



Learning

Outcomes

Framework

April 2004

Grade 9

Learning Outcomes Framework
Grade 9

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Introduction

The learning outcomes framework comprises a series of curriculum outcomes statements describing what knowledge, skills, and attitudes students are expected to demonstrate a result of their cumulative learning experiences in the primary–graduation continuum. Through an ongoing process, the Department of Education is developing a learning outcomes framework for each area of the public school program.

This document provides an overview of the learning outcomes framework organized by grade level and subject area. It is intended to serve as a brief survey of expected learning outcomes and as a tool to assist teachers in program planning. The connections among learning outcomes reflect natural affinities among subject areas and facilitate the design of a balanced, integrated program.

In designing appropriate learning experiences that enable students to achieve the expected learning outcomes, teachers and administrators are expected to refer to foundation documents and related curriculum guides listed in *Public School Programs: 2003–2004*. In planning the appropriate use of information technologies as tools for learning and teaching, teachers and administrators should also refer to *Vision and Learning Outcomes for the Integration of Information Technologies within Nova Scotia Public School Programs*. It is available on-line at <lr.EDnet.ns.ca>.

Foundation documents provide the framework for general and key-stage curriculum outcomes, outline the focus and key features of the curriculum, and describe contexts for learning and teaching. Curriculum guides elaborate on specific curriculum outcomes and describe other aspects of curriculum, such as program design and components, instructional and assessment strategies, and resources.

General curriculum outcomes are statements that identify what students are expected to know and be able to do upon completion of study in a curriculum area. Key-stage curriculum outcomes are statements that identify what students are expected to know and be able to do by the end of grades 3, 6, 9, and 12 as a result of their cumulative learning experiences in a curriculum area. Specific curriculum outcomes are statements that identify what students are expected to know and be able to do at a particular grade level.

The following overview of the learning outcomes framework notes general curriculum outcomes and specific curriculum outcomes. For some subject areas, key-stage curriculum outcomes are also included. It should be noted that specific curriculum outcomes for music, family studies, and visual arts are not yet available and that specific curriculum outcomes noted for Health/Personal Development and Relationships 9 and Technology Education 9 are **draft** statements. While implementation of new curriculum in these subjects is not yet required, teachers may wish to consider these draft specific curriculum outcomes in planning their instructional programs.

Junior High Program Components

Each school board is required to provide, in grades 7 to 9 inclusive, in each school under its jurisdiction, instruction in the prescribed courses in English language arts; French, Gaelic, or Mi'kmaq; mathematics; personal development and relationships; physical education; science; social studies; and **two** of arts education, family studies, or technology education. Students in grades 7–9 are expected to take at least **one** of the following electives: Art, Family Studies, Music, or Technology Education. It is expected that information technologies will be integrated within the prescribed courses; the junior high program does not include discrete computer-related studies. Each school is also required to provide programming and services for students with special needs.

Exploratory Options

Exploratory options (sometimes called mini-courses) may be provided to extend the curriculum and provide enrichment opportunities for young adolescents. Exploratory options may be designed as a component of compulsory or elective courses but may not replace program requirements noted above.

Exploratory options should contribute to the students' achievement of specific curriculum outcomes in one or more subject areas and should reflect the developmental needs of the young adolescent.

Exploratories may be offered for short periods of time during the year.

Core French

Key-Stage Curriculum Outcomes

By the end of grade 9, students will be expected to

Specific Curriculum Outcomes

Students will be expected to

Communication

GCO: On the basis of their experiences in the Core French Program, students will be expected to

- communicate effectively in French, both orally and in writing; and to interact appropriately in a variety of situations that relate to their needs and interests

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- | | |
|---|--|
| <ul style="list-style-type: none"> function in a classroom where French is the language spoken | <ul style="list-style-type: none"> listen to longer communications (demonstrate independently) follow more complex directions (demonstrate independently) negotiate to understand (demonstrate independently) |
| <ul style="list-style-type: none"> participate in an informal conversation, with support | <ul style="list-style-type: none"> ask for and give information (demonstrate independently) initiate and conclude a conversation (demonstrate independently) communicate on the telephone (demonstrate independently) |
| <ul style="list-style-type: none"> identify, describe, and compare objects, people, events and places | <ul style="list-style-type: none"> recount an event (demonstrate independently) give a report (demonstrate independently) describe physical and personality traits (demonstrate independently) give directions (demonstrate independently) |
| <ul style="list-style-type: none"> express a preference, an opinion or a feeling with justification | <ul style="list-style-type: none"> discuss tastes (demonstrate independently) state preferences (demonstrate independently) justify choices (demonstrate independently) persuade (demonstrate with occasional support) |
| <ul style="list-style-type: none"> become involved in a variety of interactive activities | <ul style="list-style-type: none"> make telephone calls and participate in interviews (demonstrate independently) participate in a debate, games, round table discussions, brainstorming, surveys, and role-plays (demonstrate independently) |
| <ul style="list-style-type: none"> ask a variety of questions | <ul style="list-style-type: none"> find information (demonstrate independently) clarify and verify learning (demonstrate independently) select pertinent information (demonstrate independently) |
| <ul style="list-style-type: none"> select information by reading, listening to, or viewing different texts | <ul style="list-style-type: none"> distinguish the characteristics of different types of text (demonstrate independently) |

Key-Stage Curriculum Outcomes

By the end of grade 9, students will be expected to

- respond personally to a variety of texts
- produce a variety of texts by following criteria

Specific Curriculum Outcomes

Students will be expected to

- identify the main ideas of a text (demonstrate independently)
- infer the evolution, the conclusion of a story (demonstrate independently)
- draw, mime, dramatize (demonstrate independently)
- plan, organize, and evaluate a portfolio (demonstrate with occasional support)
- compose songs and poetry (demonstrate with occasional support)
- keep a personal journal (demonstrate independently)
- produce expressive, informative, persuasive, humorous, poetic texts (demonstrate with occasional support)
- revise and correct text (demonstrate with occasional support)

Culture

GCO: On the basis of their experiences in the Core French Program, students will be expected to

- demonstrate an appreciation and understanding of Francophone cultures, while comparing them with their own culture, as well as an appreciation and understanding of Canada's multicultural reality

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|--|--|
| <ul style="list-style-type: none"> • describe certain Francophone regions locally, provincially, nationally and internationally | <ul style="list-style-type: none"> • name and locate certain Francophone communities in Canada (demonstrate independently) • identify and describe the different Acadian regions in Nova Scotia (demonstrate independently) • identify certain areas in the world where French is spoken (demonstrate independently) |
| <ul style="list-style-type: none"> • describe, with relevant details, certain realities of Francophone cultures | <ul style="list-style-type: none"> • describe Acadian festivals and the important role of music and dance (demonstrate independently) • describe some Acadian meals (demonstrate independently) • identify some Francophone festivals in Canada (demonstrate independently) • identify some Francophone customs in Canada (demonstrate independently) • name some events associated with Francophone regions in the world (demonstrate independently) |
| <ul style="list-style-type: none"> • compare aspects of Francophone cultures with aspects of their own culture | <ul style="list-style-type: none"> • compare Acadian culture and their own culture (demonstrate independently) |

Key-Stage Curriculum Outcomes

By the end of grade 9, students will be expected to

- explain the contribution of some contemporary Francophone personalities to Canadian society
- identify the diverse origins of people who make up the Canadian mosaic
- identify the cultural elements in authentic documents
- explain the advantages of being bilingual in our society

Specific Curriculum Outcomes

Students will be expected to

- inform themselves about the contributions to Canada of some famous Francophones (demonstrate independently)
- describe some contributions of famous Acadians (demonstrate independently)
- recognize certain cultural stereotypes (demonstrate independently)
- express an opinion with respect to some stereotypes (demonstrate occasional support)
- demonstrate a respect towards other languages (demonstrate independently)
- inform themselves of activities through the media (demonstrate with occasional support)
- inform and amuse themselves by listening to the radio and viewing televisions and films (demonstrate with occasional support)
- demonstrate an interest in using French (demonstrate independently)
- identify the evidence of bilingualism in our society (careers, laws, etc.) (demonstrate independently)

General Language Education

GCO: On the basis of their experience in the Core French Program, students will be expected to

- choose and implement strategies to facilitate their communication in French and their learning
- use learning strategies, communication strategies, and social strategies to communicate in French, both orally and in writing
- demonstrate the importance of non-verbal communication (use gestures) (demonstrate independently)
- use partial sentences, repetition, paraphrase, and circumlocutions (demonstrate independently)
- request clarification and explanation in order to understand (demonstrate independently)
- plan and organize their productions using their own learning experiences
 - prepare checklist
 - adapt a message to the circumstances
 - plan a written production (demonstrate with occasional support)
- self-correct (demonstrate independently)
- keep a personal journal (demonstrate independently)
- give advice to facilitate group work (demonstrate independently)

Key-Stage Curriculum Outcomes

By the end of grade 9, students will be expected to

Specific Curriculum Outcomes

Students will be expected to

- take turns (demonstrate independently)
- accept suggestions given by others (demonstrate independently)
- identify how knowledge and skills in French class can be useful in everyday life (demonstrate with occasional support)

Language

GCO: On the basis of their experience in the Core French Program, students will be expected to

- recognize and use in context elements of the linguistic code, orally and in writing, to facilitate their communication in French
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- understand and use the vocabulary, expressions, and structures relating to the needs in the classroom and to areas of experience
 - function in the classroom by using expressions from the unit «*comment survivre en français dans un cours de français*» and the directions and rules of the classroom (demonstrate independently)
 - participate in a conversation and involve themselves in a variety of interactions by using the present, future, and simple past tenses; connecting words such as *d'abord, ensuite, finalement, puis, et, mais*; interrogative and negative (demonstrate with occasional support)
 - describe and compare by using the present, future, and simple past tenses; adjectives; adverbs; comparative and superlative; connecting words (demonstrate with occasional support)
 - select information using verb tenses, connecting words such as *d'abord, ensuite, finalement, puis, cependant, en plus, par contre* (demonstrate with occasional support)
 - produce a variety of texts using the present, future, and past tenses; interrogative and negative; connecting words such as: *puis, et, mais, en plus* in order to produce a cohesive and coherent text (demonstrate with occasional support)

English Language Arts

General Curriculum Outcomes Specific Curriculum Outcomes

GCO 1: Students will be expected to speak and listen to explore, extend, clarify, and reflect on their thoughts, ideas, feelings, and experiences.

GCO 2: Students will be expected to communicate information and ideas effectively and clearly, and to respond personally and critically.

GCO 3: Students will be expected to interact with sensitivity and respect, considering the situation, audience, and purpose.

GCO 4: Students will be expected to select, read, and view with understanding a range of literature, information, media, and visual texts.

Students will be expected to

- 1.1 examine others' ideas in discussion to extend their own understanding
 - 1.2 ask relevant questions calling for elaboration, clarification, or qualification and respond thoughtfully to such questions
 - 1.3 articulate, advocate, and support points of view, presenting view points in a convincing manner
 - 1.4 listen critically to assess the adequacy of the evidence speakers give to evaluate the integrity of information presented
- 2.1 participate constructively in conversation, small-group and whole-group discussion, and debate, using a range of strategies that contribute to effective talk
 - 2.2 adapt vocabulary, sentence structure, and rate of speech to the speaking occasion
 - 2.3 give and follow instructions and respond to questions and directions of increasing complexity
 - 2.4 evaluate their own and others' uses of spoken language in a range of contexts, recognizing the effects of significant verbal and non-verbal language features
- 3.1 demonstrate active listening and respect for the needs, rights, and feelings of others
 - 3.2 demonstrate an awareness of the power of spoken language to influence and manipulate, and to reveal ideas, values, and attitudes
 - 3.3 demonstrate an awareness that spoken language has different conventions in different situations and cultures and use language appropriate to the situation
- 4.1 select texts that address their learning needs and range of special interests
 - 4.2 read widely and experience a variety of young adult fiction and literature from different provinces and countries
 - 4.3 demonstrate an understanding that information texts are constructed for particular purposes
 - 4.4 use cueing systems and a variety of strategies to construct meaning in reading and viewing increasingly complex print and media texts
 - 4.5 articulate their own processes and strategies for reading and viewing texts of increasing complexity

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

GCO 5: Students will be expected to interpret, select, and combine information using a variety of strategies, resources, and technologies.

- 5.1 independently access and select specific information to meet personal and learning needs
- select, from a wide range, sources appropriate to their purposes
 - use the electronic network
 - develop approaches and strategies to conduct their research

GCO 6: Students will be expected to respond personally to a range of texts.

- 6.1 respond to some of the material they read or view by questioning, connecting, evaluating, and extending
- move beyond initial understanding to more thoughtful interpretations
- 6.2 express and support points of view about texts and about issues, themes, and situations within texts, citing appropriate evidence

GCO 7: Students will be expected to respond critically to a range of texts, applying their understanding of language, form, and genre.

- 7.1 critically evaluate information presented in print and media texts
- assess relevance and reliability of available information to answer their questions
- 7.2 demonstrate that print and media texts are constructed for particular purposes and particular audiences
- describe how specific text and genre characteristics contribute to meaning and effect
- 7.3 respond critically to texts of increasing complexity
- analyse and evaluate a text in terms of its form, structure, and content
 - recognize how their own ideas and perceptions are framed by what they read and view
 - demonstrate an awareness that personal values and points of view influence both the creation of text and the reader's/viewer's interpretation and response
 - explore and reflect on culture and reality as portrayed in media texts
 - identify the values inherent in a text

GCO 8: Students will be expected to use writing and other ways of representing to explore, clarify, and reflect on their thoughts, feelings, experiences, and learnings; and to use their imagination.

- 8.1 use a range of strategies in writing and other ways of representing to
- extend ideas and experiences
 - explore and reflect on their feelings, values, and attitudes
 - consider others' perspectives
 - reflect on problems and responses to problems
 - describe and evaluate their learning processes and strategies
 - reflect on their growth as language learners and language users

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

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| <p>GCO 9: Students will be expected to create texts collaboratively and independently, using a variety of forms for a range of audiences and purposes.</p> | <p>8.2 use note-making to reconstruct knowledge and select effective strategies appropriate to the task</p> <p>8.3 make informed choices of language to create a range of interesting effects in imaginative writing and other ways of representing</p> |
| <p>GCO 10: Students will be expected to use a range of strategies to develop effective writing and other ways of representing and to enhance their clarity, precision, and effectiveness.</p> | <p>9.1 demonstrate facility in using a variety of forms of writing to create texts for specific purposes and audiences, and represent their ideas in other forms (including visual arts, music, drama) to achieve their purposes</p> <p>9.2 demonstrate an awareness of the effect of context on writing and other forms of representing
– make appropriate choices of form, style, and content for specific audiences and purposes</p> <p>9.3 analyse and assess responses to their writing and media productions</p> <p>10.1 demonstrate an awareness of what prewriting, drafting, revising, editing, proofreading, and presentation strategies work for them with various writing and other representations</p> <p>10.2 consistently use the conventions of written language in final products</p> <p>10.3 experiment with the use of technology in communicating for a range of purposes with a variety of audiences</p> <p>10.4 demonstrate a commitment to crafting pieces of writing and other representations</p> <p>10.5 integrate information from several sources to construct and communicate meaning</p> |

Health/Personal Development and Relationships (Draft)

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

The Body: Growth and Development

GCO A: Students will be expected to demonstrate knowledge of the body, body functions, and growth and development.

- A1.1 demonstrate an understanding of the interrelated functions of the endocrine and reproductive systems
- A1.2 demonstrate an understanding of the stages of pregnancy and prenatal development
- A2.1 demonstrate an understanding of the ageing process as a natural part of life

Strategies for Healthy Living

GCO B: Students will be expected to demonstrate knowledge, skills, and attitudes that contribute to active, healthy living.

- B1.1 identify factors that affect the health and efficiency of the endocrine and reproductive systems
- B1.2 identify factors that affect the health of the pregnant woman and the developing fetus
- B2.1 demonstrate an understanding of the personal and environmental health consequences of various food-producing practices
- B3.1 identify high-risk behaviours related to drug and inhalant use
- B3.2 evaluate the safety and effectiveness of various methods of contraception
- B3.3 identify risks of smoking, drinking, and other drug use during pregnancy
- B3.4 identify signs and influences related to problem gambling
- B3.5 identify strategies for quitting smoking and helping a friend to quit
- B3.6 identify risks associated with the non-medical use of steroids and other performance-enhancing drugs
- B3.7 identify social costs related to harmful involvement with drugs and gambling
- B3.8 identify signs and stages of dependence on a substance or behaviour
- B4.1 identify and practise ways of contributing to the physical and emotional safety of the school community
- B4.2 identify precautions and rights related to occupational health and safety

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

- B4.3 identify and practise strategies for preventing sexual harassment or rape in dating relationships
- B4.4 identify positive and negative influences related to the prevention of teen suicide
- B4.5 identify and practise safety precautions related to outdoor recreation

- B5.1 maintain a personal health history
- B5.2 demonstrate a knowledge of symptoms, risk factors, and management strategies for a variety of chronic illnesses and conditions
- B5.3 evaluate the trustworthiness of alternative products and therapies used for the prevention and treatment of disease

- B6.1 express strong feelings such as anger, fear, and rejection in healthy ways
- B6.2 demonstrate a knowledge of the symptoms, prevention, and treatment of depression

- B7.1 participate in a broad range of physical activities they enjoy

Values and Practices for Healthy Living

GCO C: Students will be expected to demonstrate knowledge of factors that contribute to healthy living values and practices.

- C1.1 describe their attitudes and values regarding the role of family life in a changing society

- C2.1 demonstrate an understanding of the impact of various occupations on the health of the community
- C2.2 identify and acknowledge individuals and groups who are making a special contribution to the health of the community

- C3.1 demonstrate an awareness of ways that behaviours and values related to work and career have changed over time
- C3.2 demonstrate an awareness of ways that attitudes and laws related to drug use have changed over time
- C3.3 demonstrate an awareness of ways that behaviours and values related to health and health care vary over time and across cultures
- C3.4 demonstrate an awareness of changing attitudes toward adulthood and ageing

- C4.1 demonstrate an understanding of ways that food production methods affect environmental sustainability

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

- C5.1 demonstrate awareness of, and respect for, their own and others' special needs

Strategies for Positive Personal Development and Healthy Relationship

GCO D: Students will be expected to demonstrate the knowledge, skills, and attitudes necessary to live happily and productively as an individual, within a family, and within the community.

- D1.1 define and practise strategies for maintaining a general sense of health and well-being
- D1.2 identify and practise strategies for living with change and uncertainty
- D1.3 manage personal resources in order to achieve personal goals
- D1.4 demonstrate attitudes and strategies needed to face and deal with problems

- D2.1 identify and practise strategies for helping a friend who is having problems with drugs, gambling, or other behaviours
- D2.2 identify ways that community services support the prevention and treatment of addictions

- D3.1 demonstrate respect for the feelings and beliefs of others
- D3.2 identify and practise strategies for dealing with the challenges of peer relationships
- D3.3 identify and practise strategies for dealing with change, stress, and crisis within the family

- D4.1 locate and interpret information about a range of occupations
- D4.2 identify occupations or sectors that are on the rise and those that are on the decline
- D4.3 identify employment laws that may affect them in the near future

- D5.1 identify social, economic, and technological trends that affect life/work building
- D5.2 identify and demonstrate knowledge, skills, and attitudes needed to be successful in the workplace
- D5.3 demonstrate an understanding of the ongoing role of decision making in life/work building
- D5.4 demonstrate an understanding of the role of mentoring in life/work building
- D5.5 develop short- and medium-term life/work goals
- D5.6 prepare a personal résumé

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

- D6.1 demonstrate an ability to teach or mentor others
- D6.2 demonstrate an understanding of the roles of job shadowing and volunteerism in life/work building
- D6.3 select items for and maintain a life/work portfolio
- D6.4 develop a plan to acquire the skills and credentials which will lead to their career goal(s)

Information Technologies

Outcome Components

Students will demonstrate expected performance levels in five IT-based learning outcome areas within the context of essential graduation learnings and outcomes specified for the public school program as a whole.

Basic Operations and Concepts (BOC)

- concepts and skills associated with the safe, efficient operation of a range of information technologies

Key-Stage Curriculum Outcomes

By the end of grade 9, students will have achieved the outcomes for grades primary–6 and will also be expected to

- BOC 9.1 under general supervision as they research, design, and create products that represent their learning, independently and safely
 - operate a wide variety of school media equipment, including audio equipment, overhead projectors, video cameras, videocassette recorder/players, televisions, photocopiers, and still cameras
 - use computer equipment to access and use curriculum-based computer software, from CD-ROMs, hard drives, or other data storage media
- BOC 9.2 demonstrate accurate, efficient keyboarding and manipulation of appropriate input devices; be able to assist others in the use of peripherals
- BOC 9.3 using a variety of technologies, demonstrate an understanding of technological applications and apply appropriate technologies to solve curriculum problems and enhance their learning
- BOC 9.4 independently run grade-appropriate software and manage folders and directories of their electronic work in accordance with school policies
- BOC 9.5 understand and use an increasing range of specialized vocabulary associated with the technologies they use
- BOC 9.6 practise and demonstrate a developing understanding of sound ergonomics as they use IT; identify and report dangerous workstation configurations or practices
- BOC 9.7 apply basic troubleshooting techniques in assessing equipment and software problems that affect their use of IT; document and articulate such problems to assist technical support staff in further diagnosis

Outcome Components

Students will demonstrate expected performance levels in five IT-based learning outcome areas within the context of essential graduation learnings and outcomes specified for the public school program as a whole.

Productivity Tools and Software

- the efficient selection and use of IT to perform tasks such as
 - the exploration of ideas
 - data collection
 - data manipulation, including the discovery of patterns and relationships
 - problem solving
 - the communication of learning

Key-Stage Curriculum Outcomes

By the end of grade 9, students will have achieved the outcomes for grades primary–6 and will also be expected to

- PTS 9.1 independently use electronic planning software to brainstorm; develop a thought web; outline and map ideas under study; and track their progress toward agreed work deadlines
- PTS 9.2 in the process of collecting, analysing, and displaying data, independently create electronic charts, tables, and graphs; and design, create, and manipulate spreadsheets and databases
- PTS 9.3 with the assistance of their teachers, explore curriculum concepts under study using specialized software; peripheral measuring, sampling, and recording equipment; and computer-based simulations
- PTS 9.4 explore the curriculum through a wide range of print and electronic forms; access, create, and process information by means of the specialized techniques associated with the technologies they select
- PTS 9.5 under the general supervision of their teachers, independently manipulate sound and a range of image types, using digital imaging equipment and computer-based editing, to represent their learning in a variety of ways and for particular audiences
- PTS 9.6 independently develop multimedia presentations, based on sound principles of design, with increasing confidence and efficiency
- PTS 9.7 use information technology to explore increasingly complex numerical and geometric situations for the purpose of developing conjectures

Communications Technology

- the use of specific, interactive technologies that support collaboration and sharing through communication

- CT 9.1 represent their learning in a range of media, including print, video, audio, and multimedia, with growing confidence and competence
- CT 9.2 with teacher supervision, locate and access curriculum-relevant books, journals, and other print documents; media resources; and electronic files for use in all types of research
- CT 9.3 manage their electronic files and correspondence efficiently

Outcome Components

Students will demonstrate expected performance levels in five IT-based learning outcome areas within the context of essential graduation learnings and outcomes specified for the public school program as a whole.

Key-Stage Curriculum Outcomes

By the end of grade 9, students will have achieved the outcomes for grades primary–6 and will also be expected to

- CT 9.4 demonstrate their understanding of how form, standards, conventions, and methods of transmission affect their use of information and its impact on themselves and others
- CT 9.5 with teacher supervision, work collaboratively in small groups to design and build, for peer use, intranet or Internet websites of student-produced pages about a curriculum topic

Research, Problem Solving, and Decision Making

- the organization, reasoning, and evaluation by which students rationalize their use of IT in pursuit of other curriculum outcomes
- RPSD 9.1 with the assistance of their teachers, select appropriate measuring and recording devices and/or software to collect data, discover patterns of change over time, solve problems, and make logical decisions based on their investigations
- RPSD 9.2 with the assistance of their teachers, select and use appropriate forms, styles, media, and sources to access, manipulate, assess, and present information meaningfully for different audiences
- RPSD 9.3 with the assistance of their teachers, assess the quality, completeness, biases, and perspectives of print, media, and electronic resources for possible use in their curricular studies
- RPSD 9.4 independently select, use, and occasionally develop specialized techniques to create communication environments, processes, and products in print, media, and electronic forms that meet defined information needs and appropriate quality standards
- RPSD 9.5 independently and critically evaluate how style, form, source, and medium influence the accessibility, validity, and meaning of information
- RPSD 9.6 with the assistance of their teachers, access the strengths and limitations of different approaches to research, then select those approaches that more efficiently meet their learning needs
- RPSD 9.7 with the assistance of their teachers, select and refine a research a topic, according to teacher-provided criteria, to fulfill a curriculum requirement
- RPSD 9.8 accurately and independently cite bibliographic information

Outcome Components

Students will demonstrate expected performance levels in five IT-based learning outcome areas within the context of essential graduation learnings and outcomes specified for the public school program as a whole.

Social, Ethical, and Human Issues

- understanding associated with the use of IT that encourages in students a commitment to pursue personal and social good, particularly to build and improve their learning environments and to foster stronger relationships with their peers and others who support their learning

Key-Stage Curriculum Outcomes

By the end of grade 9, students will have achieved the outcomes for grades primary–6 and will also be expected to

- SEHI 9.1 demonstrate understanding of the nature of technology and its impacts on different societies and environments; assume personal responsibility for ethical behaviour and attitudes with regard to information technologies and resources and use them—in local and global contexts—with due regard for the legal and human rights of others
- SEHI 9.2 demonstrate understanding of, model, and assume personal responsibility for the acceptable use of copyrighted information resources
- SEHI 9.3 identify and demonstrate the techniques of mass media, popular culture, and electronic information environments, and evaluate the effects of these techniques
- SEHI 9.4 identify the values that inform mass media, popular culture, and electronic information environments in relation to their personal values
- SEHI 9.5 with the assistance of their teachers as required, identify the impacts of various media and information technologies on them, their learning environment, their cultures, and society
- SEHI 9.6 as researchers, demonstrate an understanding of and a commitment to accuracy and ethical behaviour as they create and distribute information about themselves, others, and curriculum topics under study
- SEHI 9.7 identify technology-related career opportunities of personal interest, and begin to assess their strengths and interests with respect to technology

Mathematics

General Curriculum Outcomes Specific Curriculum Outcomes

GCO A: Students will demonstrate number sense and apply number-theory concepts.

GCO B: Students will demonstrate operation sense and apply operation principles and procedures in both numeric and algebraic situations.

Students will be expected to

- A1 investigate problems involving square root and principal square root
- A2 graph and write in symbols and in words the solution set for equations and inequations involving integers and other real numbers
- A3 demonstrate an understanding of the meaning and uses of irrational numbers
- A4 interrelate subsets of the set of real numbers
- A5 compare and order real numbers
- A6 represent problem situations using matrices

- B1 model, solve, and create problems involving real numbers
- B2 add, subtract, multiply, and divide rational numbers in fractional and decimal forms using the most appropriate methods
- B3 apply the order of operations in rational number computations
- B4 demonstrate an understanding of and apply the exponent laws for integral exponents
- B5 model, solve, and create problems involving numbers expressed in scientific notation
- B6 judge the reasonableness of results in problem situations involving square roots, rational numbers, and numbers written in scientific notation
- B7 model, solve, and create problems involving the matrix operations of addition, subtraction, and scalar multiplication
- B8 add and subtract polynomial expressions symbolically to solve problems
- B9 find products of two monomials, a monomial and a polynomial, and two binomials concretely, pictorially, and symbolically
- B10 find quotients of polynomials with monomial divisors
- B11 evaluate polynomial expressions
- B12 factor algebraic expressions with common monomial factors concretely, pictorially, and symbolically
- B13 demonstrate an understanding of the applicability of commutative, associative, distributive, identity, and inverse properties to operations involving algebraic expressions
- B14 select and use appropriate strategies in problem situations

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

GCO C: Students will explore, recognize, represent, and apply patterns and relationships, both informally and informally.

- C1 represent patterns and relationships in a variety of formats and use these representations to predict and justify unknown values
- C2 interpret graphs that represent linear and non-linear data
- C3 construct and analyse tables and graphs to describe how changes in one quantity affect a related quantity
- C4 determine the equations of lines by obtaining their slopes and y -intercepts from graphs and sketch graphs of equations using y -intercepts and slopes
- C5 explain the connections among different representations of patterns and relationships
- C6 solve single-variable equations algebraically and verify the solutions
- C7 solve first-degree single-variable inequalities algebraically, verify the solutions, and display them on number lines
- C8 solve and create problems involving linear equations and inequalities

GCO D: Students will demonstrate an understanding of and apply concepts and skills associated with measurement.

- D1 apply rates, other ratios, and proportions in indirect measurement problems with particular focus on slopes
- D2 solve measurement problems involving conversion among SI units
- D3 relate the volumes of pyramids and cones to the volumes of corresponding prisms and cylinders
- D4 estimate, measure, and calculate volumes and surface areas of pyramids, cones, and spheres and apply these measures
- D5 demonstrate understanding of and apply ratios within similar triangles

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

- E1 investigate and demonstrate an understanding of the minimum sufficient conditions to produce unique triangles
- E2 investigate and demonstrate an understanding of the properties of and the minimum sufficient conditions to guarantee congruent triangles
- E3 make informal deductions using congruent triangle and angle properties
- E4 demonstrate an understanding of and apply the properties of similar triangles
- E5 relate congruence and similarity of triangles
- E6 use mapping notation to represent translations, reflections, rotations, and dilatations of geometric figures and interpret such notations

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

GCO F: Students will solve problems involving the collection, display, and analysis of data.

- E7 analyse and represent transformations and combinations of transformations using mapping notation
- E8 investigate, determine, and apply the effects of transformations of geometric figures on congruence, similarity, and orientation
- F1 determine the strength of the relationships in scatter plots
- F2 sketch lines of best fit and determine their equations
- F3 sketch curves of best fit for relationships that appear to be non-linear
- F4 select, defend, and use the most appropriate methods for displaying data
- F5 draw inferences and make predictions based on data analysis and data displays
- F6 demonstrate an understanding of the role of data management in society
- F7 evaluate arguments and interpretations that are based on data analysis

GCO G: Students will represent and solve problems involving uncertainty.

- G1 make predictions of, and conduct experiments and simulations to determine, probabilities involving dependent and independent events
- G2 determine theoretical probabilities of compound events
- G3 compare experimental and theoretical probabilities
- G4 recognize and explain why decisions based on probabilities may be combinations of theoretical calculations, experimental results, and subjective judgments

Music

General Curriculum Outcomes

Key-Stage Curriculum Outcomes

NOTE: Specific curriculum outcomes have not yet been developed for Music 7–9. Teachers may wish to use the following general curriculum outcomes and key-stage curriculum outcomes from the *Foundation for the Atlantic Canada Arts Education Curriculum* in planning their music program.

By the end of grade 9, students will have achieved the outcomes for entry-grade 6 and will also be expected to

Creating, Making, and Presenting

GCO 1: Students will be expected to explore, challenge, develop, and express ideas using the skills, language, techniques, and processes of the arts.

- sing or play, maintaining a part within a variety of textures and harmonies, using a range of musical structures and styles
- use the elements of music to express and communicate meaning
- interpret non-verbal gestures, making connections to notation and musical expression
- use a variety of notational systems to represent musical thoughts and ideas

GCO 2: Students will be expected to create and/or present, collaboratively and independently, expressive products in the arts for a range of audiences and purposes.

- improvise and compose patterns and short pieces, using a variety of sound sources and technologies
- present music, co-ordinating reading, listening, and playing/singing skills
- perform, alone and with others, music expressing a broad range of thoughts, images, and feelings

Understanding and Connecting Contexts of Time, Place, and Community

GCO 3: Students will be expected to demonstrate critical awareness of and value the role of the arts in creating and reflecting culture.

- identify and describe uses of music in daily life, both local and global
- identify opportunities to participate in music in school, community, and the world of work
- compare music from a range of cultural and historical contexts
- examine and describe ways in which music influences and is influenced by local and global culture

GCO 4: Students will be expected to respect the contributions of individuals and cultural groups to the arts in local and global contexts and value the arts as a record of human experience and expression.

- reflect on ways in which music expresses the history and the cultural diversity of local, national, and international communities
- examine ways in which music enhances and expresses life's experiences

General Curriculum Outcomes **Key-Stage Curriculum Outcomes**

By the end of grade 9, students will have achieved the outcomes for entry–grade 6 and will also be expected to

GCO 5: Students will be expected to examine the relationship among the arts, societies, and environments.

- define relationships among music, other arts, and other subjects
- examine the roles that music plays in local and global communities

Perceiving and Responding

GCO 6: Students will be expected to apply critical thinking and problem-solving strategies to reflect on and respond to their own and others' expressive works.

- examine and explore a range of possible solutions to musical challenges
- use processes of description, analysis, interpretation, and evaluation to make and support informed responses to their own and others' music and musical performances
- critically reflect on ideas and feelings in works of music, and identify patterns, trends, and generalizations

GCO 7: Students will be expected to understand the role of technologies in creating and responding to expressive works.

- identify combinations of instruments and sound sources, including electronic sources
- identify and describe instruments common to cultures and countries included in the social studies curriculum
- explore a range of non-acoustic musical sound sources
- describe the relationship of instruments and other technologies to the mood and feeling of their own and others' music

GCO 8: Students will be expected to analyse the relationship between artistic intent and the expressive work.

- discuss why a range of musical works has been created
- analyse the source of ideas and reasons for musical decisions in light of original intent
- use feedback from others to examine their own music work in light of their original intent
- analyse performances and provide critical commentary on aspects of musical presentation in light of the performers' intent

Physical Education

General Curriculum Outcomes

Students will be expected to

Knowing

- demonstrate an understanding of the concepts that support human movement
- demonstrate a knowledge of the components and processes needed to develop and maintain a personal level of functional fitness

Doing

- demonstrate motor skills in all movement categories using efficient and effective body mechanics
- participate regularly in a variety of activities that develop and maintain personal physical fitness
- demonstrate creativity in all movement categories

Valuing

- demonstrate positive personal and social behaviours and interpersonal relationships
- demonstrate positive attitudes toward and an appreciation of physical activity through participation
- demonstrate awareness of career and occupational opportunities related to physical activities

Specific Curriculum Outcomes

Students will be expected to

Active Living

- use relaxation techniques for stress management
- design a nutritional plan appropriate for a specific activity (e.g., cross-country skiing, weight lifting, aerobics)
- participate in activities that develop personal fitness for active, healthy living
- plan and participate in personal fitness and activity programs, using the principles of training
- design a circuit that includes activities to develop muscular strength, cardiovascular fitness, flexibility, and endurance
- set specific goals that use community resources or facilities to enhance his/her personal active-living goals

Outdoor Activities

- create a map and design an orienteering course on their school grounds or in a local park
- demonstrate map-reading skills as an aid to navigation
- demonstrate compass-reading skills as an aid to navigation
- participate in at least one land-based (e.g., hiking, orienteering) and one water-based (e.g., swimming, canoeing) seasonal activity that practises environmental safety
- know and practise safety procedures and routines in a variety of outdoor activities

Dance

- research and share with peers dances from other countries and/or cultures
- create and teach an aerobic dance sequence to a small group or the class
- integrate sports themes and music to create dances (e.g., “Sweet Georgia Brown” and basketball, victory dance and football, slow-motion replay and martial arts)
- create, choreograph, and perform dances for themselves and others in a variety of dance forms
- apply the principles of mechanics to improve performance in dance activities

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

Students will be expected to

Educational Gymnastics

- demonstrate safety procedures and practices to avoid risks
- create and perform group sequences using basic gymnastics skills on the floor and on small and/or large equipment
- demonstrate balance and body control as they relate to sport (e.g., snowboarding, heading a soccer ball, or catching balls in the air)

Sport Experience

- play a variety of games putting several sport-specific skills into practice
- identify the relationship between body mechanics and performance
- apply game strategies in a variety of sports and games
- demonstrate an understanding of the role that leadership plays in sport experiences
- modify rules of games for a variety of purposes
- demonstrate an understanding of rules through officiating
- demonstrate positive personal and social behaviours that emphasize fair play

Science

General Curriculum Outcomes

STSE

GCO 1: Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

Skills

GCO 2: Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

Knowledge

GCO 3: Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science, and apply these understandings to interpret, integrate, and extend their knowledge.

Attitudes

GCO 4: Students will be encouraged to develop attitudes that support the responsible acquisition and application of scientific and technological knowledge to the mutual benefit of self, society, and the environment.

Specific Curriculum Outcomes

Students will be expected to

Reproduction

Cellular Processes

- recognize that the nucleus of a cell contains genetic information and determines cellular processes (305-1)
- explain the importance of using the terms gene and chromosome properly (109-14)
- identify major shifts in scientific understanding of genetics (110-3)
- illustrate and describe the basic processes of mitosis and meiosis (304-11)
- determine and graph the theoretical growth rate of a cell, and interpolate and extrapolate the cell population from the graph (210-2, 210-4, 210-9)

Asexual and Sexual Reproduction

- distinguish between sexual and asexual reproduction in representative organisms (305-2)
- compare sexual and asexual reproduction in terms of their advantages and disadvantages (305-3)
- identify questions to investigate about sexual reproduction in plants (208-2)
- use tools and apparatus safely to investigate the structure of flowers (209-6)
- communicate the results of an investigation into the structure of flowers (211-2)

Genetic Changes

- provide examples of genetic conditions that cannot be cured using scientific and technological knowledge at the present time (113-10)
- compare factors that may lead to changes in a cell's genetic information: mutations caused by nature and mutations caused by human activities (305-5)
- evaluate information and evidence gathered on the topic of genetics and genetic engineering (209-5, 210-8)
- provide examples of how the knowledge of cellular functions has resulted in the development of technologies (111-1)

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

- provide examples of Canadian contributions to science and technology related to heredity and genetic engineering (112-12)

Atoms and Elements**Safety Consideration and Physical Properties**

- compare earlier conceptions of the structure of matter with their conceptions (110-1)
- demonstrate a knowledge of WHMIS standards by using proper techniques for handling and disposing of lab materials (209-7)
- investigate materials and describe them in terms of their physical properties (307-12)
- compile and display data collected during an investigation of the physical properties of materials (210-2)

Chemical Changes/Reactions

- describe changes that result from common chemical reactions:
 - energy change
 - change in colour
 - precipitate formed
 - gas formed
 - new chemical substance formed (307-13)
- determine, where possible, if the change in a material or object is physical or chemical on the basis of experimental data (210-11)
- identify new questions about physical and chemical changes that arise from investigations (210-16)

Atomic Theory

- identify major changes in atomic theory up to and including the Bohr model (110-3)
- use models in describing the structure and the components of atoms and molecules, and explain the importance of choosing words that are scientifically appropriate:
 - determine the number of protons and electrons in the atom of an element, given its atomic number
 - determine the number of protons, electrons, and neutrons, given the mass number and atomic number

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

- be able to write the appropriate symbol for an isotope, given the number of protons and neutrons (109-13, 307-14)
- provide examples of technologies that have enhanced, promoted, or made possible scientific research in chemistry (111-4)
- provide examples to illustrate that scientific and technological activities related to atomic structure take place in a variety of individual and group settings (112-8)
- explain the importance of using the terms law and theory in science (109-14)

Periodic Law

- identify examples of common elements, and compare their characteristics and atomic structure (307-15)
- describe and explain the role of collecting evidence, finding relationships, and proposing explanations in the development of the periodic table (109-2)
- use a periodic table to predict properties of a family of elements:
 - period
 - family
 - metals
 - metalloids
 - nonmetals (210-1)
- identify the elements and number of atoms, given a chemical formula (307-16)
- provide examples where knowledge of chemistry has resulted in the development of commercial materials (111-1)
- given and explain examples illustrating how limited resource have forced scientists have forced scientists and technologist to develop more efficient ways to extract elements and compounds from nature, or to find or develop appropriate substitutes (112-3)

Characteristics of Electricity**Static Electricity**

- identify properties of static electrical charges:
 - like charges repel
 - unlike charges attract
 - induced charges (308-14)
- explain the production of static electrical charges in some common materials (308-13)

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

- provide examples of how knowledge of static electricity has resulted in the development of technologies (111-1, 112-7)
- provide examples of careers related to electricity in their community and province (112-10)

Static Electricity and Electric Current

- describe the flow of charge in an electrical circuit and describe the factors affecting the amount of resistance in a wire (length, diameter, type):
 - voltage
 - electric current
 - resistance (109-14, 308-16)
- compare qualitatively static electricity and electric current (308-15)

Series and Parallel Circuits

- rephrase questions in a restatable form related to series and parallel circuits (208-1)
- use an ammeter and a voltmeter to measure current and voltage in series and parallel circuits (209-3)
- identify potential sources of error in ammeter and voltmeter readings (210-10)
- identify and suggest explanations for discrepancies in data collected using an ammeter and a voltmeter (210-7)
- present graphically the data from investigation of voltage, current, and resistance in series and parallel circuits (210-5, 211-2)
- describe series and parallel (maximum two resistors) circuits involving varying resistance, voltage, and current, using Ohm's Law:
 - draw circuit diagrams, using current symbols for a cell, switch, battery, lamp, resistor, multirange meter (308-17)

Use of Electrical Energy

- relate electrical energy to domestic power consumption costs:
 - watt as a unit of power ($1\text{ W} = 1\text{ J/s}$) (308-18)
- explain that precise language is required to properly interpret Energiguide labels and to understand a utility bill (109-14)
- compare examples of past and current technologies that used current electricity to meet similar needs (110-9)

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

- determine quantitatively the efficiency of an electrical appliance that converts electrical energy to heat energy (308-19)

Electricity and the Environment

- describe the transfer and conversion of energy from a generating station to the home (308-20)
- evaluate evidence and sources of information when conducting research on electrical energy production and its impact on the environment (210-8)
- select recent data while conducting research on the environmental problems associated with various types of electrical energy production (113-6, 210-8)
- propose a course of action that reduces the consumption of electrical energy (113-9, 113-13)
- give examples of the development of alternative sources of energy (such as wind generators and solar energy) that are a result of cost and the availability and properties of materials (109-6)

Space Exploration**The Beginnings of the Solar System**

- describe and explain the apparent motion of celestial bodies:
 - moon
 - sun
 - planets
 - comets
 - asteroids (312-4)
- describe theories on the formation of the solar system (312-1)

Composition and Characteristics of the Solar System

- describe the composition and characteristics of the following components of the solar system:
 - terrestrial and gas planets and Pluto
 - periodicity of comets
 - asteroids/meteors (312-5)
- explain the need for new evidence in order to continually test existing theories about the composition and origin of our solar system and galaxies (110-6, 210-3)

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

- provide examples of how the Canadian government and/or Canadian Space Agency is involved in research projects about space (112-6)
- defend their position regarding societal support for space exploration (211-5)
- describe the effects of solar phenomena on Earth:
 - sunspots
 - solar flares
 - solar radiation (312-6)
- in small groups, design and describe a model space station on the basis of what they have learned about the sun's influences on Earth (208-4, 211-1)

Composition and Characteristics of the Universe

- describe theories on the origin and evolution of the universe:
 - big bag theory
 - oscillating theory (312-3)
- describe and classify the major components of the universe:
 - nebulae
 - galaxies
 - giant stars
 - dwarf stars
 - quasars
 - black holes (312-2)
- calculate the travel time to a distant star at a given speed:
 - define and explain a light year (210-9)
- explain how data provided by technologies contribute to our knowledge of the universe (109-3)
- working collaboratively with group members, prepare a comparative data table on various stars, and design a model to represent some of these stars relative to our solar system (209-4, 211-1, 211-3)
- working collaboratively with group members, prepare a comparative data table on various stars, and design a model to represent some of these stars relative to our solar system (209-4, 211-1, 211-3)
- describe examples of science-and technology-based careers in Canada that are associated with space exploration (112-11)
- identify new questions and problems that arise from the study of space exploration (210-16)
- describe the science underlying three technologies designed to explore space (109-11, 111-5)

Social Studies

General Curriculum Outcomes

Citizenship, Power, and Governance

GCO: Students will be expected to demonstrate an understanding of the rights and responsibilities of citizenship and the origins, functions, and sources of power, authority, and governance

Individuals, Societies, and Economic Decisions

GCO: Students will be expected to demonstrate the ability to make responsible economic decisions as individuals and as members of society.

People, Place, and Environment

GCO: Students will be expected to demonstrate an understanding of the interactions among people, places, and the environment

Culture and Diversity

GCO: Students will be expected to demonstrate an understanding of culture, diversity, and world view, recognizing the similarities and differences reflected in various personal, cultural, racial, and ethnic perspectives.

Interdependence

GCO: Students will be expected to demonstrate an understanding of the interdependent relationship among individuals, societies, and the environment—locally, nationally, and globally—and the implications for a sustainable future.

Specific Curriculum Outcomes

Students will be expected to

Theme One: Physical Setting

- 1.1 identify and locate the Atlantic region in the Canadian, North American, and global contexts
- 1.2 describe the area, size, and physical features of Atlantic Canada
- 1.3 identify the basic weather and climatic patterns of Atlantic Canada
- 1.4 link human activity to the natural resources of the Atlantic region
- 1.5 identify and trace population and settlement patterns affecting Atlantic Canadians from Aboriginal to early new-world migration to the present day

Theme Two: Culture

- 2.1 examine and develop a general concept of culture
- 2.2 examine and describe contemporary culture in the Atlantic Canadian context and its connections to other global cultures
- 2.3 demonstrate an understanding of the local and global factors that have shaped the culture(s) of Atlantic Canada
- 2.4 demonstrate an understanding of the nature of the cultural, ethnic, and linguistic groups in Atlantic Canada
- 2.5 demonstrate an understanding of the issues and events surrounding cross-cultural understanding at the local, regional, and global levels
- 2.6 demonstrate an understanding of and appreciation for the link between culture and occupations/lifestyles in Atlantic Canada
- 2.7 demonstrate an understanding of the local and global forces that cause cultures to constantly change
- 2.8 explain how Atlantic Canadians shape political culture by exercising power and influencing political decisions

Theme Three: Economics

- 3.1 examine and explain the role that basic economic principles play in daily life
- 3.2 demonstrate an understanding of the role of economics in Atlantic Canadian society

General Curriculum Outcomes Specific Curriculum Outcomes

Time, Continuity, and Change

GCO: Students will be expected to demonstrate an understanding of the past and how it affects the present and the future.

Students will be expected to

- 3.3 evaluate the importance of economics in entrepreneurship
- 3.4 examine and explain the contribution of the primary, secondary, tertiary, and quaternary sectors of the economy of Atlantic Canada
- 3.5 analyse local, regional, and global economic patterns and related issues that are challenging Atlantic Canadians
- 3.6 identify and demonstrate an understanding of trade and other economic linkages among Atlantic Canada and the national and global communities.

Theme Four: Technology

- 4.1 develop a concept of technology and explain its regional and global applications
- 4.2 examine and describe the historical application of technology in the Atlantic region
- 4.3 demonstrate an understanding of how technology has affected employment and the standard of living in Atlantic Canada
- 4.4 analyse how technology affects transportation and communications in the Atlantic region
- 4.5 examine and describe the effects of technology on manufacturing in the Atlantic region
- 4.6 analyse the effect of technology on resource industries in Atlantic Canada
- 4.7 evaluate the effects of technology on recreation, home life, and community life

Theme Five: Interdependence

- 5.1 explore his/her concept of world view and explain the factors that influence and are influenced by it
- 5.2 examine and analyse how Atlantic Canadians are members of the global community through different interconnected systems
- 5.3 access the individual qualities and attributes Atlantic Canadians need to become contributing members of the global community
- 5.4 demonstrate an understanding that the future well-being of Atlantic Canada involves co-operation with the national and global communities

Technology Education (Draft)

General Curriculum Outcomes Specific Curriculum Outcomes

GCO 1: Students will be expected to design, develop, evaluate, and articulate technological solutions.

GCO 2: Students will be expected to evaluate and manage technological systems.

GCO 3: Students will be expected to demonstrate an understanding of the history and evolution of technology, and of its social and cultural implications.

GCO 4: Students will be expected to demonstrate an understanding of current and evolving careers and of the influence of technology on the nature of work.

GCO 5: Students will be expected to demonstrate an understanding of their personal responsibility in determining the future.

Students will be expected to

Control Technology 9

Big Ideas

What is a Control System?

- define systems and describe the components of a system
- describe the control elements of sensing, switching, and regulating
- identify examples of control systems and describe the functions of their subsystems
- differentiate between open and closed loop systems

Fluid Control Systems

- explore the evolution of fluidic systems
- describe fluidic systems in terms of components and functions
- distinguish between the two common fluidic systems of pneumatics and hydraulics
- identify ways that other systems have been used to control fluidic systems

Electronic Control Systems

- explore the evolution of electronic systems
- describe electronic systems in terms of subsystems and functions
- identify and describe the function of specific electronic systems
- identify ways that electronic systems have been used to control other systems or processes

Robotics

- explore the evolution of robotic systems
- identify and describe the subsystems of a robot
- describe the functions and operations of robotic devices
- identify ways that robots use control systems

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

Programming

- define programming in terms of communications between different devices
- examine simple programs and determine their functions
- demonstrate an understanding of programming, its affect on a machine/device, and implications for entrepreneurs

Control System Safety

- identify the risks in using specific control systems and devices
- develop personal rules of conduct to minimize risk

Control Systems and Careers

- identify ways that control systems are used in the home and the workplace
- discuss ways that evolving control systems are affecting the nature of work
- identify careers that focus specifically on the use and management of control systems or systems that incorporate control systems
- identify required skills and competencies for selected careers

Basic Skills**Schematics and Pictorials**

- identify basic symbol sets that are employed in schematic
- read and interpret a simple schematic drawing
- relate a schematic drawing to a pictorial drawing
- create simple schematic drawings

Fabrication

- develop techniques to adjust tools and processes in order to obtain accuracy, precision, and repeatability
- employ separating, shaping, forming, combining, and finishing techniques to fabricate the physical components of control systems

General Curriculum Outcomes **Specific Curriculum Outcomes**

Students will be expected to

Soldering

- identify solder
- define a good solder joint
- identify types of solder for different purposes
- safely employ soldering procedures to join two materials

Interfacing

- describe how a tool or device operates an interface between two dissimilar environments
- construct a simple interface device

Programming

- write an instruction set to describe a simple process
- write and test a simple program to control a process

Troubleshooting

- use established troubleshooting routines to troubleshoot and test components and systems

Design Activities

Step 1: Problem Situation

- investigate situations, including those at home, at school, or in industry to determine opportunities for design of control systems
- identify specific problems for design and development of control devices and systems

Step 2: Design Briefs

- select a specific problem for design and development of control devices and systems and communicate it clearly in the form of a design brief
- generate a design brief for inclusion in the design portfolio

Step 3: Investigation and Research

- investigate similar problems and situations to determine ways they were solved
- research developments in control systems and devices and determine their applicability

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

- investigate resources available to solve this problem
- compile a list of information and resources suitable to solving the problem
- use the design portfolios to document their investigation and research

Step 4: Identify Possible Solutions

- identify a range of solutions to the problem
- maintain portfolio documentation

Step 5: Select the Best Solution

- use established criteria for evaluating the solution options
- examine the most appropriate option, and justify the choice
- use the design portfolio to document the proposed solution and the rationale for choosing it

Step 6: Develop the Solution

- identify tools and materials required to develop the solution, including physical and software-based
- work from detailed plans and instructions to construct the solution
- modify the plans, instructions, and the solution necessary, in accordance with the requirement of the design brief
- incorporate performance testing into all phases of the development process
- use the design portfolios to document the process

Step 7: Evaluate the Solution

- develop testing criteria and procedures to assess the solution
- evaluate the solution based on the developed criteria
- make recommendations for improvement
- construct a project report
- use the design portfolio to document the evaluation criteria and to explain how the solution was assessed

General Curriculum Outcomes **Specific Curriculum Outcomes**

Students will be expected to

Step 8: Present the Report

- present a report which describes the problem, the design brief, the evolution of the solution, the actual solution, an evaluation of the solution, and recommendations for improvement using appropriate language/terminology and resources

Biotechnology 9

Basic Skills

What is Biotechnology?

- define biotechnology
- explore and identify biotechnology, components used in the community
- identify current careers in biotechnology and future directions in the industry

Agriculture/Environmental Technologies

- identify/describe bio-related technologies contributing to increased agricultural production
- identify and describe bio-related technologies maintaining quality agricultural production
- identify examples of an agricultural product that was developed, enhanced, or improved using bio-related agricultural technology
- appreciate consequences of actions and decisions in agricultural bio-related technologies

Exploration of Biotechnology Systems

- examine a variety of biotechnology systems, for example, agriculture, aquaculture, transgenic plants, and animals
- investigate ways that communications, production, energy/power, and control subsystems are used in biotechnology systems

What are Biotechnology Processes?

- describe and explain the following biotechnology processes: fermentation, biodegradability, separation, and purification, microbiology and process monitoring
- identify examples of biotechnology process
- identify the role of enzymes in bioprocessing

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

- demonstrate an understanding of bioprocessing conditions

Issues and Trends

- investigate the comment on current issues and emerging practices and trends in the development of biotechnology systems
- present an assessment of the impact of biotechnology on the need to be technologically literate

Ethical and Legal Implications

- examine the ethical issues involved in genetic manipulation of plants and animals, including patenting of life forms
- discuss the rights of individuals and societies with respect to use of biotechnologies
- discuss the legal implications for individuals, governments, and companies of biotechnology systems

Health and Safety

- identify safety issues and concerns in selected biotechnology processes
- develop personal risk management strategies
- specify safe ways to dispose of biotechnology waste products
- examine the impact of biotechnologies on health

Biotechnology and Careers

- identify workplaces and careers in each area of biotechnology and determine the features and requirements of each career
- examine ways that careers and workplaces are being affected by evolution in biotechnology
- identify opportunities for entrepreneurial activity in biotechnology

Basic Skills**Monitoring and Controlling Biotechnology Processes**

- use a variety of sensors and data-logging devices to collect data related to biotechnology processes

General Curriculum Outcomes **Specific Curriculum Outcomes**

Students will be expected to

- employ a variety of control systems to manage and regulate biotechnology processes

Investigating and Identifying Resources Employed for Biotechnology

- investigate the variety of current and emerging biotechnology systems, processes, and products
- research and report on systems and resources employed in biotechnology systems

Design Activities

Step 1: Problem Situation

- investigate situations to determine opportunities for the development of biotechnology systems that are capable of producing biotechnology products
- identify specific problems for design and development of biotechnology systems

Step 2: Design Briefs

- use appropriate language to describe and write about control technology such as: input, process, output, sensors, interfaces, programs, relays, and indicators
- Incorporate communications, production, energy, power, and transportation technologies into control technology related problem-solving activities

Step 3: Investigation and Research

- research, and demonstrate understanding of, technological systems use in control technology
- present a critical evaluation of products, both their role and others, including suggestions for improvement
- investigate control technology
- use of the language and terminology of control technology
- use appropriate language to describe and write about control technology
- use appropriate language to describe problem situations, solution ideas, procedures and processes to implement the solution (including technical drawings closed), and to assess and report on the effectiveness of the solution

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

- use communications technologies, production technologies, energy, power, transportation technologies as an integral components of control technology

Step 4: Identify Possible Solutions

- develop multiple options for a solution and identify the most appropriate solution considering conservation of resources, suitability of the solution, outcomes of the solution, and the technical activity required to produce it
- use appropriate language to describe and write about control technology-related issues
- maintain portfolio documentation

Step 5: Select the Best Solution

- use established criteria, access the solution options, select the most appropriate option, and justify the choice
- use appropriate language to describe and write about control technology-related issues.
- maintaining portfolio documentation

Step 6: Develop the Solution

- identify tools and materials required to develop the solution, including physical and software-based
- develop plans and procedures to construct the solution
- modify the plans, instructions, and the solution necessary, in accordance with the requirement of the design brief
- incorporate performance testing into all phases of the development process
- maintain portfolio documentation

Step 7: Evaluate the Solution

- present a critical evaluation of products, both their own and others, including suggestions for improvement
- explore ethical decision making and intellectual honesty as factors in making technological choices
- use action-related language to describe problem situations, solution ideas, procedures and processes to implement the solution in the project report as part of the portfolio
- make recommendations for improvement

General Curriculum Outcomes Specific Curriculum Outcomes

Students will be expected to

- maintain portfolio documentation

Step 8: Present the Report

- present a report which describes the problem, the design brief, the evolution of the solution, the actual solution, an evaluation of the solution, and recommendations for improvement using appropriate language/terminology and communications resources
- use communications technologies to collaborate with students, teachers, and others at a distance in order to develop and implement solutions to control technology problems

Visual Arts

General Curriculum Outcomes

Key-Stage Curriculum Outcomes

NOTE: Specific curriculum outcomes have not yet been developed for Visual Arts 7–9. Teachers may wish to use the following general curriculum outcomes and key-stage curriculum outcomes from the *Foundation for the Atlantic Canada Arts Education Curriculum* in planning their visual arts program.

By the end of grade 9, students will have achieved the outcomes for entry–grade 6 and will also be expected to

Creating, Making, and Presenting

GCO 1: Students will be expected to explore, challenge, develop, and express ideas using the skills, language, techniques, and processes of the arts.

- manipulate and organize design elements and principles to achieve planned compositions
- assess and utilize the properties of various art media and their ability to convey messages and meaning
- create artworks, integrating themes found through direct observation, personal experience, and imagination
- respond verbally and visually to the use of art elements in personal works and the work of others
- analyse and use a variety of image development techniques (e.g., distortion, metamorphosis, fragmentation)
- demonstrate increasing complexity in art skills and techniques

GCO 2: Students will be expected to create and/or present, collaboratively and independently, expressive products in the arts for a range of audiences and purposes.

- invent and incorporate unique visual symbols to create personal meaning in their art
- analyse and make use of visual, spatial, and temporal concepts in creating art images
- select, critique, and organize a display of personally meaningful images from their own portfolio
- acknowledge and respect individual approaches to and opinions of art
- work interactively, co-operatively, and collaboratively

Understanding and Connecting Contexts of Time, Place, and Community

GCO 3: Students will be expected to demonstrate critical awareness of and value the role of the arts in creating and reflecting culture.

- examine the role and the influence of visual images in their daily lives, including mass media and popular culture
- evaluate visual communication systems as a part of daily life
- through their own art develop concepts and imagery based on personal ideas and experience

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GCO 4: Students will be expected to respect the contributions of individuals and cultural groups to the arts in local and global contexts and value the arts as a record of human experience and expression.

GCO 5: Students will be expected to examine the relationship among the arts, societies, and environments.

Perceiving and Responding

GCO 6: Students will be expected to apply critical thinking and problem solving strategies to reflect on and respond to their own and others' expressive work.

- recognize and describe the role of the visual arts in challenging, sustaining, and reflecting society's beliefs and traditions
- identify opportunities to participate in the visual arts in school, community, and the world of work
- develop an appreciation of diversity among individuals as reflected in their art work
- recognize the existence of a variety of visual languages that reflect cultural, socio-economic, and national origins
- recognize that and investigate how art as a human activity emerges from human needs, values, beliefs, ideas, and experiences
- demonstrate an understanding of how individual and societal values affect our response to visual art
- create personally meaningful imagery that reflects influence from a variety of historical and contemporary artists
- compare the characteristics of artwork from different cultures and periods in history
- draw upon other arts disciplines as a resource in the creation of their own art works
- use, with confidence, experiences from their personal, social, cultural, and physical environments as a basis for visual expression
- demonstrate an understanding of how individual and societal values affect our response to visual art
- interpret visual parallels between the structures of natural and built environments
- recognize and respect the ethical and moral considerations involved in copying works
- develop independent thinking in interpreting and making judgments about subject matter
- constructively critique the work of others
- analyse the works of artists to determine how they have used the elements and principles of design to solve specific visual design problems
- engage in critical reflective thinking as part of the decision-making and problem-solving process
- investigate and analyse how meaning is embedded in works of art

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GCO 7: Students will be expected to understand the role of technologies in creating and responding to expressive works.

- practise safety associated with proper care of art materials and tools
- create images that solve complex problems that take into consideration form and function, and understand the value of looking for alternative solutions
- evaluate and use various media and technological processes for their sensory qualities and ability to convey messages and meaning
- realize the direct influence expanding technology has had and continues to have on the individual and society

GCO 8: Students will be expected to analyse the relationship between artistic intent and the expressive work.

- analyse artwork and determine the artist's intention
- analyse why images were created by artists
- identify and discuss the source of ideas behind their own work and the work of others
- use feedback from others to examine their own art works in light of their original intent