.	Unit Test, Quizzes, Etc.	Textbook, Handouts, scientific or graphing calculators.
2 <i>Equivalent Algebraic Expressions</i>	Determine equivalent expressions. Simplify rational expressions. Add, subtract, multiply and factor polynomials and rational expressions.	Unit Test, Quizzes, Thinking and Inquiry Task	Textbook, Handouts, TI-83 graphing calculators, (computers)
3 <i>Quadratic Functions</i>	Determine zeros and max/min values of a quadratic function. Analyze properties and solve problems involving quadratic functions.	Unit Test, Quizzes, Technology Application, Thinking and Inquiry Task	Textbook, Handouts, TI-83 graphing calculators, (computers)
4 <i>Exponential Functions</i>	Evaluate powers with integer and rational exponents and simplify expressions involving them. Use exponential functions to solve exponential growth and decay problems.	Unit Test, Quizzes, Technology Application, Thinking and Inquiry Task	Textbook, Handouts, TI-83 graphing calculators, (computers)
5 <i>Trigonometric ratios</i>	Relate the six trigonometric ratios to the unit circle. Solve problems using trigonometric ratios, properties of triangles, sine law and cosine law. Prove trigonometric identities.	Unit Test, Quizzes, Thinking and Inquiry Task	Textbook, Handouts, TI-83 graphing calculators, (computers)
6 <i>Sinusoidal Functions</i>	Identify periodic relationships; represent sinusoidal functions, and solve applications problems. Apply transformations of trigonometric functions.	Unit Test, Quizzes, Technology Application, Thinking and Inquiry Task	Textbook, Handouts, TI-83 graphing calculators, (computers)
7 <i>Discrete Functions: Sequences and Series</i>	Understanding of recursive sequences, relationships involved in arithmetic and geometric sequences; solve related problems.	Unit Test, Quizzes, Thinking and Inquiry Task	Textbook, Handouts, Scientific Calculators
8 <i>Financial Applications</i>	Solving simple interest, compound interest and annuity problems	Part of Exam	Textbook, Handouts, Scientific Calculators

Academic Standards

It is your responsibility to provide evidence of your learning within established timelines. Due dates for assignments and the scheduling of tests will be communicated well in advance to allow you to schedule your time. If you aren't going to be able to follow an agreed upon timeline you should demonstrate your responsibility and organizational skills by discussing with your teacher the challenges you're facing as far in advance of the deadline as possible.

It is your responsibility to be academically honest in all aspects of your schoolwork so that the marks you receive are a true reflection of your achievement.

Plagiarism is using the words, ideas or work of someone else without giving appropriate credit to the original creator. This is a form of cheating.

Consequences for not meeting these academic standards may include:

- Reporting the issue to your parents;
- Requiring you to complete the original or alternative work after school or during your lunch hour;
- Requiring you to complete an alternative assignment;
- Suspension;
- Assigning a “zero” for an assignment not completed prior to an agreed upon closure date;
- Mark deduction of 5% / day.

NOTE: the complete HDSB policies and administrative procedures for “Lates and Missed Assignments” and “Cheating and Plagiarism” policies may be found at www.hdsb.ca

These learning skills and work habits will be taught, assessed and evaluated throughout the course.

Learning Skills and Work Habits		E – Excellent		G – Good		S – Satisfactory		N – Needs Improvement	
Responsibility					Organization				
<ul style="list-style-type: none"> ▪ Fulfills 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 own behaviour. 					<ul style="list-style-type: none"> ▪ 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					Collaboration				
<ul style="list-style-type: none"> ▪ Independently monitors, assesses, and revises plans to complete tasks and meet goals. ▪ Uses class time appropriately to complete tasks. ▪ Follows instructions with minimal supervision. 					<ul style="list-style-type: none"> ▪ 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					Self-Regulation				
<ul style="list-style-type: none"> ▪ 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. 					<ul style="list-style-type: none"> ▪ 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. 				