



Department of Education
English Programs

Atlantic Canada Science Curriculum

Science

Grade 1

CURRICULUM

Acknowledgements

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- The Provincial Curriculum Working Group, comprising teachers and other educators in Prince Edward Island, which served as lead province in drafting and revising the document.
- The teachers and other educators and stakeholders across Atlantic Canada who contributed to the development of the grade 1 science curriculum guide.

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Foreword

The pan-Canadian *Common Framework of Science Learning Outcomes K to 12*, released in October 1997, assists provinces in developing a common science curriculum framework.

New science curriculum for the Atlantic Provinces is described in *Foundation for the Atlantic Canada Science Curriculum (1998)*.

This curriculum guide is intended to provide teachers with the overview of the outcomes framework for science education. It also includes suggestions to assist teachers in designing learning experiences and assessment tasks.

Introduction

Background

The curriculum described in *Foundation for the Atlantic Canada Science Curriculum* was planned and developed collaboratively by regional committees. The process for developing the common science curriculum for Atlantic Canada involved regional consultation with the stakeholders in the education system in each Atlantic province. The Atlantic Canada science curriculum is consistent with the framework described in the pan-Canadian *Common Framework of Science Learning Outcomes K to 12*.

Aim

The aim of science education in the Atlantic provinces is to develop scientific literacy.

Scientific literacy is an evolving combination of the science-related attitudes, skills, and knowledge students need to develop inquiry, problem-solving, and decision-making abilities; to become life-long learners; and to maintain a sense of wonder about the world around them. To develop scientific literacy, students require diverse learning experiences that provide opportunities to explore, analyse, evaluate, synthesize, appreciate, and understand the interrelationships among science, technology, society, and the environment.

Program Design and Components

Learning and Teaching Science

What students learn is fundamentally connected to how they learn it. The aim of scientific literacy for all has created a need for new forms of classroom organization, communication, and instructional strategies. The teacher is a facilitator of learning whose major tasks include

- creating a classroom environment to support the learning and teaching of science
- designing effective learning experiences that help students achieve designated outcomes
- stimulating and managing classroom discourse in support of student learning
- learning about and then using students' motivations, interests, abilities, and learning styles to improve learning and teaching
- assessing student learning, the scientific tasks and activities involved, and the learning environment to make ongoing instructional decisions
- selecting teaching strategies from a wide repertoire

Effective science learning and teaching take place in a variety of situations. Instructional settings and strategies should create an environment that reflects a constructive, active view of the learning process. Learning occurs through actively constructing one's own meaning and assimilating new information to develop a new understanding.

The development of scientific literacy in students is a function of the kinds of tasks they engage in, the discourse in which they participate, and the settings in which these activities occur. Students' disposition towards science is also shaped by these factors. Consequently, the aim of developing scientific literacy requires careful attention to all of these facets of curriculum.

Learning experiences in science education should vary and should include opportunities for group and individual work, discussion among students as well as between teacher and students, and hands-on/minds-on activities that allow students to construct and evaluate explanations for the phenomena under investigation. Such investigations and the evaluation of the evidence accumulated provide opportunities for students to develop their understanding of the nature of science and the nature and status of scientific knowledge.

Writing in Science

Learning experiences should provide opportunities for students to use writing and other forms of representation as ways to learning. Students, at all grade levels, should be encouraged to use writing to speculate, theorize, summarize, discover connections, describe processes, express understandings, raise questions, and make sense of new information using their own language as a step to the language of science. Science logs are useful for such expressive and reflective writing. Purposeful note making is also an intrinsic part of learning in science that can help students better record, organize, and understand information from a variety of sources. The process of creating webs, maps, charts, tables, graphs, drawing, and diagrams to represent data and results help students learn and also provides them with useful study tools.

Learning experiences in science should also provide abundant opportunities for students to communicate their findings and understandings to others, both formally and informally, using a variety of forms for a range of purposes and audiences. Such experiences should encourage students to use effective ways of recording and conveying information and ideas and to use the vocabulary of science in expressing their understandings. It is through opportunities to talk and write about the concepts they need to learn that students come to better understand both the concepts and related vocabulary.

Learners will need explicit instruction in and demonstration of the strategies they need to develop and apply in reading, viewing, interpreting, and using a range of science texts for various purposes. It will be equally important for students to have demonstrations of the strategies they need to develop and apply in selecting, constructing, and using various forms for communicating in science.

The Three Processes of Scientific Literacy

An individual can be considered scientifically literate when he/she is familiar with, and able to engage in, three processes: inquiry, problem-solving, and decision making.

Inquiry

Scientific inquiry involves posing questions and developing explanations for phenomena. Students require certain skills to participate in the activities of science. Skills such as questioning, observing, inferring, predicting, measuring, hypothesizing, classifying, designing experiments, collecting data, analysing data, and interpreting data are fundamental to engaging in science. These activities provide students with opportunities to understand and practise the process of theory development in science and the nature of science.

Problem Solving

The process of problem solving involves seeking solutions to human problems. It consists of proposing, creating, and testing prototypes, products, and techniques to determine the best solution to a given problem.

Decision Making

The process of decision making involves determining what we, as citizens, should do in a particular context or in response to a given situation. Decision-making situations are important in their own right, and but they also provide a relevant context for engaging in scientific inquiry and/or problem solving.

Meeting the Needs of All Learners

The *Foundation for the Atlantic Canada Science Curriculum* stresses the need to design and implement a science curriculum that provides equitable opportunities for all students according to their abilities, needs, and interests. Teachers must be aware of and make adaptations to accommodate the diverse range of learners in their class. To adapt instructional strategies, assessment practices, and learning resources to the needs of all learners, teachers must create opportunities that will permit them to address their various learning styles.

As well, teachers must not only remain aware of and avoid gender and cultural biases in their teaching, they must also actively address cultural and gender stereotyping (e.g., about who is interested in and who can succeed in science and mathematics). Research supports the position that when science curriculum is made personally meaningful and socially and culturally relevant, it is more engaging for groups traditionally under-represented in science, and indeed, for all students.

While this curriculum guide presents specific outcomes for each unit, it must be acknowledged that students will progress at different rates.

Teachers should utilize materials and strategies that accommodate student diversity, and should validate students when they achieve the outcomes to the best of their abilities.

It is important that teachers articulate high expectations for all students and ensure that all students have equitable opportunities to experience success as they work toward achieving designated outcomes. Teachers should adapt classroom organization, teaching strategies, assessment practices, time, and learning resources to address students' needs and build on their strengths. The variety of learning experiences described in this guide provide access for a wide range of learners. Similarly, the suggestions for a variety of assessment practices provide multiple ways for learners to demonstrate their achievements.

Assessment and Evaluation

The terms “assessment” and “evaluation” are often used interchangeably, but they refer to quite different processes. Science curriculum documents developed in the Atlantic region use these terms for the processes described below.

Assessment is the systematic process of gathering information on student learning.

Evaluation is the process of analysing, reflecting upon, and summarizing assessment information, and making judgments or decisions based upon the information gathered.

The assessment process provides the data, and the evaluation process brings meaning to the data. Together, these processes improve teaching and learning. If we are to encourage enjoyment in learning for students now and throughout their lives, we must develop strategies to involve students in assessment and evaluation at all levels. When students are aware of the outcomes for which they are responsible and of the criteria by which their work will be assessed or evaluated, they can make informed decisions about the most effective ways to demonstrate their learning.

The Atlantic Canada science curriculum reflects the three major processes of science learning: inquiry, problem solving, and decision making. When assessing student progress, it is helpful to know some activities/skills/actions that are associated with each process of science learning. Student learning may be described in terms of ability to perform these tasks.

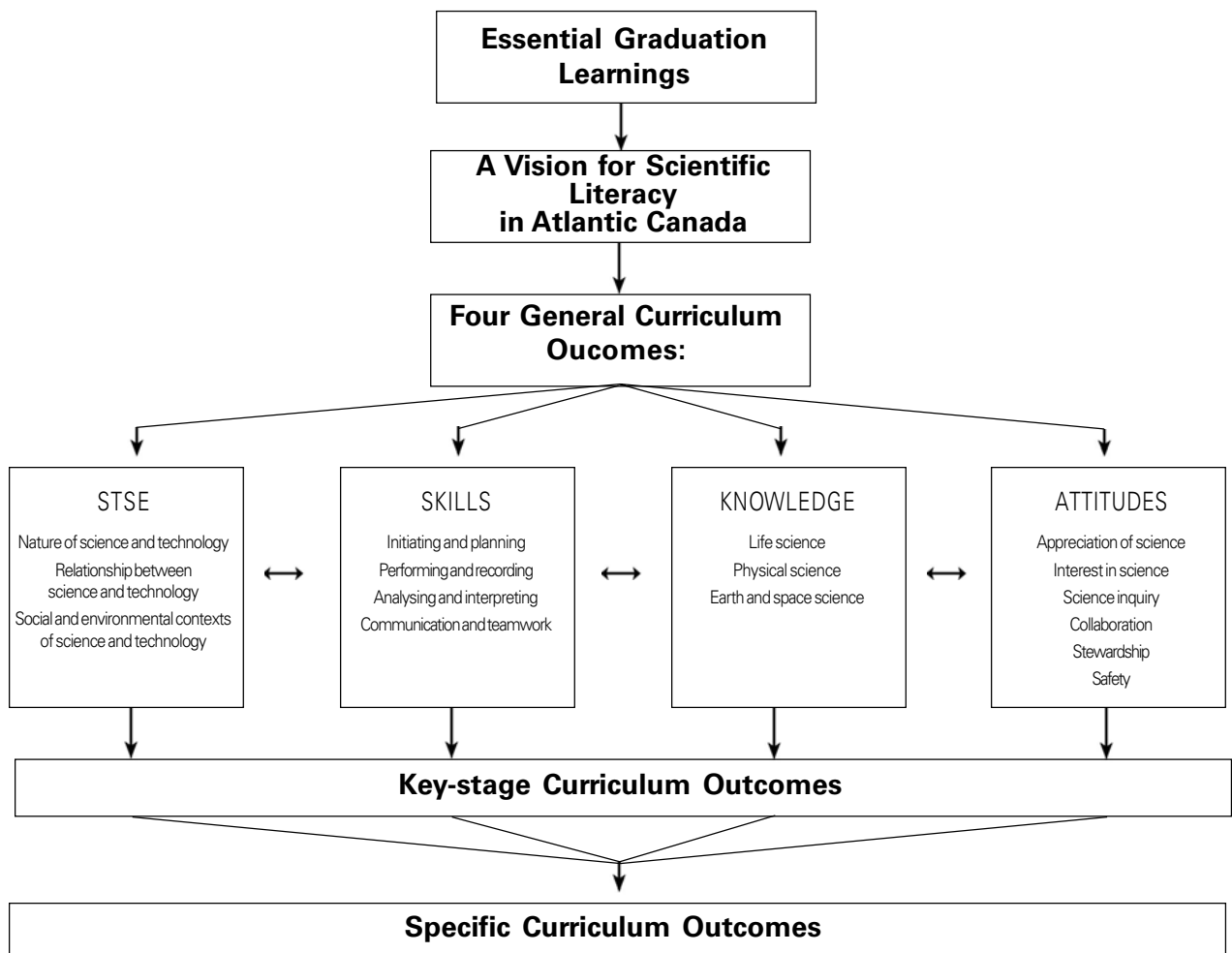
Curriculum Outcomes Framework

Overview

The science curriculum is based on an outcomes framework that includes statements of essential graduation learnings, general curriculum outcomes, key-stage curriculum outcomes, and specific curriculum outcomes. The general, key-stage, and specific curriculum outcomes reflect the pan-Canadian *Common Framework of Science Learning Outcomes K to 12*. Figure 1 provides the blueprint of the outcomes framework.

Outcomes Framework

FIGURE 1



Essential Graduation Learnings

Essential graduation learnings are statements describing the knowledge, skills, and attitudes expected of all students who graduate from high school. Achievement of the essential graduation learnings will prepare students to continue to learn throughout their lives. These learnings describe expectations not in terms of individual school subjects but in terms of knowledge, skills, and attitudes developed throughout the curriculum. They confirm that students need to make connections and develop abilities across subject boundaries and to be ready to meet the shifting and ongoing opportunities, responsibilities, and demands of life after graduation. Provinces may add additional essential graduation learnings as appropriate. The essential graduation learnings are:

Aesthetic Expression

Graduates will be able to respond with critical awareness to various forms of the arts and be able to express themselves through the arts.

Citizenship

Graduates will be able to assess social, cultural, economic, and environmental interdependence in a local and global context.

Communication

Graduates will be able to use the listening, viewing, speaking, reading, and writing modes of language(s) as well as mathematical and scientific concepts and symbols to think, learn, and communicate effectively.

Personal Development

Graduates will be able to continue to learn and to pursue an active, healthy lifestyle.

Problem Solving

Graduates will be able to use the strategies and processes needed to solve a wide variety of problems, including those requiring language, mathematical, and scientific concepts.

Technological Competence

Graduates will be able to use a variety of technologies, demonstrate an understanding of technological applications, and apply appropriate technologies for solving problems.

General Curriculum Outcomes

The general curriculum outcomes form the basis of the outcomes framework. They also identify the key components of scientific literacy. Four general curriculum outcomes have been identified to delineate the four critical aspects of students' scientific literacy. They reflect the wholeness and interconnectedness of learning and should be considered interrelated and mutually supportive.

Science, Technology, Society, and the Environment

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

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

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

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.

Key-Stage Curriculum Outcomes

Key-stage curriculum outcomes are statements that identify what students are expected to know, be able to do, and value by the end of grades 3, 6, 9, and 12 as a result of their cumulative learning experiences in science. The key-stage curriculum outcomes are from the *Common Framework for Science Learning Outcomes K-12*.

Specific Curriculum Outcomes

Specific curriculum outcome statements describe what students are expected to know and be able to do at each grade level. They are intended to help teachers design learning experiences and assessment tasks. Specific curriculum outcomes represent a framework for assisting students to achieve the key-stage curriculum outcomes, the general curriculum outcomes, and ultimately, the essential graduation learnings.

Specific curriculum outcomes are organized in units for each grade level.

Attitude Outcomes

It is expected that the Atlantic Canada science program will foster certain attitudes in students throughout their school years. The STSE, skills, and knowledge outcomes contribute to the development of attitudes, and opportunities for fostering these attitudes are highlighted in the Elaborations—Strategies for Learning and Teaching sections of each unit.

Attitudes refer to generalized aspects of behaviour that teachers model for students by example and by selective approval. Attitudes are not acquired in the same way as skills and knowledge. The development of positive attitudes plays an important role in students' growth by interacting with their intellectual development and by creating a readiness for responsible application of what students learn.

Since attitudes are not acquired in the same way as skills and knowledge, outcome statements for attitudes are written as key-stage curriculum outcomes for the end of grades 3, 6, 9, and 12. These outcome statements are meant to guide teachers in creating a learning environment that fosters positive attitudes. These key-stage attitudinal outcome statements can be found in the appendix.

Curriculum Guide Organization

Specific curriculum outcomes are organized in units for each grade level. Each unit is organized by topic. Suggestions for learning, teaching, assessment, and resources are provided to support student achievement of the outcomes.

The order in which the units of a grade appear in the guide is meant to suggest a sequence. In some cases, the rationale for the recommended sequence is related to the conceptual flow across the year. That is, one unit may introduce a concept that is then extended in a subsequent unit. Likewise, one unit may focus on a skill or context that will be built upon later in the year.

Some units or certain aspects of units may also be combined or integrated. This is one way of assisting students as they attempt to make connections across topics in science or between science and the real world. In some cases, a unit may require an extended time frame to collect data on weather patterns, plant growth, etc. These cases may warrant starting the activity early and overlapping it with the existing unit. In all cases, the intent is to provide opportunities for students to deal with science concepts and scientific issues in personally meaningful and socially and culturally relevant contexts.

Unit Organization

Each unit begins with a three-page synopsis. On the first page, introductory paragraphs provide an unit overview. These are followed by a section that specifies the focus (inquiry, problem solving, and/or decision making) and possible contexts for the unit. Finally, a curriculum links paragraph specifies how this unit relates to science concepts and skills addressed in other grades so teachers will understand how the unit fits with the students' progress through the complete science program.

The second page of the three-page overview provides a table of the outcomes from the pan-Canadian *Common Framework of Science Learning Outcomes K to 12* that the unit will address. The numbering system used is the one in the pan-Canadian document as follows:

- 100s—Science-Technology-Society-Environment (STSE) outcomes
- 200s—Skills outcomes
- 300s—Knowledge outcomes
- 400s—Attitude outcomes

These code numbers appear in brackets after each specific curriculum outcome (SCO).

The pan-Canadian Science Learning Outcomes were used as the framework in the development of the Atlantic Canada Science Curriculum at this grade level. They are included to illustrate the two types of science outcomes at the primary level: i.e., *STSE/Knowledge* and *Skills*. For planning, instructional, and assessment purposes, teachers should refer to the PEI/APEF Specific Curriculum Outcomes found on the third overview page.

The third page of the three-page overview provides a table of the PEI/APEF specific curriculum outcomes for the unit. Each unit is divided into subtopics to reflect a possible grouping of the specific curriculum outcomes.

The Four-Column Spread

All units have a two-page layout of four columns as illustrated below. In some cases, the four-column spread continues to the next two-page layout. Outcomes are grouped by a topic indicated at the top of the left page.

Two Page, Four Column Spread

Column One: Outcomes

The Senses

Outcomes

- Students will be expected to
 - identify each of the senses (100-9a)

- demonstrate ways that materials can be changed to alter their smell and taste (100-11)


- demonstrate ways we can use materials to make different sounds (101-3)

Elaborations-Strategies for Learning and Teaching

Observation using all of the senses is one of the foundations of scientific exploration. Students will be used to relying on their sense of sight for making most observations, and may not realize just how much they can sense without the use of their eyes. Students can try to guess the identity of a type of food by closing their eyes, and smelling, touching, listening, and, if possible, tasting the food. Teachers can make up a blank chart for describing words, and build on it as the school year progresses:

Words I can use to Describe

Property	Describing Words
colour	red, green, ...
taste	sweet, sour, ...

Caution: Before doing any activity involving foods or scents, students with allergies should be identified. Show students how to waft odours towards their noses as a safe technique for smelling unknown materials. 

Students can try tasting something with their noses plugged so they can experience the effect of odours on the sense of taste. Students can use sugar as a material that can be changed. By smelling and tasting it, students can make observations about its properties. One change, students may suggest, would be to dissolve the sugar in water. Coloured sugar and different types of sugar may extend this activity. Students in groups of two or four, might look at the coloured sugar and/or different types of sugar and report to the class. Students might know other ways to change sugar and a class discussion might result from their ideas. Cutting up fruit is another example that might be used to demonstrate ways material can be changed.

Students can remain silent in a specific place and identify the sounds they hear. They can shake or move a container filled with small objects to try to identify its contents, or describe the sounds it makes. They can explore how the sounds of various musical instruments can be changed, or use a keyboard that can switch from one instrument to another to show how the same note can sound different depending on the instrument. Alternatively, students can use a variety of objects, such as glass, a comb, spoons, and rubber bands to make sounds. Many of these activities can be used to help address music outcomes.

The Senses

Tasks for Instruction and/or Assessment

Performance

- Smell and taste chocolate powder. Taste it again after adding water. Does it taste different? Does it smell different? Alternatively, make cookies with your class. Have students smell the dough, then smell and taste the cookies. Another suggestion would be to leave a piece of fruit to ripen. Note changes in the fruit each day using your senses. (100-11)
- Use a variety of cans or pots. Tap on the bottoms with a wooden spoon or drumstick and listen to the different sounds. Can you make it louder? Softer? (101-3)
- Fill containers with different amounts of water. Tap the top of the bottles or containers with a spoon, and note the difference in sounds created. (Teachers may assist students in filling bottles. Teachers may wish to use plastic containers and compare the results with glass.) (101-3)

Journal

- Complete statements like, My favourite toy (food, animal) is ... It looks like this ... It smells like ... It feels ... It sounds like ... It tastes like ... (100-9a)
- Draw a picture in your journal to illustrate something you've seen, heard, smelled, tasted, or touched. (100-9a)

Interview

- What senses would you use to describe the following: fur, plastic, bird, cat, dog, flower, perfume, whistle, drums, shakers, salt, sugar. What words would you use to describe them? (Students should use more than one of their senses in their description.) (100-9a)

Presentation

- Objects or pictures can be used for a collage to show that items can be identified using the five senses. You may choose to make separate posters or tables for each of the senses. (100-9a)

Resources/Notes

Science Safety Guide

100-9a Lesson One and Lesson Two

Science and Technology Resource

100-9a

#1, #2, #3 and #7

Student Book/Flip Book Activities #1

100-11

Student Book/Flip Book Activities #3

101-3

#6 and #8

Student Book/Flip Book Activities #2 and DWYK

The first column provides the specific curriculum outcomes. These are based on the pan-Canadian *Common Framework of Science Learning Outcomes K to 12*. The statements involve the Science-Technology-Society-Environment (STSE), skills, and knowledge outcomes indicated by the outcome number(s) that appears in parenthesis after the outcome. Some STSE and skills outcomes have been written in a context that shows how these outcomes should be addressed.

Specific curriculum outcomes have been grouped by topic. Other groupings of outcomes are possible and in some cases may be necessary to take advantage of local situations. The grouping of outcomes provides a suggested teaching sequence. Teachers may prefer to plan their own teaching sequence to meet the learning needs of their students.

Column One and Column Two define what students are expected to learn, and be able to do.

*Column Two: Elaborations—
Strategies for Learning and
Teaching*

The second column may include elaborations of outcomes listed in column one, and describes learning environments and experiences that will support students' learning.

*Column Three: Tasks for
Instruction and/or
Assessment*

The strategies in this column are intended to provide a holistic approach to instruction. In some cases, they address a single outcome; in other cases, they address a group of outcomes.

The third column provides suggestions for ways that students' achievement of the outcomes could be assessed. These suggestions reflect a variety of assessment techniques and materials that include, but are not limited to, informal/formal observation, performance, journal, interview, paper and pencil, presentation, and portfolio. Some assessment tasks may be used to assess student learning in relation to a single outcome. Others to assess student learning are organized in relation to several outcomes. The assessment item identifies the outcome(s) addressed by the outcome number in brackets after the item.

*Column Four: Resources/
Notes*

This column provides correlations of outcomes to authorized resources.

Physical Science: Materials, Objects, and our Senses

Introduction

Our awareness of our environment, and the many materials found within it, are based on our sensory experiences. Through the wonders of our senses, we can make distinctions by recognizing things that may be good to eat, things that may pose dangers, materials that may be “harder” or “softer”, or things that we may want to use. Our senses are immediate and automatic, but the ability to use our senses safely and effectively involves focus, discernment, awareness, and judgement.

The materials and objects around us have a wide variety of properties, representing the rich and diverse environments in which we live. Initially, young children may not make a clear distinction between objects and materials; however, through guided experiences that require careful and critical use of the senses, students can be encouraged to develop and refine their skills of observation. Students can also discover that the selection of materials is related to the purpose of the object.

Caution: Before doing any activity involving foods or scents, students with allergies should be identified. Show students how to waft odours toward their noses as a safe technique for smelling unknown materials. This will be noted as an “Allergy Alert” throughout this unit. Where an allergy has been identified, an alternate activity/material should be sought.



Focus and Context

Inquiry, with an emphasis on observation, is the focus for this unit. Students explore the world around them through their senses, making observations that will involve seeing, hearing, tasting, touching, and smelling. They use their senses to investigate the properties of objects and materials.

A variety of contexts could be used for this unit. Early in the school year, the senses could be introduced using their knowledge of food and the classroom pets that are being cared for throughout the year for the Needs and Characteristics of Living Things. As the students move into investigating objects and the materials they are made from, their toys, and school supplies, can be used for exploration. In constructing new objects, construction materials like straws, play dough, popsicle sticks, and paper can be used.

Science Curriculum Links

Students have investigated their senses in kindergarten. This grade 1 unit will give students the background they need for a grade 2 unit, “Properties of Liquids and Solids”, a grade 3 unit, “Materials and Structures”, and a grade 5 unit, “Meeting Basic Needs and Maintaining a Healthy Body.”

pan-Canadian Science Learning Outcomes

N.B. The following pan-Canadian Science Learning Outcomes were used as the framework in the development of the Atlantic Canada Science Curriculum at this grade level. They are included here to illustrate the two types of science outcomes at the primary level: i.e., *STSE/Knowledge* and *Skills*. For planning, instructional, and assessment purposes, teachers should refer to the PEI/APEF Specific Curriculum Outcomes found on the next page.

STSE/Knowledge	Skills
<p>100-9a identify each of the senses</p> <p>100-11 demonstrate ways that materials can be changed to alter their smell and taste</p> <p>101-3 demonstrate ways we can use materials to make different sounds</p> <p>101-4 describe ways in which materials can be changed to alter their appearance and texture</p> <p>100-9b demonstrate how each of the senses helps us to recognize, describe, and safely use a variety of materials</p> <p>102-2 identify objects used, how they are used, and for what purpose they are used</p> <p>100-13 compare and describe the components of some familiar objects</p> <p>100-10 identify attributes of materials that we can learn to recognize through each of our senses</p> <p>100-12a observe similar objects made with different materials, and describe their similarities and differences</p> <p>100-12b observe different forms that some materials can take, and note their similarities and differences</p> <p>101-5 explore and describe ways to create useful objects by combining or joining different components or materials</p> <p>102-1 create a product that is functional and aesthetically pleasing to the user by safely selecting, combining, and modifying materials</p> <p>103-3 describe and demonstrate ways to use materials appropriately and efficiently to the benefit of themselves and others</p>	<p>Initiating and Planning</p> <p>201-1 follow a simple procedure where instructions are given one step at a time</p> <p>200-2 identify problems to be solved</p> <p>200-3 make predictions, based on an observed pattern</p> <p>200-4 select and use materials to carry out their own explorations</p> <p>Performing and Recording</p> <p>201-1 follow a simple procedure where instructions are given one step at a time</p> <p>201-3 use appropriate tools for manipulating and observing materials and in building simple models</p> <p>201-5 make and record relevant observations and measurements, using written language, pictures, and charts</p> <p>201-8 follow given safety procedures and rules and explain why they are needed</p> <p>Analysing and Interpreting</p> <p>202-2 place materials and objects in a sequence or in groups according to one or more attributes</p> <p>202-4 construct and label concrete-object graphs, pictographs, or bar graphs</p> <p>202-7 propose an answer to an initial question or problem and draw simple conclusions based on observations or research</p> <p>202-8 compare and evaluate personally constructed objects with respect to their form and function</p> <p>Communication and Teamwork</p> <p>203-1 communicate questions, ideas, and intentions while conducting their explorations</p> <p>203-3 communicate procedures and results, using drawings, demonstrations, and written and oral descriptions</p>

PEI/APEF Specific Curriculum Outcomes

The Senses

Students will be expected to

- identify each of the senses (100-9a)
- demonstrate ways that materials can be changed to alter their smell and taste (100-11)
- demonstrate ways we can use materials to make different sounds (101-3)
- describe ways in which materials can be changed to alter their appearance and texture (101-4)
- demonstrate how each of the senses helps us to recognize, describe, and safely use a variety of materials (110-9b)

Objects Are Made From Materials

Students will be expected to

- identify objects used, how they are used, and for what purpose they are used (102-2)
- compare and describe the parts of some familiar objects using their senses (100-13, 100-10)
- observe similar objects made with different materials, and describe their similarities and differences (100-12a, 100-10)
- organize objects or pictures in concrete-object graphs, pictographs, or symbolic bar graphs to show the number of similar objects made with various types of materials (202-4)

Properties of Materials

Students will be expected to

- observe different to some materials can take, and note their similarities and differences (100-12b)
- make predictions about the way a material will perform, for example, predict which material will be the strongest (200-3)
- follow a simple procedure where instructions are given, one step at a time, to test their predictions of properties of materials (201-1)
- communicate questions, ideas, and intentions while conducting their explorations (203-1)
- select and use materials to carry out their own explorations to test the properties of the materials (200-4)
- make and record observations and measurements during investigations of materials (201-5, 100-10, 203-3)

Constructing Objects

Students will be expected to

- explore and describe ways to create functional and aesthetically pleasing objects by safely selecting, combining, modifying, or joining different components or materials (101-5, 102-1, 201-8)
- select the amount and kind (recycled or reused, if possible) of materials that are appropriate while constructing objects (103-3)
- use appropriate tools, such as safety glue and scissors, for manipulating materials when building objects (201-3)
- identify problems to be solved while constructing objects, and work cooperatively and collaboratively to propose answers during the design process (200-2, 202-7, 203-1)
- compare and evaluate personally constructed objects with respect to their form and function (202-8)

The Senses

Outcomes

Students will be expected to

- identify each of the senses (100-9a)
- demonstrate ways that materials can be changed to alter their smell and taste (100-11)
- demonstrate ways we can use materials to make different sounds (101-3)

Elaborations-Strategies for Learning and Teaching

Observation using all of the senses is one of the foundations of scientific exploration. Students will be used to relying on their sense of sight for making most observations, and may not realize just how much they can sense without the use of their eyes. Students can try to guess the identity of a type of food by closing their eyes, and smelling, touching, listening, and, if possible, tasting the food. Teachers can make up a blank chart for describing words, and build on it as the school year progresses:

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Property	Describing Words
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Caution: Before doing any activity involving foods or scents, students with allergies should be identified. Show students how to waft odours towards their noses as a safe technique for smelling unknown materials.



Students can try tasting something with their noses plugged so they can experience the effect of odours on the sense of taste. Students can use sugar as a material that can be changed. By smelling and tasting it, students can make observations about its properties. One change, students may suggest, would be to dissolve the sugar in water. Coloured sugar and different types of sugar may extend this activity. Students in groups of two or four, might look at the coloured sugar and/or different types of sugar and report to the class. Students might know other ways to change sugar and a class discussion might result from their ideas. Cutting up fruit is another example that might be used to demonstrate ways material can be changed.

Students can remain silent in a specific place and identify the sounds they hear. They can shake or move a container filled with small objects to try to identify its contents, or describe the sounds it makes. They can explore how the sounds of various musical instruments can be changed, or use a keyboard that can switch from one instrument to another to show how the same note can sound different depending on the instrument. Alternatively, students can use a variety of objects, such as glass, a comb, spoons, and rubber bands to make sounds. Many of these activities can be used to help address music outcomes.

The Senses

Tasks for Instruction and/or Assessment

Performance

- Smell and taste chocolate powder. Taste it again after adding water. Does it taste different? Does it smell different?
Alternatively, make cookies with your class. Have students smell the dough, then smell and taste the cookies. Another suggestion would be to leave a piece of fruit to ripen. Note changes in the fruit each day using your senses. (100-11)
- Use a variety of cans or pots. Tap on the bottoms with a wooden spoon or drumstick and listen to the different sounds. Can you make it louder? Softer? (101-3)
- Fill containers with different amounts of water. Tap the top of the bottles or containers with a spoon, and note the difference in sounds created. (Teachers may assist students in filling bottles. Teachers may wish to use plastic containers and compare the results with glass.) (101-3)

Journal

- Complete statements like, My favourite toy (food, animal) is ... It looks like this ... It smells like ... It feels ... It sounds like ... It tastes like ... (100-9a)
- Draw a picture in your journal to illustrate something you've seen, heard, smelled, tasted, or touched. (100-9a)

Interview

- What senses would you use to describe the following: fur, plastic, bird, cat, dog, flower, perfume, whistle, drums, shakers, salt, sugar. What words would you use to describe them? (Students should use more than one of their senses in their description.) (100-9a)

Presentation

- Objects or pictures can be used for a collage to show that items can be identified using the five senses. You may choose to make separate posters or tables for each of the senses. (100-9a)

Resources/Notes

Science Safety Guide

100-9a Lesson One and Lesson Two

Science and Technology Resource

100-9a

#1, #2, #3 and #7

Student Book/Flip Book Activities

#1

100-11

Student Book/Flip Book Activities

#3

101-3

#6 and #8

Student Book/Flip Book Activities

#2 and DWYK

The Senses (continued)

Outcomes

Students will be expected to

- describe ways in which materials can be changed to alter their appearance and texture (101-4)
- demonstrate how each of the senses helps us to recognize, describe, and safely use a variety of materials (100-9b)

Elaborations-Strategies for Learning and Teaching

Take a fresh sheet of aluminium foil and crumple it to show the difference texture can make to appearance. Compare different sweaters or woven materials. Have students describe how different stitches can be put together to give many looks and textures (such as smooth, rough, ribbed). Note the appearance of cream before and after it has been shaken enough to curdle it.

Once students are able to make observations using their senses, every classroom or outside experience can be used as an opportunity to practice making observations. Teachers can emphasize safety precautions for using their senses (e.g., the use of safety goggles, wafting techniques for smelling materials, tasting only when given permission, touching hot objects or corrosive materials).

Students could go on a field trip or a walk around the school grounds to explore using their senses. Students could draw pictures of things they heard, touched, smelled, and saw. Remind students of safety rules around tasting unknown substances. Some may be poisonous; others may taste bitter or unpleasant. Try playing “I Spy”, with a senses twist: “I Hear”, “I Feel”, “I Smell” or “I Taste”. Make lists of words that describe various senses.

Students can tape various sounds and then replay them for their classmates to see if they can identify the sounds.

Students might explore how their sense of smell can help them identify when food has gone bad. For example, students could discuss previous experiences with food that has gone bad. (mouldy bread, sour milk ...)

Students can use their senses while observing their classroom pets or plants throughout the year. This outcome can be reinforced in the Daily and Seasonal Changes unit, as students use their senses to describe the changes that occur from one season to the next. For example, in autumn, they see the leaves changing colour and they feel the dryness of the fallen leaves.

Students could try to identify and describe objects without the use of one or more senses. For example, have students identify objects while blindfolded, with mittens on, with their ears covered, or with their nose plugged. Students could explore paper bags containing several objects of different sizes, shapes, and textures and identify the objects using their sense of touch. They can listen to excerpts from the story of Helen Keller or Louis Braille to demonstrate how individuals can overcome the challenge of being without one or more of their senses.

Students could try to identify objects of different sizes, shapes or textures hidden in bags or boxes so that they are using only their sense of touch to determine what the object might be.

The Senses (continued)

Tasks for Instruction and/or Assessment

Informal/Formal Observation

- Observe students as they attempt to (100-9b)
 - identify their senses as they use them
 - describe the objects using more than one of their senses
 - describe yarn, vinegar, sugar, wood, a mug and building blocks using a variety of describing words.

Paper and Pencil

- Students may describe what they observed on their field trip. Teachers could develop a class senses chart to record students observations. (100-9b)

Senses Chart

Object	Students' Observations				
	Sight	Touch	Taste	Hear	Smell
Seaweed	green, floating brown seaweed	cold, wet	salty	loud	Fishy, Salty

Interview

- Describe this piece of aluminium foil. Can you change the way it looks? How? What does it look like now? (101-4)
- Compare a ball of yarn to knitted sweaters, and describe the differences in how they look. (Show students a variety of sweaters, some with plain knitting, turning inside out to see the texture of the reverse side, some with cables or other textured designs.) (101-4)

Resources/Notes

Science Safety Guide

100-9b Lesson One and Lesson Two

Science and Technology Resource

101-4

Student Book/Flip Book Activities #3

100-9b

Activity Bank Activities

#1, #2, #3, #4, #5, #6, #7, #8 and #11

Student Book.Flip Book Activities

#1, #2, #3, LB and DWYK

Objects Are Made From Materials

Outcomes

Students will be expected to

- identify objects used, how they are used, and for what purpose they are used (102-2)
- compare and describe the parts of some familiar objects using their senses (100-13, 100-10)
- observe similar objects made with different materials, and describe their similarities and differences (100-12a, 100-10)
- organize objects or pictures in concrete-object graphs, pictographs, or symbolic bar graphs to show the number of similar objects made with various types of materials (202-4)

Elaborations-Strategies for Learning and Teaching

Students can start to look closely at the objects around them, identify the uses for these objects, and the variety of materials these objects can be made from. For example, they can look at their pencils, note that they are made from wood, a black middle part (they might call it graphite), a metal part that holds the eraser, and the rubber eraser part.

Caution: Allergy Alert. Students can, using their senses, describe the various parts of sandwiches, a pencil or a shoe. The focus should be on taking an object and seeing that it is made up of parts. Each of these parts is made with different materials.



Students can make observations using their senses to name and describe various parts of familiar objects (e.g., the legs of a chair, windows in a house, eraser on a pencil).

Students could collect and display a variety of similar objects that are made of different materials:

- writing instruments
- books/magazines
- shoes
- leaves
- containers

Introduce students to the concept of a concrete object graph. Students can count objects made from the same material and compare the total to the similar objects made from a different material. For example, pencils can be made from many different materials. There are wooden pencils, mechanical pencils and coloured pencils. Have students sort and graph the pencils according to the material that they are made of, then interpret the results.

Alternatively, they can organize pictures of different kinds of pencils in a pictograph. These graphing activities can be used to address outcomes in Data Management strand of the grade 1 mathematics program.

Objects are made from Materials

Tasks for Instruction and/or Assessment

Performance

- Classify pencils according to their attributes to create a concrete object graph (graphite, coloured, mechanical). A table similar to the one shown below could be used to display the data. (202-4)
- Create a concrete graph classifying fasteners for shoes. (202-4)

Shoes (Concrete - object Graph)

Shoes		
Shoes with laces	Shoes with Velcro™	Other

Interview

- Look closely at the pencil. What is it made from? What is the purpose of the wood, the graphite middle, the metal part on top, and the rubbery material on top? (Repeat using other objects such as a window, shoe.) (102-2, 100-13, 100-10)
- Look at a collection of different kinds of pencils (e.g., regular graphite pencils, coloured, mechanical pencils). How are they all similar? How are they different? (100-12a, 100-10)

Resources/Notes

Science and Technology Resource

102-2

Activity Bank Activities

#9

Student Book/Flip Book Activities

#1, #2, #4, #6 and AH

100-13, 100-10

Launch

Activity Bank Activities

#7 and #9

Student Book/Flip Book Activities

#1 and #5

100-12a, 100-10

Launch

Activity Bank Activities

#10

Student Book/Flip Book Activities

#2, #4, AH, LB and DWYK

204-4

Activity Bank Activities

#10

Student Book/Flip Book Activities

#2

Properties of Materials

Outcomes

Students will be expected to

- observe different forms that some materials can take, and note their similarities and differences (100-12b)
- make predictions about the way a material will perform, for example, predict which material will be the strongest (200-3)
- follow a simple procedure where instructions are given, one step at a time, to test their predictions of properties of materials (201-1)
- communicate questions, ideas, and intentions while conducting their explorations (203-1)
- select and use materials to carry out their own explorations to test the properties of the materials (200-4)
- make and record observations and measurements during investigations of materials (201-5, 100-10, 203-3)

Elaborations-Strategies for Learning and Teaching

Students will start to look more closely at various types of materials, the different forms they can take, and the properties that they have. Opportunities for both open-ended exploration of materials, and explorations in which students follow simple steps should be undertaken.

A focus on materials can be initiated by making displays featuring one type of material (e.g., displays of objects made with plastic, paper, wood) or engaging in activities whereby students sort objects into groups based on the materials they are made from. This will allow students to see the different forms materials can take.

From exploratory activities in which students investigate the properties of materials, students can make predictions about similar materials. This should lead to discussions about the type of objects that could be made from a material with the determined properties. For example, students can suggest which materials would be appropriate for building a bridge, a house, a bowl, or a swing. Literature can be used as a context. Students may try to predict which material would be the best to make a house for the pigs in the story “The Three Little Pigs”, for example, or a bridge for the story “The Three Billy Goats Gruff”.

Students can use their senses to explore, describe and test their predictions about the properties of materials. Some of the properties of materials that students could explore are hardness, roughness, texture, colour, strength, odour, flexibility, stretch, and transparency. Teachers can devise simple procedures for students to follow to test some properties. For example, students may use simple procedures to test the strength of paper straws versus plastic straws by hanging paper clips from them until they bend. Alternately, they could test the stretch of rubber bands when similar masses are hung from them.

Students can also devise their own methods for testing certain properties, like hardness or flexibility. They will do this naturally, by bending, stretching, rolling, and smelling the materials. Encourage them to describe what they are observing as they explore the various materials.

Teachers can make a chart listing a variety of materials, and use the students’ descriptions of the properties from the previous paragraph to fill in the chart.

Properties of Materials

Tasks for Instruction and/or Assessment

Performance

- Provide students with a variety of materials, such as paper, cardboard, or paper towel. Have students predict which of the materials they think is the strongest.

Place two cups approximately 4 cm apart. Lay materials across the cups to create a bridge. Test the strength of each material by adding pennies or washers, one at a time, until the material breaks or caves in. Then have students order the materials from the strongest to the weakest.

Create a concrete-object chart by laying the pennies or washers that it took to break or bend each material on the chart in the appropriate place. (200-3, 201-1, 201-5, 100-10, 203-3)

Strength of Materials Chart

Materials	Prediction (# of pennies/washers)	Observations (Actual Total)
Paper		
Cardboard		
Paper towel		

Interview

- Display a variety of objects made of the same material (e.g., plastic blocks, plastic toys, plastic bags, plastic straws, plastic rulers). (100-12b)

Ask the student how are these things alike? How are they different?

Informal/Formal observation

- Observe students as they explore materials.
 - Student shares information with their classmates.
 - Student will make suggestions as to how to improve a test or procedure. (203-1)

Resources/Notes

Science and Technology Resource

100-12b

Launch

Student Book/Flip Book Activities #1, #2, #4, #6, AH and LB

200-3

Student Book/Flip Book Activities #4

201-1

Student Book/Flip Book Activities #4

203-1

Student Book/Flip Book Activities #1, #2, #3, #4 and #5

200-4

Student Book/Flip Book Activities #4

201-5, 100-10, 203-3

Student Book/Flip Book Activities #1, #2, #3 and #4

Constructing Objects

Outcomes

Students will be expected to

- explore and describe ways to create functional and aesthetically pleasing objects by safely selecting, combining, modifying, or joining different components or materials (101-5, 102-1, 201-8)
- select the amount and kind (recycled or reused, if possible) of materials that are appropriate while constructing objects (103-3)
- use appropriate tools, such as safety glue and scissors, for manipulating materials when building objects (201-3)
- identify problems to be solved while constructing objects, and work cooperatively and collaboratively to propose answers during the design process (200-2, 202-7, 203-1)
- compare and evaluate personally constructed objects with respect to their form and function (202-8)

Elaborations-Strategies for Learning and Teaching

When students have identified properties of various materials they should be prepared to use their knowledge to select appropriate materials for the objects that they will construct.

Students are to try to solve a problem or task involving a variety of senses. Some examples are:

- design and create a simple device that can make a variety of sounds
- design and create a container that can hold sand
- design and create a container that can hold the most marbles without breaking
- design a house for the “Three Little Pigs”
- design a bridge for the “Three Billy Goats Gruff”.

Students can also explore how objects can be made from recycled or reused material. They can make objects out of used materials, e.g.:

- make a ornamental wreath out of garbage bags
- make a rag rug
- make puppets out of old socks

Before they create their product, students should do activities that demonstrate various ways of joining materials. Twisted paper clips with straws, soaked peas stuck on toothpicks and left to dry, safety glue with stir sticks, Velcro™, marshmallows stuck on toothpicks, and other methods of joining materials can be used.

Caution: Students are not to eat these materials or put them in their mouths—students can choke on some of the smaller objects.



Working in pairs, students can plan their design, talk together about the materials that they are going to use and how they will join them. As problems arise during the design and construction phases, students should be encouraged to work together to solve them.

When they have finished their construction, they can show their product to the rest of the class, explain what it does, and why they chose the materials and design that they did. The products that they make should be of their own design, and as such, should not be the same as others in their class.

Constructing Objects

Tasks for Instruction and/or Assessment

Performance

- Provide students with a variety of materials including materials for joining and cutting, such as glue, twist ties, marshmallows. Which materials seem to join the best? Which hold really well? (200-2, 202-7, 203-1)
- Use a variety of materials to construct a structure.
 - Students will discuss the appropriateness and performance of the selected materials. (101-5, 102-1, 201-8, 103-2, 200-2, 202-7, 203-1)
- Using a variety of materials, design a tower that is strong enough to hold a book. (101-5, 102-1, 201-8, 103-2, 200-2, 202-7, 203-1)

Journal

- In this unit, I built a ... I learned all about ... I liked building the ... because ... encourage students to draw pictures. Provide a list of words they might use in their writing. (202-8)

Interview

- Tell me some of the problems you had while you were constructing your ... How did you solve them? (200-2, 202-7, 203-1)

Presentation

- Create a poster that shows pictures or drawings of things that can be recycled, and things that can be reused. (103-3)

Portfolio

- Choose a piece of work that you are most proud of from this unit. Why you are proud of your work?

Resources/Notes

Science and Technology Resource

101-5, 102-1, 201-8

Activity Bank Activities

#8 and #12

Student Book/Flip Book Activities

#5, #6 and DWYK

103-3

Activity Bank Activities

#12

Student Book/Flip Book Activities

#5 and #6

201-3

Activity Bank Activities

#12

Student Book/Flip Book Activities

#5 and #6

200-2, 202-7, 203-1

Student Book/Flip Book Activities

#5 and #6

202-8

Activity Bank Activities

#12

Student Book/Flip Book Activities

#5 and #6

Life Science: Needs and Characteristics of Living Things

Introduction

Students in grade 1 are interested in a wide variety of living things, including those found in their local environments and ones from afar. A study of living things provides an opportunity for students to discover the many different forms life takes. Students can observe similarities and differences in living things developing an understanding of the general characteristics of living things. Through this study, students also become aware that all living things—including themselves—have needs. They discover that some of the needs of organisms are similar, while others may be unique.

Focus and Context

The focus of this unit is inquiry. Instruction should provide many opportunities for students to participate in open-ended investigations involving living things. Students should have many opportunities to make first-hand observations of plants and animals inside and outside of the classroom. These observations will lead to grouping organisms based on similar characteristics, which form the beginnings of classification. The investigations will also lead to an awareness of the dynamic nature of life: all living things are interdependent, and must take an active role in obtaining the necessities of life.

Pets, Farm Animals, Creatures of the Tundra, or Ocean Creatures are a few of the many contexts that this unit could have. The local environment and the creatures and plants that live there should be the determining factor in deciding the most appropriate context for this unit.

Science Curriculum Links

This unit will lead to a grade 2 unit, “Animal Growth and Changes”, and a grade 3 unit, “Plant Growth and Changes”, both of which focus on life cycles.

pan-Canadian Science Learning Outcomes

N.B. The following pan-Canadian Science Learning Outcomes were used as the framework in the development of the Atlantic Canada Science Curriculum at this grade level. They are included here to illustrate the two types of science outcomes at the primary level: i.e., *STSE/Knowledge* and *Skills*. For planning, instructional, and assessment purposes, teachers should refer to the PEI/APEF Specific Curriculum Outcomes found on the next page.

STSE/Knowledge	Skills
<p>100-8 identify and describe common characteristics of humans and other animals, and identify variations that make each person and animal unique</p> <p>100-4 observe and identify similarities and differences in the needs of living things</p> <p>100-5 describe different ways that plants and animals meet their needs</p> <p>100-7 describe the different ways that humans and other living things move to meet their needs</p> <p>100-6 describe ways that humans use their knowledge of living things in meeting their own needs and the needs of plants and animals</p> <p>103-2 recognize that humans and other living things depend on their environment, and identify personal actions that can contribute to a healthy environment</p>	<p>Initiating and Planning</p> <p>200-1 ask questions that lead to exploration and investigation</p> <p>200-3 make predictions based on an observed pattern</p> <p>Performing and Recording</p> <p>201-5 make and record relevant observations and measurements, using written language, pictures, and charts</p> <p>201-7 identify and use a variety of sources of science information and ideas</p> <p>Analysing and Interpreting</p> <p>202-2 place materials and objects in a sequence or in groups according to one or more attributes</p> <p>202-9 identify new questions that arise from what was learned</p> <p>Communication and Teamwork</p> <p>203-2 identify common objects and events, using terminology and language that others understand</p> <p>203-4 respond to the ideas and actions of others in constructing their own understanding</p>

PEI/APEF Specific Curriculum Outcomes

Characteristics of Living Things

Students will be expected to

- make and record relevant observations and measurements about animals and plants, using written language, pictures, and charts (201-5)
- identify and use common terms for parts of humans, other animals, and plants (203-2)
- identify and describe common characteristics of humans, other animals, and plants, and identify variations that make each person, animal and plant unique (100-8)
- listen and respond to another student's description of an animal or plant (203-4)
- place animals and plants in groups according to one or more characteristics (202-2)

Needs of Living Things

Students will be expected to

- ask questions about the needs of living things that lead to exploration and investigation (200-1)
- observe and identify similarities and differences in the needs of living things (100-4)
- describe different ways that plants and animals meet their needs (100-5)
- describe ways that humans and other living things move to meet their needs (100-7)
- make predictions about the movement of animals based on their previous observations (200-3)
- identify new questions about the needs of living things, and identify and use a variety of sources of science information to answer them (201-7, 202-9)
- describe ways that humans use their knowledge of the needs of living things (100-6)
- recognize that humans and other living things depend on their environment, and identify personal actions that can contribute to a healthy environment (103-2)

Characteristics of Living Things

Outcomes

Students will be expected to

- make and record relevant observations and measurements about animals and plants, using written language, pictures, and charts (201-5)
- identify and use common terms for parts of humans, other animals, and plants (203-2)
- identify and describe common characteristics of humans, other animals, and plants, and identify variations that make each person, animal and plant unique (100-8)
- listen and respond to another student's description of an animal or plant (203-4)
- place animals and plants in groups according to one or more characteristics (202-2)

Elaborations—Strategies for Learning and Teaching

Throughout this unit, children are encouraged to use their five senses when making observations of classroom or visiting pets, such as fish, gerbils, or other appropriate animals, and of plants grown in the classroom or out in the school yard. Activities could start by comparing humans to other animals, and then comparing animals to plants.

Terms such as legs, wings, ears, roots, and stems could be used to describe living things. A bird feeder set up at home or at school would attract various types of birds for students to observe, noting their characteristics. Students could collect insects in clear, plastic bottles with holes in the lids, and observe them, taking note of things such as the number of wings, legs, and antennae. Encourage students to return the insects to their natural environment. These experiences can be extended with visits to farms, aquariums, zoos, nature parks, or other settings with live animals and plants. This will encourage students to develop interest and curiosity about living things within their immediate environment. Other extensions could include exploring living things through the use of print resources, videos, and software.

In the classroom, teachers can model recording strategies as they tally information to create concrete graphs, picture graphs, and pictographs. This will also address outcomes from the Data Management strand in the grade 1 mathematics program. For example, students could use pictures of chickens, pigs, and cows to make a picture graph of the number of animals at a farm they visited. They could use nonstandard units of measuring, such as “longer stem” or “shorter ears”. They could make a concrete graph using themselves to illustrate the number of students in the class with certain eye colours. This could be done with one half of the class at a time so that the other half can see the graph.

Invite the students to brainstorm characteristics of humans. These characteristics could be divided into two categories - characteristics that are common to most people (such as hands and eyes) and characteristics that are unique to people (such as eye and hair colour). Be sensitive to students feelings, and do not do activities in which individual students are stigmatized for physical characteristics. Teachers could use classroom literature and other resources to illustrate the diversity of characteristics.

Students can take turns describing a feature of an animal or plant, helping each other with describing words.

Using the accumulated records of observations of different animal characteristics, students can be encouraged to identify similarities and differences, grouping similar animals together. For example, they may group animals based on how many legs they walk on, whether they have wings or not, or whether they live in the water. They could group plants into trees, flowers, and shrubs, or base the groups on the number or shapes of leaves.

Characteristics of Living Things

Tasks for Instruction and/or Assessment

Performance

- Students would collect pictures of plants or animals highlighting specific characteristics. Display in a collage format. (201-5, 202-2, 203-2, 100-8)

Paper and Pencil

- Complete the chart. On the back, draw a picture of your favourite animal. (100-8)

Can you see the difference?

Characteristics	Human	Cat	Fish	Bird
legs	2			
eyes	2			
ears	side of head			
fur, feathers, or skin	skin			
Moves by ...	walking, running, swimming, crawling, walking			

Teacher's Note: Instead of using "words" in the chart, pictures pasted in each column/row may be more suitable for some students.

Presentation

- Tell us about your favourite animal or plant. (201-5, 203-4)
 - What type of animal/plant did you choose?
 - Where does your animal/plant live?
 - Where does your animal/plant get nourishment?
 - How does your animal/plant breathe?

Resources/Notes

Science and Technology Resource

201-5

Launch

Activity Bank Activities

#7, #8 and #9

Student Book/Flip Book Activities

#2, #3, #4, #5, #6 and AH

203-2

Activity Bank Activities

#1, #6, #7 and #8

Student Book/Flip Book Activities

#2, #5, #6, AH and LB

100-8

Launch

Activity Bank Activities

#5, #6 and #7

Student Book/Flip Book Activities

#2, #3, #5, LB and DWYK

203-4

Activity Bank Activities

#9

Student Book/Flip Book Activities

#2, #4 and #6

202-2

Student Book/Flip Book Activities

#2 and #5

Needs of Living Things

Outcomes

Students will be expected to

- ask questions about the needs of living things that lead to exploration and investigation (200-1)
- observe and identify similarities and differences in the needs of living things (100-4)
- describe different ways that plants and animals meet their needs (100-5)
- describe ways that humans and other living things move to meet their needs (100-7)
- make predictions about the movement of animals based on their previous observations (200-3)
- identify new questions about the needs of living things, and identify and use a variety of sources of science information to answer them (201-7, 202-9)
- describe ways that humans use their knowledge of the needs of living things (100-6)
- recognize that humans and other living things depend on their environment, and identify personal actions that can contribute to a healthy environment (103-2)

Elaborations—Strategies for Learning and Teaching

Classroom discussion will generate questions like “Which of these things is alive?” and “What does it need to live?”. These questions can provide a focus for this part of the unit. Living things grow and change, require air, food and water. Some questions that might be posed are “How do they eat?”, “How often should I water this plant?”, or “How much water do I use?”. Students could discuss how they care for a pet and/or plants.

Students could observe and care for their classroom and/or visiting animals, or plants as well as focus on a wide range of animals using a variety of resources (film, software, print) to learn how animals meet their needs. Students could explore ways that different animals adapt to changes in temperature (hibernation, migration), the ways that the various animals move (flying, swimming, running) that helps them live in their environment. Similarities and differences in the ways different animals get their food and protect themselves from danger can be explored. Students can also grow simple plants from seeds, take care of the plants as they grow, and recognize the needs of their plants.

Students should try to predict which group of animals will fly, which will crawl, which will jump, or which will slide. Have them look at pictures of fish, birds, reptiles, and other types of animals and try to predict how they will move.

Opportunities should be provided for students to use a variety of sources of information, such as observing living things, books, videos, software, Internet, to find answers to their questions.

Using their knowledge of the needs of living things, students could investigate how people care for plants and animals in order to make sure that their needs are met. This can be compared to how plants and animals growing in the wild meet their needs. This is an opportunity to introduce the concept of technology as the means by which people manage their environment for their own needs.

Students should start to explore the importance of taking care of natural and other habitats. An investigation of “litter” is very appropriate at this grade level. Students could investigate and discuss questions such as “What is litter?”, “How is litter harmful to plants and animals?” and “What can we do to keep our homes, school, and communities healthy and safe?”

Needs of Living Things

Tasks for Instruction and/or Assessment

Performance

- Plant a seed and use your knowledge of needs of living things to care for it. (100-6)
- Take a walk around your school yard and look for signs of littering. Draw pictures of what you saw. (103-2)

Interview

- What kind of things would you do to take care of a plant? What would you do differently if you had to take care of a horse? (100-4, 100-5, 100-7, 200-3)
- What different ways do animals move to get food or escape from other animals? (100-7)
- How would a bird move from one tree to another? (100-7)
- How would a baby girl or boy get to its toy? (100-7)
- How could you find additional information about plants/or animals? (CD-Rom, videos, visits to zoo, books, Internet) (201-7, 202-9)

Informal/Formal Observation

- Note the types of questions that students ask about living things. (200-1)
- Look at pictures of different animals and describe how they move. (100-7)

Resources/Notes

Science Safety Guide

103-2 Lesson One, Lesson Two,
Lesson Three and Lesson Four

Science and Technology Resource

200-1

Activity Bank Activities

#9

Student Book/Flip Book Activities
#4 and DWYK

100-4

Launch

Student Book/Flip Book Activities
#1, #3, #4 and #6

100-5

Activity Bank Activities

#4, #6, #7 and #9

Student Book/Flip Book Activities
#2, #3, #5, #6, AH and DWYK

100-1

Activity Bank Activities

#2, #3

Student Book/Flip Book Activities
#2, #3 and #4

200-3

Activity Bank Activities

#3

Student Book/Flip Book Activities
#2 and #3

201-7, 202-9

Activity Bank Activities

#9

Student Book/Flip Book Activities
#4 and #6

100-6

Activity Bank Activities

#9

Student Book/Flip Book Activities
#4, #5 and #6

103-2

Activity Bank Activities

#2

Student Book/Flip Book Activities
#4

Earth and Space Science: Daily and Seasonal Changes

Introduction

In observing their environment, students become aware of things that change, including changes in physical factors such as temperature, wind, or light, and changes in plants and animals found near their home. With guidance, students learn that changes often occur in cycles, including the relatively short cycle of day and night and the longer cycle of the seasons. Recognizing these patterns prepares students to discover relationships among events in their environment, and between the environment and themselves.

Focus and Context

The inquiry focus in this unit will emphasize making observations of daily and seasonal events, recording these observations over time, and noting patterns or cycles that exist. The context for this unit is cycles. Students will learn that many things in life occur in cycles, and knowing about these cycles helps people make predictions and plan for the future.

This unit could be addressed over the school year, so that students can explore the seasonal changes that occur.

Science Curriculum Links

After the introduction to “Daily and Seasonal Changes” in this unit, students will go on to investigate the causes of these changes in a unit on “Space” in grade 6. They look further into how animals and plants adapt to these changes in “Habitats and Communities” in grade 4 and “Diversity of Life” in grade 6.

pan-Canadian Science Learning Outcomes

N.B. The following pan-Canadian Science Learning Outcomes were used as the framework in the development of the Atlantic Canada Science Curriculum at this grade level. They are included here to illustrate the two types of science outcomes at the primary level: i.e., *STSE/Knowledge* and *Skills*. For planning, instructional, and assessment purposes, teachers should refer to the PEI/APEF Specific Curriculum Outcomes found on the next page.

STSE/Knowledge	Skills
<p>101-6 describe ways of measuring and recording environmental changes that occur in daily and seasonal cycles</p> <p>100-14 describe changes in heat and light from the sun</p> <p>102-3 observe and describe changes in sunlight and describe how these changes affect living things</p> <p>102-4 investigate and describe changes that occur on a daily basis in the characteristics, behaviours, and location of living things</p> <p>102-5 investigate and describe changes that occur in seasonal cycles in the characteristics, behaviours, and location of living things</p> <p>103-4 investigate and describe human preparations for seasonal changes</p>	<p>Initiating and Planning</p> <p>200-1 ask questions that lead to exploration and investigation</p> <p>200-3 make predictions based on an observed pattern</p> <p>Performing and Recording</p> <p>201-5 make and record relevant observations and measurements, using written language, pictures, and charts</p> <p>201-8 follow given safety procedures and rules and explain why they are needed</p> <p>Analysing and Interpreting</p> <p>202-2 place materials and objects in a sequence or in groups according to one or more attributes</p> <p>202-7 propose an answer to an initial question or problem and draw simple conclusions based on observations or research</p> <p>202-9 identify new questions that arise from what was learned</p> <p>Communication and Teamwork</p> <p>203-1 communicate questions, ideas, and intentions while conducting their explorations</p> <p>203-2 identify common objects and events, using terminology and language that others understand</p>

PEI/APEF Specific Curriculum Outcomes

Introduction to Cycles:

Daily/Seasonal Changes in Heat and Light

Students will be expected to

- identify the days of the week and the names of the seasons (203-2)
- describe ways of qualitatively measuring and recording environmental changes that occur in daily and seasonal cycles (101-6)
- observe and describe daily and seasonal changes in heat and light from the sun (100-14)
- predict the types of weather for a certain season, based on their observations of the patterns of weather during the year (200-3)

Daily Changes in Living Things

Students will be expected to

- ask questions about daily changes that affect the characteristics, behaviours, and locations of living things, that lead to exploration and investigation (200-1)
- investigate and describe daily changes in the characteristics, behaviours, and location of living things (102-4)
- make and record relevant observations and measurements, using written language, pictures, and charts, while investigating daily changes in the characteristics, behaviours, and locations of living things (201-5)

Seasonal Changes in Living Things

Students will be expected to

- identify questions about how living things cope with seasonal changes in temperature and amount of light that arise from their study of seasonal changes (202-9)
- answer questions raised by investigating and describing seasonal changes in the characteristics, behaviours, and location of living things (102-5, 202-7)
- observe and describe changes in sunlight and describe how these changes affect living things (102-3)
- communicate questions, ideas, and intentions while conducting their explorations into how living things cope with seasonal changes (203-1)
- make predictions about seasonal changes in plants and animals (200-3)
- group pictures by the season that they depict (202-2)
- investigate and describe human preparations for seasonal changes (103-4)
- follow safety procedures and rules related to dressing appropriately for the weather and explain why they are needed (201-8)

Introduction to Cycles: Daily/Seasonal Changes in Heat and Light

Outcomes

- Students will be expected to
- identify the days of the week and the names of the seasons (203-2)
 - describe ways of qualitatively measuring and recording environmental changes that occur in daily and seasonal cycles (101-6)
 - observe and describe daily and seasonal changes in heat and light from the sun (100-14)

Elaborations—Strategies for Learning and Teaching

Students could display pictures of seasonal activities of humans and living things as well as weather typical of various seasons. Have students describe their favourite weekly and seasonal activities to introduce the concept that the days of the week and the seasons have a sequence, and that this sequence is repeated over and over. Teachers may wish to have a “Calendar Time” every morning, in which the date, day of the week, and month are identified.

To prepare for collecting and recording data around seasonal changes in weather, discuss with your students what kinds of information can be collected and how they will go about recording the data. Focus on the types of language, drawings, and nonstandard measurements that can be used to describe temperature (hot, warm, cold), light (light or dark, cloudy or sunny), position of the sun (drawing a picture of what they see when they look out the window, and then drawing the sun at various times of the day), and types of precipitation (rain, fog, snow, sleet, hail; perhaps using a bucket to measure the amount of rain or snow). This will prepare them for observing and recording environmental changes that occur in daily and seasonal cycles.

Students can go outdoors at various intervals during the day and note whether they feel it is hotter or colder. They will not be reading thermometers at this level. However, a teacher may wish to show them one, and refer to it at various times so they get the idea of what it is used for. This can be continued over the course of the school year so that students can see and feel that temperatures fluctuate on a daily and seasonal basis. They can also use their clothing as a measure of the temperature throughout the year. When it is cold, they wear clothing like mittens, hats and parkas, and when it is warm, they wear clothing like swimming suits and shorts.

Students can note the daily cycle of the sun rising and setting, and the gradual darkness that occurs after the sun sets. Seasonal measurements would reflect the amount of daylight at various times of the school year. While students will probably be asleep when the sun rises, they will often see the sun set, and they can note trends by relating the sun set to daily activities they perform. For example, in the fall, the sun will set as they are going to bed, while in the winter, it will set before they have supper. In the summer, it may still be light when they are going to bed.

Introduction to Cycles: Daily/Seasonal Changes in Heat and Light

Tasks for Instruction and/or Assessment

Performance

- Use symbols for sun, rain, snow, cloud, fog, sleet and hail to record daily weather conditions on a classroom calendar. Notice the types of precipitation over various seasons. (101-6, 100-14)
- For one week of every month, fill in the table below.

Changes in Seasons

Month: (Student fills this in)		Season: (Student fills this in)		
Day of the Week (Student fills in)	Temperature (Hot,cold, warm)	Rain, snow, fog, ...	Sun Rise (relate to a daily activity)	Sun Set (relate to a daily activity)
Monday			(e.g., Before I got up)	(e.g., As I was eating Supper)

Teacher's Note: After each season, ask students to reflect on their findings. During which season do you get the most sunlight? the least sunlight? (100-14, 101-6)

Journal

- Every day as the students fill in their journal, they can note the day of the week, the month, and the season. (203-2)

Interview

- What is it like outside right now? Is it sunny or cloudy? Is it warm? What kind of clothes would you wear for this weather? (Repeat at various times during the day.)
- When, during the day, is it usually warmer? When night comes, does it usually get warmer or colder? (100-14)

Presentation

- Cut out pictures of various types of clothes from advertising flyers. Sort and group the clothing according to seasonal use and different weather conditions. Create a poster from print resources to show the groupings. (100-14)

Resources/Notes

Science and Technology Resource

203-2

Launch

Activity Bank Activities

#4, #5 and #7

Student Book/Flip Book Activities

#1, AH and DWYK

101-6

Activity Bank Activities

#1, #2, #8, #9

Student Book/Flip Book Activities

#5, #6

100-14

Activity Bank Activities

#1 and #2

Student Book/Flip Book Activities

#1, #3, #4, #5 and #6

Introduction to Cycles: Daily/Seasonal Changes in Heat and Light (continued)

Outcomes

- Students will be expected to
- observe and describe daily and seasonal changes in heat and light from the sun (100-14) (continued)
 - predict the types of weather for a certain season, based on their observations of the patterns of weather during the year (200-3)

Elaborations—Strategies for Learning and Teaching

Students could observe and describe the types of precipitation that occur at various seasons of the school year.

Students can also note the position of the sun in the sky at different times of the day. **Caution: Students are not to look directly at the sun.** Where does it rise? Where does it set?

Students can note these daily changes, and do activities to see how their shadows change over the course of a day. To highlight daily changes in shadows, students could trace the shadow of a short straw that has been erected on a piece of paper by a window. The student could come back at another time of the day, and trace the shadow again. Teachers may wish to encourage students to notice the differences in the position of the sun as it sets over the course of the school year. To highlight seasonal changes in the position of the sun and the resulting shadows (if desired), students could repeat the straw activity using a different piece of paper for each month, comparing the shadow lengths. The focus of these activities is simply observing the position of the sun, and the length of the shadows at various times, not on explaining why this happens. When students investigate Space in grade 6, they will explore the rotation of the Earth around the sun, and propose explanations for shadow lengths.

Students could observe and describe the types of precipitation that occur at various seasons of the school year. Students can collect rain and snow in buckets or other containers, and using terms like “more than” or “less than”, describe the amounts of rain or snow that fell. They could also use nonstandard units of measurement such as how many pencils, crayons, or stir stick widths is the height of the rain in the container.

Students can make simple weather predictions related to the seasons, for example, predicting what the weather will be like in June or December.



Introduction to Cycles: Daily/Seasonal Changes in Heat and Light (continued)

Tasks for Instruction and/or Assessment

Performance



- Draw the position of the sun, relative to a landmark such as a tree or mountain, at various times during the day (morning, noon and afternoon). Repeat this activity for a week so that children will notice a movement pattern of the sun. (101-6, 100-14) **Caution: Do not look directly at the sun.**
- Teacher's Note: With a partner and a piece of chalk, trace your feet on the pavement outside your school on a sunny day. Standing straight and still, ask your partner to mark on the pavement the end of your shadow. Repeat this at various times during the day, making sure to stand the same way each time. Answer the questions:
 - a. Is your shadow pointing the same way all day?
 - b. What happens to the length of your shadow during the day? (100-14)

Journal

- What happens to the sun as I go through my day? Where is it when I get on the bus, have my lunch, and go to bed? (100-14)

Interview

- What would the weather be like during the winter break? What might the weather be like at Halloween? (100-14, 200-3)

Presentation

- Make a poster showing the kind of clothing worn in July and in December. (200-3)

Resources/Notes

Science and Technology Resource

100-14

Activity Bank Activities

#1 and #2

Student Book/Flip Book Activities

#1, #3, #4, #5 and #6

200-3

Launch

Student Book/Flip Book Activities

#3, AH and DWYK

Daily Changes in Living Things

Outcomes

- Students will be expected to
- ask questions about daily changes that affect the characteristics, behaviours, and locations of living things, that lead to exploration and investigation (200-1)
 - investigate and describe daily changes in the characteristics, behaviours, and location of living things (102-4)
 - make and record relevant observations and measurements, using written language, pictures, and charts, while investigating daily changes in the characteristics, behaviours, and locations of living things (201-5)

Elaborations—Strategies for Learning and Teaching

In this part of the unit, students note the daily changes and cycles in living things. This section can reinforce the outcomes in the previous unit, Needs and Characteristics of Living Things.

Teachers should encourage students to ask questions about potential daily changes in a variety of living things. Some of their questions should be chosen for further exploration.

Students should keep track of their activities throughout the week to see what things they do on a daily basis (e.g., sleep at night, eat meals, brush their teeth after eating). Discussions should describe characteristics about themselves such as sleepy, alert, or hungry as well as their location over the course of a day such as bed, kitchen, playground and school.

If students have pets, they can observe and record the activities of their pets to see their daily pattern. They could note natural habits and routines, such as when they sleep, as well as habits and routines that are established by the care they receive.

Students could note the times of the day that the birds come to feed at a school or home bird feeder. Do different kinds of birds arrive at different times? Birds make excellent subjects to study, since they have daily cycles that are easily observable and well known. Many stories relate how a rooster crows at dawn, or how an owl is active at night.

Students could explore, through print and electronic resources, animals that are nocturnal, that is, sleep during the day and are awake at night. If any students have pet gerbils or hamsters, ask them to share the night-time activities of these animals.

Students could explore through discussion the daily changes in plants. All plants change throughout the day, usually reacting to the presence or absence of sun. Some change more obviously than others, for example, pansies close up their flowers at night. Time lapse videos or living species in the classroom can be used to show these changes.

Teachers might prompt the discussion by asking questions such as “Are there things you do everyday?”, “What are things plants might do everyday?”, and “What things that dogs or cats do everyday?”

Daily Changes in Living Things

Tasks for Instruction and/or Assessment

Performance

- Complete the chart below. This chart could be used for a classroom or home pet as well. (102-4, 201-5)

A Day in my Life			
Morning	Afternoon	Evening	Night

Interview

- What kind of things do you do at the same time each day or night (e.g., going to bed at night and getting up in the morning, eating breakfast)? (102-4)
- Do animals or plants do the same things at about the same time each day? Are there any plants or animals we could investigate to see if they have a daily routine too? What could we watch for? (200-1)
- Do birds sing when it's dark? Are there any animals that sleep during the day and are awake at night? What happens to flowers in the dark? What happens to flowers when the sun shines? This should lead students to see that the time of day and sun affect the activity of plants and animals. (102-3)

Resources/Notes

Science and Technology Resource

200-1

Activity Bank Activities

Teacher's Guide, Activity 9

102-4

Activity Bank Activities

#9

Student Book/Flip Book Activities

#2

201-5

Activity Bank Activities

#1 and #11

Student Book/Flip Book Activities

#2

Seasonal Changes in Living Things

Outcomes

Students will be expected to

- identify questions about how living things cope with seasonal changes in temperature and amount of light that arise from their study of seasonal changes (202-9)
- answer questions raised by investigating and describing seasonal changes in the characteristics, behaviours, and location of living things (102-5, 202-7)
- observe and describe changes in sunlight and describe how these changes affect living things (102-3)
- communicate questions, ideas, and intentions while conducting their explorations into how living things cope with seasonal changes (203-1)
- make predictions about seasonal changes in plants and animals (200-3)
- group pictures by the season that they depict (202-2)

Elaborations—Strategies for Learning and Teaching

The suggestions on this page are meant to deal with the group of outcomes as a whole; thus there is not a strict alignment of suggestions to outcomes. As the school year progresses from late summer to fall, winter, and then spring, the various seasons can be highlighted throughout the classroom with pictures, displays and outdoor walks.

Student questions about how living things cope with the seasons should form the basis for their investigations. Students could investigate how the amount of sunlight and temperature varies over the seasons by noting sunsets, sunrises and the relative temperatures at various times of the day (qualitative: hotter, colder, types of clothing). They could note that in the winter, there is less sunlight, and the temperatures are colder. How living things cope with these changes is highlighted in this section.

A bird feeder could be set up outside of the school or home. Students could keep descriptions of the birds over the school year or season. They could note which ones do not show up at the feeder. This can be an introduction to the concept of migration. Depending on the local setting, students may be aware of other migratory species such as cod, caplin, whales, harp seals, caribou, geese and ducks.

Students with dogs or cats could describe the changes that occur in their coat over the year, for example shedding in spring and a thickening coat in autumn. Using print or electronic media, students could research animals or plants that change colour over the year. (snowshoe hares/rabbits).

There are various ways living things cope with seasonal changes, such as migration and hibernation. Many species have seasonal hibernation stages. Students could explore how and why certain animals can sleep for so long or go without food. Students can use interactive software, videos and print resources that illustrate the seasonal activities, behaviours and locations of animals.

Students could investigate the changes that take place in plants. Students could observe the leaves and seeds falling from trees in the fall, seeds germinating in the spring, and new leaves budding in the spring. They can draw pictures that show how the trees change over the seasons or use pictures from print resources. Students could attempt to predict when the leaves will fall in autumn, or predict that certain animals will hibernate during the winter.

Students should group pictures to depict the season they represent.

Seasonal Changes in Living Things

Tasks for Instruction and/or Assessment

Performance

- Select a tree in your community or at home. Observe it throughout the year, and draw the changes in the table or on a poster. (102-3, 102-5, 202-7) Photographs may be used to show changes.

Paper and Pencil

My Tree !		
Fall	Winter	Spring

- Predict the season: (200-3, 203-1)
 - leaves fall off the tree
 - bears hibernate
 - squirrels start to hide their nuts and acorns
 - buds form on trees

Interview

- What happens in the fall? Do all trees lose their leaves? What do bears do to prepare for winter? What do rabbits do? What do geese do? What do people do? Have you noticed any changes in your pet? (This should lead to an understanding that animals will hibernate, migrate, or change their coats; some trees lose leaves,) (102-5, 202-7, 202-9)

Presentation

- Create posters to show behaviours or changes in living things in summer and winter. (fish, bears, birds, trees, humans, etc.). (102-3, 202-2, 203-1)

Resources/Notes

Science Safety Guide

102-3 Lesson One

Science and Technology Resource

202-9

Activity Bank Activities

#1 and #11

Student Book/Flip Book Activities

#2

102-5, 202-7

Activity Bank Activities

#3, #5 and #10

Student Book/Flip Book Activities

#1, #2, #3, #4, AH and DWYK

102-3

Activity Bank Activities

#8 and AH

203-1

Activity Bank Activities

#9

Student Book/Flip Book Activities

#2, #3 and #4

200-3

Activity Bank Activities

#9, AH and DWYK

202-2

Activity Bank Activities

#11

Student Book/Flip Book Activities

#4 and AH

Seasonal Changes in Living Things (continued)

Outcomes

Students will be expected to

- investigate and describe human preparations for seasonal changes (103-4)
- follow safety procedures and rules related to dressing appropriately for the weather and explain why they are needed (201-8)

Elaborations–Strategies for Learning and Teaching

Students could question workers in their community about how they prepare for the winter. A field trip to a farm, zoo, fish plant, fishing village, or other areas that need to prepare for the seasons would be a valuable experience. A guest speaker involved in a related industry, could describe the seasonal preparations that they have to complete.

Students' behaviours, location, and activities vary throughout the year as well. Students can collaborate to design posters and murals that illustrate their seasonal activities, dress, and places where they like to go. They may even identify foods that they like to eat during the various seasons. Recess and lunch times that are "outside" days can be used to reinforce the concepts of dressing appropriately for the weather.

Seasonal Changes in Living Things (continued)

Tasks for Instruction and/or Assessment

Paper and Pencil

- Using print resources, write or draw the different types of things that are sold to help people prepare for the different seasons. (103-4)

Interview

- Why do we have to dress appropriately for the weather? (103-4, 201-8)

Presentation

- Interview your parents to find out what they do around your home or with their cars to prepare for winter and summer. Present an oral report to class. (103-4, 201-8)
- Draw pictures to show what you do each season. (103-4)
- Collect a variety of seasonal pictures and group them by the season they represent. (202-2)

Seasons of the year	Seasonal Changes
Fall	Winter
Spring	Summer

Portfolio

- Choose a piece of work to put in your portfolio that reflects seasonal changes. Tell your teacher why you chose it.

Resources/Notes

Science Safety Guide

103-4 Lesson One and Lesson Two
201-8 Lesson Two

Science and Technology Resources

103-4

Activity Bank Activities

#6 and #12

Student Book/Flip Book Activities LB

201-8

Activity Bank Activities

#3, #12 and #13

Student Book/Flip Book Activities #2, #3, LB and DWYK

Elementary Science Safety

Although experimentation in the elementary years may not be in as much depth as in secondary school, and the equipment and chemicals may not be as sophisticated, the attention to safety is just as important. Safety is an important concern in the elementary science classroom because students are learning new skills and working with unfamiliar equipment and materials that can pose some degree of hazard. Safety in the elementary school science classroom depends upon the wise selection of experiments, materials, resources and field experiences as well as consistent adherence to correct and safe techniques. Some work procedures require thorough planning, careful management and constant monitoring of students' activities. Teachers should be knowledgeable of the properties, possible hazards, and proper use and disposal of all materials used in the classroom.

The Safe Classroom

Some general principles of safe science classroom management may be identified:

- Prepare, maintain, and prominently display a list of emergency telephone numbers.
- Identify people within the school who are qualified to administer first aid.
- Annually review and complete the safety checklists relevant to your situation.
- Familiarize yourself with the relevant medical histories of individual students.
- Review basic first aid procedures regularly.
- Formulate, in consultant with administration and other teachers, an action plan to deal with accidents in the classroom and also on extracurricular activities such as field trips.

Non-Hazardous Chemicals

The following chemicals can be used safely by students (but remember that any substance, even salt, can be harmful if taken in sufficient quantity). Be aware that any substance in a fine powder or dust form can be inhaled and thus harm health.

Aluminum foil	Detergents, hand-washing types (but not dishwashing)	Soap
Baking powder (sodium bicarbonate and tartaric acid)	Food colouring	Starch
Baking soda (sodium bicarbonate)	Glycerine (glycerol)	Steel wool
Bath salts/Epsom salts (magnesium sulfate)	Iron filings	Sugar
Borax (sodium borate)	Lemon juice (contains citric acid)	Tea (contains tannic acid)
Carbonated (fizzy) drinks	Marble chips (calcium carbonate)	Universal (pH) indicator paper or solution
Chalk (calcium carbonate)	Litmus paper or solution	'Vaseline'
Charcoal (carbon)	Milk	Vinegar (dilute acetic acid)
Citric acid crystals	Oils, vegetable and mineral (but not motor oil)	Vitamin C (ascorbic acid)
Clay (moist)	Plaster of Paris or cellulose fillers ('Polyfilla')	Washing powder, hand-washing types
Copper foil	Salt (sodium chloride)	Zinc foil
Cream of tartar (tartaric acid and potassium hydrogen tartrate)	Sand	

Dangerous Household Chemicals

Some common products are potentially hazardous and should not be used in the elementary classroom. Consider warning the students about the dangers in their homes.

Bleach	Fine powdered substances	Paint strippers
Caustic soda (sodium hydroxide)	Fireworks, sparklers and party poppers	Pesticides, fungicides, and insecticides
Rust-removal solution	Gasoline and other fuels	Some plant growth substances
Dishwasher detergents	Hydrogen peroxide	(e.g. rooting powders)
Drain cleaner	(more than a 3% solution)	Scale removers
Dry cleaning fluids	Laundry detergents	Toilet cleansers
Some fertilizers	Oven cleaners	Weed killers

Disposing of Chemicals

- The disposal of non-hazardous, water-soluble liquid wastes (e.g. liquid handsoap, vinegar) should involve diluting the liquid waste before pouring it down the drain, then running tap water down the drain to further dilute the liquid.
- Non-hazardous solid wastes (e.g. iron filings, table salt) should be disposed of in a waste container.
- Hazardous wastes should be placed in specially marked waste containers and disposed of in an appropriate manner.

Science Safety Rules and Procedures for Elementary Science Students

(not a conclusive list)

1. Never do any experiment without the approval and direct supervision of your teacher.
2. Read all written instructions before doing an activity.
3. Listen to all instructions and follow them carefully.
4. Make sure you understand all the safety labels.
5. Always ask your teacher if you do not understand.
6. Wear proper safety protection as instructed by teacher.
7. Never remove your goggles during an activity.
8. Tie back long hair and avoid wearing loose clothing such as scarves, ties or long necklaces.
9. Know the location of safety and first aid equipment.
10. Work carefully and make sure that your work area is not cluttered.
11. Always cut away from yourself and others when using a knife.
12. Always keep the pointed end of scissors or any other sharp object facing away from yourself and others if you have to walk with it.
13. Dispose of broken glass as your teacher directs.
14. Do not smell a substance directly. Fan the smell toward you with your hand.

Science Safety Rules and Procedures for Elementary Science Students (not a conclusive list) (continued)

15. Never eat or drink in the laboratory.
16. Never drink or taste any substances.
17. Never use cracked or broken glassware.
18. Make sure that your hands are dry when touching electrical cords, plugs, or sockets.
19. Handle hot objects carefully.
20. Tell your teacher immediately if an accident or spill occurs, no matter how minor.
21. Clean equipment before you put it away.
22. Dispose of materials as directed by your teacher.
23. Clean up your work area upon completion of your activity.
24. Wash hands carefully with soap and water after handling chemicals, after all spills and at the end of each activity.

Plant and Animal Care in the Classroom

(<http://www.sasked.gov.sk.ca/docs/elemsci/corgesc.html>)

Teachers should familiarize themselves with any local, provincial, or federal statutes pertaining to the care of plants or animals. If in doubt, inquire. Pet shops may have useful information. Remember that there are regulations preventing the picking of some wild flowers, or the captive use of migratory birds or endangered species. The following are some guidelines for the care of plants and animals in the classroom:

- Be wary of any possible signs of allergic reactions among students to any plants or animals.
- Inform the administration before bringing any animals into the school.
- Inquire about specific feeding and facility requirements for classroom pets.
- Be wary of possible diseases that may be spread by animals, or by people to animals.
- Poisonous animals and plants, or other potentially dangerous animals such as venomous snakes and spiders should not be kept in the classroom.
- Wear gloves when handling animals in the classroom. Over-handling can put the animals under excessive stress.
- Involve students in helping to care for plants and animals.
- Make arrangements to have the plants and animals looked after over holidays and on weekends.

(Adapted and used with permission from the Ministry of Education, British Columbia)

Attitude Outcome Statements

For grades 1-3, it is expected that students will be encouraged to

Appreciation of Science	Interest in Science	Scientific Inquiry
<p>400 recognize the role and contribution of science in their understanding of the world</p> <p><i>Evident when students, for example,</i></p> <ul style="list-style-type: none"> • give examples of science in their own lives • give examples of how objects studied and investigations done in class relate to the outside world • recognize that scientific ideas help use to explain how or why events occur 	<p>401 show interest in and curiosity about objects and events within the immediate environment</p> <p>402 willingly observe, question, and explore</p> <p><i>Evident when students, for example,</i></p> <ul style="list-style-type: none"> • ask “why” and “how” questions about observable events • ask many questions related to what is being studied • participate in show-and-tell activities, bringing objects from home or sharing a story or an observation • ask questions about what scientists do • express enjoyment from being read to from science books • seek out additional information from library books and digital discs • express enjoyment in sharing science-related information gathered from a variety of sources, including discussions with family members and friends • ask to use additional science equipment to observe objects in more detail • express the desire to find answers by exploring and conducting simple experiments 	<p>403 consider their observations and their own ideas when drawing a conclusion</p> <p>404 appreciate the importance of accuracy</p> <p>405 be open-minded in their explorations</p> <p><i>Evident when students, for example,</i></p> <ul style="list-style-type: none"> • raise questions about the world around them • willingly record observations in a given format • compare results of an experiment with other classmates • use observations to draw a conclusion or verify a prediction • take the time to measure with care • willingly explore a change and its effects • choose to follow directions when they complete a simple investigation • express the desire to find answers by conducting simple experiments

Attitude Outcome Statements

For grades 1-3, it is expected that students will be encouraged to

Collaboration	Stewardship	Safety in Science
<p>406 work with others in exploring and investigating</p> <p><i>Evident when students, for example,</i></p> <ul style="list-style-type: none"> • willingly share ideas and materials • respond positively to others' questions and ideas • take on and fulfil a variety of roles within the group • participate in science-related activities with others, regardless of their age or their physical or cultural characteristics • respond positively to other people's views of the world 	<p>407 be sensitive to the needs of other people, other living things, and the local environment</p> <p><i>Evident when students, for example,</i></p> <ul style="list-style-type: none"> • ensure that living things are returned to an adequate environment after a study is completed • demonstrate awareness of the need for recycling and willingness to do something about it • show concern for other students' feelings or needs • care for living things that are kept in their classroom • clean reusable materials and store them in a safe place • willingly suggest how we can protect the environment 	<p>408 show concern for their safety and that of others in carrying out activities and using materials</p> <p><i>Evident when students, for example,</i></p> <ul style="list-style-type: none"> • are attentive to the safe use of materials • insist that classmates use materials safely • act with caution in touching or smelling unfamiliar materials, refrain from tasting them, and encourage others to be cautious • point out to others simple and familiar safety symbols • put materials back where they belong • follow given directions for set-up, use, and clean-up of materials • wash hands before and after using materials, as directed by teacher • seek assistance immediately for any first aid concerns like cuts, burns, and unusual reactions • keep the work station uncluttered, with only appropriate materials present