



Department of Education
English Programs

Atlantic Canada Science Curriculum

Science

Grade 2

CURRICULUM

Acknowledgements

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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.

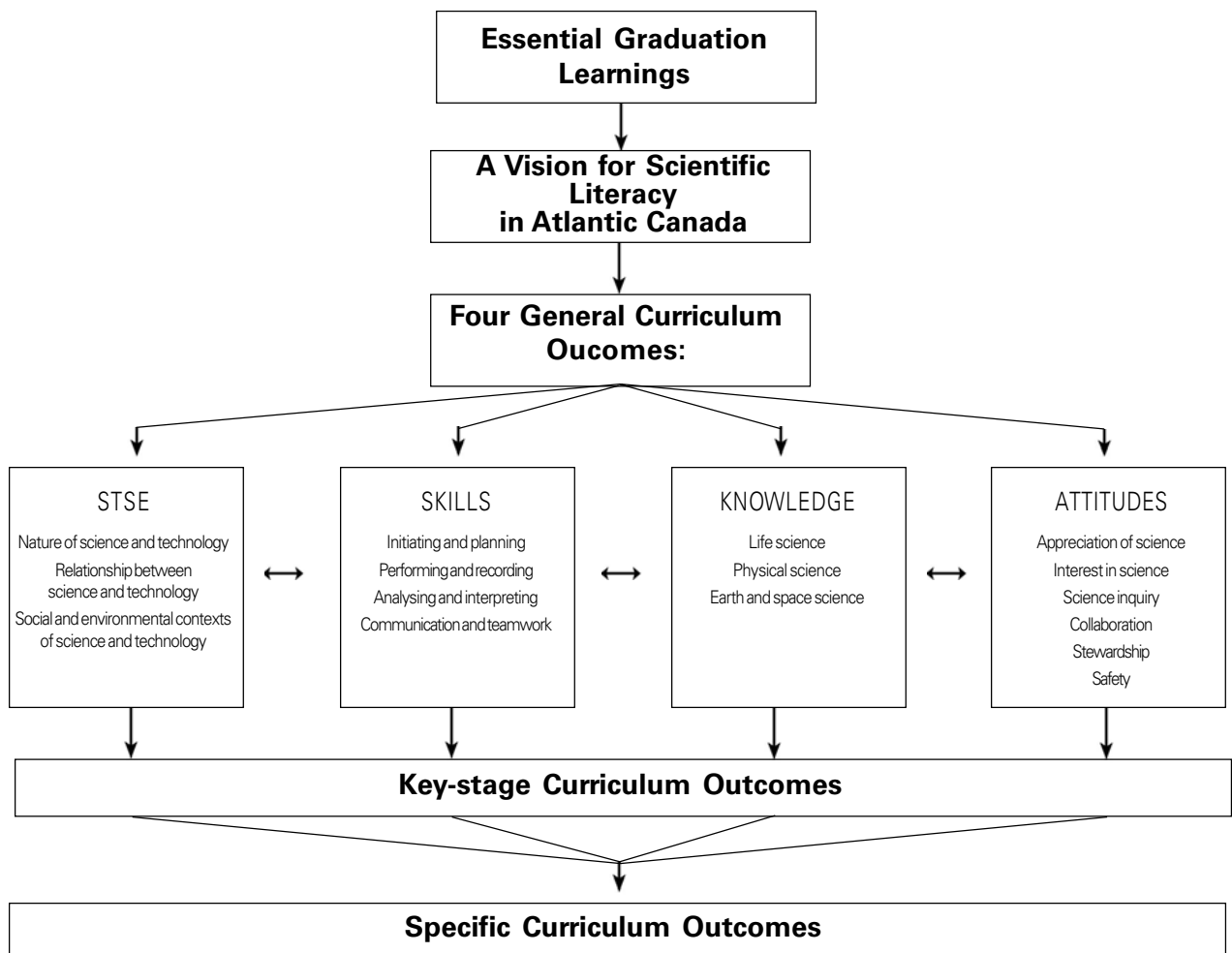
Curriculum Outcomes Framework

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

Investigating the Needs and Life Cycle of an Organism

Outcomes

Students will be expected to

- observe and describe changes in the appearance and activity of an organism as it goes through its life cycle (101-7)
- select and use materials to carry out their own explorations for observing the life cycle of an organism (200-4)
- ask questions about an organism's needs and changes in growth patterns that lead to exploration and investigation (200-1)
- record relevant observations of changes in the appearance and activity of an organism as it goes through its life cycle, using written language, pictures, and/or charts (201-5)

Elaborations—Strategies for Learning and Teaching

Students should investigate the life cycle of at least one type of organism first hand. The selection of this organism could vary, depending on student and teacher interest, the availability of local organisms, any student or teacher allergies, and the availability of specialized classroom equipment such as incubators or refrigerator. This means that aquariums, jars, terrariums, or cages be set up to hold the creatures for extended periods of time, so this unit should be started early in the school year when specimens may be more easily obtained, and students will get the chance to see as much of the life cycle as possible.

Students could describe changes in their pets or siblings. They could notice their pets or siblings different needs, as they change over time. Students should be encouraged to ask questions such as "I wonder how long it takes a chick to hatch from an egg?", "Do butterflies really come from caterpillars?", "Where do moths come from?", and "Is a baby frog just like an grown-up frog?" These questions can form the basis for exploration, and students will undoubtedly ask many more questions as the investigations proceed. Teachers can guide the discussion by introducing other creatures, like butterflies, fish, chicks, frogs, meal worms, or other organisms that they will be able to observe and investigate. Students could be encouraged to think of and ask other questions about other organisms' needs and changes in growth patterns such as: "Do you know how living organisms grow and change?" and "What types of things would you think would be interesting to learn about...?"

Students should focus on recording their observations carefully, by drawing pictures, writing descriptions of changes as they occur, and recording observations at various time intervals as they observe organisms through their life cycle. As they observe organisms go through their life cycle, students should also include information about the organisms' feeding behaviour and activity. Attention should be paid to features of the organism's environment that enable it to meet its needs at different stages of its life cycle. Students can work together to care for these organisms.

Investigating the Needs and Life Cycles of an Organism

Tasks for Instruction and/or Assessment

Performance

- Making a cocoon: Dip string or thread in a starch solution, and wrap around and around an empty film container or other small container. Cut out and colour a butterfly and a caterpillar. Using the cocoon you have made, show the steps that occur as a caterpillar turns into a butterfly. What is the next stage of this life cycle? How could you show it? (101-7)

Journal

- Three times a week, as you watch the life cycle of your butterfly (meal worm, chick, ...), record your observations in your journal. Did you have to use any special equipment? Draw pictures to show how your butterfly is developing. (101-7, 102-6, 200-4, 201-5, 203-2, 203-3)

- We are going to be taking care of a _____ so that we can watch it grow. I would like to find out ... (Describe questions that inquire about what the organism will look like as it grows.) (200-1)

Paper and Pencil

- Cut and paste in order. (Teachers should have the students paste it in a circular pattern, with arrows from one picture to the next, to indicate the life cycle) (100-7)



- Teachers may begin a wall growth chart, that students could use to record their heights and/or weights throughout the year. (101-7)
- A chart of tooth loss could be added to throughout the year. (101-7)

Resources/Notes

Science Safety Guide

101-7 Lesson One
200-1 Lesson Two

Addition Weekly Resource

101-7
Student Book/Flip Book Activities
#2 and #5, DWYK

200-4
Student Book/Flip Book Activities
#2

200-1
Launch
Activity Bank Activities
#8
Student Book/Flip Book Activities
#2 and AH

201-5
Student Book/Flip Book Activities
#2

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.

Life Science: Animal Growth and Changes

Introduction

All animals grow and change from their earliest beginnings until they reach their full adult condition. The form and pattern of this growth distinguish one kind of animal from another and are sources of interest for children of all ages. Viewing the growth and development of an individual organism can be a powerful learning experience for the young student, especially if the student shares responsibility for its care. For example, students can raise a butterfly from caterpillar to adult. The growth and development of the butterfly can then be compared to that of other animals and of themselves, and the opportunity is provided for children to identify the conditions needed to support healthy growth.

Focus and Context

The focus in this unit is on making observations as part of the inquiry process. As much as possible, these observations should be on live animals, either in their natural habitat, or in a environment that models a natural habitat, such as an aquarium or terrarium, in the classroom. As students observe the growth and changes in a variety of animals, they will be able to compare and contrast the various processes and stages that the animals go through in their life cycle.

Science Curriculum Links

Students should already be aware that living things have basic needs, and can be grouped based on their common characteristics, from the grade 1 unit on *Needs and Characteristics of Living Things*. This unit extends these concepts by focusing on growth and life cycles of animals. In grade 3, students will explore growth and life cycles again in a unit called *Plant Growth and Change*.

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>Students will be expected to</p> <p>101-7 observe and describe changes in the appearance and activity of an organism as it goes through its life cycle</p> <p>102-6 identify constant and changing traits in organisms as they grow and develop</p> <p>100-15 compare the life cycles of familiar animals and classify them according to the similarities and differences of their life cycles</p> <p>102-7 describe features of natural and human-made environments that support the health and growth of some familiar animals</p> <p>100-16 describe changes in humans as they grow, and contrast human growth to that of other organisms</p> <p>103-5 identify the basic food groups, and describe actions and decisions that support a healthy lifestyle</p>	<p>Students will be expected to</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>200-4 select and use materials to carry out their own explorations</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>202-7 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>203-2 identify common objects and events, using terminology and language that others understand</p> <p>203-3 communicate procedures and results, using drawings, demonstrations, and written and oral descriptions</p> <p>203-5 respond to the ideas and actions of others and acknowledge their ideas and contributions</p>

PEI/APEF Specific Curriculum Outcomes

Animal Growth and Changes

Investigating the Needs and Life Cycles of an Organism

Students will be expected to

- observe and describe changes in the appearance and activity of an organism as it goes through its life cycle (101-7)
- select and use materials to carry out their own explorations for observing the life cycle of an organism (200-4)
- ask questions about an organism's needs and changes in growth patterns that lead to exploration and investigation (200-1)
- record relevant observations of changes in the appearance and activity of an organism as it goes through its life cycle, using written language, and/or charts (201-5)
- identify constant and changing traits in organisms as they grow and develop (102-6)
- respond to other students' ideas about an organism's needs and changes in growth patterns (203-5)
- recognize the stages of development of the organism, using applicable terminology and language (203-5)
- propose suggestions for meeting the needs of the organism being investigated, and draw conclusions about its growth patterns or stages based on observations (202-7)
- communicate procedures and results of the investigation into the life cycle of an organism, using drawings, demonstrations, and/or written and oral descriptions (203-3)
- identify new questions about the needs and growth patterns of other organisms (202-9)

Comparing Life Cycles of Familiar Animals

Students will be expected to

- identify and use a variety of sources of science information and ideas to find out about the life cycles of other organisms (201-7)
- compare the life cycles of familiar animals and group them according to the similarities and differences of their life cycles (100-15, 202-2)
- describe features of natural and human-made environments that support the health and growth of some familiar animals (102-7)
- make predictions about the stages in a life cycle of an organism, based on an observed pattern of stages in a similar organism (200-3)

Human Growth and Development

Students will be expected to

- describe changes in humans as they grow, and contrast human growth with that of other organisms (100-16)
- identify the basic food groups and describe actions and decisions that support a healthy lifestyle (103-5)

Investigating the Needs and Life Cycle of an Organism

Outcomes

Students will be expected to

- observe and describe changes in the appearance and activity of an organism as it goes through its life cycle (101-7)
- select and use materials to carry out their own explorations for observing the life cycle of an organism (200-4)
- ask questions about an organism's needs and changes in growth patterns that lead to exploration and investigation (200-1)

- record relevant observations of changes in the appearance and activity of an organism as it goes through its life cycle, using written language, pictures, and/or charts (201-5)

Elaborations—Strategies for Learning and Teaching

Students should investigate the life cycle of at least one type of organism first hand. The selection of this organism could vary, depending on student and teacher interest, the availability of local organisms, any student or teacher allergies, and the availability of specialized classroom equipment such as incubators or refrigerator. This means that aquariums, jars, terrariums, or cages be set up to hold the creatures for extended periods of time, so this unit should be started early in the school year when specimens may be more easily obtained, and students will get the chance to see as much of the life cycle as possible.

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- We are going to be taking care of a _____ so that we can watch it grow. I would like to find out ... (Describe questions that inquire about what the organism will look like as it grows.) (200-1)

Paper and Pencil

- Cut and paste in order: (Teachers should have the students paste it in a circular pattern, with arrows from one picture to the next, to indicate the life cycle) (100-7)



- Teachers may begin a wall growth chart, that students could use to record their heights and/or weights throughout the year. (101-7)
- A chart of tooth loss could be added to throughout the year. (101-7)

Resources/Notes

Science Safety Guide

101-7 Lesson One

200-1 Lesson Two

Addison Wesley Resource

101-7

Student Book/Flip Book Activities

#2 and #5, DWYK

200-4

Student Book/Flip Book Activities

#2

200-1

Launch

Activity Bank Activities

#8

Student Book/Flip Book Activities

#2 and AH

201-5

Student Book/Flip Book Activities

#2

Investigating the Needs and Life Cycle of an Organism (continued)

Outcomes

Students will be expected to

- identify constant and changing traits in organisms as they grow and develop (102-6)
- respond to other students' ideas about an organism's needs and changes in growth patterns (203-5)
- recognize the stages of development of the organism, using applicable terminology and language (203-2)
- propose suggestions for meeting the needs of the organism being investigated, and draw conclusions about its growth patterns or stages based on observations (202-7)
- communicate procedures and results of the investigation into the life cycle of an organism, using drawings, demonstrations, and/or written and oral descriptions (203-3)
- identify new questions about the needs and growth patterns of other organisms (202-9)

Elaborations—Strategies for Learning and Teaching

Students should investigate constant traits such as eye colour, number of arms and legs, and changing traits such as height and weight. Insects, such as butterflies, moths, or meal worms, are relatively easy to study in the classroom. Many of these insects go through metamorphosis. The four stages of this cycle are egg, larva, pupa, and adult. Teachers should encourage students to use this terminology during their observations. Magnifying lenses can be used to get a closer look at the different stages in the life cycle.

The total life cycle of a meal worm is about six months. They can be kept in a large jar with holes in the top. Meal worms can be bought from pet stores as pet food.

Students may be able to bring in caterpillars that they have caught in order to study the life cycle of a butterfly or moth. These can be kept in a container with leaves and a twig. Fresh leaves must be supplied each day for caterpillars. Some butterflies will only lay their eggs on certain leaves, for example, monarch butterflies will only lay eggs on milkweed.

Because frogs mature from tadpoles to adult frogs over the summer, a first-hand look at the complete life cycle of frogs would have to be done by students independently. Software, video or text resources can be used to study the life cycle of frogs in the classroom.

Caution: Wear gloves if handling chickens. Caution must be exercised if chickens' life cycles are studied first hand. A resource person, such as a farmer, could help communicate the proper way to take care of incubating eggs and young chicks. A plan should be developed before acquiring the eggs regarding the proper handling and eventual placement of the chicks soon after they hatch.

Some schools may opt to investigate the life cycles of fish like salmon or guppies. Raising these organisms requires research and specialized equipment, such as a temperature controlled aquarium and refrigerators for the eggs. Various agencies, such as the Department of Fisheries and Oceans, salmonid interpretation centers, and pet stores may supply eggs and equipment, as well as information and video resources about the life cycles.

Brine shrimp are organisms that are easy to care for in an aquarium. They are tiny, and may be difficult for students to observe closely without magnifying lenses.

As students observe the life cycle of the organism they have chosen, they should be encouraged to raise questions about the life cycles of other organisms and how they may be impacted by humans. Many of them may have cared for pets, and may be willing to share their observations and experiences with their classmates. This will lead to further study of the life cycles of other organisms in the next section.



Investigating the Needs and Life Cycles of an Organism (continued)

Tasks for Instruction and/or Assessment

Performance

- Build a home for the organism that you are going to investigate. (202-7)

Journal

- Record any changes you observe as the organism develops. (You may choose to keep a drawing or written record). (102-6)

Interview

- Over the time that you have been watching your butterfly (meal worm, chick, ...) grow, what things have stayed the same? What things have changed? (102-6)

Presentation

- Present the results of your investigation of the life cycle of a butterfly (meal worm, chick, ...) to the class. (203-3)

Informal/Formal Observation

- In brainstorming/sharing/generating questions sessions on the life cycles of organisms, assess the degree of participation and respect for others' points of view.

Observe how: (teacher note)

- individual students contribute to the group (202-7, 203-5)
- the group follows directions (200-4)
- the amount of detail in recording their observation (101-7, 201-5, 202-7)
- the students describe the life cycle of the organism and how it connects to their world (100-7, 203-2)
- they recognize that they experience changes in life too (202-7)

Interview

- Do you think all animals go through the same stages as the animal(s) we are studying? What other animals would you be interested in finding out about? What are some questions you ask about the growth of living things? (202-9)

Resources/Notes

Science Safety Guide

203-5 Lesson Two

Addison Wesley Resource

102-6

Activity Bank Activities

#5

Student Book/Flip Book Activities

#1, #3, #6, and DWYK

203-5

Activity Bank Activities

#8

Student Book/Flip Book Activities

#4

203-2

Student Book/Flip Book Activities

#2, AH and DWYK

202-7

Student Book/Flip Book Activities

#2 and #4

203-3

Student Book/Flip Book Activities

#2 and #3

202-9

Student Book/Flip Book Activities

#3 and AH

Comparing Life Cycles of Familiar Animals

Outcomes

Students will be expected to

- identify and use a variety of sources of science information and ideas to find out about the life cycles of other organisms (201-7)
- compare the life cycles of familiar animals and group them according to the similarities and differences of their life cycles (100-15, 202-2)

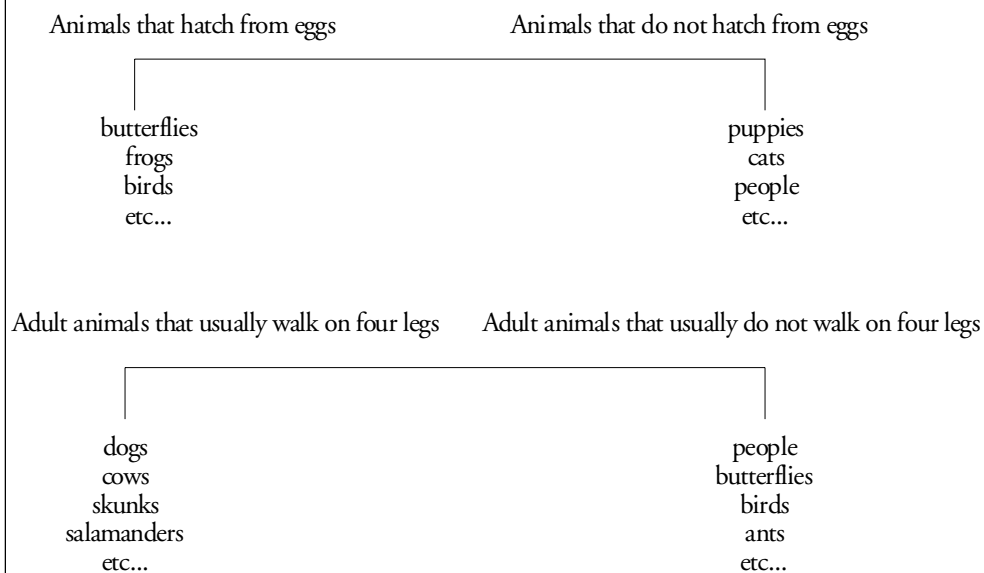
Elaborations—Strategies for Learning and Teaching

Children at this age generally associate the word “animal” with organisms that have the characteristics of most adult mammals, reptiles and amphibians. Many children will not naturally classify or group invertebrates (eg. insects, spiders, jellyfish...), birds and fish as animals. Students should be guided to learn that “animals” are a very large group of living things that include most living things that they can see that are not plants.

Students can now explore the life cycles of other animals. If possible, these explorations should be first-hand (classroom habitats, visits to farms, zoos, aquariums, nature parks, seashore and aquaculture farms), but in order to make comparisons between similar types of organisms (for example, between the life cycles of cod and salmon), print or electronic sources may be necessary. These resources should be well illustrated, and written in simple, age-appropriate language.

Similarities and differences between the life cycles of organisms could be explored. Mammals, birds, insects, fish, reptiles (lizards and alligators) or amphibians (frogs, toads, and salamanders) can be used. Note: This is not terminology that we would expect students to use at this level. It is only mentioned here for teachers to attempt to choose from a variety of organisms that have very different life cycles.

Students could compare the life cycle of the organism they have investigated, to their own life cycle. Teachers could use a dichotomous key to compare animals. Examples include animals that start as an egg or not, animals that make cocoons or not, and animals that walk on four legs or not.



Comparing Life Cycles of Familiar Animals

Tasks for Instruction and/or Assessment

Performance

- Produce a pictorial timeline of an organism's life cycle. (201-7)

Presentation

- Select an organism and research its life cycle using a variety of sources. (100-15, 200-3, 201-7, 202-2)

How Animals Compare

6 legs	4 legs
starts as an egg	doesn't start as an egg
makes a cocoon	doesn't make a cocoon

Resources/Notes

Addison and Wesley Resource

201-7

Activity Bank Activities

#8

Student Book/Flip Book Activities

#2 and AH

100-15, 202-2

Activity Bank Activities

#6

Student Book/Flip Book Activities

#2, #3 and DWYK

Comparing Life Cycles of Familiar Animals (continued)

Outcomes

Students will be expected to

- describe features of natural and human-made environments that support the health and growth of some familiar animals (102-7)

- make predictions about the stages in a life cycle of an organism, based on an observed pattern of stages in a similar organism (200-3)

Elaborations—Strategies for Learning and Teaching

Students should explore organisms in their natural environment. They should explore how these organisms eat, drink, and move in their natural surroundings. Students could match pictures of organisms to their environments. For example, they could match frogs to ponds, birds to nests, and worms to soil. They can also explore how human-made environments (e.g., farms, zoos, aquaculture farms, aquaria) have supported the health and growth of animals, for example. They could describe the types of environment that they would need to have if they wanted to raise different organisms, such as horses, puppies, or kittens.

Students should be able to make simple predictions about the life cycles of similar organisms, and recognize patterns. For example, if they have explored the lifecycle of a chicken they should be able to predict that a robin will also have eggs that will hatch into baby birds.

Comparing Life Cycles of Familiar Animals (continued)

Tasks for Instruction and/or Assessment

Performance

- Explore and construct a natural or human-made environment that could support or hinder the health and growth of organisms. (102-7)

Paper and Pencil

- Pretend that you have to take care of a bird (or some other type of animal) for a while. How would you take care of it? What kinds of things would you do to make sure that it is comfortable, and lives as normally as possible? Draw a picture of the type of home you would make for it. (102-7)

Interview

- Tell me some ways human-made environments have helped the health and growth of animals. (102-7)

Resources/Notes

Science Safety Guide

102-7 Lesson Two

Addison and Wesley Resource

102-7

Activity Bank Activities

#1, #3, #7 and #9

Student Book/Flip Book Activities

#4, #5, #6 and LB

200-3

Student Book/Flip Book Activities

#2 and #3

Human Growth and Development

Outcomes

Students will be expected to

- describe changes in humans as they grow, and contrast human growth with that of other organisms (100-16)
- identify the basic food groups and describe actions and decisions that support a healthy lifestyle (103-5)

Elaborations—Strategies for Learning and Teaching

These outcomes connect well with some outcomes of the health curriculum.

Students love to see evidence that they are growing. These outcomes give students the chance to focus on their own growth over the school year. At the beginning of the school year, various measurements could be taken (hand length, feet size, distance around head), and these measurements could be continued at intervals throughout the year.

To show that voices change and deepen as they get older, students can listen to tape of a number of different voices, and try to guess who is the oldest, and who is the youngest of the people they are listening to.

Students may have some of their baby clothes or baby pictures that they could bring in to illustrate how they have grown. They can also bring in pictures of their brothers, sisters, and parents or guardians to illustrate the progression from baby to child to adult.

To focus on their needs that have changed as they have grown, they could draw pictures of types of foods that they have eaten as they have grown, from milk to mashed food to solid food. Classroom displays could be set up to illustrate this progression.

Health and nutrition issues can be brought in at this point by raising probing questions. Students should be able to recognize that food is a necessary ingredient for growth.

Students can be introduced to the major food groups (dairy, meat, fruit and vegetable and bread and cereal) by using posters or displays showing the four main food groups. They can then classify various snack and lunch foods into these groups. Guidelines for appropriate amounts of each group can also be displayed and discussed in class.

Students will already have an awareness of some basic hygienic practices that reduce the spreading of germs. They can identify personal behaviours, such as attention to clothing, cleanliness, exercise, and nutritional choices, that help maintain good health. (Community health nurses or dieticians can be invited to talk to the class about nutrition.)

Students could record a list of the food choices they have made over a day or a week. They could then organize the foods into healthy food choices and unhealthy food choices. Ask students what they think constitute a balanced diet. Have the students suggest that they could change their eating habits to become even healthier.

Human Growth and Development

Tasks for Instruction and/or Assessment

Journal

- Write or illustrate foods that are good for me and foods that are not. (103-5)

Paper and Pencil

- Draw or print the names of the food groups on separate pieces of paper. Cut out pictures of foods and drinks from a magazine, and paste them on the correct sheet. (103-5)

Interview

- What is good nutrition? Why is it important to eat nutritious food? (103-5)

Presentation

- Make a picture poster of people at different ages. Select pictures that show how some characteristics change (height, weight), while others remain the same (eye and hair colour).
- Have students use a sheet of paper as a placemat. Cut foods out of magazines to create a healthy, tasty meal that they would enjoy eating and explain why it is a healthy meal. (103-5)

Resources/Notes

Science Safety Guide

100-16 Lesson One

Addison and Wesley Resource

100-16

Activity Bank Activities

#3 and #5

Student Book/Flip Book Activities

#3

103-5

Activity Bank Activities

#9

Student Book/Flip Book Activities

#5

Earth and Space Science:

Air and Water in the Environment

Introduction

Air and water are all around us. They form a major part of the physical environment and are essential for life, yet our awareness of them is often incomplete. Where solids are tangible and directly measurable, gases and liquids are sometimes visible only through their effects. The emphasis in this unit is on characteristics of air and water, and on how they affect us in daily life. Through investigations, students learn about changes and interactions of air and water when they are heated or cooled, and about their movement through the environment. In the process, students discover that water is important to us in many ways. Students can also learn to appreciate that there is more to obtaining clean water than simply turning on a tap.

Focus and Context

The focus in this unit is on inquiry. Students are presented with many opportunities to explore how air and water are connected, and how temperature and moving air can affect the form of water. Students are also provided with opportunities to test fabrics to see how suitable they are for various weather conditions. Finally, they gain an appreciation for having a clean water supply, and investigate how water pollution can affect living things.

Science Curriculum Links

Some of this unit can be integrated with the first section on *The Three States of Water* in the grade 2 unit, *Liquids and Solids*. These sections are noted in the following pages.

Students will have already investigated changing weather conditions in the grade 1 unit, *Daily and Seasonal Changes*. In this unit, they account for changes in weather through an understanding of water and air in the environment. This exploration will deepen in the grade 5 unit, *Weather*.

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>Students will be expected to</p> <p>102-10 demonstrate how air, as a substance that surrounds us, takes up space and is felt as wind when it moves</p> <p>100-26 observe changes in air conditions in indoor and outdoor environments, and describe and interpret these changes</p> <p>102-9 identify evidence of moisture in the environment, in materials, and in living things</p> <p>100-27 describe changes in the location, amount, and form of moisture, and identify conditions that can affect these changes</p> <p>103-7 describe the effects of weather and ways to protect things under different conditions</p> <p>102-11 identify examples of water in the environment and describe ways that water is obtained, distributed, and used</p> <p>103-8 identify the importance of clean water for humans, and suggest ways they could conserve water</p>	<p>Students will be expected to</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>200-4 select and use materials to carry out their own explorations</p> <p>Performing and Recording</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>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>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> <p>203-3 communicate procedures and results, using drawings, demonstrations, and written and oral descriptions</p>

PEI/APEF Specific Curriculum Outcomes

Air

Students will be expected to

- demonstrate how air, as a substance that surrounds us, takes up space and is felt as wind when it moves (102-10)
- use appropriate tools in constructing a device to measure the speed and direction wind (201-3)
- communicate questions and ideas about air while conducting explorations (203-1)
- observe changes in air conditions in indoor and outdoor environments, and describe and interpret these changes (100-26)

Forms and Changes in Moisture

Students will be expected to

- identify evidence of moisture in the environment, in materials, and in living things (102-9)
- describe changes in the location, amount, and form of moisture, and investigate and identify conditions that can affect these changes (100-27, 200-4, 201-5)
- use appropriate tools to measure amount of precipitation for a period of time (201-3)

Materials and Moisture

Students will be expected to

- ask questions to investigate how various materials interact with moisture (200-1)
- communicate the procedures and results of their tests of materials, using drawings, notes, and/or oral descriptions (203-2, 203-3)
- make predictions about which materials are more absorbent, or waterproof, or dry more quickly, and select and use materials and tools to test their predictions (200-3, 200-4, 201-3)
- describe the effects of weather and ways to protect things under different weather conditions (103-7)
- put tested materials in a sequence according to their ability to absorb water, be waterproof, and/or dry (202-2, 202-7)

Protecting our Water Sources

Students will be expected to

- identify examples of water in the environment and describe ways that water is obtained, distributed, and used (102-11)
- identify the importance of clean water for humans, and suggest ways they could conserve water (103-8)

Air

Outcomes

Students will be expected to

- demonstrate how air, as a substance that surrounds us, takes up space and is felt as wind when it moves (102-10)
- communicate questions and ideas about air while conducting explorations (203-1)
- use appropriate tools in constructing a device to measure the speed and direction wind (201-3)

Elaborations—Strategies for Learning and Teaching

Students can explore how air takes up space by trying to fill up empty bottles (plastic) with water by holding the bottles under water in a tub or bucket. Structure the activity so that they attempt to fill up the bottles by holding the bottles in different positions under water (opening down, sideways, up).

Alternatively, students can be given bottles with paper towels in the bottom, and asked to submerge the bottle without getting the towel wet.

Many familiar technological products (balloons, tires, and air mattresses) can be used to illustrate that air takes up space. Students can inflate some of these products, and manipulate them with their hands to feel the air that has been trapped inside.

Air is invisible. As such, students can only see and feel evidence of air in order to gain an understanding that it is an actual substance.

In classroom discussion, students can be given the opportunity to think about why the bottles won't fill up with water if they are held upside down, and what they think is in the bubbles they saw as the bottles did start to fill up. Encourage students to respond to other students' ideas. Students can use what they have learned as they race to see who can fill up the bottle fastest, then share their techniques with other students. They can also explore the fastest method to empty the water from a bottle. Students may think holding the bottle upside down is the fastest way to let water out, but it will pour out more quickly if air is allowed to get in by tipping or swirling the bottle.

Have students observe how air feels, when there is wind. Involve students in activities where they can feel moving air (for example, letting the air out of balloons or tires; standing in front of a fan; standing in the wind). Teachers can help students make a list of things that wind can do (for example, cause a flag to wave, blow down trees, move sailboats). Probe their conceptions of what it is they are feeling, and introduce the idea of "too small to see, but it is there".

Students can construct weather vanes to measure the direction of the wind, or make simple wind direction indicators using ribbons hanging from various places around the school and school grounds. They can use phrases like "It is blowing towards the tree", as well using terms like north, south, east, and west. They can use pinwheels to show how fast the wind is blowing.

Air

Tasks for Instruction and/or Assessment

Performance

- In a group, construct a wind speed indicator. Use it to measure the wind speed and direction at various locations and at different times. (201-3)

Observing Wind

Location	Wind Speed	Wind Direction
Beside the school	Really windy. The pinwheel turned so fast it was blurry.	The ribbon pointed straight out towards the back of the school.
In an open field		
On the seashore		

Journal

- Today we did experiments with air. I learned lots of things ... I wonder about ... (203-1)

Paper and Pencil

- Draw pictures to show how you know: (102-10)
 - air takes up space
 - air can move things

Interview

- How can you show me that air is a real substance when you can't see it? (102-10)

Resources/Notes

Science Safety Guide

102-9 Lesson One

Addison and Wesley Resource

102-10

Launch

Activity Bank Activities

#5

Student Book/Flip Book Activities

#1 and #2

203-1

Launch

Activity Bank Activities

#4, #5 and #6

Student Book/Flip Book Activities

#1, #2 and #6

201-3

Activity Bank Activities

#5 and #11

Student Book/Flip Book Activities

#2

Air (continued)**Outcomes**

Students will be expected to

- observe changes in air conditions in indoor and outdoor environments, and describe and interpret these changes (100-26)

Elaborations—Strategies for Learning and Teaching

Teachers may have demonstrated the use of thermometers in the unit *Daily and Seasonal Changes* in grade one, but students did not use them or any standard units of measurement. In grade two, students are being introduced to standard units of measurement in the math program (such as metres and litres), but they are not introduced to temperature units until later. Students could measure air temperature in various parts of the classroom (by a window, in the sun, by a space heater) with a thermometer to see if they can detect any changes in the height of the liquid in the thermometer.

Indoor air conditions do not change very much. They can describe changes that occur when the thermostat is turned up using terms like “colder” and “warmer”. They can identify places in the room that appear to be warmer than others. For example, they may note that it is noticeably warmer by the heater, and noticeably cooler by the open window. They may also observe that it is warmer when they are by a window with the sunlight pouring in. They may note breezes that come through an open window, or feel the breeze from a fan, or the warm air rising from a heater, but other than that, moving air will not be very detectable indoors.

This investigation can continue outside in the school yard and at home. With the help of their teacher, they could compare outside temperature readings that are taken in the sun to those taken in the shade. Students can describe changes in temperature by describing the type of clothing they would have to wear to be comfortable (such as sweaters, parkas, shorts).

Students can attempt to interpret the various changes in temperature (for example, sun makes it warmer, near a furnace, cloudy day), and wind (by an open window, out in the open and not sheltered) using simple explanations.

They can also record the wind direction and wind speed in the same chart using the instruments that they designed. They could compare the wind speed out in an open field, and compare it to the wind speed in a more sheltered area.

Students could note the amount of cloud cover each day (draw pictures to show shape of clouds and relative amount of cloud cover). Forms of moisture in the environment are addressed next in this unit, so clouds are a natural introduction to this topic.

Air (continued)**Tasks for Instruction and/or Assessment***Performance*

- With a partner, describe how warm or cold it is at indoor and outdoor locations, and record your observations in the table below. (100-26, 102-9)

What do you feel?

Location in classroom	How I feel...
Near a fan	I can feel the wind from the fan, and it feels cool on my face.
By an open window	
In a sunny spot	
In a shaded spot	
⋮	

- Find a place outside near your school where you want to collect your weather measurements. Three times a day (for example, before recess, after recess, and afternoon), for one week, fill out the table with your observations (class activity). (100-26)

Observing the weather

Time/Day	Observations (hot, cold, warm, chilly)	Clouds (draw picture)	Rain/ Snow	Wind speed /direction (draw ribbons)
Monday 9:30				
Monday 11:00				
⋮				

Journal

- The things that I learned about the air conditions indoors are ...
The things that I learned about outdoor air conditions are ...
(100-26)

Resources/NotesAddison and Wesley Resource

100-26

Activity Bank Activities

#5 and #6

Student Book/Flip Book Activities

#1 and #2

Forms and Changes in Moisture

Outcomes

Students will be expected to

- identify evidence of moisture in the environment, in materials, and in living things (102-9)
- use appropriate tools to measure amount of precipitation for a period of time (201-3)

Elaborations—Strategies for Learning and Teaching

Students should explore evidence of moisture in the environment by observing the various forms of precipitation (fog, rain, snow, drizzle, etc.) in their local area. They can note their breath on a cold day, water steaming up their mirrors after a bath, or fogging up the windows in their car. If they wear glasses, they may note that they sometimes fog up when they come inside on a cold day.

Moisture in the form of water vapour will be present in the air in varying amounts, even when it is not evident. It can be detected by students noting the changes that occur on the surface of a cold object taken from a freezer, and placed on a desk. Teachers can freeze a container of water, and bring it to the classroom for students to observe. Some students may think that the ice and water are actually coming through the container when they see the ice and condensation forming on the surface of the container. Teachers can take a chilled solid object from the freezer (empty glass pot, for example). Students will notice the condensation occurring, ruling out the explanation that the water has come from inside the container, and supporting the idea that the water has come from the air. Alternatively, they could add a couple of drops of food colouring to the container of ice water, and show that the water that condenses is not coloured.

Students can observe evidence that moisture is present in many materials, such as a wet towel or damp clothes, by feeling them or squeezing some water from them. They can also see evidence of moisture in living things, such as fruits and vegetables. Students could take an apple that has been cut in half, and put one piece, sealed in plastic, in the refrigerator, and leave the other piece out. They can then compare appearances, and use a pan balance to see which one is heavier. Other activities could involve making juice from oranges, or noting that they perspire after exercise.

Students can use a magnifying glass to observe the moisture on leaves or grass at various times of the day. Students should be able to predict the forms of precipitation that will occur during the various seasons.

Students can record the types of precipitation in their journal, and use water gauges, measuring sticks for snow, to record the amount of precipitation over the course of a week or month. This could be done using non-standard or standard units. Some of these data can be used for symbolic bar graphs, which teachers can help students construct. This can be used to connect with math outcomes in data management.

Forms and Changes in Moisture

Tasks for Instruction and/or Assessment

Performance

- As a class, record your results (For students who may have trouble writing the evidence, these can be relayed orally) (102-9)

Water in Many Places

Places where I found moisture or water ...	Evidence:
air	
apple	
: :	

Journal

- Some of the places that I've discovered water are ... (102-9)

Interview

- Where do you think the water from the apple went (from the activity on p. 70)? (102-9)

Resources/Notes

Science Safety Guide

102-9 Lesson Two

Addison and Wesley Resource

102-9

Activity Bank Activities

#1, #7 and #9

Student Book/Flip Book Activities

#3

Forms and Changes in Moisture (continued)

Outcomes

Students will be expected to

- describe changes in the location, amount, and form of moisture, and investigate and identify conditions that can affect these changes (100-27, 200-4, 201-5)

Elaborations—Strategies for Learning and Teaching

Students should explore the conditions under which water can change from one form to another. Ask students what they noticed about the location and form of moisture.

Students can investigate conditions affecting evaporation by putting the same amount of water on pieces of the same fabric. Students can hang them from various places, then record the temperature and note air movement. Students may design investigations that attempt to control these variables (temperature and air movement).

Set up cooperative learning groups. Provide opportunities for children to discuss and share their ideas on the conditions under which things dry faster in one location than the other.

For example, water vapour in the air can condense on a cool window or water in a glass can evaporate into the air. Dew on a leaf can evaporate, and wet clothes might dry on the line, and icicles will melt and drip. Water will freeze into cubes in the freezer.

Forms and Changes in Moisture (continued)

Tasks for Instruction and/or Assessment

Performance

- (Class Activity) Make an instrument for measuring the amount of rain (or snow). Measure the amount of rain (snow) each day for two weeks, and record your findings in the chart. (A different student can take the measurement each day) When you are finished, construct a graph to show your results. (201-3, 202-4)

Rainfall

Date	Amount of Rain
October 11	
October 12	
:	
:	

Paper and Pencil

- As you explore how to change moisture from one form to another, fill in the chart: (Include all changes: such as water to water vapour, water vapour to water) (100-27, 200-4, 201-5)

Ice, Water and Water vapour

Form	Location of moisture	Conditions	Observations
Water	Wet towel	hung to dry with no wind	towel dried slowly
Water	wet towel	hung to dry in wind	
Ice	water in ice cube trays	put in freezer	
	:		
	:		

Resources/Notes

Addison and Wesley Resource

100-27, 200-4, 201-5

Activity Bank Activities

#7

Student Book/Flip Book Activities

#3, #4 and #5

Materials and Moisture

Outcomes

Students will be expected to

- ask questions to investigate how various materials interact with moisture (200-1)
- make predictions about which materials are more absorbent, or waterproof, or dry more quickly, and select and use materials and tools to test their predictions (200-3, 200-4, 201-3)
- put tested materials in a sequence according to their ability to absorb water, be waterproof, and/or dry (202-2, 202-7)
- communicate the procedures and results of their tests of materials, using drawings, notes, and/or oral descriptions (203-2, 203-3)

Elaborations—Strategies for Learning and Teaching

These outcomes explore the role of choosing materials for a specific purpose. Students could explore different materials and investigate questions such as, “Which materials hold the most water?”, “Is one material more waterproof than the other?” “Which material will dry the fastest?”. Students can suggest situations in which they would need materials to absorb water (towels, paper towels), repel water (raincoats, tents), and dry quickly (dish towels, clothing). They should also note the clothing for different weather conditions. For example, students could be challenged to name clothing associated with wet weather such as rain coats, boots, parkas, umbrellas. “Encourage the students to ask questions about such things as which materials keep them driest the longest or which materials are the easiest to dry.”

Students can make predictions about the materials that they have to test, and then perform simple tests on various fabrics to test the qualities that make them suitable for different weather conditions or absorbing water.

Absorbing qualities: Students can set up several containers with equal amounts of water, and place different materials in the water. They can remove the materials and observe how much water is left in each container after a designated period of time. This also supports outcome 100-18 in the “Liquids and Solids” unit.

Waterproofing qualities: Students can drop water on materials, and note whether the drops “sit” on top of the material, are absorbed by the material, or soak right through. For the materials that allow the water to sit on top, they can see how far they can get the drop to move before it is absorbed.

Drying times: Students can wet a variety of materials, and note how long each takes to dry.

Using the results of these tests, students can sequence the materials that they tested from least to most absorbent, or from least to most waterproof, or from fastest to slowest drying. They can discuss with classmates which materials would be suitable for different purposes, for example, clothing for various weather conditions, for drying towels, or for tents.

Students should be able to communicate what they did and their results using words such as “absorb” and “waterproof.” This can be done formally through the creation of products that show their procedures and results of their tests, or informally through teacher interviews with students as they are finishing up their work at a learning centre.

Materials and Moisture

Tasks for Instruction and/or Assessment

Paper and Pencil

- Predict which materials are more absorbent and give a plan to test your predictions. (200-3, 200-4, 201-3)
- List your materials in order from least waterproof to most waterproof. (202-2, 202-7, 203-3, 203-2)

Which materials are waterproof? (absorbant, dry fastest)

Material	Prediction	What I saw

Interviews

- When would you want materials to be absorbent? Waterproof? Dry quickly?

Resources/Notes

Science Safety Guide

200-1 Lesson One

200-3, 200-4, 201-3 Lesson One

Addison and Wesley Resource

200-1

Activity Bank Activities

#10

200-3, 200-4, 201-3

Activity Bank Activities

#10

202-2, 202-7

Activity Bank Activities

#10

203-2, 203-3

Activity Bank Activities

#10

Student Book/Flip Book Activities

#5

Materials and Moisture (continued)

Outcomes

Students will be expected to

- describe the effects of weather and ways to protect things under different weather conditions (103-7)

Elaborations–Strategies for Learning and Teaching

Students can note signs of weather effects around the school yard, home and community. Students can note products that protect structures from the effects of weather.

Both wind and precipitation can affect houses, patios, and other structures. Students can note signs of weather damage around the school yard and home. Peeling paint, warped wood, shingles or siding blown off buildings, are examples of evidence that weather has a marked effect. Students could suggest products or processes that have been designed to reduce the impact of weather, such as driveway sealer and storm windows. Students could collect pictorial images that illustrate these products, and display them on a weather poster.

Materials and Moisture (continued)

Tasks for Instruction and/or Assessment*Journal*

- This is how I would protect ... from weathering. (103-7)

Interview

- What kinds of things do you or your family use to prepare for different weather conditions? (103-7)

Presentation

- Create a poster of products that are used to weatherproof things like clothing, houses, decks, and roads. Flyers and catalogues from hardware stores make a good source of pictures. (103-7)

Resources/Notes*Science Safety Guide*

103-7 Lesson One and Lesson Two

Addison and Wesley Resource

103-7

Activity Bank Activities

#3, #4, #10, AH and LB

Protecting our Water Sources

Outcomes

Students will be expected to

- identify examples of water in the environment and describe ways that water is obtained, distributed, and used (102-11)
- identify the importance of clean water for humans, and suggest ways they could conserve water (103-8)

Elaborations—Strategies for Learning and Teaching

Students can identify sources of water in their local area, such as streams, lakes, and wells. They can explore where their water comes from through field trips and/or guest speakers, and how it is treated to make it clean and safe to drink. Once they recognize that the water from their taps actually comes from a water supply, be it a well or lake, they should explore how important it is to protect these water supplies from pollution.

Students can brainstorm a list of uses of water, and again, through classroom discussion, appreciate the importance of clean water. Some communities may have a “Boil Order” in effect, so that all water is boiled before it is used for cooking or drinking. The effects of having a water supply that is not safe can be devastating to a community; and students may become scared if the full extent of contaminated water is made known to them. Classroom discussions should be limited to the effect of “getting a bad stomach”, or having cuts that may get infected or not heal quickly, but examples of communities stricken by cholera or other diseases are not appropriate for students of this age.

Humans and animals are not the only ones affected by polluted water. Students can perform investigations showing the effect of polluted water on plant growth by growing bean plants and watering them with tap water, and “acid rain” (water with small amounts of vinegar can be used to simulate acid rain).

Students can track and record their personal use of water in daily activities and identify situations where water is wasted, and suggest ways to reduce the waste. For example, they can measure the water from a dripping tap over a period of time, or they can measure the amount of water used to water lawns, take a bath, brush their teeth, or flush the toilet, and suggest ways to reduce the consumption of water for each of these activities.

Personal and age-appropriate actions to protect and safeguard our water supplies could be discussed. Students could be challenged to explain how litter may cause water pollution or problems for living things that live in the water.

Protecting our Water Sources

Tasks for Instruction and/or Assessment

Performance

- Visit a local stream, river, seashore or lake with your class. Look for signs that the water is clean and healthy, or signs that it is polluted. Record your observations. (102-11)

Write down some ways to try to make sure water is kept unpolluted. (Do not ignore the ocean.) (102-11, 103-8)

Journal

- How is water useful in my life? (103-8)
- Some ways I can help keep water clean are ... (103-8)

Interview

- How do people get clean water? Does everyone get it the same way? (102-11)
- Why is it important that our water be clean and not polluted? (103-8)

Presentation

- *Class poster or mural:* You will be responsible for getting or drawing pictures of one of four aspects of water sources:
 - water sources (lakes, rivers, underground water, ocean)
 - ways of getting this water (wells, pumping stations, hand pumps)
 - how we use water
 - ways to make sure our water is pure and clean. (102-11)
- Act out ways which water and its cleanliness affects them. (103-8)

Portfolio

- Select a piece of work from this unit and place it in your portfolio. Explain why you selected this piece of work. (201-3)

Resources/Notes

Addison and Wesley Resource

102-11

Launch

Activity Bank Activities

#2 and #8

Student Book/Flip Book Activities

#6 and DWYK

103-8

Activity Bank Activities

#2 and #8

Student Book/Flip Book Activities

#6 and DWYK

Physical Science: Liquids and Solids

Introduction

When students examine materials in their environment they become aware of a wide array of similarities and differences in their properties: the way they look, the way they feel, and the way they respond to environmental change. Some properties are common to many materials and are used to group materials into broad categories. Other properties are important for distinguishing individual materials. The categories of liquid and solid provide one way for students to organize their understanding of materials. This understanding is extended as students investigate ways that solids and liquids interact, and learn that materials can have both a solid and liquid phase.

Focus and Context

Students will have opportunities to practice both their inquiry and problem solving skills in this unit. Investigations that focus on the properties and interactions of liquids and solids will provide many opportunities for observing and recording. Students will also get opportunities to design solutions to buoyancy challenges, and create and test useful products made by combining solids and liquids.

Science Curriculum Links

Many connections can be made in the first section of this unit, *The Three States of Water*, and the *Air and Water* unit. This unit is best done during the winter months in order to have easy access to ice, snow, and cold weather.

Students have already investigated the difference between materials and objects in the grade 1 unit, *Properties of Objects and Materials*. This unit provides the prerequisite skills, knowledge, and experiences needed for a grade 5 unit, *Properties and Changes in Materials*.

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>Students will be expected to</p> <p>103-6 describe the characteristics of the three states of water and predict changes from one state to another</p> <p>100-17 investigate and compare properties of familiar liquids and solids</p> <p>100-18 investigate and describe the interactions of familiar liquids and solids</p> <p>100-21 demonstrate an understanding of sinking and floating objects by solving a related practical problem</p> <p>100-19 identify ways to use a variety of liquids and to combine solids and liquids to make useful materials</p> <p>100-20 investigate changes that result from the interaction of materials and describe how their characteristics have changed</p> <p>102-8 describe and demonstrate ways we use our knowledge of solids and liquids to maintain a clean and healthy environment</p>	<p>Students will be expected to</p> <p>Initiating and Planning</p> <p>200-1 ask questions that lead to exploration and investigation</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>201-3 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>201-7 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>202-8 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> <p>203-5 respond to the ideas and actions of others and acknowledge their ideas and contributions</p>

PEI/APEF Specific Curriculum Outcomes

The Three States of Water

Students will be expected to

- respond to the ideas and questions of classmates during investigations into the characteristics of water, and how it changes from one state to another (203-5)
- describe the characteristics of the three states of water (ice, water, water vapor) and predict changes from one state to another (103-6, 200-3)

Properties and Interactions of Familiar Liquids and Solids

Students will be expected to

- ask questions about the properties of familiar liquids and solids that lead to exploration and investigation (200-1)
- place objects in groups according to the type of liquid in which they will float or sink (202-2)
- investigate and compare properties of familiar liquids and solids (100-17)
- demonstrate an understanding of sinking and floating objects by identifying and solving a related practical problem (100-21, 200-2)
- investigate and describe the interactions of familiar liquids and solids (100-18)
- compare and evaluate solutions to the practical problem related to sinking and floating (202-8)
- make and record relevant observations during investigations of interactions of liquids and solids, using written language, pictures, and charts (201-5)
- communicate procedures used to solve the practical problem related to sinking and floating, using drawings, demonstrations, and written and/or oral descriptions (203-3)

Mixing Liquids and Solids to Make New and Useful Materials

Students will be expected to

- select and use solids, liquids and appropriate tools to make useful materials (100-19, 200-4, 201-3)
- identify and use a variety of sources to get ideas for creating new materials (201-7)
- communicate questions, ideas, and intentions to classmates while mixing and combining liquids and solids to form new and useful materials (203-1)
- describe and demonstrate ways we use our knowledge of solids and liquids to maintain a clean and healthy environment (102-8)
- investigate mixing materials to create a new material with characteristics that are different from the original components (100-20)

The Three States of Water

Outcomes

Students will be expected to

- respond to the ideas and questions of classmates during investigations into the characteristics of water, and how it changes from one state to another (203-5)
- describe the characteristics of the three states of water (ice, water, water vapour) and predict changes from one state to another (103-6, 200-3)

Elaborations—Strategies for Learning and Teaching

This section complements and reinforces the section *Forms and Changes* in Moisture in the unit *Air and Water*.

Explorations involving water can serve as a good introduction to a wide variety of less common solids and liquids. Because water is so common and changes so easily from one state to another, it is used extensively throughout this unit.

The characteristics of solids can be introduced by starting with the exploration of the characteristics of water in its solid form (ice, snow, hail). By touching it, shaping it, letting it melt in their hands, freezing water to make ice, making icicles, and observing frost on cold windows or glasses, students will be able to appreciate that solids have a definite shape. They will also experience ice melting into a liquid as it warms: They can investigate ice cubes partially submerged in water, and feel the water temperature before the ice melts, and the temperature of the water after the ice has melted. Important characteristics that they should note are that ice has a crystalline structure (evident by viewing frost as it forms, and by breaking ice cubes into smaller pieces), it is solid and therefore has a shape, and feels cold. Heat exchanges are also important: water will turn into ice if it is cooled, and ice will turn to liquid if it is warmed.

The characteristics of liquids can be introduced by exploring water in liquid form. Investigations should focus on comparisons between the properties of ice and water. Students will note that they cannot hold water, orange juice, molasses or other liquids in their hands like they can ice cubes, and that the liquid takes on the shape of the container. Other explorations into the characteristics of water in liquid form could involve surface tension of water (floating staples or pins on water), and how it evaporates. Evaporation activities will lead to explorations involving water in the gaseous state (water vapour).

Gases can be introduced through explorations with water vapour. Students should be familiar with both evaporation and boiling.

Caution: Boiling should be a discussion topic only. Boiling water has potential for serious burns.



From students' recollections of water boiling at home, they can describe the need for heat to change water into water vapour, and how it forms steam (liquid droplets suspended in air) when it cools down. They will have seen water vapour change to steam.

Invite children to describe what happens when they breath outside on a cold day. They could also be asked to describe the bathroom mirror or window after a bath. Students will have had experiences with water changing from state to state.

The Three States of Water

Tasks for Instruction and/or Assessment

Performance

- Challenge a student to melt an ice cube as quickly as possible. They cannot put the ice cube in their mouth.
When you are finished, tell your classmates the strategies that you used to melt your cube. Make a class list of ways to melt ice. (203-5, 103-6, 200-3, 100-20)
- Take two paper cups and put equal amounts of water in them. Put one in the freezer until next day.
Put the ice from one cup in a bowl, and put the water from the other cup in a second bowl.
Which form of water can be poured? Which one covers the bottom of the bowl? Which one can you pick up? Which one changes shape when you put it in the bowl? Which one feels cold? (103-6, 200-3)
- Put a couple of drops of warm water on your hand. Wave your hands gently. What do you feel? Do you feel the same way when you step out of a warm bath, shower or a swimming pool or lake? What happens to the water on your hand? (103-6, 200-3)

Performance/Journal

- Put an ice cube in a cup of warm water, and observe what happens. With a partner, talk about what you think is happening. When you have finished, feel the temperature of the water. Draw before and after pictures and label to describe your observations. (203-5, 103-6, 200-3)

Paper and Pencil

- What will happen to ice if I hold it in my hand?
What will happen to water in a glass if it is left to sit for a long time in the sun? (103-6, 200-3)
- A student puts equal amounts of water in two glasses with the same size and shape. One glass was put by a heater and one was put in the refrigerator. Draw what you think the glasses will look like after a period of several days. Explain your drawing. (103-6, 200-3)

Resources/Notes

Science Safety Guide

103-6 Lesson Two

Addison and Wesley Resource

203-5

Student Book/Flip Book Activities

#4

103-6, 200-3

Activity Bank Activities

#2

Student Book/Flip Book Activities

#4 and DWYK

Properties and Interactions of Familiar Liquids and Solids

Outcomes

Students will be expected to

- ask questions about the properties of familiar liquids and solids that lead to exploration and investigation (200-1)
- investigate and compare properties of familiar liquids and solids (100-17)
- investigate and describe the interactions of familiar liquids and solids (100-18)
- make and record relevant observations during investigations of interactions of liquids and solids, using written language, pictures, and charts (201-5)

Elaborations—Strategies for Learning and Teaching

In classroom discussion, students and teachers can share their findings about the water, ice, and water vapour. Teachers can monitor students discussion to extend their ideas to other solids and liquids. Do they think all liquids and solids have the same properties? What ways might they be different? How can we find out? Encourage students to make “I wonder...” statements that could be used as a starting point for exploration, such as “I wonder if all liquids are as runny as water” or “I wonder if there are other solids besides ice that melt in your hand”. As they explore the properties of common liquids and solids, they will probably have more “I wonder ...” statements.

Throughout these explorations, students should become used to wearing safety goggles. A number of common, safe liquids such as juice, water, milk, soft drinks, and molasses, can be used in these explorations. Students can explore the properties of these liquids by noting colour and odour, and feeling with each of these liquids. They can explore the thickness (viscosity) of the liquids by stirring the liquids with a spoon, or seeing how easily the liquids swirl or pour.

Students can explore the properties of various solids such as chalk, salt, sugar, wood and metals by noting their properties such as appearance, hardness, texture, colour, odour, and ability to be broken into smaller pieces or shaped. **Caution: Some students may have allergies.**

Some properties of materials are determined by how they interact with other substances. Students can observe what happens when drops of liquids are placed on wax paper, tin foil, cardboard, cotton, or other type of surface. They can note things like the shape of the drop on these surfaces, and if the liquid wets the surface. They can have a liquid drop race and let them select which liquid and material they want to race it on.

Charts and drawing should be used to record their observations in the activities. For example, a chart of what floats in water and what does not could be filled in by the students. Drawings could also illustrate the same thing by showing some objects floating, while others have sunk to the bottom.



Properties and Interactions of Familiar Liquids and Solids

Tasks for Instruction and/or Assessment

Performance

- Put equal amounts of water, vegetable oil, milk, juice, and molasses in paper cups. Swirl each cup gently, and put them in order of “easiest to swirl” to “hardest to swirl”. (100-17)
- Which piece of material will soak up water the most? Put a drop of water on each piece of material (e.g., wax paper, cardboard, white paper, construction paper) and tip the material. Record how far each drop travelled before it soaked into the material. (100-18, 201-5)
- Record your observations on your activity. (100-17, 201-5)

Investigating Solids

Solid	Scratch test for hardness	Does it float?	Can it bend?
wood	nail—yes finger—no pencil—yes	yes	yes, but then it breaks	
plastic				
rock				
:				
:				

Interview

- What are some things you know about liquids? Do you think all liquids are alike? What are some things that we could test to see if liquids are alike or different? (Teachers could take on a similar approach to generate “solid” questions.) (200-1)

Resources/Notes

Science Safety Guide

100-17 Lesson One and Lesson Two

Addison and Wesley Resource

200-1

Student Book/Flip Book Activities

#1, #3 and #5

100-17

Activity Bank Activities

#2 and #3

Student Book/Flip Book Activities

#1, #2, #3, #4, #5,

AH, LB and DWYK

100-18

Activity Bank Activities

#5

Student Book/Flip Book Activities

#2, #3, #5 and AH

201-5

Student Book/Flip Book Activities

#2, #3, #5 and AH

Properties and Interactions of Familiar Liquids and Solids (continued)

Outcomes

Students will be expected to

- make and record relevant observations during investigations of interactions of solids and liquids, using written language, pictures, and charts (201-5)
- place objects in groups according to the type of liquid in which they will float or sink (202-2)
- demonstrate an understanding of sinking and floating objects by identifying and solving a related practical problem (100-21, 200-2)
- compare and evaluate solutions to the practical problem related to sinking and floating (202-8)
- communicate procedures used to solve the practical problem related to sinking and floating, using drawings, demonstrations, and written and/or oral descriptions (203-3)

Elaborations—Strategies for Learning and Teaching

Students can explore how some solids float on water (pepper), dissolve in water (salt, sugar, drink crystals), sink in water (sand), or form suspensions in water (corn starch) in learning centres. An interesting mixture is formed from corn starch and water. If students scoop the mixture into their hands, it can behave as a solid or a liquid depending on the pressure they exert on it. If they hold it tight in their fist, it will behave as a solid, but if they loosen their grip, it will seep through their fingers like a liquid.

Students can experiment with various objects, like paper clips, crayons, pieces of popsicle sticks, jelly beans, to see if they sink or float in water.

Students can use fresh water and salted water to experiment with making sinking objects float and floating objects sink. For example, place an egg in fresh water to observe the sinking. Then add progressively larger amounts of salt and observe the outcome.

Use everyday examples of solids and liquids to help place objects in groups according to the type of liquid in which they will float or sink. Do liquids always mix? They can also investigate what happens when different liquids are mixed, for example, cooking oil and water, or dishwashing liquid and water, to see which ones float and which ones mix. Finally, students can make a mixture of cooking oil and water, and then add the solid objects again. Some objects will float on top, some will float on the bottom layer, and some will sink all the way to the bottom.

Using their knowledge of sinking and floating, students can generate a number of challenges that will involve designing solutions. Some examples are: designing a boat or raft from materials such as clay, aluminum foil, or modeling clay that will carry the most pennies; making a floating object sink; making a sinking object float, or making a sinking object stay suspended halfway.

Students can work together in cooperative groups to problem-solve, share ideas, and test solutions.

After they have finished refining their product, be it a raft, boat, attachments for sinking objects or keeping them afloat, they can share their observations by demonstration or in an oral presentation to class. Connections to technological products can be made with illustrations. For example, students could explore how lobster pots (made of wood) are sunk, how heavy metallic boats can float, or how fishers use a variety of floaters and weights to have their nets and lines sink or float to appropriate levels.

Properties and Interactions of Familiar Liquids and Soils (continued)

Tasks for Instruction and/or Assessment

Performance

- What floats? Take each of the objects, and see if they float in water. Draw pictures of the objects showing what they do when they are placed in a bowl of water. (100-18)
- Do all liquids mix? Complete the chart by drawing pictures to show how, using little jars, the liquids mix. If layers form, label which layer is which. (100-18, 201-5)
- In a clear cup, pour equal amounts of water and vegetable oil. Add some food colouring. Which layer does the colouring mix with? Draw a picture to show your observations. (100-18, 201-5)
- In a tall glass or bowl, add equal amounts of water and vegetable oil. Carefully drop different objects in the bowl. Record your results in the chart. (202-2)

Mixing Liquids

Mixture	Drawing
vegetable oil and water	
fruit juice and syrup	
water and vinegar	
salad dressing (e.g., Italian) and soya sauce	

Floating or Sinking

Object	Sinks through water and oil	Floats on water	Floats on oil
crayon			
eraser			
:			
:			

- (Give each student 100 cm² of aluminum foil) With a partner, design a floating device that will hold pennies. Demonstrate your floating device to the rest of the class. (202-8, 203-3)

Resources/Notes

Addison and Wesley Resource

201-5

Student Book/Flip Book Activities

#2, #3, #5 and AH

202-2

Activity Bank Activities

#9

100-21, 200-2

Activity Bank Activities

#6 and #8

Student Book/Flip Book Activities

#6

202-8

Activity Bank Activities

#6 and #8

Student Book/Flip Book Activities

#6

203-3

Activity Bank Activities

#6 and #8

Student Book/Flip Book Activities

#6

Mixing Liquids and Solids to Make New and Useful Materials

Outcomes

Students will be expected to

- select and use solids, liquids and appropriate tools to make useful materials (100-19, 200-4, 201-3)
- communicate questions, ideas, and intentions to classmates while mixing and combining liquids and solids to form new and useful materials (203-1)
- investigate mixing materials to create a new material with characteristics that are different from the original components (100-20)
- identify and use a variety of sources to get ideas for creating new materials (201-7)

Elaborations—Strategies for Learning and Teaching

Up to this point, the interactions between liquids and solids have, for the most part, left the original liquid or solid intact. In this part of the unit, new products and materials are formed from these interactions.

Caution: Students should be cautioned not to mix solids and liquids at home without supervision. Some mixtures of household chemicals can be quite hazardous.



Cooking and making construction materials, such as mud bricks, gelatine, play dough, are good contexts for this section. There are a wide variety of activities that can illustrate these outcomes; selection of which ones to do depends on availability of materials and tools such as staff room ovens or refrigerators. If these are not available, there are still many products that can be made. The focus in this section should be twofold: the products made should be useful and seen as fitting a human need, and the characteristics of the product made should be different than the components used to make it.

Students can make play dough using flour, salt and water. They can add different colours of food colouring to the dough to get multicoloured dough. They can experiment with varying the amount of water in order to change the texture of the dough.

Students can prepare a package of gelatin according to directions. Encourage students to observe the characteristics of the ingredients before and after preparation.

Plaster of Paris can also be used to make useful objects. Alternatively, students can mix flour and water to make a paste to be used for papier mâché.

Simple chemical reactions can be done to illustrate new materials being formed. Students may wish to help make cookie dough, and compare the dough to the baked cookie. Students can drop baking soda into vinegar to yield a burst of bubbles. Yogurt and baking soda will also give a bubbling mixture. The reaction of the yeast on bread dough may be observed in a bread machine

Students can use some of the many available simple chemistry experiment books to find mixtures that make smelly, bubbling or colourful products. Other sources of examples of simple chemical reactions are cook books, Internet sites and children's science television shows.

Mixing Liquids and Solids to Make New and Useful Materials

Tasks for Instruction and/or Assessment

Performance

- Using the materials given (e.g., soil, sand, small gravel, clay, water) make some mud bricks. Let your brick dry, and then test it next day to see if it will hold together. (100-19, 200-4, 201-3, 100-20)
- With a partner, add a couple of drops of vinegar to a spoonful of baking soda in a glass. Keep adding drops of vinegar. What new type of substance did you form? (100-20)
- Add a few drops of water to some corn starch and mix until it looks a bit like glue. Do you think it is a solid or liquid? Why?
Now try to hold the mixture loosely in your hands. What happens? Do you think it is a solid or liquid?
Now hold onto the mixture again, and grip it tightly and quickly. What happens? Is it acting more like a solid or a liquid? (203-1, 100-19, 200-4, 201-3)

Informal/Formal Observation

- Observe students as they make their mud bricks (play dough, Jello muffins). Assess their ability to select and use appropriate tools, communicate their questions and ideas, and evaluate their product. (100-19, 200-4, 201-3, 203-1)

Resources/Notes

Science Safety Guide

100-20 Lesson One and Lesson Two

Addison and Wesley Resource

100-19, 200-4, 201-3

Activity Bank Activities

#4 and #7

203-1

Activity Bank Activities

#4 and #7

100-20

Activity Bank Activities

#1 and #7

Student Book/Flip Book Activities

LB

201-7

Activity Bank Activities

#1

Mixing Liquids and Solids to Make New and Useful Materials (continued)

Outcomes

Students will be expected to

- describe and demonstrate ways we use our knowledge of solids and liquids to maintain a clean and healthy environment (102-8)

Elaborations—Strategies for Learning and Teaching

At the end of every investigation, students should clean up any residue material carefully, and dispose of it properly. As much as possible, students should use the knowledge they have gained throughout this unit (for example, which types of materials will absorb liquids, some solids will dissolve in water (rain) and may get into the environment more easily), when disposing of materials. Environmental posters can be placed in the room to emphasize the care that must be taken with our environment, and the types of everyday materials that should be disposed of carefully. Programs like “Waste Watch” can provide a context for this outcome. Connections to the section *Sources of Water* in the Grade 2 science unit, *Air and Water* can be made here.

Students could also investigate the ability of certain materials to soak up oil. This would simulate the real life situation of cleaning up after an oil spill. Students could note the ability of sawdust, kitty litter, feathers, moss, and other materials for soaking up oil.

Littering could be an appropriate topic to address this outcome. Students could be challenged to think of situations where some solids and liquids were not disposed of properly and could cause problems.

Mixing Liquids and Solids to Make New and Useful Materials (continued)

Tasks for Instruction and/or Assessment

Interview

- Which type of material would you use to clean up a water spill? Why? (102-8)
- What would you use to clean up dirty dog prints? Sandy prints from the beach? (102-8)

Journal

- Recycling can help us keep a clean environment. Things I recycle at home are ... (102-8)

Performance

- Observe how the student follows the waste watch separation instructions.

Resources/Notes

Addison and Wesley Resource

102-8

Student Book/Flip Book Activities

#2, #5 and AH

Physical Science: Relative Position and Motion

Introduction

Moving things are a source of fascination for children of many ages. The study of moving things offers children an opportunity to develop a sense of space, orientation, perspective, and relationship. Through observation and the use of specific language, students develop the ability to describe where things are and how they are moving, and share their experience with others.

Focus and Context

This unit should be developed with an inquiry focus, with an emphasis on making observations and developing fair tests. Students will first explore how descriptions of an object's position depend upon their perspective, and will learn to make and record accurate observations about the relative position of various objects. They will then investigate various types of motion and the factors that affect it. This will lead to a problem-solving situation, in which students will design their own devices that move in specified ways. The playground or gym would make a good context for this unit. Students could observe and describe their motion in a variety of ways (e.g., swings, merry-go-rounds, pogo sticks, teeter totters).

Science Curriculum Links

Students will investigate the causes of motion in grade 5, *Forces and Simple Machines*.

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>Students will be expected to</p> <p>100-23 describe the position of an object relative to other objects or to an identified space, and place an object in an identified position</p> <p>100-24 describe the position of objects from different perspectives</p> <p>100-25a investigate and describe different patterns of movement, such as spinning, swinging, bouncing, rolling, sliding, vibrating, or moving in a straight line</p> <p>100-22 describe the motion of an object in terms of a change in position and orientation relative to other objects</p> <p>100-25b Identify factors that affect movement</p>	<p>Students will be expected to</p> <p>Initiating and Planning</p> <p>200-1 ask questions that lead to exploration and investigation</p> <p>200-2 identify problems to be solved</p> <p>200-3 make predictions, based on an observed pattern</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>Analysing and Interpreting</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>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>

PEI/APEF Specific Curriculum Outcomes

Position

Students will be expected to

- use materials to build objects that move in a specific manner (201-3)
- describe the position of objects from different perspectives (100-24)
- describe the position of an object relative to other objects, using language such as “to the left of”, “on top”, “beside”, or “two giant steps behind”, or to an identified space, and place an object in an identified position (100-23, 203-2)
- identify questions that arise about how different students view the same object from different perspectives, and cooperate with these students to make up accurate descriptions (202-9, 203-5)

Motion

Students will be expected to

- investigate and describe different patterns of movement (100-25a)
- make predictions about how various factors will affect the motion of an object (200-3)
- describe the motion of an object in terms of a change in position and orientation relative to other objects (100-22, 203-2)
- use terms like “faster” or “slower”, and tools such as rulers, string and stopwatches to test these predictions (201-3)
- follow a simple procedure where instructions are given to move a person or object in a certain way, or in a specified direction (201-1)
- draw simple conclusions about the factors that affect movement based on their investigations (100-25b, 202-7)
- ask questions about the factors that affect the motion of an object, and identify factors to investigate (200-1, 200-2)
- compare and evaluate the abilities of their constructed object to move (202-8)

Position

Outcomes

Students will be expected to

- use materials to build objects that move in a specific manner (201-3)
- describe the position of an object relative to other objects, using language such as “to the left of”, “on top”, “beside” or “two giant steps behind”, or to an identified space, and place an object in an identified position (100-23, 203-2)
- describe the position of objects from different perspectives (100-24)
- identify questions that arise about how different students view the same object from different perspectives, and cooperate with these students to make up accurate descriptions (202-9, 203-5)

Elaborations–Strategies for Learning and Teaching

This outcome will form the basis of a unit project. After an active introduction to the unit where students can observe the various types of motion, students can be challenged to start thinking about the way things move, and what they might make to show one or more types of movement. Over the course of the unit, they should be given opportunities to design their own moving device, such as matchbox cars, sail boats, or paper airplanes. Various methods of propulsion can be used, such as balloons, magnets, sails, or propellers.

As students observe and interact with various moving objects, they can learn descriptive phrases that can be used to describe the position of objects. Students can play games like “Simon Says”. Commands such as “Simon Says, put the ball on top of the box”, or “Simon Says, put your eraser to the left of your book” can be given, occasionally leaving off the “Simon Says” to ensure that students are listening carefully. This activity will help students use the descriptive terms, and will lead to questions about perspectives. For example, if students are in a row, and the command is to put an object to the left of another object, any student who turns around will notice that the object is to his or her right.

Working in groups of two or three, students can place an object such as a paper towel tube in a certain position, and then move to different parts of the room. They can then try to describe how the other students would describe the position of the object, and listen to the other students describe what they think other students are seeing. These activities reinforce the development of spatial sense, found in the various components of spatial perception found in mathematics general curriculum outcome E.

Alternatively, students can work together to create a map for a “buried treasure,” using a variety of reference points and measures. If done orally, students can be challenged to describe more than one way to get from “Start” to “Treasure”. Connections can be made to mapping skills found in the social studies curriculum.

Position

Tasks for Instruction and/or Assessment

Performance

- Use the directions on a treasure map to find the treasure. (Hide a variety of objects, and write simple directions to give to students) or make a flight plan for your airplane then have another student follow your plan. (100-23, 203-2)
- Position yourself so that your plane on the desk is: (100-24, 202-9, 203-5)
 - beside you
 - above you
 - to the right of you
- Have a student find an object from another student's description (100-24, 202-9, 203-5)

Paper and Pencil

- Using a hundreds chart, listen to the directions on how to move your marker on the chart to find a given number. (Using words like left, right, up and down, three spaces to right, etc.) (100-23, 203-2)

Resources/Notes

Addison and Wesley Resource

201-3

Activity Bank Activities

#10

Student Book/Flip Book Activities

#6

100-23, 203-2

Activity Bank Activities

#2, #3, #4 and #10

Student Book/Flip Book Activities

#1

100-24

Activity Bank Activities

#7

202-9, 203-5

Activity Bank Activities

#8

Motion

Outcomes

Students will be expected to

- investigate and describe different patterns of movement (100-25a)
- describe the motion of an object in terms of a change in position and orientation relative to other objects (100-22, 203-2)
- follow a simple procedure where instructions are given to move a person or object in a certain way, or in a specified direction (201-1)

Elaborations—Strategies for Learning and Teaching

Students can explore the motion of a variety of objects that exhibit different types of motion such as spinning, swinging, bouncing, rolling, sliding, vibrating, or moving in a straight line (for example, tops, spring-operated toys, rubber balls, toy helicopters, Venetian blinds, and pendulum clocks, or playground motion such as swinging, sliding, going on the merry-go-round). This may give them ideas for their own device that they will construct.

Students should use appropriate language such as backwards, forwards, and sideways to describe the motion of these objects. Their descriptions should focus not only on the types of motion exhibited (such as rolling, vibrating) but also on its motion relative to other objects in the room. Once again, individual student perspectives play a large role in describing the motion. Activities relating to different perspectives should be kept simple. This could also reinforce math outcomes from grades one and two related to slides and flips.

One student can pull another in a wagon, with other students circling the room. The student in the wagon can describe the motion of the other (stationary) students from his/her perspective (for example, “Tommy is moving toward me; Jane is moving away from me; Patrick is moving to the left”). This should generate a lot of discussion, since the other students will argue that they are not moving, but from the perspective of the student sitting in the wagon, they are. The other students in the classroom can describe the motion of the student in the wagon from their own perspective.

Students can describe their experiences in a moving car—how trees and houses appear to move past them, and the car appears to be stationary. Alternatively, they can describe the motion of other objects when they are swinging or on other playground equipment.

Students can also play games like Simon Says, using directions for different types of motion. For example, instructions such as “Simon Says jump up and down” or “Simon Says roll around on the ground” can be given and followed.

Motion

Tasks for Instruction and/or Assessment

Performance

- Using geometric shapes such as a cone, cube, or sphere, ask students to investigate how these can be moved across the desk. (100-25a)
- On the playground, explore something that makes you:
 - move up and down
 - move downwards and forward at the same time
 - move around in a circle
 (100-25, 201-1)

Paper and Pencil

- Pick some objects in the class and describe how they move (such as pencil sharpener, doors, or windows). (100-25)

Resources/Notes

Science Safety Guide

100-25a Lesson One and Lesson Two

100-22 Lesson Two

201-1 Lesson Two

Addison and Wesley Resource

100-25a

Launch

Activity Bank Activities

#1, #2, #3, #8 and #9

Student Book/Flip Book Activities

#1, #2, #6, AH and LB

100-22, 203-2

Activity Bank Activities

#1, #3, #6, #8 and #9

Student Book/Flip Book Activities

#1 and AH

201-1

Activity Bank Activities

#2, #5 and #6

Student Book/Flip Book Activities

#2, #3, #4 and #5

Motion (continued)

Outcomes

Students will be expected to

- ask questions about the factors that affect the motion of an object, and identify factors to investigate (200-1, 200-2)
- make predictions about how various factors will affect the motion of an object (200-3)
- use terms like “faster” or “slower”, and tools such as rulers, string and stopwatches to test these predictions (201-3)
- draw simple conclusions about the factors that affect movement based on their investigations (100-25b, 202-7)
- compare and evaluate the abilities of their constructed object to move (202-8)

Elaborations—Strategies for Learning and Teaching

As the students explore the motion of various objects, they can be encouraged to find ways to change its motion, and identify the factors that affect the motion of the object. The possible factors that they could investigate could include the amount of force (this concept should be introduced here, and defined as a push and a pull), the mass of an object (or how heavy it is), the height of ramps that they may use to roll things down, and the type of surface that an object is moving over (e.g., carpet, smooth floor). The focus of these activities should be, as much as possible, the development of fair tests.

Students can investigate a variety of motions to try to determine factors that affect them (such as height of a ramp, surface of a ramp, and type of object being rolled down a ramp). For example, students could investigate how to keep an object spinning for longer periods of times, or compare two objects ability to spin. They could roll various objects down ramps, and time the descent to see which ones rolled fastest, or measure the path with string to see which ones rolled furthest. They can try to determine if empty containers roll faster than full ones, or if containers filled with liquids roll faster than those with solids. They can investigate the effect of rolling cars with different wheel sizes down the ramp. They can investigate how various surfaces or lubricants, or the ramp angle affect an object’s ability to slide. They could investigate how the length of a slinky or spring, or the suspension of a weight, affects its up and down motion. They could make gels of various thicknesses to see how this affects its ability to vibrate or jiggle. This list simply illustrates the variety of motions that can be investigated; there are many more investigations that the students could explore beyond these.

At the beginning of the unit, students were challenged to make an object that moves in a specific way. Students should be given opportunities to construct this device, and use what they have learned in this unit. It can then be tested on the basis of the motion that they have designed it for, and compared to their classmates’ devices.

Motion (continued)

Tasks for Instruction and/or Assessment

Performance

- Predict which toy truck (ball, soup can) will reach the end of the ramp first. Test your prediction. (200-3,201-3)

Which one goes fastest?

	Prediction	Test Result
One ramp higher than the other		
one ramp is wet, the other is dry		
one truck is big, another is small		
:		
:		

Journal

- You have to try to make your ball roll down this ramp as fast as possible. In your journal, write down the things that you would like to try to see if you can make it speed up. (200-1, 200-2)

Paper and Pencil

- What things can you do to make balls on a ramp roll faster? (100-25b, 202-7)

Presentations

- Design and make your own toy or gadget that moves. Try to make
 - an object that always rolls to the left
 - a paper glider that spins in the air

Resources/Notes

Science Safety Guide

200-3 Lesson One

100-25b Lesson One and Lesson Two

Addison and Wesley Resource

200-1, 200-2

Student Book/Flip Book Activities

#2, #3, #4 and #5

200-3

Activity Bank Activities

#5 and #6

Student Book/Flip Book Activities

#2, #3, #4, #5 and DWYK

201-3

Student Book/Flip Book Activities

#2, #3, #4 and #5

100-25b, 202-7

Activity Bank Activities

#5 and #6

Student Book/Flip Book Activities

#2, #3, #4, #5 and DWYK

202-8

Activity Bank Activities

#10

Student Book/Flip Book Activities

#6

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