Science 2

Curriculum Guide 2016

Newfoundland Labrador

Education and Early Childhood Development
By March 31, 2017, the Department of Education and Early Childhood Development will have improved provincial early childhood learning and the K-12 education system to further opportunities for the people of Newfoundland and Labrador.
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Section One: Newfoundland and Labrador Curriculum

Introduction

There are multiple factors that impact education: technological developments, increased emphasis on accountability, and globalization. These factors point to the need to consider carefully the education students receive.

The Newfoundland and Labrador Department of Education and Early Childhood Development believes that curriculum design with the following characteristics will help teachers address the needs of students served by the provincially prescribed curriculum:

- Curriculum guides must clearly articulate what students are expected to know and be able to do by the time they graduate from high school.
- There must be purposeful assessment of students’ performance in relation to the curriculum outcomes.

Outcomes Based Education

The K-12 curriculum in Newfoundland and Labrador is organized by outcomes and is based on The Atlantic Canada Framework for Essential Graduation Learning in Schools (1997). This framework consists of Essential Graduation Learnings (EGLs), General Curriculum Outcomes (GCOs), Key Stage Curriculum Outcomes (KSCOs) and Specific Curriculum Outcomes (SCOs).

Essential Graduation Learnings (common to all subject areas)

General Curriculum Outcomes (unique to each subject area)

Key Stage Learning Outcomes (met by end of grades 3, 6, 9 and 12)

Specific Curriculum Outcomes (met within each grade level and subject area)

EGLs provide vision for the development of a coherent and relevant curriculum. They are statements that offer students clear goals and a powerful rationale for education. The EGLs are delineated by general, key stage, and specific curriculum outcomes.
EGLs describe the knowledge, skills, and attitudes expected of all students who graduate from high school. Achievement of the EGLs will prepare students to continue to learn throughout their lives. EGLs describe expectations, not in terms of individual subject areas, but in terms of knowledge, skills, and attitudes developed throughout the K-12 curriculum. They confirm that students need to make connections and develop abilities across subject areas if they are to be ready to meet the shifting and ongoing demands of life, work, and study.

**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), and mathematical and scientific concepts and symbols, to think, learn and communicate effectively.

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

**Personal Development** – Graduates will be able to continue to learn and to pursue an active, healthy lifestyle.

**Spiritual and Moral Development** – Graduates will demonstrate understanding and appreciation for the place of belief systems in shaping the development of moral values and ethical conduct.

**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.
Curriculum outcomes are statements that articulate what students are expected to know and be able to do in each program area in terms of knowledge, skills, and attitudes.

Curriculum outcomes may be subdivided into General Curriculum Outcomes, Key Stage Curriculum Outcomes, and Specific Curriculum Outcomes.

**General Curriculum Outcomes (GCOs)**
Each program has a set of GCOs which describe what knowledge, skills, and attitudes students are expected to demonstrate as a result of their cumulative learning experiences within a subject area. GCOs serve as conceptual organizers or frameworks which guide study within a program area. Often, GCOs are further delineated into KSCOs.

**Key Stage Curriculum Outcomes (KSCOs)**
Key Stage Curriculum Outcomes (KSCOs) summarize what is expected of students at each of the four key stages of grades three, six, nine, and twelve.

**Specific Curriculum Outcomes (SCOs)**
SCOs set out what students are expected to know and be able to do as a result of their learning experiences in a course, at a specific grade level. In some program areas, SCOs are further articulated into delineations. It is expected that all SCOs will be addressed during the course of study covered by the curriculum guide.

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**EGLs to Curriculum Guides**

![Diagram](image-url)
Context for Teaching and Learning

Teachers are responsible to help students achieve outcomes. This responsibility is a constant in a changing world. As programs change over time so does educational context. Several factors make up the educational context in Newfoundland and Labrador today: inclusive education, support for gradual release of responsibility teaching model, focus on literacy and learning skills in all programs, and support for education for sustainable development.

All students need to see their lives and experiences reflected in their school community. It is important that the curriculum reflect the experiences and values of all genders and that learning resources include and reflect the interests, achievements, and perspectives of all students. An inclusive classroom values the varied experiences and abilities as well as social and ethno-cultural backgrounds of all students while creating opportunities for community building. Inclusive policies and practices promote mutual respect, positive interdependencies, and diverse perspectives. Learning resources should include a range of materials that allow students to consider many viewpoints and to celebrate the diverse aspects of the school community.
Curriculum is designed and implemented to provide learning opportunities for all students according to abilities, needs, and interests. Teachers must be aware of and responsive to the diverse range of learners in their classes. Differentiated instruction is a useful tool in addressing this diversity.

Differentiated instruction responds to different readiness levels, abilities, and learning profiles of students. It involves actively planning so that the process by which content is delivered, the way the resource is used, and the products students create are in response to the teacher’s knowledge of whom he or she is interacting with. Learning environments should be flexible to accommodate various learning preferences of the students. Teachers continually make decisions about selecting teaching strategies and structuring learning activities that provide all students with a safe and supportive place to learn and succeed.

**Planning for Differentiation**

- Create a dynamic classroom
  - present authentic and relevant communication situations
  - manage routines and class organization
  - provide realistic and motivating classroom experiences

- Vary teaching strategies
  - allow students to construct meaning and connect, collaborate and communicate with each other in a positive learning community
  - form essential links between the text and the students

- Respond to student differences
  - allow students to make relevant and meaningful choices
  - provide students ownership of learning goals
  - empower students through a gradual release of responsibility
  - allow students multiple ways to demonstrate their learning

**Differentiating the Content**

Differentiating content requires teachers to pre-assess students to identify those who require prerequisite instruction, as well as those who have already mastered the concept and may therefore apply strategies learned to new situations. Another way to differentiate content is to permit students to adjust the pace at which they progress through the material. Some students may require additional time while others will move through at an increased pace and thus create opportunities for enrichment or more indepth consideration of a topic of particular interest.
Teachers should consider the following examples of differentiating content:

- Meet with small groups to reteach an idea or skill or to extend the thinking or skills.
- Present ideas through auditory, visual, and tactile means.
- Use reading materials such as novels, websites, and other reference materials at varying reading levels.

**Differentiating the Process**

Differentiating the process involves varying learning activities or strategies to provide appropriate methods for students to explore and make sense of concepts. A teacher might assign all students the same product (e.g., presenting to peers) but the process students use to create the presentation may differ. Some students could work in groups while others meet with the teacher individually. The same assessment criteria can be used for all students.

Teachers should consider flexible grouping of students such as whole class, small group, or individual instruction. Students can be grouped according to their learning styles, readiness levels, interest areas, and/or the requirements of the content or activity presented. Groups should be formed for specific purposes and be flexible in composition and short-term in duration.

Teachers should consider the following examples of differentiating the process:

- Offer hands-on activities for students.
- Provide activities and resources that encourage students to further explore a topic of particular interest.
- Use activities in which all learners work with the same learning outcomes but proceed with different levels of support, challenge, or complexity.

**Differentiating the Product**

Differentiating the product involves varying the complexity and type of product that students create to demonstrate learning outcomes. Teachers provide a variety of opportunities for students to demonstrate and show evidence of what they have learned.

Teachers should give students options to demonstrate their learning (e.g., create an online presentation, write a letter, or develop a mural). This will lead to an increase in student engagement.
Differentiating the Learning Environment

The learning environment includes the physical and the affective tone or atmosphere in which teaching and learning take place, and can include the noise level in the room, whether student activities are static or mobile, or how the room is furnished and arranged. Classrooms may include tables of different shapes and sizes, space for quiet individual work, and areas for collaboration.

Teachers can divide the classroom into sections, create learning centres, or have students work both independently and in groups. The structure should allow students to move from whole group, to small group, pairs, and individual learning experiences and support a variety of ways to engage in learning. Teachers should be sensitive and alert to ways in which the classroom environment supports their ability to interact with students.

Teachers should consider the following examples of differentiating the learning environment:

• Develop routines that allow students to seek help when teachers are with other students and cannot provide immediate attention.
• Ensure there are places in the room for students to work quietly and without distraction, as well as places that invite student collaboration.
• Establish clear guidelines for independent work that match individual needs.
• Provide materials that reflect diversity of student background, interests, and abilities.

The physical learning environment must be structured in such a way that all students can gain access to information and develop confidence and competence.

Meeting the Needs of Students with Exceptionalities

All students have individual learning needs. Some students, however, have exceptionalities (defined by the Department of Education and Early Childhood Development) which impact their learning. The majority of students with exceptionalities access the prescribed curriculum. For details of these exceptionalities see www.gov.nl.ca/edu/k12/studentsupportservices/exceptionalities.html

Supports for these students may include

1. Accommodations
2. Modified Prescribed Courses
3. Alternate Courses
4. Alternate Programs
5. Alternate Curriculum

For further information, see Service Delivery Model for Students with Exceptionalities at www.cdli.ca/sdm/

Classroom teachers should collaborate with instructional resource teachers to select and develop strategies which target specific learning needs.
Some students begin a course or topic with a vast amount of prior experience and knowledge. They may know a large portion of the material before it is presented to the class or be capable of processing it at a rate much faster than their classmates. All students are expected to move forward from their starting point. Many elements of differentiated instruction are useful in addressing the needs of students who are highly able.

Teachers may

- assign independent study to increase depth of exploration in an area of particular interest;
- compact curriculum to allow for an increased rate of content coverage commensurate with a student's ability or degree of prior knowledge;
- group students with similar abilities to provide the opportunity for students to work with their intellectual peers and elevate discussion and thinking, or delve deeper into a particular topic; and
- tier instruction to pursue a topic to a greater depth or to make connections between various spheres of knowledge.

Highly able students require the opportunity for authentic investigation to become familiar with the tools and practices of the field of study. Authentic audiences and tasks are vital for these learners. Some highly able learners may be identified as gifted and talented in a particular domain. These students may also require supports through the Service Delivery Model for Students with Exceptionalities.
Gradual Release of Responsibility

Teachers must determine when students can work independently and when they require assistance. In an effective learning environment, teachers choose their instructional activities to model and scaffold composition, comprehension, and metacognition that is just beyond the students' independence level. In the gradual release of responsibility approach, students move from a high level of teacher support to independent work. If necessary, the teacher increases the level of support when students need assistance. The goal is to empower students with their own learning strategies, and to know how, when, and why to apply them to support their individual growth. Guided practice supports student independence. As a student demonstrates success, the teacher should gradually decrease his or her support.

Gradual Release of Responsibility Model

[Diagram showing the Gradual Release of Responsibility Model with stages: Modelled (“I do ... you watch”), MENTOR (Shared and Guided, “I do ... you help”), MONITOR (Independent, “You do ... I watch”), and Independent (“You do ... I watch”).]
Literacy

"Literacy is the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society". To be successful, students require a set of interrelated skills, strategies and knowledge in multiple literacies that facilitate their ability to participate fully in a variety of roles and contexts in their lives, in order to explore and interpret the world and communicate meaning. (The Plurality of Literacy and its Implications for Policies and Programmes, 2004, p.13)

Reading in the Content Areas

The focus for reading in the content areas is on teaching strategies for understanding content. Teaching strategies for reading comprehension benefits all students as they develop transferable skills that apply across curriculum areas.

When interacting with different texts, students must read words, view and interpret text features, and navigate through information presented in a variety of ways including, but not limited to:

- Advertisements
- Blogs
- Documentaries
- Magazine articles
- Books
- Online databases
- Plays
- Podcasts
- Movies
- Music videos
- Online databases
- Speeches
- Podcasts
- Songs
- Video games
- Websites

Students should be able to interact with and comprehend different texts at different levels.
There are three levels of text comprehension:

- **Independent level** – Students are able to read, view, and understand texts without assistance.
- **Instructional level** – Students are able to read, view, and understand most texts but need assistance to fully comprehend some texts.
- **Frustration level** – Students are not able to read or view with understanding (i.e., texts may be beyond their current reading level).

Teachers will encounter students working at all reading levels in their classrooms and will need to differentiate instruction to meet their needs. For example, print texts may be presented in audio form, physical movement may be associated with synthesizing new information with prior knowledge, or graphic organizers may be created to present large amounts of print text in a visual manner.

When interacting with information that is unfamiliar to students, it is important for teachers to monitor how effectively students are using strategies to read and view texts:

- Analyze and think critically about information.
- Determine importance to prioritize information.
- Engage in questioning before, during, and after an activity related to a task, text, or problem.
- Make inferences about what is meant but not said.
- Make predictions.
- Synthesize information to create new meaning.
- Visualize ideas and concepts.
Learning Skills for Generation Next

Generation Next is the group of students who have not known a world without personal computers, cell phones, and the Internet. They were born into this technology. They are digital natives.

Students need content and skills to be successful. Education helps students learn content and develop skills needed to be successful in school and in all learning contexts and situations. Effective learning environments and curricula challenge learners to develop and apply key skills within the content areas and across interdisciplinary themes.

Learning Skills for Generation Next encompasses three broad areas:

- Learning and Innovation Skills enhance a person’s ability to learn, create new ideas, problem solve, and collaborate.
- Life and Career Skills address leadership, and interpersonal and affective domains.
- Literacy Skills develop reading, writing, and numeracy, and enhance the use of information and communication technology.

The diagram below illustrates the relationship between these areas.

A 21st century curriculum employs methods that integrate innovative and research-driven teaching strategies, modern learning technologies, and relevant resources and contexts.
Support for students to develop these abilities and skills is important across curriculum areas and should be integrated into teaching, learning, and assessment strategies. Opportunities for integration of these skills and abilities should be planned with engaging and experiential activities that support the gradual release of responsibility model. For example, lessons in a variety of content areas can be infused with learning skills for Generation Next by using open-ended questioning, role plays, inquiry approaches, self-directed learning, student role rotation, and Internet-based technologies.

All programs have a shared responsibility in developing students’ capabilities within all three skill areas.
Education for Sustainable Development

Sustainable development is comprised of three integrally connected areas: economy, society, and environment.

As conceived by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) the overall goal of Education for Sustainable Development (ESD) is to integrate the knowledge, skills, values, and perspectives of sustainable development into all aspects of education and learning. Changes in human behaviour should create a more sustainable future that supports environmental integrity and economic viability, resulting in a just society for all generations.

ESD involves teaching for rather than teaching about sustainable development. In this way students develop the skills, attitudes, and perspectives to meet their present needs without compromising the ability of future generations to meet their needs.

Within ESD, the knowledge component spans an understanding of the interconnectedness of our political, economic, environmental, and social worlds, to the role of science and technology in the development of societies and their impact on the environment. The skills necessary include being able to assess bias, analyze consequences of choices, ask questions, and solve problems. ESD values and perspectives include an appreciation for the interdependence of all life forms, the importance of individual responsibility and action, an understanding of global issues as well as local issues in a global context. Students need to be aware that every issue has a history, and that many global issues are linked.

*Sustainable development is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.* (Our Common Future, 43)
Assessment and Evaluation

Assessment

Assessment is the process of gathering information on student learning.

How learning is assessed and evaluated and how results are communicated send clear messages to students and others about what is valued.

Assessment instruments are used to gather information for evaluation. Information gathered through assessment helps teachers determine students' strengths and needs, and guides future instruction.

Teachers are encouraged to be flexible in assessing student learning and to seek diverse ways students might demonstrate what they know and are able to do.

Evaluation involves the weighing of the assessment information against a standard in order to make a judgement about student achievement.

Assessment can be used for different purposes:

1. Assessment for learning guides and informs instruction.
2. Assessment as learning focuses on what students are doing well, what they are struggling with, where the areas of challenge are, and what to do next.
3. Assessment of learning makes judgements about student performance in relation to curriculum outcomes.

1. Assessment for Learning

Assessment for learning involves frequent, interactive assessments designed to make student learning visible. This enables teachers to identify learning needs and adjust teaching accordingly.

Assessment for learning is not about a score or mark; it is an ongoing process of teaching and learning:

- Pre-assessments provide teachers with information about what students already know and can do.
- Self-assessments allow students to set goals for their own learning.
- Assessment for learning provides descriptive and specific feedback to students and parents regarding the next stage of learning.
- Data collected during the learning process from a range of tools enables teachers to learn as much as possible about what a student knows and is able to do.
2. Assessment as Learning
Assessment as learning involves students’ reflecting on their learning and monitoring their own progress. It focuses on the role of the student in developing metacognition and enhances engagement in their own learning. Students can
• analyze their learning in relation to learning outcomes,
• assess themselves and understand how to improve performance,
• consider how they can continue to improve their learning, and
• use information gathered to make adaptations to their learning processes and to develop new understandings.

3. Assessment of Learning
Assessment of learning involves strategies designed to confirm what students know in terms of curriculum outcomes. It also assists teachers in determining student proficiency and future learning needs. Assessment of learning occurs at the end of a learning experience and contributes directly to reported results. Traditionally, teachers relied on this type of assessment to make judgements about student performance by measuring learning after the fact and then reporting it to others. Used in conjunction with the other assessment processes previously outlined, assessment of learning is strengthened. Teachers can
• confirm what students know and can do;
• report evidence to parents/guardians, and other stakeholders, of student achievement in relation to learning outcomes; and
• report on student learning accurately and fairly using evidence obtained from a variety of contexts and sources.

Involving Students in the Assessment Process
Students should know what they are expected to learn as outlined in the specific curriculum outcomes of a course as well as the criteria that will be used to determine the quality of their achievement. This information allows students to make informed choices about the most effective ways to demonstrate what they know and are able to do.

It is important that students participate actively in assessment by co-creating criteria and standards which can be used to make judgements about their own learning. Students may benefit from examining various scoring criteria, rubrics, and student exemplars.

Students are more likely to perceive learning as its own reward when they have opportunities to assess their own progress. Rather than asking teachers, “What do you want?”, students should be asking themselves questions:
• What have I learned?
• What can I do now that I couldn’t do before?
• What do I need to learn next?

Assessment must provide opportunities for students to reflect on their own progress, evaluate their learning, and set goals for future learning.
Assessment Tools

In planning assessment, teachers should use a broad range of tools to give students multiple opportunities to demonstrate their knowledge, skills, and attitudes. The different levels of achievement or performance may be expressed as written or oral comments, ratings, categorizations, letters, numbers, or as some combination of these forms.

The grade level and the activity being assessed will inform the types of assessment tools teachers will choose:

- Anecdotal Records
- Audio/Video Clips
- Case Studies
- Checklists
- Conferences
- Debates
- Demonstrations
- Exemplars
- Graphic Organizers
- Journals
- Literacy Profiles
- Observations
- Photographic Documentation
- Podcasts
- Portfolios
- Presentations
- Projects
- Questions
- Quizzes
- Role Plays
- Rubrics
- Self-assessments
- Tests
- Wikis

Assessment Guidelines

Assessments should measure what they intend to measure. It is important that students know the purpose, type, and potential marking scheme of an assessment. The following guidelines should be considered:

- Collect evidence of student learning through a variety of methods; do not rely solely on tests and paper and pencil activities.
- Develop a rationale for using a particular assessment of learning at a specific point in time.
- Provide descriptive and individualized feedback to students.
- Provide students with the opportunity to demonstrate the extent and depth of their learning.
- Set clear targets for student success using learning outcomes and assessment criteria.
- Share assessment criteria with students so that they know the expectations.
Evaluation

Evaluation is the process of analyzing, reflecting upon, and summarizing assessment information, and making judgements or decisions based on the information gathered. Evaluation is conducted within the context of the outcomes, which should be clearly understood by learners before teaching and evaluation take place. Students must understand the basis on which they will be evaluated and what teachers expect of them.

During evaluation, the teacher interprets the assessment information, makes judgements about student progress, and makes decisions about student learning programs.
Section Two: Curriculum Design

Rationale

The vision of science education in Newfoundland and Labrador 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 lifelong learners; and to maintain a sense of wonder about the world around them.*

To develop scientific literacy, students require diverse learning experiences which provide opportunities to explore, analyse, evaluate, synthesize, appreciate, and understand the interrelationships among science, technology, society, and the environment that will affect their personal lives, careers, futures.

Science education which strives for scientific literacy must engage students in science inquiry, problem solving, and decision making.

Science Inquiry

Science inquiry involves posing questions and developing explanations for phenomena. While there is general agreement that there is no such thing as “the” scientific method, 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, analyzing data, and interpreting data are fundamental to engaging in science. These skills are often represented as a cycle which involves the posing of questions, the generation of possible explanations, and the collection of evidence to determine which of these explanations is most useful in accounting for the phenomenon under investigation. Teachers should engage students in science inquiry activities to develop these skills.

Problem Solving

Problem solving involves seeking solutions to human problems. It may be represented as a cycle consisting of the proposing, creating, and testing of prototypes, products, and techniques in an attempt to reach an optimum solution to a given problem. The skills involved in this cycle facilitate a process which has different aims and procedures from science inquiry. Students should be given opportunities to propose, perform, and evaluate solutions to problem solving or technological tasks.

Decision Making

Decision making involves determining what we should do in a particular context or in response to a given situation. Increasingly, the types of problems that we deal with, both individually and collectively, require an understanding of the processes and products of science and technology. The process of decision making involves identification of the problem or situation, generation of possible solutions or courses of action, evaluation of the alternatives, and a thoughtful decision based on the information available. Students should be actively involved in decision making situations. While important in their own right, decision making situations also provide a relevant context for engaging in science inquiry and/or problem solving.
The basis of the curriculum outcomes framework are the general curriculum outcomes (GCOs). Four general curriculum outcomes have been identified to delineate the four critical aspects of students’ scientific literacy: science, technology, society, and the environment (STSE), skills, knowledge, and attitudes. These four GCOs are common to all science courses.

**GCO 1: 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.

**GCO 2: 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.

**GCO 3: 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.

**GCO 4: 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 (KSCOs) align with the GCOs and summarize what students are expected to know and be able to do by the end of Science 3.

Please note that for Science Kindergarten to Science 3, key stage curriculum outcomes for GCO 1 and GCO 3 are combined under one heading STSE/Knowledge.
By the end of Science 3, students will be expected to
• investigate objects and events in their immediate environment, and use appropriate language to develop understandings and to communicate results
• demonstrate and describe ways of using materials and tools to help answer science questions and to solve practical problems
• describe how science and technology affect their lives and those of people and other living things in their community
• undertake personal actions to care for the immediate environment and contribute to responsible group decisions

By the end of Science 3, students will be expected to
• ask questions about objects and events in the immediate environment and develop ideas about how those questions might be answered
• observe and explore materials and events in the immediate environment and record the results
• identify patterns and order in objects and events studied
• work with others and share and communicate ideas about their explorations

By the end of Science 3, students will be expected to
• recognize the role and contribution of science in their understanding of the world
• show interest in and curiosity about objects and events within their immediate environment
• willingly observe, question, and explore
• consider their own observations and ideas when drawing a conclusion
• appreciate the importance of accuracy
• be open-minded while exploring and investigating
• work with others in exploring and investigating
• be sensitive to the needs of other people, other living things, and the local environment
• show concern for their safety and that of others while exploring and investigating

Specific curriculum outcomes (SCOs) align with the KSCOs and describe what students should know and be able to do at the end of each course. They are intended to serve as the focus for the design of learning experiences and assessment tasks.

SCOs are organized into units for each course.
Course Overview

The vision of scientific literacy sets out the need for students to acquire science-related skills, knowledge, and attitudes, and emphasizes that this is best done through the study and analysis of the interrelationships among science, technology, society, and the environment.

Science 2 SCOs are organized into four units:

- Air and Water in the Environment
- Liquids and Solids
- Relative Position and Motion
- Animal Growth and Changes
Suggested Yearly Plan

The order in which the units appear in the Science 2 curriculum guide is the recommended sequence.

- Unit 1 - Air and Water in the Environment
- Unit 2 - Liquids and Solids
- Unit 3 - Relative Position and Motion
- Unit 4 - Animal Growth and Changes

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How to Use the Four Column Curriculum Layout

Outcomes

Column one contains specific curriculum outcomes (SCO) and accompanying delineations where appropriate. The delineations provide specificity in relation to key ideas. Outcomes are numbered in ascending order. Delineations are indented and numbered as a subset of the originating SCO. All outcomes are related to general curriculum outcomes.

Focus for Learning

Column two is intended to assist teachers with instructional planning. It also provides context and elaboration of the ideas identified in the first column. This may include:

- cautionary notes
- clarity in terms of scope
- common misconceptions
- depth of treatment
- knowledge required to scaffold and challenge student’s learning
- references to prior knowledge

Sample Performance Indicator(s)

This provides a summative, higher order activity, where the response would serve as a data source to help teachers assess the degree to which the student has achieved the outcome.

Performance indicators are typically presented as a task, which may include an introduction to establish a context. They would be assigned at the end of the teaching period allocated for the outcome.

Performance indicators would be assigned when students have attained a level of competence, with suggestions for teaching and assessment identified in column three.
### Suggestions for Teaching and Assessment

This column contains specific sample tasks, activities, and strategies that enable students to meet the goals of the SCOs and be successful with performance indicators. Instructional activities are recognized as possible sources of data for assessment purposes. Frequently, appropriate techniques and instruments for assessment purposes are recommended.

Suggestions for instruction and assessment are organized sequentially:

- **Activation** - suggestions that may be used to activate prior learning and establish a context for the instruction
- **Connection** - linking new information and experiences to existing knowledge inside or outside the curriculum area
- **Consolidation** - synthesizing and making new understandings
- **Extension** - suggestions that go beyond the scope of the outcome

These suggestions provide opportunities for differentiated learning and assessment.
How to Use a Unit Overview

At the beginning of each unit grouping there is explanation of the focus for the unit and a flow chart identifying the relevant GCOs, KSCOs and SCOs.

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

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

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

The SCOs Continuum follows the chart to provide context for teaching and assessment for the grade/course in question. The current grade is highlighted in the chart.

SCOs

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

<table>
<thead>
<tr>
<th>Grade 6</th>
<th>Grade 7</th>
<th>Grade 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 examine how sharing experiences, explanations or reasoning with others clarifies and extends thinking</td>
<td>1.1 recognize that contributions from others are needed to generate and sustain discussions</td>
<td>1.1 reflect upon the contribution of others’ ideas during discussion</td>
</tr>
<tr>
<td>2.0 use active listening strategies for a variety of purposes</td>
<td>1.2 ask questions of others about their ideas</td>
<td>1.2 ask questions of others for clarification</td>
</tr>
<tr>
<td>3.0 assess how thinking may be affected as a result of listening to others</td>
<td>1.3 respond to questions to provide clarification and elaboration</td>
<td>1.3 respond to questions to provide accuracy, relevancy, and validity</td>
</tr>
<tr>
<td>1.4 express a point of view and support it with personal examples, explanations, or reasoning</td>
<td>1.4 express a point of view and support it with personal examples and evidence from various sources</td>
<td></td>
</tr>
<tr>
<td>1.5 use active listening skills to identify main ideas and supporting details</td>
<td>1.5 use active listening skills to interpret main ideas and the relevancy of supporting details</td>
<td></td>
</tr>
</tbody>
</table>

Key Stage 9

- examine others’ ideas in discussion to extend their own understanding
- ask relevant questions calling for elaboration, clarification, or qualification and respond thoughtfully to such questions
- articulate, advocate, and support points of view, presenting viewpoints in a convincing manner
- listen critically to assess the adequacy of the evidence speakers give to evaluate the integrity of information presented

GCOs

Key Stage 9

- participate constructively in conversation, small-group and whole-group discussion, and debate, using a range of strategies that contribute to effective talk
- adapt vocabulary, sentence structure, and rate of speech to the speaking occasion
- give and follow instructions and respond to complex questions and directions of increasing complexity
- evaluate their own and others’ uses of spoken language in a range of contexts, recognizing the effects of significant verbal and non-verbal language features

KSCOs

John would like to discuss this chart with his colleagues to better understand how to incorporate it into their lessons.
Section Three:
Specific Curriculum Outcomes

Unit 1: Air and Water in the Environment
Focus

Air and water are all around us. They form a major part of the physical environment and are essential materials 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 focus of this unit is on characteristics of these important materials, and how air and water affect us in daily life. Through investigations, students learn about changes and interactions of air and water when heated and cooled, and about their movement through the environment. Through the process, students discover that water is important in many ways. Students can also learn to appreciate that there is more to obtaining clean water than simply turning on a tap.

Scientific inquiry is the process focus of this unit. The unit emphasizes the development of skills related to making predictions, making and recording observations and measurements, proposing answers to questions and drawing simple conclusions, sequencing and grouping, constructing and labelling concrete-object graphs or pictographs, and communicating procedures and results.

Outcomes Framework

GCO 1 (STSE): 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.

GCO 3 (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.

3.0 explore how air surrounds us, takes up space, and can be felt as it moves
4.0 explore characteristics of the three states of water
5.0 investigate changes that occur when the three states of water are heated or cooled
8.0 explore evidence of moisture in the environment, in materials, and in living things
11.0 explore changes in the location, amount, and form of moisture
13.0 investigate conditions that affect changes in the location, amount, and form of moisture
15.0 explore changes in air conditions in indoor and outdoor environments, and describe and interpret these changes
17.0 explore the effects of weather on objects and materials
18.0 investigate ways to protect objects and materials under different conditions
20.0 explore how water is used, obtained, and distributed in personal, local, and regional environments
22.0 explore ways to protect and improve the quality of air and water in the environment
GCO 2 (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.

1.0 pose questions that lead to exploration and investigation
2.0 communicate using scientific terminology
6.0 predict based on an observed pattern
7.0 make and record observations and measurements
9.0 propose an answer to an initial question or problem and draw a simple conclusion
10.0 sequence or group materials and objects
12.0 communicate while exploring and investigating
14.0 communicate procedures and results
16.0 use appropriate tools
19.0 select and use materials to carry out their own explorations and investigations
21.0 construct and label concrete-object graphs or pictographs

GCO 4 (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.

• recognize the role and contribution of science in their understanding of the world
• show interest in and curiosity about objects and events within their immediate environment
• willingly observe, question, and explore
• consider their own observations and ideas when drawing a conclusion
• be open-minded in their explorations and investigations
• work with others in exploring and investigating
• be sensitive to the needs of other people, other living things, and the local environment
SCO Continuum

**GCO 1 (STSE):** 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.

**GCO 3 (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.

<table>
<thead>
<tr>
<th>Science 1</th>
<th>Science 2</th>
<th>Science 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Daily and Seasonal Changes</strong></td>
<td><strong>Air and Water in the Environment</strong></td>
<td><strong>Weather</strong></td>
</tr>
<tr>
<td>• investigate changes in heat and light from the sun</td>
<td>• explore how air surrounds us, takes up space, and can be felt as it moves</td>
<td>• describe weather in terms of temperature, wind speed and direction, precipitation, and cloud cover</td>
</tr>
<tr>
<td>• devise ways to measure environmental changes</td>
<td>• explore characteristics of the three states of water</td>
<td>• describe situations demonstrating that air takes up space, has weight, and expands when heated</td>
</tr>
<tr>
<td>• explore how changes in sunlight affect living things</td>
<td>• investigate changes in the three states of water when heated or cooled</td>
<td>• relate the constant circulation of water on Earth to the processes of evaporation, condensation, and precipitation</td>
</tr>
<tr>
<td></td>
<td>• explore evidence of moisture</td>
<td>• describe and predict patterns of change in weather conditions</td>
</tr>
<tr>
<td></td>
<td>• explore changes in the location, amount, and form of moisture</td>
<td>• identify patterns of indoor and outdoor air movement</td>
</tr>
<tr>
<td></td>
<td>• investigate conditions that affect changes in the location, amount, and form of moisture</td>
<td>• describe the key features of a variety of weather systems</td>
</tr>
<tr>
<td></td>
<td>• explore changes in air conditions in indoor and outdoor environments</td>
<td>• relate the transfer of energy from the Sun to weather conditions</td>
</tr>
<tr>
<td></td>
<td>• explore the effects of weather and ways to protect objects under different conditions</td>
<td></td>
</tr>
</tbody>
</table>
**GCO 2 (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.

<table>
<thead>
<tr>
<th>Science 1</th>
<th>Science 2</th>
<th>Science 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>• pose questions that lead to exploration and investigation</td>
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<td>• pose questions that lead to exploration and investigation</td>
</tr>
<tr>
<td>• communicate using scientific terminology</td>
<td>• communicate using scientific terminology</td>
<td>• communicate using scientific terminology</td>
</tr>
<tr>
<td>• predict based on an observed pattern</td>
<td>• predict based on an observed pattern</td>
<td>• predict based on an observed pattern</td>
</tr>
<tr>
<td>• make and record observations and measurements</td>
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</tr>
<tr>
<td>• propose an answer to an initial question or problem and draw a simple conclusion</td>
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</tr>
<tr>
<td>• sequence or group materials and objects</td>
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</tr>
<tr>
<td>• communicate while exploring and investigating</td>
<td>• communicate while exploring and investigating</td>
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<tr>
<td>• communicate procedures and results</td>
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</tr>
<tr>
<td>• use appropriate tools</td>
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</tr>
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</tbody>
</table>

**Suggested Unit Plan**

*Air and Water in the Environment* is the Earth and space science unit of Science 2. It is positioned at the start of the school year to provide opportunities for outdoor learning.
Initiating Exploration and Investigation of Air and Water

Outcomes

Students will be expected to

1.0 pose questions that lead to exploration and investigation [GCO 2]

Focus for Learning

Science is often presented as a body of knowledge to be learned; however, it is more than this. Science is a way of learning. Science is asking questions about the things we observe, and then exploring and investigating to find answers.

Questioning is a fundamental science skill that initiates the processes of scientific inquiry. The importance of this skill cannot be overstated.

Primary students ask questions. Their questions flow from innate curiosity and observations of objects and events in their immediate environment. Questions lead naturally to exploration and investigation as students actively construct knowledge about the natural and constructed world around them.

To facilitate the generation of questions, establish a classroom culture where student questions are highly valued. Respond to questions positively, record and display them in the classroom, provide students with time to explore and investigate their questions and to communicate what they have learned. Additionally, create a curiosity centre in the classroom, filled with interesting objects and materials related to air and water in the environment, for students to explore during structured and unstructured time.

The expectation of Skill outcome 1.0 is for students to pose questions related to air and water throughout the unit. Student questions could include

- Why are air and water important?
- How do you know air surrounds us? What makes air move? Is there water in the air?
- What is the difference between ice, water, and water vapour? What happens when ice melts? What happens to the water in clothing hung on a clothesline to dry? Why does water form on the outside of a cold water bottle?
- What does moisture look and feel like? Where can you find it?
- Why does the air feel different on different days?
- What do you use water for? How much water do you use? Where does your water come from? What happens to it before you use it? What happens to water after you use it?
- What is pollution? What does pollution do?

Cross curricular connections may be made to English Language Arts 2 outcomes related to formulating questions that lead to inquiry.

Attitude

Encourage students to recognize the role and contribution of science in their understanding of the world. [GCO 4]
## Sample Teaching and Assessment Strategies

Provide daily opportunities for students to be scientists; to observe, pose questions, explore, investigate, share what is learned, and pose new questions that arise. This may accomplished during morning routines using the “I Wonder” wall, curiosity centre, and mini inquiries.

### Activation

Teachers may

- Ask “What is science?” and “What do Scientists do?” to highlight the role of asking questions in science inquiry.

### Connection

Teachers may

- Create a “curiosity centre” for students to explore and ask students “What are you thinking about?” or “What I Wonder questions do you have?” Curiosity centre objects may include
  - children’s literature, plastic and paper bags, whoopy cushion, straws, bubble wrap, miniature flags, pinwheels, windsocks, anemometer, weather vane, electric fans, hairdryers
  - water, ice cubes, various containers, eyedroppers, spray bottles, various materials to wrap or place under ice cubes
  - baby wipes, hand lotion, household plant, dried foods, fruits and vegetables

Alternatively, teachers may place selected items in an artifact box for students to explore and make connections.

- Model posing “I Wonder” questions from observations of air and water in the environment.
- Record student questions on a digital or print anchor chart (e.g., “I Wonder” wall, RAN chart, KWL or KWLM chart, linoit application) that is used as a focus for learning in subsequent classes. As the unit progresses, add questions that arise to the anchor chart.
- Incorporate student questions into Daily 5 writing activities.

### Students may

- Participate in a nature walk to explore evidence of air and water in the environment and pose air and water-related “I Wonder” questions from their observations (e.g., I wonder why the flag is moving? I wonder why the grass is wet?)
- Use question generators (i.e., who, what, when, where, why and how) or a question matrix to assist with posing inquiry questions.

### Consolidation

Students may

- Investigate their inquiry questions and share what is learned.

---

### Resources and Notes

#### Authorized

*Let’s Do Science* (Teacher Resource [TR])
- *Air and Water in the Environment* - pp. 11-17
- *Science Card 1*
- *Teachers Website* - Anchor Video - *Air and Water in the Environment*

#### Supplementary

Science Library
- *Why is Soap Slippery?*

What Is the Inquiry Process? (poster)

#### Suggested

- Skill - Questioning
- Question Generator
- I Wonder (video)
## Communicating about Air and Water

### Outcomes

Students will be expected to

| 2.0 | communicate using scientific terminology [GCO 2] |

### Focus for Learning

Whether engaged in science inquiry or problem solving, the ability to communicate so that others understand is an essential skill. Effective communication in science requires students to use appropriate scientific terminology.

Students are expected to use scientific terminology when communicating about objects and events.

Presenting all the unit terminology at once is strongly discouraged. Terminology should be introduced gradually as the need emerges. Throughout the unit, teachers should repeatedly assess student use of scientific terminology, model the use of appropriate terms, and encourage students to adopt them.

Memorizing definitions for terminology is not an expectation.

Air and water related terminology may include

- question, explore, investigate, observe, predict, measure, record, sequence, group, evidence, conclude, communicate;
- air, water, ice, water vapour, steam, moisture, moist;
- weather, wind, rain, snow, hail, fog, cloud, dew, frost, humidity;
- solid, liquid, gas;
- evaporation, evaporate, condensation, melting, freezing;
- temperature, thermometer, rain gauge, windsock, anemometer, weather vane;
- weathering, waterproof, rust;
- rainwater, stream, river, lake, pond, ocean;
- pipes, tap, water supply, surface water, ground water, well; and
- pollution, polluted.

Communicating using scientific terminology is a constant expectation for students in Science 2, regardless of whether the outcome is specifically addressed within a unit.
Communicating about Air and Water

Sample Teaching and Assessment Strategies

Throughout the unit, whenever students are investigating or problem solving, their use of appropriate terminology when communicating can be assessed.

Activation

Teachers may
- Present a Wordle of unit terminology as an exit card and ask students
  - predict the main ideas explored in the unit
  - group terminology into personally designed categories.
- Create a visual display of unit terminology incorporating labeled pictures or add terminology to existing word walls.
- Introduce unit terminology using relevant children's literature (e.g., Science library titles). Once read aloud, titles can be added to the curiosity centre for students to explore independently or with friends.

Connection

Teachers may
- Introduce new terminology in context during explorations and investigations.
- Incorporate relevant scientific terminology into daily literacy activities (e.g., Daily 5 word work).

Students may
- View the unit anchor video *Air and Water in the Environment* and identify new terminology.
- Use air and water-related terminology when observing, describing, and recording weather conditions as part of the morning routine.
- Play word games incorporating unit terminology (e.g., bingo, memory match).

Consolidation

Teachers may
- Assess terminology use during collaborative discussions and while exploring and investigating. Digital recordings of student conversations may facilitate assessment.

Students may
- Create a personal visual glossary of unit terminology using labelled illustrations.

Resources and Notes

Authorized

*Let's Do Science (TR)*
- *Air and Water in the Environment*  
  - pp. 11-17
- Science Card 1
- Teachers Website  
  - Anchor Video - *Air and Water in the Environment*

Supplementary

Science Library
- *I Am Water*

What Is the Inquiry Process? (poster)

Suggested

- Skill - Using Appropriate Vocabulary
### Outcomes

*Students will be expected to*

3.0 explore how air surrounds us, takes up space, and is felt as wind when it moves  
[GCO 1/3]

### Focus for Learning

Students should participate in demonstrations designed to confirm that air surrounds them, takes up space, and is felt when it moves. Note that demonstrating that air has mass and that it exerts pressure are not expectations of Science 2.

Primary students rely on their five senses to make sense of the world around them. As a result, some students may have difficulty accepting the presence of air; a substance that cannot been seen, tasted, or smelled.

Air is an invisible, colourless, odourless gas. It can not be observed directly. However, air can be felt when it moves and the effects of air on objects can be observed:

- Air can be moved with a paper fan.
- Air can be pumped into a basketball.
- Air can make sounds when blown into a recorder.
- Air can fill a beach ball.
- Air can spin a pinwheel.
- Air can move trees, clouds, and sailboats.

### Sample Performance Indicator

Explore and select materials from the curiosity centre (e.g., balloons, hand-held electric fans, paper, paper or silk hand fans, plastic cups, recycled bottles, straws, water, whoopy cushion, zip-top plastic bags) with which to demonstrate that

- air exists all around you,
- air takes up space, and
- air can be felt when it moves.
Air in the Environment

Sample Teaching and Assessment Strategies

Activation

Teachers may
- Open a window or turn on an electric fan to show students the effects of wind on a light object (e.g., a streamer). Ask students to explain what happens to the object.

Connection

Students may
- Demonstrate that air takes up space:
  - Take a deep breath and hold it.
  - Inflate a beach ball with their own breath.
  - Blow bubbles.
  - Inflate and deflate a zip-top plastic bag, adding and removing air with a straw.
  - Add air to a basketball using an air pump.
- Demonstrate that moving air can be felt:
  - Fan themselves using a paper or hand-held, electric fan.
  - Hold an inflated, untied balloon between their thumb and finger and release the air against their other hand
  - Place their hand in front of their mouth, take a deep breath, and exhale.
- Demonstrate the existence of air:
  - Place a crumpled paper towel in the bottom of a transparent, plastic cup and invert it in a container of water. Air already in the cup prevents water from entering.
  - Slip a deflated balloon inside a recycled plastic bottle, stretch the balloon’s mouth over the bottle’s neck, and attempt to blow up the balloon. Air already inside the bottle will prevent the balloon from fully inflating. Punch a small hole near the bottom of the bottle with a hammer and nail and try again to inflate the balloon.
  - Hold a recycled plastic bottle horizontally, place a scrap of paper inside the neck of the bottle, and attempt to blow the paper into the bottle. The scrap of paper pushes up against air already inside the bottle preventing it from entering.
- Explain the results of the demonstrations, providing evidence to support their ideas.

Consolidation

- Fill zip-top bags with air and investigate how many books, or similar objects, can be supported on top of the air before it escapes the bag.

Resources and Notes

Authorized

Let’s Do Science (TR)
- Air and Water in the Environment
  - pp. 11-17
- Science Card 1
- Teachers Website
  - Anchor Video - Air and Water in the Environment
  - IWB Activity 1
  - Image bank

Supplementary

Science Library
- Magic School Bus Rides The Wind

Suggested

Children’s Literature
- Millicent and The Wind, by R. Munsch
- Wind, by M. Bauer
States of Water

Outcomes

Students will be expected to
4.0 explore characteristics of the three states of water [GCO 1/3]

Focus for Learning

Students are expected to identify ice, water, and water vapour as the three states of water. Students will be familiar with water and ice, however, some may have difficulty accepting the existence of water vapour (i.e., the presence of water in air).

Water vapour is an invisible gas; it cannot be seen. Teachers should note that steam, fog, and clouds are not examples of water vapour. They consist of tiny water droplets formed when water vapour contacts cooler air. They form when water vapour present in air condenses and becomes visible. Observing steam, fog, or clouds indirectly confirms the presence of water vapour (i.e., they form from water vapour present in the air). Students should observe the production of steam and its eventual disappearance into the air.

Students should explore, using their five senses, ice, water, and water vapour at open exploration centres and share what is learned about their characteristics. For example:

- Water is a colourless, odourless, tasteless, and transparent liquid. It feels wet to the touch and can be hot, warm, or cold. Water can be poured, sucked up using a straw, and absorbed by a sponge or paper towel.
- Water vapour is an invisible and odourless gas. It can be felt as humidity. It can be added to the air by a humidifier and removed using a dehumidifier. It condenses on cold surfaces.
- Ice is a colourless, odourless, and transparent solid. However, it may appear white and opaque. Ice feels very cold and hard to the touch. It is slippery. Ice melts when removed from a freezer and when salt is added. Ice floats in water.

Note that snow, frost, ice pellets, and hail are all types of ice that form under different conditions.

States of matter (i.e., solid, liquid, and gas) are not addressed until Unit 2, Solids and Liquids. Teachers may, however, introduce these terms while exploring the characteristics of ice (solid), water (liquid), and water vapour (gas).

Attitude

Encourage students to willingly observe, question, and explore. [GCO 4]

Sample Performance Indicator

Describe the characteristics of ice, water, and water vapour observed with your five senses during explorations.
States of Water

Sample Teaching and Assessment Strategies

Activation

Teachers may
- Present images containing one or more forms of water (e.g., backyard sprinkler, ice skaters on a pond, exhaling on a cold day) and ask students to identify the states visible. Note that water vapour is never visible; its presence is inferred.
- Read Aloud *Solids, Liquids, and Gases* (pp. 9-14) to introduce the states of water.

Connection

Teachers may
- Explore with students the characteristics of water vapour, modelling the processes students will independently follow to explore water and ice. Humidifiers, spray bottles, steam cleaners, electric irons, or electric kettles may be used to add water vapour to the air. Students should observe how the steam or mist evaporates into the air, becoming water vapour. Students should describe water vapour using their five senses (i.e., invisible, odourless, tasteless, can be felt on hot humid days). Other characteristics, such as water vapour condensing on cold surfaces, could be explored.

Students may
- Explore, in collaborative small groups, the characteristics of water and ice:
  - Water may be provided in glasses, tubs, or bottles. Ensure water samples of varying safe temperatures are provided. Students should describe water using their five senses and explore other characteristics using containers of various sizes, zip-top plastic bags, eye droppers, food colouring, funnels, sponges, stir sticks, thermometers, and absorbent and non-absorbent materials.
  - Ice may be provided as cubes contained in zip-top plastic bags. Students should describe ice using their five senses and explore other characteristics using containers of various sizes, modelling clay, food colouring, salt, funnels, thermometers, balance scales, warm and cold water, and materials to place under or wrap around the ice cubes.

Consolidation

Students may
- Compare two of the three states of water in a Venn diagram.
- Label the three states of water in a digital image using the pic collage application.

Resources and Notes

Authorized

*Let’s Do Science* (TR)
- *Air and Water in the Environment*
  - pp. 18-24
- *Science Card 2*
- *Teachers Website*
  - IWB Activities 2 and 3
  - Image bank

Supplementary

Science Library
- *Water*
- *Solids, Liquids, and Gases*

Suggested

Other curriculum resources
- *Literacy Place for the Early Years Grade 2* (ELA 2)
  - *Fog, p. 7, An Early Worm Got Out of Bed,* (Shared Reading - Active Learning Kit)
### Outcomes

**Students will be expected to**

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Focus for Learning</th>
</tr>
</thead>
</table>
| 5.0 investigate changes that occur when the three states of water are heated or cooled [GCO 1/3] | Students should come to learn that water changes state. For example:  
- When heated to specific temperatures  
  - ice changes to water (melting); and  
  - water changes to water vapour (evaporation).  
- When cooled to specific temperatures  
  - water vapour changes to water (condensation); and  
  - water changes to ice (freezing).  
Note that frost (i.e., a type of ice) forms when water vapour changes directly to ice. Forms of ice can also change directly to water vapour.  
Students will have experienced water changing states. For example, snowmen melt, ponds freeze over, puddles evaporate, and condensation forms on a cold water bottle. Introduce scientific terminology to describe these changes as the need emerges.  
Students should conduct inquiry investigations, using thermometers, to determine what changes occur when ice, water, and water vapour are heated or cooled:  
- I wonder what affect cooling has on water?  
- I wonder what affect heating has on water?  
- I wonder what affect cooling has on water vapour?  
- I wonder what affect heating has on ice?  
Students were introduced to the inquiry process in Science 1. Conducting investigations provides opportunities to address and assess inquiry-related skill outcomes.  
Prior to starting an investigation, students should make a prediction about what they expect to occur. Their prediction should not be a guess. Rather, it should be a reasoned statement based on prior knowledge or an observed pattern. Requiring students to explain their reason for a prediction should eliminate guesses. Predictions may be written as “If..., then...” statements (e.g., If we heat the water, then it will warm up and evaporate).  
Students should make and record observations and measurements, while investigating their inquiry question. These observations will be used as evidence to support or reject their prediction. Students whose predictions are rejected may attempt to change them after the fact in order to be viewed as “correct”. Inform students that in science, a rejected prediction is not “failure”; new learning occurred.  
Making observations involves students using all appropriate senses to identify characteristics, properties, or changes in objects or events. Some observations can be measured (i.e., standard or non-standard) using tools and techniques. Observations and measurements should be recorded for future analysis and interpretation. Students may record observations as written language, photographs, video, drawings, tables, charts, and graphic organizers. |
Water and Temperature

Sample Teaching and Assessment Strategies

Students used thermometers in Science 1. Use may have been limited, however, to noting if the temperature was going up or down. Instruction on how to use thermometers to measure temperature may be required.

Connection

Students may
- Use thermometers to measure how water temperature changes over time when it is heated or cooled (e.g., ice water and hot water left on a desk, cold water warmed on a hot plate, hot water placed in the fridge).

Consolidation

Teachers may
- Heat water using an electric kettle or hot plate to investigate the effect of heating on water. Prior to starting the investigation, students should predict what will occur (i.e., If we heat the water, then...). Students should make observations (i.e., changes) and measurements (i.e., temperature) at several stages during the heating process and record their observations. Bring the water to a boil to ensure students observe evaporation (i.e., water changing to water vapour). Students should conclude whether their collected observations and measurements confirm or reject their prediction. This directed inquiry could be used as a model for students to more independently investigate other changes.

Students may
- Investigate the heating of ice. Ice cubes may be placed in a funnel above a glass to facilitate observations and measurements of melting. Alternatively, ice may be placed in zip-top baggies or bowls. Students may investigate methods to speed up the melting of ice (e.g., heating it with a lamp or hair dryer, placing it in water, holding it in your hand, crushing it, sprinkling it with salt) and make predictions. Observations and measurements (e.g., time to melt) can be recorded in a science journal and students can share with classmates what worked and what didn’t work.
- Investigate the freezing of water by placing water in a freezer and making repeated observations and measurements. Students may investigate whether container size or shape affects the time required for water to freeze.
- Compete, in small collaborative groups, to keep their ice person (i.e., ice cube with googly eyes) from melting. This competition may be an introduction to the problem solving process. Students should brainstorm possible solutions prior to the competition. Provide a collection of materials that students could use if they so choose.

Resources and Notes

Authorized

Let’s Do Science (TR)
- *Air and Water in the Environment* - pp. 25-32
- *Science Card 3*
- *Teachers Website* - IWB Activity 4

Supplementary

Science Library
- *Why is Soap so Slippery?*
- *Why Can I Draw on the Mirror?*
- *What Is the Inquiry Process?* (poster)

Suggested

- *Thermometer suppliers* (websites)
- *Skill - Observing*
- *Skill - Predicting*

Other curriculum resources
- *Literacy Place for the Early Years Grade 2 (ELA 2)*
- *Journey of a Water Drop* (Guided Reading)
Where Can We Find Moisture around Us?

Outcomes

Students will be expected to
8.0 explore evidence of moisture in the environment, in materials, and in living things [GCO 1/3]

Focus for Learning

Moisture, another term for water, is small amounts of water and water vapour that are found almost everywhere on Earth; in the environment, in objects and materials, and in living things.

Moisture includes

• humidity in the air, clouds, steam, fog, dew;
• condensation that forms on windows, bathroom mirrors, car windshields, water bottles, eyeglasses when we breathe on them;
• condensation that forms on the underside of food container covers in the fridge, inside plastic bags containing warm bread, on the outside of toilet bowls, drinking fountains, and water pipes;
• dampness in wet sand, soil, moss, rotting wood, concrete, wet towels and clothing;
• moistness felt in fresh breads, baked goods, moist towelettes, baby wipes;
• perspiration that forms on the skin and absorbs into clothing and sports equipment; and
• the juiciness or freshness of fruits and vegetables, plants, and animals.

Sometimes indirect evidence of existing moisture or past moisture can be observed (e.g., water stains on ceiling tiles, mildew scent on old books, mould on window sills, water rings on furniture).

Students should explore their surroundings (i.e., home, school, community) to find and communicate evidence of moisture in the environment, objects and materials, and in living things.

Attitude

Encourage students to show interest in and curiosity about objects and events within their immediate environment. [GCO 4]

Sample Performance Indicator

Identify places where moisture can be found in the beach image found within Good Enough to Eat: A Kid’s Guide to Food and Nutrition from the Science library.
### Where Can We Find Moisture around Us?

#### Sample Teaching and Assessment Strategies

**Activation**

Students may

- Brainstorm locations where they have seen moisture in their immediate surroundings. Create a moisture KWLM chart.

**Connection**

Teachers may

- Read aloud *Come On, Rain!*. Ask students to identify evidence of moisture in the text and create a class concept web of moisture.
- Add moisture to the air using a humidifier or spray bottle. Ask students to make observations using appropriate senses.
- Use a dehumidifier in their classroom. Students can measure and record the amount of water removed from the air over time. Students could discuss where dehumidifiers are used.
- Place a clear plastic bag over a leafy house plant. Tape the bag to the pot so that it is airtight. Place the plant in a sunny location. When moisture is observed inside the bag, ask students where the moisture came from.
- Relate moisture in living things to products we use to prevent drying (e.g., lip balm, hand cream, body lotion).
- Use a dehydrator to remove water from foods making before and after observations and measurements. Alternatively, foods such as bread or cheese can be left out to allow them to dry.

Students may

- Participate in physical activities to induce perspiration and identify it as a form of moisture.
- Investigate moisture found in plant leaves. Fresh leaves can be squeezed, torn, and blotted into paper towelling.
- Press leaves or dry flowers. Leaves can be dried in a plant press. Flowers can be dried in rice, borax, or silica.
- Rehydrate dried foods (e.g., apricots) making before and after observations and measurements.

**Consolidation**

Students may

- Participate in a "moisture" walk in and around their school, looking for evidence of moisture. Digital images may be used to record observations. Students may work in small groups to create a digital presentation (e.g., pic collage, book creator) to represent the evidence they observed. Presentations should be shared with classmates.

#### Resources and Notes

**Authorized**

*Let's Do Science (TR)*

- *Air and Water in the Environment*  
  - pp. 33-41
- *Science Card 4*
- *Teachers Website*  
  - Image Bank
- *Read Aloud*  
  - *Come On, Rain!*

**Supplementary**

Science Library

- *Good Enough to Eat?*
### Moisture around Us

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Focus for Learning</th>
</tr>
</thead>
</table>
| **9.0** propose an answer to an initial question or problem and draw a simple conclusion **[GCO 2]** | Students should, in small collaborative groups, investigate guided inquiry questions related to the amount of moisture found in different objects and materials in the environment (e.g., fruits and vegetables, soil from different areas, moss and leaves). To investigate which fruit or vegetable sample is the juiciest, for example, students should:  
  - select the fruit and vegetable samples they wish to test;  
  - predict the sequence of their samples from most juicy to least juicy (i.e., driest)  
  - devise a procedure to test and measure the moisture levels of their samples (e.g., blot on a paper towel, squeeze them to extract the juice);  
  - select a method to record their observations  
  - draw a conclusion  
  - and communicate their question, procedure, and results to others.  
Student conclusions should be based on their personal observations. It should answer the initial inquiry question and indicate if their prediction was supported or not supported. |  
| **10.0** sequence or group materials and objects **[GCO 2]** | Students are expected to sequence (i.e., place in order) or group (i.e., sort) objects and materials according to one or more attributes. This skill requires students to make detailed observations and identify similarities, differences, changes, and patterns amongst objects and materials.  
Sequencing and grouping opportunities include:  
  - sequencing fruit and vegetable samples from juiciest to driest, and vice versa,  
  - sequencing samples of a fruit or vegetable in various stages of dehydration, and  
  - grouping foods as moist or dry.  
Cross curricular connections may be made to English Language Arts 2 outcomes related to sequencing and Mathematics 2 outcomes related to sorting and ordering. |  

### Attitude

Encourage students to consider their observations and their own ideas when drawing a conclusion. [GCO 4]

### Sample Performance Indicator

Observe samples of three different fruits or vegetables and sequence them according to their moisture level from driest to juiciest.
Moisture around Us

Sample Teaching and Assessment Strategies

Activation

Teachers may

• Display the introductory spread from *Good Enough to Eat: A Kid’s Guide to Food and Nutrition*. Ask students to predict the juiciness of the various foods depicted.

• Provide a variety of fruit and vegetable samples for students to observe. Keep in mind the presence of any food allergies. Ask students to predict which foods will be juicy (i.e., moist) and discuss ways they could measure the juiciness of a sample.

Connection

Students may

• Investigate, in small collaborative groups, the moisture levels of various fruit and vegetable samples. Food samples from which to select should include some that are quite juicy and some that are very dry. Students should blot cut samples on paper towels; holding them in place for a few seconds. Their level of juiciness can be determined from the amount of moisture absorbed by the paper towel.

• Conduct a dehydration study over the course of a week. Food samples (e.g., apple slices, carved pumpkin, sliced bread), should be left out to dry and observations made daily. Digital images may be used to record observations. Alternatively, students may record observations in their science journal.

Consolidation

Students may

• Create a class continuum, based on the collective observations of different groups, to sequence all food samples investigated from the least to greatest amount of moisture.

Extension

Students may

• Conduct dehydration studies of other moist objects (e.g., soil, moss, baby wipes, moist towelettes).

Resources and Notes

Authorized

*Let’s Do Science* (TR)

• *Air and Water in the Environment*  
  - pp. 33-41

Supplementary

Science Library

• *Good Enough to Eat?*

What Is the Inquiry Process? (poster)

Suggested


• Sequence Organizer

• Skill - Classifying and Organizing
Changes in Moisture

Outcomes

Students will be expected to

11.0 explore changes in the location, amount, and form of moisture

Focus for Learning

The location, amount, and form of moisture in the environment changes. Moisture, in the form of water, may evaporate into the air, even at low temperatures. Moisture in the air moves with the air and may condense to form water when it comes in contact with a sufficiently cold surface. Moisture may also be absorbed by some materials.

Students should explore examples of evaporation, condensation, and absorption, and describe changes observed in the location (e.g., Where did the moisture come from? Where did it go?), amount (i.e., increasing or decreasing), and form of moisture. Examples to explore include:

- drying of wet objects with paper towels,
- evaporation of water
  - spilled on a paper plate
  - from a wet paper towel
  - from puddles after it rains
  - from open and closed containers over a series of days,
- condensation on cold water bottles removed from the fridge, and
- condensation and evaporation of
  - dew on the ground over the course of a school day
  - moisture on window sills over the course of a school day
  - moisture on eyeglasses when you breath on them.

While collaboratively exploring, students should be encouraged to communicate their thinking with those around them. Science is a social activity. Students should communicate their questions, share their observations and ideas, and describe what they are doing or intending to do.

In the context of these explorations, students should communicate with others while exploring changes in location, amount, and form of moisture.

Cross curricular connections may be made to English Language Arts outcomes related to speaking and listening.

Attitude

Encourage students to work with others in exploring and investigating.

Sample Performance Indicator

Repeatedly exhale on a mirror placed directly in front of your mouth and quickly observe. Describe, using appropriate terminology, the initial changes observed in the location, amount, and form of moisture and what eventually happens.
Changes in Moisture

Sample Teaching and Assessment Strategies

Activation

Teachers may
• Read aloud *Where Do Puddles Go?* and discuss how evaporation changes the location, amount, and form of the water.

Connection

Teachers may
• Present a series of images depicting changes in the location, amount, or form of moisture (e.g., hair before and after drying, a puddle before and after evaporation, a bathroom mirror before and after condensation). Ask students to describe where the water comes from or where it goes, if the moisture level is increasing or decreasing, and if the moisture is changing form.

Consolidations

Students may
• Clean up spilled water with a paper towel and describe changes in the location and amount of moisture.
• Dry their hands using a hot air hand dryer and describe where the water went, if the amount of water on their hands increased or decreased, and if the water changed form.
• Trace their hand on a piece of paper. Wet the same hand and place it inside the tracing. Observe the paper when the hand print is wet, partially dried, and again when completely dry and describe the location, amount, and form of moisture.
• Place two identical, metal containers of water on a table and add ice to one of the containers. Once condensation forms, touch the outside of the cans. Provide explanations for any observations made.
• Breathe on eyeglasses and explain the changes in location, amount, and form of moisture that are observed.

Resources and Notes

Authorized

*Let’s Do Science* (TR)
• *Air and Water in the Environment*  
  - pp. 42-47
• Science Card 5
• Teachers Website  
  - IWB Activity 5

Supplementary

Science Library
• *Where Do Puddles Go?*
## Changes in Moisture

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Focus for Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will be expected to investigate conditions that affect changes in the location, amount, and form of moisture [GCO 1/3]</td>
<td>Changes in moisture occur primarily through evaporation and condensation. The rate of change depends on conditions such as, temperature, humidity (i.e., the amount of water vapour in the air), and air movement. Wet clothes, for example, may be hung on a clothesline to dry. The clothes dries faster in low humidity, high temperature air. Wind also speeds up the rate of drying. As the moisture in the clothes evaporates, the air surrounding the clothes becomes more humid. Wind removes the humid air and replaces it with drier air. Students should conduct several guided inquiry investigations to determine how temperature, humidity, air movement, or other conditions affect evaporation and condensation. Teachers should facilitate a class discussion to brainstorm possible “I Wonder” questions to investigate for students to select. For example: • I wonder if wet face cloths dry faster on a calm day or a windy day? • I wonder if water evaporates faster in a cold fridge or a warm cupboard? • I wonder if condensation forms faster on an ice cold, cool, or warm glass of water? • I wonder if condensation forms faster in direct sunlight or shade? • I wonder if the shape or size of a container affects how fast water evaporates from it? • I wonder if wet paper towels will dry faster in the air or inside a zip-top plastic bag? Students should, with teacher guidance, devise a procedure that enables them to collect evidence relevant to the question being investigated. To determine if wet face cloths dry faster on a calm or windy day, for example, students may create a classroom clothesline from string and hang two wet cloths on the line. An electric fan can be placed in front of one cloths to mimic the wind. Repeated observations can be made until one of the cloths is dry. Communicating what is learned is the final step in a science inquiry process. Following completion of their investigations, students should communicate what they did (i.e., procedure) and what they found out (i.e., results). Scientists regularly present and publish the procedures and results of their investigations. This practice allows other scientists to critique their investigations and replicate them to confirm conclusions.</td>
</tr>
<tr>
<td>14.0 communicate procedures and results [GCO 2]</td>
<td>Communicate the ideal conditions to dry clothes quickly on a clothesline and explain how these conditions change the location, amount, and form of moisture.</td>
</tr>
</tbody>
</table>
Changes in Moisture

Sample Teaching and Assessment Strategies

Activation

Teachers may
- Discuss what is meant by the expression “some day on clothes” and wonder aloud about factors that affect the evaporation.

Students may
- Propose evaporation and condensation-related “I Wonder” questions to investigate and place them on the “I Wonder” wall.

Connection

Teachers may
- Model devising a procedure to investigate an inquiry question. To investigate if water evaporates faster from a closed or open container, for example, teachers may ask
  - What evidence is needed to answer the question? How can we determine which evaporates fastest? How can we measure the amount of water?
  - What materials do we need? What type of containers will we use? How will we cover one container? What will we use to measure the water?
  - How much water should we add to both containers? Where will we put the containers? How often will we make observations? What will we observe or measure each time? How will we record our observations?

Students may
- Collaboratively devise and carry out procedures to investigate “I Wonder” questions related to conditions that affect changes in the location, amount, and form of moisture. Once completed, students should communicate the procedure and results of their investigation digitally using computer and mobile device applications (e.g., Explain Everything, Write About It, iMovie).

Consolidation

Students may
- Create a plan for a lemonade stand; applying what has been learned about the states of water and changes of state. Consider
  - where the stand should be located (i.e., sunshine or shade);
  - whether the lemonade should be kept in a pitcher or pre-poured into glasses;
  - whether the pitcher should be covered or uncovered;
  - how and where the ice should be stored; and
  - whether the ice should be put in the pitcher before you pour or placed in one at a time when someone buys a glass.

Resources and Notes

Authorized

*Let’s Do Science (TR)*
- Air and Water in the Environment
  - pp. 48-53
- Science Card 6

Supplementary

What Is the Inquiry Process? (poster)
Changes in Air Conditions

**Outcomes**

*Students will be expected to*

15.0 explore changes in air conditions in indoor and outdoor environments, and describe and interpret these changes [GCO 1/3]

16.0 use appropriate tools [GCO 2]

**Focus for Learning**

Students should observe and measure changes in air conditions, selecting and using tools appropriate for the task.

In indoor environments, students should explore changes in air temperature, movement, and humidity. In outdoor environments, students should explore changes in air temperature, wind speed, wind direction, and humidity. These outdoor air conditions, combined with the amount of sunlight, cloud cover, and precipitation, collectively represent the weather for a given area at a particular time.

To explore changes in air conditions, these conditions must be repeatedly observed and measured. Students should use a combination of scientific and personally constructed tools to qualitatively observe and quantitatively measure air conditions. Students should

- measure changes in indoor and outdoor air temperatures using thermometers;
- observe the indoor movement of air by blowing bubbles;
- attach tissue paper strips to vents and open window and door frames
- measure outdoor wind direction using a compass and a weather vane, bubbles, or personally constructed device (wind direction refers to the direction the wind is coming from, not the direction the wind is moving);
- measure wind speed using an anemometer, wind sock, or a personally constructed pinwheel;
- measure changes in humidity using a hygrometer or qualitatively describe humidity using the terms humid and dry; and
- observe changes in outdoor air conditions measured using a digital weather station.

Following exploration of changes in air conditions, students should describe and interpret the changes they observed. For example

- bubbles blown in front of the open window move toward the centre of the room - air must be coming in through the window,
- classroom temperature was higher in the afternoon than first thing in the morning - indoor air temperatures change throughout the day, and
- wind speed was higher on one side of the school than the other and the direction changed - the building must alter the wind.

Scientists often use tools when exploring and investigating environmental phenomena. Selecting the appropriate tool for a task and using it properly are important science-related skills.

**Sample Performance Indicator**

Select and use an appropriate tool (e.g., anemometer, windsock, pinwheel) to measure outdoor wind speed at ankle level and above your head and describe and interpret any differences in air conditions observed.
Changes in Air Conditions

Sample Teaching and Assessment Strategies

Exploring changes in air conditions in outdoor environments may be addressed, in part, through student observations, measurement, and recording of weather conditions as part of the daily morning routine.

Activation

Teachers may
• Read aloud *The Rain Came Down* and ask students to describe how the air conditions are changing.
• Guide students on an imagination walk through different indoor and outdoor environments (e.g., a walk-in freezer, greenhouse, sauna, indoor swimming pool, snowshoeing in February, swimming at the beach in summer, walking a forest trail after a rainstorm, sea kayaking on a foggy day) and ask them to describe how the air feels.

Connection

Students may
• Brainstorm situations when knowing the current air conditions (i.e., temperature, humidity, wind speed, direction) is important.
• Explore whether indoor air temperature changes during the day.
• Explore indoor air movement by blowing bubbles. Students may explore how opening a window, turning on an electric fan, or other factors, affect the movement of indoor air. Patterns of air movement should be described (e.g., bubbles move away from an open window) and interpreted (e.g., outdoor air is coming inside through the open window).
• Observe and measure wind speed using pinwheels, a wind sock or an anemometer; exploring changes in different locations around the school and at different elevations (i.e., on the ground, high in the air). Describe and interpret differences observed.
• Explore changes in air temperature at different locations around the school (e.g., in full sun and shade) and at different times of day (e.g., morning and afternoon).
• Compare indoor and outdoor humidity and explore how opening a window or door changes indoor humidity.
• Explore online weather information sites noting hourly or daily changes in air conditions.

Consolidation

Students may
• Create a class weather station using a combination of scientific and personally constructed weather instruments and record weather data over an extended period of time.

Resources and Notes

Authorized

*Let's Do Science* (TR)
• *Air and Water in the Environment*  
  - pp. 54-60
• Science Card 7
• Teachers Website  
  - IWB Activity 6  
  - BLM - Pinwheel

Supplementary

Science Library
• *The Rain Came Down*

Suggested

• Science suppliers
• Pinwheels for peace
• Constructing weather instruments

Other curriculum resources
• *Literacy Place for the Early Years Grade 2* (ELA 2)
  - *The North Wind and the Sun* (Guided Reading)
• Digital weather station  
  (Science 4-12)
### Protection from Different Weather Conditions

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Focus for Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>17.0 explore the effects of weather on objects and materials</strong> [GCO 1/3]</td>
<td>A guided walk around the school and adjacent neighbourhoods should identify examples of objects and materials that have been affected by weather (e.g., weathered shingles, peeling paint, rust on vehicles, a tattered flag, faded clapboard or siding, rotting wood). Students are expected to explore the effects of weather on objects and materials. To facilitate this, students should bring to class a small, inexpensive object that can be left outside over the course of the year. The collection of objects can be periodically brought back into the classroom to observe evidence of weathering. Additionally, students should specifically explore the effects of moisture on wood (i.e., warping) and metals (i.e., rusting). Having explored the weathering of objects, and specifically the effects of moisture on wood and metals, students should now investigate ways to protect wood and metals from weathering. Steel wool, for example, rusts quickly in water. Students could investigate if spray painting the steel wool, dipping it in vegetable oil or hot wax, spraying it with rust protector, or placing it in a zip-top bag will protect it from rusting when immersed in water. Sometimes the materials needed to complete an exploration or investigation are provided. To address this outcome, however, students should select the materials they wish to use to carry out their exploration or investigation. Students should select, for example • small, inexpensive objects they wish to leave outside over the course of the year to explore the effects of weather, • small metal objects they wish to test to determine if they rust when placed in water, and • materials needed to investigate ways to protect wood or a susceptible metal from weathering. Students selections should be discussed to make their thinking visible. Selecting materials is an important aspect of designing science inquiry investigations. Facilitate the development of this skill by providing students a choice of materials they can use. If providing materials, provide a diverse collection for students to choose from and ask them to explain the thinking behind their selections.</td>
</tr>
<tr>
<td><strong>18.0 investigate ways to protect objects and materials under different conditions [GCO 1/3]</strong></td>
<td></td>
</tr>
<tr>
<td><strong>19.0 select and use materials to carry out their own explorations and investigations [GCO 2]</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Attitude**

Encourage students to be open-minded in their explorations and investigations. [GCO 4]

**Sample Performance Indicator**

Explain how weather affected the knight’s armour in *The Little Knight Who Battled the Rain* and suggest ways to protect his armour based on what was learned.
Protection from Different Weather Conditions

Sample Teaching and Assessment Strategies

Activation

Teachers may
- Place weathered items in an artifact box for students to explore.
- Read aloud *The Little Knight Who Battled the Rain* and discuss the effects of weather on the ladders in the village and the little Knight’s armour. What materials are these objects made of? How does the storm affect these materials? How might the little knight and the villagers protect these objects from the weather? What other materials could these objects be made from?

Students may
- Fold a piece of dark coloured construction paper in half and open it again. Lightly coat one half with sunscreen or cover with aluminum foil. Tape the construction paper to a sunny window and observe changes over time. The colour on the uncoated or uncovered side should noticeably fade.

Connection

Students may
- Explore the outdoor areas around their home and take digital images of weathered objects and materials they find to share.
- Explore how moisture affects metals by personally selecting small metal objects (e.g., coins, common nail, copper wire, key, paper clip, safety pin, steel wool, thumb tack) and placing them in water. Observe the objects over several days to determine if they rust.
- Compare the rusting of common nails and galvanized nails. Galvanized nails have been coated in zinc to prevent rusting.
- Explore how moisture causes wood to warp. Place craft sticks in water and compare how easily wood bends when wet compared to dry wood.

Consolidation

Students may
- Propose ways to protect common nails, or another susceptible metal, from rusting in water. Select one suggested method and design and carry out an investigation to test its effectiveness (e.g., paint it, coat with wax, dip in vegetable oil, spray with rustproof protector). An identical untreated item should be included in the test for the purpose of comparison.
- Propose ways to protect wood from weathering in water. Select one suggested method and design and carry out an investigation to test its effectiveness (e.g., paint it, stain it, coat with wax, dip in vegetable oil).
- Suggest ways to protect objects made from wood or metals based on what was learned.
Outcomes

Students will be expected to

20.0 explore how water is used, obtained, and distributed in personal, local and regional environments [GCO 1/3]

21.0 construct and label concrete-object graphs or pictographs [GCO 2]

Focus for Learning

Students should describe surface water (i.e., streams and lakes), ground water (i.e., wells), ice, and rainwater as sources of water in the environment.

In Newfoundland and Labrador, the majority of homes use surface water for their water supply. The water from lakes or ponds travels through underground pipes into homes and comes out of the taps. In other homes, ground water is used for the water supply. A well is dug near the home and a pump moves ground water through pipes to the taps inside the home. The water from either supply is treated to make it safe for use.

Water is used in many different ways in our homes. Water is used for drinking, cooking, showering and bathing, washing hands, brushing teeth, laundry, cleaning, and flushing toilets.

Students should explore how their family uses water at home. Using a tally chart, students should collect data about the frequency of water use for various purposes at home over the course of a day. Students could record the number of times water was used for brushing teeth, drinking, hand washing, toilet flushing, bathing, cooking, and laundry.

Teachers should discuss with students the relative amounts of water used for each of these purposes (e.g., a drinking glass of water is less than the amount of water used to flush a toilet). Students should be challenged to suggest ways to reduce water waste at home (e.g., turning off taps when not in use, watering lawns only when very dry, watering plants with bath water or water collected in a rain barrel).

In Science 2, students are expected to communicate their findings by constructing concrete-object graphs (i.e., physical objects) or pictographs (i.e., pictures or symbols).

Students should communicate their family’s water usage using a pictograph. The graph should be titled and labelled, and a raindrop could be used as the symbol to represent water use.

Sample Performance Indicator

Construct a pictograph of the following data. The data represents the number of times water was used for different purposes by a family of three people during one day.

<table>
<thead>
<tr>
<th>Tooth Brushing</th>
<th>Drinking</th>
<th>Hand Washing</th>
<th>Toilet flushing</th>
<th>Bath or Shower</th>
<th>Cooking</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>13</td>
<td>22</td>
<td>12</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>
Water Use

Sample Teaching and Assessment Strategies

Activation

Teachers may

• Read aloud *A Cool Drink of Water* and discuss ways water is obtained and distributed.

Students may

• Brainstorm ways water is used in their home, school, and community, thinking about their daily routines (e.g., brushing their teeth, washing their face, drinking water, giving water to a pet, washing the car, watering plants).

Connection

Teachers may

• Read aloud pages 20-33 from *Magic School Bus At the Waterworks* and discuss how water is distributed through that community.
• Ask students where the water they use in their homes comes from (e.g., municipal water supply, well, water bottles, rain barrels).
• Read aloud pages 22-23 from *You Wouldn’t Want to Live Without Clean Water!* and identify any new examples of water use.

Students may

• Participate in a field trip to a local water treatment facility or pumping station, if applicable.
• Complete the question activity on pages 2-5 from *Explore Magazine!: Water*

Consolidation

Students may

• Conduct a home water use survey, recording the number of times water is used for various purposes over the course of a day. Assistance of a family member may be needed to track usage. Students should then construct a pictograph to communicate their findings.
• Communicate the findings of their home survey to classmates and compare their results with those of others.
• Conduct a class-wide survey of water usage at school for a single day. Data can be collected using a tally sheet for the number of times water is used to flush toilets, wash hands, or drink.

Resources and Notes

Authorized

*Let’s Do Science (TR)*
- *Air and Water in the Environment*
- pp. 69-74
- *Science Card 10*
- *Teachers Website*
- IWB Activities 7 and 8

Supplementary

Science Library
- *A Cool Drink of Water*
- *Explore Magazine!: Water*
- *Magic School Bus At the Waterworks*
- *You Wouldn’t Want to Live Without Clean Water!*

Suggested

Children’s literature
- *All the Water in the World*, by G. Lyon
- *Colors of the Ocean*, by G. Collins
- *Water as a Liquid*, by H. Frost
- *Water as a Solid*, by H. Frost
- *Water as a Gas*, by H. Frost
Air, Water, and People

Outcomes

Students will be expected to 22.0 explore ways to protect and improve the quality of air and water in the environment [GCO 1/3]

Focus for Learning

Students should identify causes of air and water pollution and their affects on humans and other living things and suggest actions that can be undertaken to reduce pollution and protect air and water resources.

Sources of air pollution include industries, transportation, and burning firewood. Sources of water pollution include industries, sewage contamination, agricultural runoff, and oil spills.

Air pollution negatively affects human health causing asthma and other respiratory ailments. Drinking polluted water may make you unhealthy and sick. Polluted water may contain microorganisms and harmful chemicals that cause disease.

Students should come to recognize that clean air and water are important and that protecting and improving their quality in the environment should be a priority. Actions that can be undertaken to reduce pollution and conserve and protect the quality of air and water include

• walking, biking, car-pooling, using public transportation, and not idling vehicles to reduce transportation-related air pollution;
• reducing, reusing, and recycling to reduce industrial pollution caused by producing new goods;
• disposing of hazardous chemicals properly; not pouring harmful substances down the drain or storm sewers to reduce water pollution.

Attitude

Encourage students to be sensitive to the needs of other people, other living things, and the local environment. [GCO 4]

Sample Performance Indicator

Create a foldable to communicate action that can be undertaken to protect and improve the quality of air and water in their environment.
Air, Water, and People

Sample Teaching and Assessment Strategies

Activation

Teachers may
- Read aloud pages 20-24 and 16-17 from Explore Magazine!: Water and discuss the importance of clean water and how to help keep it clean.
- Bring in a bottle of dirty water. Ask students if they would drink the water. Discuss the implications if this was the only water supply they had access to.

Connection

Teachers may
- Present digital images or videos of air and water pollution. Students should discuss the effects this pollution could have on humans and other living things in the area.
- Read aloud Earth Day Every Day and discuss ways to protect and improve the quality of air and water in our environment.
- Read aloud pp.16-17 from You Wouldn’t Want to Live Without Clean Water! and identify three actions that can reduce water consumption.

Students may
- Brainstorm sources of water and air pollution in their communities and regions.
- Model an oil spill by adding vegetable oil to a bowl of water. Feathers can be dipped in the oil and the effect observed.
- Construct air pollution traps from strips of wax paper coated with petroleum jelly. When hung in various outdoor locations, the traps will collect particulate matter from the air which can be viewed using magnifying lenses.

Consolidation

Students may
- Suggest ways they, as a class, might act to reduce pollution. Collaboratively, students may select an action, and devise and carry out a plan to implement their idea.

Resources and Notes

Authorized
Let’s Do Science (TR)
- Air and Water in the Environment
  - pp. 75-79
- Science Cards 11 and 12
- Teachers Website
  - IWB Activity 9

Supplementary
Science Library
- Earth Day Every Day
- Explore Magazine!: Water
- Our Earth: Helping Out
- You Wouldn’t Want to Live Without Clean Water!

Suggested
Other curriculum resources
- The Air I Breathe (Health 2)

Children’s literature
- Washing the Willow Tree Loon, by J. Martin
- Just a Dream, by C. Van Allsberg
- Keeping Water Clean, by H. Frost
- A Place for Fish, by M. Stewart
Section Three: Specific Curriculum Outcomes

Unit 2: Liquids and Solids
Focus

When students examine materials in their environment they become aware of a wide array of similarities and differences in 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 in to broad categories. Other properties are important for distinguishing individual materials. This understanding is extended as students investigate ways that solids an liquids interact, and learn that materials can have both a solid and liquid phase.

The unit focuses on both scientific inquiry and design and problem solving processes. Many skill outcomes related to the the inquiry process are readdressed, while a number of new design and problem-solving related skills are introduced (e.g., identifying problems to solve, evaluating personally constructed objects, acknowledging and responding to the ideas and actions of others). The unit includes several inquiry investigations and ends with a design challenge to demonstrate an understanding of sinking and floating.

Outcomes Framework

GCO 1 (STSE): 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.

GCO 3 (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.

23.0 explore properties of familiar liquids and solids
24.0 investigate the interactions of familiar liquids and solids
25.0 investigate changes that result from the interaction of materials and describe how their characteristics have changed
26.0 explore ways to use combinations of liquids and solids to make useful materials
28.0 apply their knowledge of liquids and solids to maintain a clean and healthy environment
29.0 demonstrate an understanding of sinking and floating objects by solving a related practical problem
GCO 2 (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.

1.0 pose questions that lead to exploration and investigation
7.0 make and record observations and measurements
10.0 sequence or group materials and objects
12.0 communicate while exploring and investigating
14.0 communicate procedures and results
16.0 use appropriate tools
19.0 select and use materials to carry out their own explorations and investigations
21.0 construct and label concrete-object graphs or pictographs
27.0 identify problems to be solved
30.0 identify and use a variety of sources of science information and ideas
31.0 respond to the ideas and actions of others and acknowledge their ideas and contributions
32.0 compare and evaluate personally constructed objects

GCO 4 (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.

- willingly observe, question, and explore
- consider their own observations and ideas when drawing a conclusion
- appreciate the importance of accuracy
- be open-minded in their explorations and investigations
- work with others in exploring and investigating
- show concern for their safety and that of others while exploring and investigating
### SCO Continuum

**GCO 1 (STSE):** 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.

**GCO 3 (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.

<table>
<thead>
<tr>
<th>Science K</th>
<th>Science 2</th>
<th>Science 5</th>
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</thead>
<tbody>
<tr>
<td><strong>Exploring the World with Our Senses</strong></td>
<td><strong>Liquids and Solids</strong></td>
<td><strong>Properties and Changes of Materials</strong></td>
</tr>
<tr>
<td>• describe what is seen, felt, heard, tasted, and thought</td>
<td>• investigate the properties and interactions of familiar liquids and solids</td>
<td>• group materials as solids, liquids, or gases, based on their properties</td>
</tr>
<tr>
<td>• explore how characteristics of materials may change as a result of manipulating them</td>
<td>• investigate and describe changes that result from interactions of familiar liquids and solids</td>
<td>• identify texture, hardness, flexibility, strength, buoyancy, and solubility as properties to distinguished one material from another</td>
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<td></td>
<td>• explore ways to use combinations of liquids and solids to make useful materials</td>
<td>• relate the mass of a whole object to the sum of the mass of its parts</td>
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<tr>
<td></td>
<td>• apply their knowledge of liquids and solids to maintain a clean and healthy environment</td>
<td>• identify the source of materials found in an object and describe the changes to the natural material required to make the object</td>
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<td></td>
<td>• demonstrate an understanding of sinking and floating objects by solving a related practical problem</td>
<td>• identify changes that can be made to an object without changing the properties of the material it is made of.</td>
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<td>• identify and describe reversible and irreversible changes to materials</td>
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<td>• describe changes that occur in the properties of materials when they interact with each other</td>
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<td>• describe examples of interactions between materials that result in the production of gas.</td>
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<tr>
<td><strong>Science 1</strong></td>
<td><strong>Materials and Our Senses</strong></td>
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<td></td>
<td>• explore how senses help us recognize and safely use materials</td>
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<td>• explore attributes of materials we can recognize with our senses</td>
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<td>• investigate ways to alter smell and taste of materials</td>
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<td>• investigate ways to alter appearance and texture of materials</td>
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<td>• investigate ways to alter the sounds made by materials</td>
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SECTION THREE: SPECIFIC CURRICULUM OUTCOMES

GCO 2 (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.

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**What are Liquids and Solids?**

### Outcomes

**Students will be expected to**

1. **pose questions that lead to exploration and investigation**

   [GCO 2]

### Focus for Learning

Skill outcome 1.0 was previously addressed in Unit 1. Refer to the elaboration provided on pp. 32-33.

In the context of this unit, students are expected to pose questions that lead to exploration and investigation of familiar liquids and solids. Questions could include:

- What is matter? What are the states of matter?
- What are solids? How do we describe solids? How do we know something is a solid? Are all solids hard?
- What are liquids? How do we describe liquids? How do we know something is a liquid? Are all liquids “runny”?
- How are liquids and solids different? What happens to liquids and solids if we put them in different containers? How can we change the shape of liquids and solids?
- Which solids break easily? Which liquids pour easily?
- What happens if we mix two liquids together? Two solids? A liquid and a solid? How do liquids and solids change when we mix them?
- Which solids dissolve in liquids? Which solids absorb liquids? Which solids float in a liquid?
- What useful products can we make by mixing liquids and solids?

Cross curricular connections may be made to English Language Arts 2 outcomes related to formulating questions that lead to inquiry.

### Attitude

Encourage students to willingly observe, question, and explore.

[GCO 4]
What are Liquids and Solids?

Sample Teaching and Assessment Strategies

Provide daily opportunities for students to be scientists; to explore, observe, pose questions, investigate, collaborate, share what is learned, and pose new questions that arise from what was learned.

Activation

Teachers may
- Introduce a mystery box containing varied liquids and solids (e.g., cotton ball, aluminum foil, zip-top plastic bag, crayon, wood block, eraser, drinking straw, modelling clay, glue, milk, vinegar packet, hand lotion, ketchup packet, bottle of water, shampoo, hair conditioner, juice box). Multiple objects may be placed in one mystery box or each liquid or solid object may be placed in a separate box. Students should identify the mystery items and infer the topic of the new unit (i.e., Liquids and Solids). Alternatively, these items can be added to the curiosity centre for hands-on exploration.
- Pose the questions “What are solids?” and “What are liquids?” to assess students’ prior knowledge.
- Use questions posed in Why is Soap Slippery? from the science library as model inquiry questions.

Connection

Teachers may
- Ask students to match each state of water (i.e., ice, water, water vapour) to the appropriate state of matter (i.e., solid, liquid, gas).
- Model posing “I Wonder” questions from observations of liquids and solids.
- Incorporate student “I Wonder” questions into Daily 5 writing activities.

Students may
- Explore physical samples of familiar liquids and solids at the curiosity centre and pose “I Wonder” questions. A question generator or question matrix may assist with the posing of questions. Questions can be recorded on sticky notes or index cards and placed on the class “I Wonder” wall.
- Select an “I Wonder” question to investigate and share what is learned.

Resources and Notes

Authorized

Let’s Do Science (Teacher Resource [TR])
- Liquids and Solids
  - pp. 13-17
- Science Card 1
- Teachers Website
  - Anchor Video - Liquids and Solids
  - IWB Activities 1 and 2
- Image bank

Supplementary

Science Library
- Solids, Liquids, and Gases
- Why is Soap Slippery?

What Is the Inquiry Process? (poster)

Suggested

- Skill - Questioning
- Question Generator
- I Wonder (video)
- Matter chatter (video)

Children’s Literature
- What is the World Made Of? All About Solids, Liquids, and Gases, by K. Zoehfeld
How Can We Describe Liquids and Solids?

Outcomes

Students will be expected to
23.0 explore properties of familiar liquids and solids
[GCO 1/3]

Focus for Learning

In Science 1, students explored properties of objects and materials (e.g., colour, lustre, shape, size, texture) using appropriate senses. In Science 2, students explore properties of familiar liquids and solids.

Liquid and solid are two states of matter. The third state of matter, gas, should only be introduced, however, as it connects to the three states of water (i.e., ice, water, and water vapour) explored in unit 1.

Students are expected to describe a variety of familiar liquids and solids according to their properties. Students should

- observe the colour, lustre, shape, size, texture, odour, buoyancy, transparency, hardness, and flexibility of various familiar solids;
- observe the colour, odour, texture, transparency, thickness or thinness, and viscosity (i.e., resistance to flow) of various familiar liquids;
- place liquids and solids in a variety of different containers and observe if their shape changes; and
- physically change the shape of solids and observe if their properties change.

Students should come to recognize that liquids take the shape of their container (i.e., they change shape) and solids do not. To change the shape of a solid requires some form of physical manipulation (e.g., tearing, bending, flattening).

Explorations should be conducted in small, collaborative groups. Group exploration provides opportunities for peer-to-peer communication. Students should be encouraged to orally communicate their questions, ideas, and intentions while investigating. Teachers may facilitate and guide oral communication through questioning (e.g., What were you interested in finding out? What did you do first?, Then what did you do? What are you doing now? Why are you doing that? Does anyone have an idea or suggestion? Does anyone have a question to add to the discussion?). The use of digital audio recordings to capture peer-to-peer communication may encourage oral communication and provide assessment data.

Students should describe their liquids and solids according to their properties and use appropriate scientific terminology.

Attitude

Encourage students to willingly observe, question, and explore.
[GCO 4]

Sample Performance Indicator

Create a “Wanted Poster” for molasses, a crayon, or another familiar liquid or solid. Use its properties to provide a detailed description of the liquid or solid item.
How Can We Describe Liquids and Solids?

Sample Teaching and Assessment Strategies

Activation

Teachers may
• Present images of varied liquids and solids from the image bank and ask students to indicate if each item is a solid, a liquid, or a mystery (i.e., unsure).
• Play the anchor video Liquids and Solids. Ask students to identify the images in the video as liquids or solids.

Students may
• Search the classroom for examples of liquids and solids. Capture a digital image of each item and create a digital collage.

Connection

Teachers may
• Organize a digital photo scavenger hunt containing examples of solids that are shiny or dull, rough or smooth, rigid or flexible, hard or soft, transparent or opaque, or specific colours, shapes, or sizes.

Students may
• Use their appropriate senses to describe the properties (i.e., colour, lustre, shape, size, texture, odour, transparency, hardness, flexibility) of various solids (e.g., cotton ball, wood block, paper clip, aluminum foil, sugar cube, drinking straw, modelling clay, marble, zip-top bag). Observations may be recorded in a chart.
• Use their appropriate senses to describe the properties (i.e., colour, odour, texture, transparency, thickness or thinness, and viscosity) of various liquids (e.g., glue, milk, vinegar, juice, honey, cooking oil, ketchup, smoothie, hand lotion, shampoo, paint).
• Bring small, reusable, plastic containers from home (ensure a wide variety of shapes and sizes). Play a modified version of “pass the parcel”; passing a small rock from container to container and observing changes. Repeat the game using a volume of coloured water instead of the rock. Students should pour the water from container to container noting that the water takes the shape of the containers, but the rock did not.
• Explore various ways to change the shape of plasticine or paper.
• Place a cookie inside a zip-top bag and weigh it. Crack or crush the cookie and reweigh to observe that the mass doesn’t change.

Consolidation

Students may
• Read Solids, Liquids, and Gases to consolidate knowledge of the different states of matter and their properties.
• Play a barrier game; choosing and describing a familiar liquid or solid according to its properties for a partner to identify.

Resources and Notes

Authorized

Let’s Do Science (TR)
• Liquids and Solids
  - pp. 18-23, 24-30
• Science Cards 2 and 3
• Teachers Website
  - Anchor Video - Liquids and Solids
  - IWB Activities 3 and 5
• BLM - Properties of Solids
  - Image bank

Teaching and Learning Strategies
• www.k12pl.nl.ca/curr/k-6/sci/science-2/teaching-and-learning-strategies.html
• Integrating Technology in Science

Supplementary

Science Library
• Just One Goal!
• Solids, Liquids, and Gases

What Is the Inquiry Process? (poster)

Suggested

Children’s Literature
• What is the World Made Of? All About Solids, Liquids, and Gases, by K. Zoehfeld
### Outcomes

**Students will be expected to**

10.0 **sequence or group materials and objects**  

[SCO 2]  

### Focus for Learning

Skill outcome 10.0 should be addressed while students are exploring the properties of familiar liquids and solids (SCO 23.0).

Students should sequence or group familiar liquids and solids according to their properties. Students should

- group items as solids, liquids, or mysteries (i.e., unsure);
- group familiar solids according to a specific property (e.g., round and not round, flexible, somewhat flexible, or rigid, floats, does not float);
- group familiar liquids according to a specific property (e.g., coloured or colourless, thick, medium thickness, or thin); and
- conduct liquid races to sequence liquids according to their resistance to flow or viscosity (high viscosity liquids are thicker and flow slowly; they have a high resistance to flow).

Teachers should note that some familiar materials (e.g., yogurt, grease, toothpaste, hair gel, Jell-o™, mayonnaise) may be difficult for students to classify as either liquid or solid; they exhibit “solid-like” and “liquid-like” properties. Materials made by combining solids and liquids sometimes have the properties of both.

Cross curricular connections may be made to English Language Arts 2 outcomes related to sequencing and Mathematics 2 outcomes related to sorting and ordering.

### Sample Performance Indicator

Complete the tasks below using the following collection of items: elastic band, orange, shampoo, hammer, paint, plastic spoon, sea shell, toothpaste, yogurt, maple syrup, sock, orange juice, water, dish liquid.

Group items from the collection as liquids or solids. Indicate which items were easiest to sort, most difficult to sort, and why.

Group solid items from the collection according to whether they are flexible or rigid.

Sequence liquid items from the collection according to the amount of thickness; from thickest to thinnest or vice versa.

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**How Can We Describe Liquids and Solids?**

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*LIQUIDS AND SOLIDS*

---

**Focus for Learning**

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*How Can We Describe Liquids and Solids?*
How Can We Describe Liquids and Solids?

Sample Teaching and Assessment Strategies

**Connection**

Students may
- Pour various familiar liquids at the curiosity centre and observe how they flow.
- In small collaborative groups, physically sort samples of familiar liquids (e.g., water, vinegar, apple juice, corn syrup, vegetable oil, white milk, honey, mustard, shampoo, hand soap) into groups (e.g., coloured and colourless, odoured and odourless, transparent and opaque, thick, medium thickness, or thin). A digital image of the sorted liquids can be captured as an observational record.
- In small collaborative groups, explore samples of familiar liquids and sequence them according to thickness or ease of pouring.

**Consolidation**

Students may
- Conduct swirl tests on small samples of various liquids contained in small, covered, plastic containers (e.g., medicine cup with lid). Physically sequence liquids from easiest to most difficult to swirl or vice versa. Students should make predictions prior to testing.
- Individually collect various solids from around the classroom and group them according to a personally selected property. Classmates can participate in a gallery walk and attempt to guess the sorting rules of their peers.
- Conduct viscosity races by pouring different liquids, four at a time, down an inclined plane (e.g., cookie sheet, waxed cardboard, laminated shelf) and determining their placement (i.e., 1st, 2nd, 3rd, 4th). Students should select the liquids they wish to test and predict their order of placement. The concept of “fair testing” may be discussed. The race winner should be the liquid with the lowest amount of thickness (i.e., lowest viscosity). To conclude, students should sequence their liquids according to order of placement (i.e., thinnest/least viscous to thickest/most viscous) and compare their results to their predictions. Students could identify new questions to investigate arising from what was learned.

Resources and Notes

**Authorized**

*Let’s Do Science (TR)*
- Liquids and Solids - pp. 18-23, 24-30
- Science Card 4
- Teachers Website
  - IWB Activity 4
  - BLM - Sequencing Liquids

**Supplementary**

What Is the Inquiry Process? (poster)

**Suggested**

- Sequence Organizer
- Skill - Classifying and Organizing
Outcomes

Students will be expected to
24.0 investigate the interactions of familiar liquids and solids [GCO 1/3]

Focus for Learning

Outcome 24.0 could be addressed in conjunction with outcome 25.0 on the next spread.

Liquids can be combined with other liquids. Solids can be combined with other solids. Liquids and solids can be combined.

Students should investigate the interactions of familiar liquids and solids by combining substances together. Teachers should provide access to a wide variety of familiar liquids (e.g., cooking oil, corn syrup, dish liquid, food colouring, hand cream, hand sanitizer, juice, ketchup, liquid soap, paint, soda, shampoo, vinegar, water) and solids (e.g., aluminum foil, baking powder, beans, candy, corn starch, cotton balls, flour, glitter, ground pepper, powdered drink mix, rice, salt, sand, Styrofoam™, sugar, tissue paper, wood chips), and various tools and materials to use to combine them (e.g., eyedroppers, dropper bottles, spoons, plastic containers or cups). Students should choose the substances that they wish to combine (e.g., paint and dish liquid, flour and food colouring, glitter and sand). Through multiple investigations, they should observe that different combinations of substances yield different results (e.g., no change, floating, sinking, absorbing, dissolving).

Prior to combining substances, students should predict the expected result and record their prediction. Once combined, students should describe and record their observations. Predictions and observations should be recorded in a results table and may include drawings. Alternatively, digital photographs of substances before and after combining could be captured. Students should be encouraged to use appropriate scientific terminology when describing the results of their investigations (e.g., dissolve, absorb, float, sink).

Having individually chosen different liquids and solids to combine, students should share with their classmates the combinations they investigated, their predicted results, and the actual results observed. The importance of keeping detailed records of their observations (e.g., results table, digital images) to facilitate future communication should be discussed.

Attitude

Encourage students to be open-minded in their explorations and investigations. [GCO 4]

Sample Performance Indicator

Predict the result of combining water, vegetable oil, food colouring, and black pepper pods. Combine the substances and describe the resulting mixture, before and after shaking, using appropriate scientific terminology. Compare the predicted and actual results.
### What Happens When Liquids and Solids Combine?

#### Sample Teaching and Assessment Strategies

**Activation**

Teachers may
- Read aloud the *Perfect Snow* and ask students to describe what happens when snow and rain combine.

**Connection**

Teachers may
- Display familiar liquids and solids and ask students to name any two items and predict how they will interact if combined. Introduce appropriate terminology (e.g., mix, dissolve, absorb, float, sink) to describe student predictions and record terms on a class anchor chart.
- Make a class “lava lamp”. Pour cooking oil into a colourless plastic bottle until 3/4 full and top it off with water. Once separated, add 10 drops of food colouring. Students should observe that oil and water do not combine (i.e., oil floats on water) and that the food colouring sinks through the cooking oil and then combines with the water. Adding a small piece of a seltzer tablet will create the movement typical of a lava lamp.

**Consolidation**

Students may
- Participate in a “Mad Mixology” inquiry investigation. Students should select pairs of familiar liquids and solids that they wish to test and combine them. Each combination tested should be recorded in the *Results Table* BLM along with the predicted result and the actual result observed. Students should share their results with classmates.
- Create a personal “sensory bottle” by combining various liquids and solids in a colourless recycled plastic bottle. Teachers may permanently attach screw caps using a glue gun.

#### Resources and Notes

**Authorized**

- *Let’s Do Science (TR)*
  - *Liquids and Solids*  
    - pp. 31-38
  - *Science Cards 5 and 6*
  - *Teachers Website*
    - BLM - *Results Table*
  - Read Aloud
    - *Perfect Snow*

**Supplementary**

- What Is the Inquiry Process? (poster)

**Suggested**

  - Skill - Observing
- Other curriculum resources
  - *Literacy Place for the Early Years Grade 2 (ELA 2)*
    - *The Muddy Puddle*, from *An Early Worm Got Out of Bed*, (Shared Reading - Active Learning Kit)
How Do Liquids and Solids Change When Combined?

**Outcomes**

Students will be expected to

25.0 investigate changes that result from the interaction of materials and describe how their characteristics have changed

[GCO 1/3]

**Focus for Learning**

Outcome 25.0 could be addressed in conjunction with outcome 24.0 on the preceding spread.

Students should recognize that the interactions of some liquids and solids result in changes to their properties.

**Example**

Salt is a colourless, odourless, salty tasting, cube-shaped solid. Water is a colourless, transparent, tasteless liquid. When mixed, the salt dissolves in the water. The salt is no longer visible, however, the water tastes salty. The salt and the water have both changed.

Students should investigate ways familiar liquids and solids change when combined. Students could describe changes in properties observed when

- solids dissolve in liquids;
- miscible liquids are mixed (i.e., two liquids that appear as one when mixed; water and apple juice);
- immiscible liquids are mixed (e.g., cooking oil and water);
- liquids are diluted with water;
- dish washing liquid is added to water and agitated;
- two parts cornstarch is mixed with 1 part water;
- a compressed soil pellet or dried fruit is placed in water; and
- water is added to a sponge, paper towel, disposable diaper, or clumping kitty litter.

Teachers should note that the interactions described above are all physical changes. These interactions result in changes that do not change what the substance is (e.g., sugar dissolved in water is still sugar and water). Chemical changes are interactions where new substances are produced (e.g., baking soda reacts with vinegar to produce carbon dioxide gas). Focus on investigating physical changes. Student use of the term physical change is beyond the expectation of Science 2.

Teachers could discuss with students whether the changes observed are reversible or irreversible.

**Attitude**

Encourage students to work with others in exploring and investigating.

[GCO 4]

**Sample Performance Indicator**

Describe the properties of water, loose tea leaves, and milk. Observe a cup of tea being made in a transparent glass mug. Describe how the properties of the substances changed at various stages.
### How Do Liquids and Solids Change When Combined?

#### Sample Teaching and Assessment Strategies

**Activate**

Teachers may
- Display a glass of water and a bottle of food colouring and ask students to describe the properties of both liquids. Add a drop of food colouring to the water and ask students to describe what they observe before and after stirring. Extend the activity by asking students to predict what would happen if more drops of food colouring were added. Proceed with the addition of more drops to test their predictions.

**Connection**

Teachers may
- Present images of familiar mixtures and ask students to predict what liquids or solids were mixed together (e.g., steeped tea, bubble bath, green paint, salad) to form them.
- Read aloud *From Wax to Crayon* and ask students to identify the liquids and solids combined and describe how they change.

Students may
- Make an oil and vinegar salad dressing by combining cooking oil, vinegar, salt, and pepper. Students should describe the properties of the ingredients before and after mixing.
- Investigate the changes in properties that result from mixing
  - various granular and powdered solids (e.g., pepper, flour, instant coffee, drink crystals) with water;
  - various familiar liquids together (e.g., apple juice, dish liquid, food colouring, glue, honey, paint, vegetable oil, vinegar, water);
  - compressed soil pellets or dried fruit and water; and
  - water and a sponge, paper towel, disposable diaper or kitty litter.

  Investigations could be completed using a centres approach or different groups could investigate different interactions and then share their procedures and results. Digital images or video of the investigations may aid student communication.

**Consolidation**

Students may
- Follow a simple procedure (i.e., recipe) to make slime, oobleck, "magic mud", or a similar mixture. Describe how the properties of the ingredients change as a result of their interactions.

#### Resources and Notes

**Authorized**

*Let's Do Science (TR)*
- *Liquids and Solids* - pp. 39-43
- *Science Card 7*
- *Teachers Website*
  - BLM - *Results Table*
  - Image bank

**Supplementary**

*Science Library*
- *From Wax to Crayon*
- *Making Rock Candy*
- *Splat the Cat Takes the Cake*
- *The Little Red Hen (Makes a Pizza)*
- *Why is Soap So Slippery?*

*What Is the Inquiry Process? (poster)*

**Suggested**

- Slime recipes (websites)
- Explorations and Investigations

*Other curriculum resources*
- *Literacy Place for the Early Years Grade 2 (ELA 2)*
  - 3-2-1 Blast Off!

*Children’s Literature*
- *Bartholomew and the Oobleck*, by Dr. Seuss
## What Useful Mixtures Can We Make by Combining Liquids and Solids?

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Focus for Learning</th>
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</thead>
</table>
| **Students will be expected to** 26.0 explore ways to use combinations of liquids and solids to make useful materials [GCO 1/3] | Familiar liquids and solids are used to create mixtures that are useful in daily life. Provide opportunities for students to create useful mixtures by combining two or more liquids and solids. They should follow procedures (e.g., recipes) and note how the properties of the liquids and solids have changed. Students could make  
• foods (e.g., cookies, gelatin, ice cream, instant oatmeal, pancakes, pizza, pudding from a mix, rock candy, salad);  
• beverages (e.g., drinks from a powdered mix, juice from concentrate, lemonade from scratch, punch, smoothies);  
• play materials (e.g., bubble blowing mixtures, homemade play dough, slime); or  
• art and art materials (e.g., flour finger paint, colour mixing of tempera paints, paper mache, stamping, water colour painting). Teachers should note that creating some of these suggested mixtures involves a chemical change. This should be overlooked as the focus is exploring ways to make useful materials by combining liquids and solids. Cross curricular connections may be made to English Language Arts 2 outcomes related to procedural writing. The creation of many mixtures requires more than simply combining liquids and solids. Tools are used to measure and manipulate the materials. Tools may be used to add, beat, blend, extract, grate, measure, mix, pour, stir, and whisk liquids and solids. Students are expected to use appropriate tools to measure and manipulate liquids and solids while exploring ways to make useful mixtures. Teachers should provide a variety of tools and question students on their selections (e.g., What tool did you choose to use? Why did you choose that tool? Are there other tools that you could have used? Why is the tool you chose better than the other tools?). Adult supervision may be required for the use of some tools. **Attitude** Encourage students to show concern for their safety and that of others while exploring and investigating. [GCO 4] **Sample Performance Indicator** Follow a recipe to combine liquids and solids to make pizza dough from scratch or a boxed mix, using appropriate tools to measure and manipulate the ingredients. |
What Useful Mixtures Can We Make by Combining Liquids and Solids?

Sample Teaching and Assessment Strategies

Connection

Teachers may
- Revisit The Little Knight Who Battled the Rain and read aloud suggested titles from the science library to identify the useful mixtures created within each text and the tools used.
- Provide a variety of appropriate and inappropriate tools from which students can select and use when measuring and manipulating liquids and solids.
- Display a package of gelatin dessert mix and show students where the instructions are found. Model following the instructions to measure and combine ingredients, using appropriate tools, as indicated.
- Provide ingredients, containers, and tools required to make various foods or beverages from instructions on their packaging. Ask students to choose one item to make and to gather the necessary ingredients, containers, and tools. Students should follow the instructions on the packaging to make their food or beverage (e.g., juice from concentrate, drink from powdered mix, chocolate milk from cocoa powder or chocolate syrup, punch, pancake batter, instant pudding, brownie or muffin batter); measuring, combining, and manipulating liquid and solid ingredients, using appropriate tools. Students should describe the ingredients before and after mixing and note how their properties have changed.

Consolidation

Students may
- Make a bubble solution by combining liquid soap and water. Students may investigate the proportions of soap and water that are needed to create the best bubble blowing solution.
- Follow a recipe to make homemade play dough for use in art activities.
- Create a class recipe book. Include recipes for each of the useful mixtures made in class.

Resources and Notes

Authorized

Let’s Do Science (TR)
- Liquids and Solids
  - pp. 44-49
- Science Cards 8 and 9
- Teachers Website
  - IWB Activity 6
  - BLM Recipe Card
- Read Aloud
  - The Little Knight Who Battled the Rain

Supplementary

Science Library
- From Wax to Crayon
- Making Rock Candy
- Splat the Cat Takes the Cake
- The Little Red Hen (Makes a Pizza)

Suggested

- Bubble investigation (website)
- Magic School Bus: Ready, Set, Dough (video)

Other curriculum resources
- Literacy Place for the Early Years Grade 2 (ELA 2)
  - Mr. Fix-It (Guided Reading - Level K)

Children’s Literature
- Elliot Bakes a Cake, by A. Beck
How Can We Use Liquids and Solids to Keep Things Clean?

Outcomes

Focus for Learning

Students will be expected to

27.0 identify problems to be solved [GCO 2]

28.0 apply their knowledge of liquids and solids to maintain a clean and healthy environment [GCO 1/3]

Students should apply what they have learned about liquids, solids, and combinations of liquids and solids to help maintain clean and healthy surroundings; including themselves, their home and school, and the natural environment.

Students should identify everyday “messes” in their surroundings that need to be cleaned (i.e., problems that need to be solved). For example

• teeth, bodies, and hair;
• dirty hands and clothing after playing outdoors;
• paint on brushes, hands, and clothing;
• fingerprints on glass, mirrors, and mobile device screens;
• spilled beverages on various surfaces;
• food residue on plates, cutlery, and various surfaces;
• snow melt and salt and sand residue on floors;
• bathrooms and kitchens;
• litter on gym and classroom floors or on school grounds; and
• oil and gasoline spills on driveways, parking lots, and beaches.

For each “mess”, students should suggest ways that liquids, solids, or combinations of liquids and solids could be used to clean up the mess. Student suggestions should be based on their prior knowledge of the properties of liquids and solids, and their interactions (e.g., absorbency of various solid materials, ability of water and other liquids to dissolve some solids, dilution of liquids by adding water, changes that result from the interaction of liquids and solids). They should explain their reasoning for each suggestion.

Students should explore ways to combine liquids and solids to make and use homemade cleaning products (e.g., baking soda paste cleaner, vinegar-water glass cleaning solution, olive oil-vinegar wood cleaner, baking soda tooth paste).

Cross curricular connections may be made to Health 2 outcomes related to hygiene practises that prevent the spread of germs and contribute to healthy bodies. Use the Literacy Place title Keep Us Clean, for example, to discuss how a useful combination of soap and water can help people stay clean and healthy.

Sample Performance Indicator

Suggest ways to

• remove an ink stain from your T-shirt,
• clean juice spilled on the floor,
• clean pencil shavings off a desk top, and
• remove salt residue from winter boots.

Provide a rationale for each suggestion.

Assess whether students apply their knowledge of liquids and solids to solve the problem and use appropriate scientific terminology.
How Can We Use Liquids and Solids to Keep Things Clean?

Sample Teaching and Assessment Strategies

**Activation**

Students may
- Identify things at home that require cleaning (e.g., teeth, bodies, hair, clothing, dishes, furniture, windows, floors, pets) and the materials used.

**Connection**

Students may
- Brainstorm potential problems that the school custodian faces in keeping the school clean. How might the custodian clean these messes? Invite the custodian to share the tools and materials used to keep the school environment clean and healthy.
- Brainstorm ways they can maintain a clean environment when engaging in potentially messy activities (e.g., water colour painting in Art, eating recess or lunch in the classroom, coming in from outside on a rainy day, mixing a cake mix).

**Consolidation**

Teachers may
- Display messes (e.g., paint on swatches of material, glue on a desktop, glitter on various surfaces, finger prints on windows, orange juice on the classroom floor) and a large collection of liquid and solid materials and cleaning tools. Ask students to suggest ways to clean each mess and test their predictions to determine the most effective way to clean each spill.

Students may
- Make and use homemade cleaners by combining familiar liquids and solids
  - cleaning paste (i.e., baking soda and water);
  - glass cleaner (i.e., 3 tbsp vinegar per 2 cups water);
  - wood furniture cleaner (i.e., 1 part olive oil to 1 part vinegar);
  - toothpaste (i.e., 4 tsp baking soda, 2 tsp fine sea salt, 4 drops peppermint oil, and enough water for desired consistency); and
  - shampoo (i.e., 2 eggs, 3 tsp baking soda, 2 tsp olive oil, and 2 tsp lemon juice).
- Investigate, as part of a simulated oil spill, the best way to clean vegetable oil off items (e.g., rubber ducks, small beach rocks, feathers) that have been submerged in the oil and water. Students should have access to a large collection of tools, liquids and solids, and household and commercial cleaning products.

Resources and Notes

**Authorized**

*Let's Do Science* (TR)
- *Liquids and Solids*
  - pp. 50-54
  - Science Card 10
- Teachers Website
  - IWB Activity 7
  - Image bank

**Supplementary**

Science Library
- *Why is Soap So Slippery?*

*What Is the Inquiry Process?* (poster)

**Suggested**

Other curriculum resources
- *Literacy Place for the Early Years Grade 2* (ELA 2)
  - *Keep Us Clean* (Guided Reading - Level J)

Children’s Literature
- *Oil Spill!,* by M. Berger
- *Washing the Willow Tree Loon*, by J. Martin
## LIQUIDS AND SOLIDS

### Focus for Learning

Students are expected to conduct guided inquiry investigations to predict and test the buoyancy of different solids in liquids.

Students should self-select the solid objects they wish to test. They should provide a rationale for their selections and predict whether the objects will float or sink prior to testing. Their predictions could be recorded in a T-chart using the headings “Float” and “Sink”. Students should test their predictions by placing the objects in fresh water. The investigation could be extended to retest their buoyancy when placed in salt water or other liquids.

Conducting these investigations as guided inquiry provides opportunities for teachers to address and assess additional skill outcomes (e.g., posing questions, making predictions, making and recording observations, drawing conclusions, using appropriate scientific terminology, communicating procedures and results).

Testing results should be displayed on concrete-object graphs using the categories “Float” and “Sink”. An alternative to using concrete objects would be for students to draw representations of the objects in the appropriate category. Digital photographs of completed concrete-object graphs could be used as records of results.

Cross curricular connections may be made to Mathematics 2 outcomes related to gathering and recording data and constructing and interpreting concrete graphs and pictographs.

### Attitude

Encourage students to

- appreciate the importance of accuracy, and
- consider their own observations and ideas when drawing a conclusion. [GCO 4]
Sample Teaching and Assessment Strategies

Teachers should ensure that students test some items that may produce unexpected results (e.g., popped and unpopped corn kernels, pumice stone, peeled and unpeeled oranges, lemons and limes, cans of unopened regular and diet cola).

Activation

Teachers may
- Present children’s literature about sinking and floating to activate students’ prior knowledge.
- Ask why it is important to know whether an object floats or sinks.

Connection

Teachers may
- Model the science inquiry process by asking “I wonder if it will sink or float?” and provide a small collection of objects to test (e.g., marbles, cotton balls, sugar cubes, wood blocks, plastic blocks, Styrofoam trays, sponges, gummy candies, crackers). Ask students to make predictions and record them in a class T-chart or table using the headings “Float” and “Sink”. Test each item and record the results in a class concrete-object graph. Expect some objects to be difficult to classify (e.g., cotton balls initially float but eventually sink in water).
- Explore with students, adding salt to fresh water to make sunken objects float (e.g., an egg). Ask students to infer why adding salt makes the egg float.

Consolidation

Students may
- Investigate, individually or in small collaborative groups, the buoyancy of self-selected solids. Students may select objects from the classroom to test or could bring items from home. Students should pose their inquiry question, make predictions, make and record observations, construct and label a concrete object graph and draw conclusions.
- Read The Case of the Sinking Seagulls (Explore! Magazine: Water, pp.6-13) and complete the activity to determine who polluted the river.

Extension

Students may
- Retest the buoyancy of their self-selected objects in different liquids (e.g., cooking oil, salt water).

Resources and Notes

Authorized

Let's Do Science (TR)
- Liquids and Solids
  - pp. 55-59
  - Science Card 11
- Teachers Website
  - IWB Activity 8

Supplementary

Science Library
- Explore! Magazine: Water
- Just One Goal!

What Is the Inquiry Process? (poster)

Suggested

- Magic School Bus: Ups and Downs (video)
- Explorations and Investigations

Children’s Literature
- Tell Me How Ships Float, by S. Willis
- Will It Float or Sink?, by M. Stewart
### Outcomes

*Students will be expected to*

29.0 demonstrate an understanding of sinking and floating objects by solving a related practical problem  

[GCO 1/3]

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### Focus for Learning

Address this outcome through a problem solving design challenge.

In small collaborative groups, students should follow an engineering design and problem solving process to construct a floating object that solves a problem. Students should

- identify and/or describe the problem to solve (i.e., clarify the design criteria);
- brainstorm possible solutions and select one to try;
- make a plan and select appropriate tools and materials to use;
- construct a prototype of the preferred solution and test it;
- evaluate the prototype and make suggestions for improvement;
- redesign, modify, and retest the prototype; and
- communicate their final solution to classmates.

Students could, for example, construct a floating object that can support a specified number of coins without sinking. Teachers may include additional design criteria (e.g., stays afloat for 60 seconds, able to float from one side of a container to the other using air blown through a straw, includes a minimum of three different materials in the design, is constructed using two or more different joining methods).

In addition to assessing student understanding of sinking and floating, engaging in the design challenge provides an opportunity for teachers to address and assess numerous skill outcomes related to the design and problem solving process.

Students should have access to a variety of print and digital resources, related to boats, which they can use as sources of information and ideas during their design, construction, and redesign stages.

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30.0 identify and use a variety of sources of science information and ideas  

[GCO 2]

31.0 respond to the ideas and actions of others and acknowledge their ideas and contributions  

[GCO 2]

32.0 compare and evaluate personally constructed objects  

[GCO 2]

---

Following construction and testing of their prototype, students should evaluate their floating object in relation to the design criteria. First attempts to solve problems are rarely successful. Prototypes may need to be redesigned, modified, or repaired. Occasionally an unsuccessful prototype is abandoned and another possible solution is selected to try. Failure is an important aspect of the design process. Students should be expected to describe their problem solving process; noting the causes of initial prototype failures and what factors were changed to achieve the final solution.

Students may also evaluate the designs and constructed prototypes of classmates and provide constructive feedback and suggestions for improvement.
**Design Challenge: How Can We Build a Boat?**

**Sample Teaching and Assessment Strategies**

The design process does not end with the construction of a solution. Personally constructed objects must be tested and evaluated. Objects that fail testing should be redesigned and retested.

**Activation**

Teachers may

- Display images of different types of boats and ask students to identify how they are the same and how they are different.

**Connections**

Teachers may

- Invite a local boat builder to class to discuss the features and uses of the boats they build.

Students may

- Engage in a design process to construct a boat out of a single material (e.g., aluminum foil, modelling clay) that can support 25 coins without sinking. Students should document their process, using digital images or video, from initial brainstorming, through construction and testing of the prototype, to redesign and retesting, to reach a preferred solution.

**Consolidation**

Teachers may

- Read aloud Iggy Peck, Architect, by A. Beaty and challenge students to follow a design and problem solving process to construct a floating object to help Iggy get off the island. Design criteria may include:
  - constructed object must float;
  - must be made from a minimum of 4 different materials;
  - must utilize a minimum of 3 different joining methods;
  - must carry Iggy (e.g., glass salt shaker with googly eyes) from one side of a container of water to the other without capsizing;
  - Iggy must be free standing and not attached to the floating object in any way; and
  - floating device must sail across the container using only wind power (i.e., air from a small hand-held personal fan or a hair dryer on the lowest setting);

Students may

- Participate in gallery walks to evaluate the designs and constructed prototypes of classmates using TAG feedback BLM. Suggestions for improvement should focus on form (i.e., parts, materials, joins) and function (i.e., how it works).

**Resources and Notes**

**Authorized**

*Let’s Do Science (TR)*

- *Liquids and Solids*
  - pp. 60-64
  - Science Card 12
- Teachers Website
  - BLM - TAG Feedback
  - IWB Activity 9

**Teaching and Learning Strategies**

- [www.k12pl.nl.ca/curr/k-6/sci/teaching-and-learning-strategies.html](http://www.k12pl.nl.ca/curr/k-6/sci/teaching-and-learning-strategies.html)
- Technological problem solving

**Supplementary**

*What Is the Design Process? (poster)*

**Suggested**


- Skill - Working Collaboratively
- Explorations and Investigations

*Children’s Literature*

- *Elliot’s Shipwreck*, by A. Beck
- *Iggy Peck, Architect*, by A. Beaty
- *Tell Me How Ships Float*, by S. Willis
- *Will It Float or Sink?*, by M. Stewart
- *Who Sank the Boat?*, by P. Allen
Section Three:
Specific Curriculum Outcomes

Unit 3: Relative Position and Motion
Focus

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

The *Relative Position and Motion* unit has both a scientific inquiry and a design and problem solving focus. Students will investigate different patterns of movement and factors that affect movement. The unit culminates with a problem solving challenge to design and construct a roller coaster from found and recycled materials to demonstrate an understanding of relative position and motion. Through these investigations and problem solving experiences, students further develop previously introduced skills and are introduced to new skills; following simple procedures and posing new questions that arise from what was learned.

Outcomes Framework

**GCO 1 (STSE):** 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.

**GCO 3 (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.

- 33.0 describe the motion of an object in terms of a change in position relative to other objects
- 34.0 describe the position of an object relative to other positions or stationary objects
- 35.0 place an object in an identified position relative to another object or position
- 37.0 describe the position of objects from different perspectives
- 38.0 investigate different patterns of movement
- 39.0 investigate factors that affect movement
SECTION THREE: SPECIFIC CURRICULUM OUTCOMES

GCO 2 (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.

1.0 pose questions that lead to exploration and investigation
2.0 communicate using scientific terminology
6.0 predict based on an observed pattern
9.0 propose an answer to an initial question or problem and draw a simple conclusion
14.0 communicate procedures and results
16.0 use appropriate tools
27.0 identify problems to be solved
31.0 respond to the ideas and actions of others and acknowledge their ideas and contributions
32.0 compare and evaluate personally constructed objects
36.0 follow a simple procedure
40.0 pose new questions that arise from what was learned

GCO 4 (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.

- recognize the role and contribution of science in their understanding of the world
- show interest in a curiosity about objects and events within their immediate environment
- willingly observe, question, and explore
- consider their own observations and ideas when drawing a conclusion
- appreciate the importance of accuracy
- work with others in exploring and investigating
- show concern for their safety and that of others while exploring and investigating
SCO Continuum

**GCO 1 (STSE):** 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.

**GCO 3 (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.

<table>
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<tr>
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<tr>
<td><strong>Needs and Characteristics of Living Things</strong></td>
<td><strong>Relative Position and Motion</strong></td>
<td><strong>Forces and Simple Machines</strong></td>
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<tr>
<td>• describe the different ways living things move to meet their needs</td>
<td>• describe the motion of an object in terms of a change in position relative to other objects</td>
<td>• investigate forces used to move objects or hold them in place</td>
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<td>• describe the position of an object relative to other positions or stationary objects</td>
<td>• describe how various forces can act directly or from a distance to cause objects to move</td>
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<td>• place an object in an identified position relative to another object or position</td>
<td>• investigate the effect of friction on the movement of an object</td>
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<td></td>
<td>• describe the position of objects from different perspectives</td>
<td>• demonstrate the use of rollers, wheels, and axles in moving objects</td>
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<td></td>
<td>• investigate different patterns of movement</td>
<td>• differentiate between the position of the fulcrum, the load, and the effort when using a lever</td>
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<td>• investigate factors that affect movement</td>
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### Suggested Unit Plan

**Relative Position and Motion** is the second physical science unit in the Science 2 curriculum.

<table>
<thead>
<tr>
<th>Science 1</th>
<th>Science 2</th>
<th>Science 3</th>
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</table>
| • pose questions that lead to exploration and investigation  
• identify problems to be solved  
• predict based on an observed pattern  
• follow a simple procedure  
• use appropriate tools  
• propose an answer to an initial question or problem and draw a simple conclusion  
• compare and evaluate personally constructed objects  
• pose new questions that arise from what was learned  
• communicate using scientific terminology  
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• communicate using scientific terminology  
• communicate procedures and results  
• respond to the ideas and actions of others and acknowledge their ideas and contributions |

---

**GCO 2 (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.
How Do Objects and People Move?

**Outcomes**

Students will be expected to

1.0 pose questions that lead to exploration and investigation  
[GCO 2]

**Focus for Learning**

This skill outcome was previously addressed. Refer to the elaboration provided on pages 32-33.

In the context of this unit, students are expected to pose questions that lead them to explore and investigate ways that objects, humans, and other animals move and how forces affect movement. Questions could include

- What things move? How do we know they are moving?
- How do objects move? How do humans and other animals move? Can they move in more than one way? What are some patterns of movement?
- How can we describe how things move? How can we describe their position?
- Do objects look the same from different perspectives?
- What makes objects move? How can we change the movement of an object? How can we make it go faster or slower, change direction, or stop moving?
- What affects the movement of an object? Does an object move the same way on different surfaces?
- How many different ways can we move?

Cross curricular connections may be made to English Language Arts 2 outcomes related to formulating questions that lead to inquiry.

**Attitude**

Encourage students to willingly observe, question, and explore.  
[GCO 4]
How Do Objects and People Move?

Sample Teaching and Assessment Strategies

Teachers may choose to begin the unit by addressing outcome 38.0 (i.e., investigate different patterns of movement, pp. 98-99) in conjunction with this skill outcome.

Activation

Teachers may
- Take students to a playground or for a short walk, and ask them to identify objects that move (e.g., flag, people, cars, birds, trees, swings, balls). Upon returning to the classroom, ask students to share their identified objects and discuss why they move.
- Create a “Curiosity Centre” containing objects that move in various ways (e.g., yo-yo, spin-top, balls, slinky, scissors, stapler, pendulum, metronome, dice, cans, toy car, dominoes, mazes, wind up toys, Rubik cube™). Place an “I Wonder” journal at the centre for students to record their questions and observations, and communicate what they have learned.

Students may
- Explore a variety of sports related equipment (e.g., balls, skipping rope, scooters, parachute, rackets, bean bags, sticks). In a gym, students can use the sports equipment and describe how they move. Questions generated about how things move should be recorded for further investigation.

Connection

Teachers may
- Record student questions on a digital or print anchor chart (e.g., “I Wonder” wall, RAN chart, KW chart, KWLM chart) that is used as a focus for learning in subsequent classes. As the unit progresses, add questions that arise from any new learning to the anchor chart.
- Assist students in using a question matrix to help with posing inquiry questions about movement.

Students may
- Interact with objects at the curiosity centre and generate “I Wonder” questions. Questions can be recorded in an “I Wonder” journal kept at the centre.

Connections

Students may
- Select an inquiry question from the “I Wonder” wall to investigate. They should make and record observations and communicate what is learned (i.e., sketches, written responses). New inquiry questions that arise should be identified and recorded.
How Do Objects and People Move?

Outcomes

Students will be expected to communicate using scientific terminology [GCO 2]

Focus for Learning

Students are expected to use appropriate scientific terminology when communicating about ways that objects, humans, and other animals move and describing their relative position. Memorizing definitions is not an expectation.

Unit terminology may include
- question, problem, explore, investigate, design, predict, materials, tools, procedure, construct, observe, record, compare, evaluate, conclude, communicate;
- movement, motion, direction, position;
- forward, backward, left, right, up, down, faster, slower, closer, further, toward, away from, over, under, around, through;
- inside, outside, above, below, near, far, in front of, behind, to the right of, to the left of, on top of, beneath, beside, between;
- perspective, point of view;
- pattern, force, push, pull, spin, swing, bounce, slide, roll;
- up and down, back and forth, round and round, zigzag, straight;
- run, walk, fly, climb, jump, crawl, skip, swim, shake; and
- surface, friction, gravity, resistance.

Sample Performance Indicator

Using position and motion related terminology displayed on a class anchor chart, lead a game of “Simon Says”. Call out actions that incorporate one or more terms from the unit. “Simon says”, for example
- put your hands above your head,
- take two steps forward,
- crawl like a baby,
- stand beside your desk,
- spin round and round,
- jump up and down,
- swing your arms back and forth, and
- pull up your socks.
How Do Objects and People Move?

Sample Teaching and Assessment Strategies

Communicating using appropriate scientific terminology is an expectation throughout the curriculum and may be addressed and assessed whenever students are exploring, investigating, and problem solving. Introduce and define new terminology gradually as the need emerges (e.g., pushes and pulls are forces).

**Activation**

Teachers may

- Play the song *I Like to Move It*, by Reel 2 Real, and have students move in different ways. Select students to demonstrate their way of moving and introduce terminology to describe it.
- Introduce position and motion-related terminology using relevant children’s literature (e.g., Science library titles). Once read, titles can be added to the curiosity centre.

**Connection**

Teachers may

- Create an anchor chart of unit terminology and incorporate terms into daily literacy activities (e.g., Daily 5 word work).

Students may

- View the anchor video *Relative Position and Motion* and identify position and motion terminology.
- Engage in play at a playground and describe the different ways they and the objects at the playground moved.

**Consolidation**

Teachers may

- Digitally record peer-to-peer conversations as students explore, investigate, and problem solve for use in assessment.

Students may

- Play “charades” using position and motion terminology (e.g., forward, left, faster, close, under, inside, spin, swim, backward).
- Create a LEGO™ maze marble run. Manipulate the base (e.g., tilt it forwards) to move a marble through the maze. Students should communicate aloud the movements of the marble.
- Create a video of the different ways they move in physical education class, incorporating position and motion terminology.

Resources and Notes

**Authorized**

*Let’s Do Science* (TR)
- *Relative Position and Motion*
  - pp. 9-13
- *Science Cards 1 and 2*
- *Teachers Website*
  - Anchor Video - *Relative Position and Motion*
  - IWB Activities 1 and 2

**Supplementary**

Science Library
- *Clap Your Hands*
- *Goodnight, Goodnight, Construction Site*
- *Push and Pull*
- *Rosie’s Walk*
- *Zip and Zoom: Toys that Roll*

**Suggested**

- Skill - Using Appropriate Vocabulary
- Marble run (instructions)

Other curriculum resources
- *Literacy Place for the Early Years Grade 2* (ELA 2)
  - *Justin’s New Bike*, (Guided Reading)

Children’s Literature
- *This is the Way*, by C. Fuge
Outcomes

Students will be expected to
33.0 describe the motion of an object in terms of a change in position relative to other objects [GCO 1/3]

Focus for Learning

Students are expected to develop and use positional terminology to describe the motion of objects. Motion should be described in terms of changes in position relative to other objects. For example

• The students walked toward the window.
• The boat sailed away from the dock.
• The chairs are moved closer together.
• The balloon floats further up into the air.
• The ball rolls down the hill.
• The worker climbs up the ladder
• The hare pulls ahead of the tortoise in the race. The tortoise falls behind the hare. The hare is moving faster than the tortoise. The tortoise is slower than the hare.

Refer to page 90 for additional unit terminology which students may use to describe the motion of an object.

Cross curricular connections may be made to Physical Education outcomes related to movement and directions.

Attitude

Encourage students to recognize the role and contribution of science in their understanding of the world. [GCO 4]

Sample Performance Indicator

Individually race two toy cars through a race track (real or imagined) and provide commentary for the race; describing the motion of the cars using positional terminology.
## How Can You Describe the Motion of an Object?

### Sample Teaching and Assessment Strategies

Describing how an object moves provides an opportunity to incorporate kinaesthetic coding activities. This type of coding activity involves devising, and carrying out, step by step movement commands (i.e., forward, right turn, left turn) to solve a problem. Using classroom floor tiles as a grid, for example, students could create a code to move a toy car from a starting square to a finishing square. The code should be tested and "debugged" if it fails. As an extension, students could be introduced to simple, technology-based coding using programmable robots, computer programs, or mobile device applications.

### Activation

Teachers may
- Facilitate a class game of “Mother May I” or “Simon Says” and ask students to change position (e.g., move forward, move backward, sit under a desk, stand beside the teacher’s desk). After several rounds, invite student volunteers to lead the game. An anchor chart of terminology may be provided for student use.

### Connection

Teachers may
- Read aloud *Ready, Set, Go!* and ask students to pay attention to the illustrations to discover how the positions of Miranda and the other runners change in the story.
- In the gym, facilitate races between selected students and ask other students to describe their motion using positional language.
- Assign a set of position-related terms to student groups and ask them to plan and demonstrate movements that illustrate them.

Students may
- Roll balls between partners and communicate how the ball is moving using position-related terminology (e.g., forward, toward, between, away).
- Write a kinaesthetic code, using movement arrows, to provide a classmate directions to the washroom or gym.

### Consolidation

Teachers may
- Present videos of sporting events (e.g., horse racing, Nascar racing, swimming, track and field,) and ask students to describe the movement of the person or animal in relation to other objects.

Students may
- Create a video to differentiate between position-related terms (e.g., faster and slower, closer and further, up and down, left and right, toward and away, over and under, around and through).
- Operate remote control toys and describe their movement.

### Resources and Notes

**Authorized**

*Let’s Do Science* (TR)
- *Relative Position and Motion*  
  - pp. 14-18
- Science Card 3
- Teachers Website  
  - IWB Activities 3 and 4
- Read Aloud  
  - *Ready, Set, Go!*

**Teaching and Learning Strategies**
- Relative Position and Motion Unit Overview
- Considerations for Teaching the Relative Position and Motion Unit

**Supplementary**

Science Library
- *Rosie’s Walk*

**Suggested**

- Coding resources (websites)

Other curriculum resources
- *Literacy Place for the Early Years Grade 2 (ELA 2)*  
  - *Beaver is Lost*
How Can You Describe the Position of an Object?

Outcomes

Students will be expected to

34.0 describe the position of an object relative to other positions or stationary objects [GCO 1/3]

27.0 identify problems to be solved [GCO 2]

35.0 place an object in an identified position relative to another object or position [GCO 1/3]

36.0 follow a simple procedure [GCO 2]

Focus for Learning

Students should describe the position of an object relative to other positions or stationary objects. On page 22-23 of Can You See What I See? Treasure Ship, for example, students should describe the position of the yellow rubber duck as in front of the red glass bottle, beside the red pelican, and on top of the wooden bar. Refer to page 90 for additional terminology which students may use to describe relative position.

Describing the relative position of an object can help to solve problems, such as calling home to have a family member locate an object in your room. Students should identify and solve similar problems that require accurate descriptions of relative position:

• Describe your position in a class photograph.
• Instruct someone to obtain a specific object from a shelving unit.
• Communicate your relative position in or around the school to a classmate trying to find you.
• Create a map of your school that indicates the relative position of different rooms.

Once students have sufficient practise describing the relative position of objects, they should give and follow instructions to place objects in specific positions relative to other objects or positions (e.g., move the game piece three spaces to the right and then four spaces down, place the toy inside the crate on the bottom shelf beside the stack of books).

Strategies employed to address outcome 35.0 provide an opportunity to assess students’ ability to follow simple procedures where instructions are given one step at a time. Students should be expected to follow simple procedures to move objects and place them in identified positions. Procedures followed may be teacher or student devised and presented in written, visual, or oral format.

Accurately following procedures is an important science skill, particularly when conducting science experiments.

Attitude

Encourage students to show interest in and curiosity about objects and events within their immediate environment. [GCO 4]

Sample Performance Indicator

Create a “toy shelf” by placing a ball, block, toy car, and yo-yo in a line from left to right across your desk.

• Describe where the block and yo-yo are located.
• Place a coin between the toy car and the block, another to the left of the ball, and another on top of the block.
• Move the yo-yo behind the block.
How Can You Describe the Position of an Object?

Sample Teaching and Assessment Strategies

Activation

Teachers may
- Read aloud *Where’s My Hockey Sweater?* and ask students to use position-related terminology to describe where Nicholas looked for and found his missing hockey equipment.
- Play “I Spy” using riddles to describe the relative position of objects (e.g., I spy something beside the window).

Connection

Teachers may
- Place position-related terms on a cube. Ask students to roll the cube and use the term to describe the position of an object in the classroom relative to another position of stationary object.
- Take a photo of the class sitting on risers or stairs. Ask students to describe the position of a classmate relative to their own position in the photo.

Students may
- Identify and describe the relative position of objects in science library title illustrations (e.g., *Can You See What I See? Treasure Ship*).
- Play a game where one student is the robot and another is the commander. The commander orally gives instructions for the robot to follow. Switch roles and play the game again.
- Navigate a toy car through a car play mat or Lego™ maze. One student should give directions, one step at a time, to a specific location (e.g., move forward to the stop sign, turn left, drive past the bank, turn right at the traffic lights, park beside the store).

Consolidation

Teachers may
- Display a large grid with an identified starting square. Provide a kinaesthetic code of movement arrows (e.g., ↑→↓↑→↑↑) to a “mystery square”. Ask students to follow the instructions and describe the position of their landing square in relation to the start to confirm that they accurately followed the code.

Students may
- Create treasure maps to “treasure” hidden in or around the school. Include step by step instructions for classmates to follow.
- Play a modified game of “Battleship” on a game board or grid. When their partner misses, they should give clues to the location of the ships (e.g., 3 rows up).

Resources and Notes

Authorized

*Let’s Do Science* (TR)
- *Relative Position and Motion* - pp. 19-25
- *Science Cards 4 and 5*
- *Read Aloud* - *Where’s My Hockey Sweater?*

Teaching and Learning Strategies
- *Relative Position and Motion Unit Overview*

Supplementary

Science Library
- *Can You See What I See? Treasure Ship*
- *I Spy Treasure Hunt: A Book of Picture Riddles*
- *Soccer Crazy*
- *The Party*
- *Where’s Walrus? And Penguin?*

Suggested

- *Coding with cups* (websites and videos)

Other curriculum resources
- *Literacy Place for the Early Years Grade 2 (ELA 2)*
  - *Active Learning Kit*
  - *Where’s Walrus?*
  - *Movie Poster: How Anansi Outsmarted Snake* (CC #15)
  - *Map: Pine Valley Wildlife Centre* (CC #13)
Describing the Position of an Object from Different Perspectives

Outcomes

Students will be expected to
37.0 describe the position of objects from different perspectives
[GCO 1/3]

Focus for Learning

The position of an object is relative and depends upon the reference point or perspective used to describe it. One reference point will result in a different description of an object’s position than from another reference point. In softball, for example, a pop fly hit to the second baseman would be described as

• to the right of the first baseman,
• to the left of the third baseman,
• behind the pitcher, and
• in front of both the centre fielder and the catcher.

The position to which the softball is hit is relative and depends upon the reference point or perspective used to describe it (i.e., the position of the viewer).

Students are expected to view and describe the position of objects from various reference points or perspectives.

To introduce the concept of perspective, teachers could initially address how different reference points change the way an object appears (e.g., a skateboard viewed from different perspectives - top-view, bottom-view, side-view, front-view, rear-view, from near and far). The concept of perspective could then be applied to descriptions of the position of objects from different points of view or perspectives.

Attitude

Encourage students to appreciate the importance of accuracy.
[GCO 4]

Sample Performance Indicator

Answer the following while viewing a chess board with a single king, queen, knight, bishop, rook, and pawn placed randomly on squares.

What is the position of the queen from the perspective of the

• king,
• knight,
• bishop,
• rook, and
• pawn?
Describing the Position of an Object from Different Perspectives

**Sample Teaching and Assessment Strategies**

**Activation**

Teachers may

- Place a Rubik’s Cube™ in the centre of four students. Ask each student to colour a 3 x 3 grid to represent the side facing them and compare with those of other students.

**Connection**

Students may

- View illustrations in *Goodnight, Goodnight, Construction Site* and note ways the heavy equipment appears similar or different from different points of view.
- View pages 10-19, 20-29, 30-33 from *Can You See What I See? Treasure Ship* and note ways the objects appear similar or different when viewed from progressively farther away.

**Consolidation**

Teachers may

- Seat two students in the centre and arrange the remaining students into four groups around them, seated in the 3, 6, 9, and 12 o’clock positions. Have groups describe the position of one of the students in the centre in relation to the other (i.e., in front of, behind, to the right of, to the left of) and compare descriptions.
- Project satellite aerial views of the local community using Google Maps™ and ask students to describe the position of a landmark from different perspectives.

Students may

- View board games and describe the position of a specific game piece in relation to the other game pieces.
- View a photo of the class on risers. Ask each student to record the position of a specific classmate relative to their position in the photo. Students should then compare their descriptions recognizing that position depends on perspective.
- View the illustrations in *Where’s Walrus? And Penguin?* and describe the position of Walrus from the perspective of Penguin and the Zookeeper.
- Describe the position of a specific room in the school from the perspective of different classrooms.
- Play soccer baseball and describe the landing position of each kick in relation to the position they are playing (e.g., first base).

**Resources and Notes**

**Authorized**

*Let’s Do Science* (TR)

- *Relative Position and Motion* - pp. 26-29
- Science Card 6
- Teachers Website
  - IWB Activity 5
  - Image bank

**Teaching and Learning Strategies**

- Relative Position and Motion Unit Overview

**Supplementary**

*Science Library*

- *Can You See What I See? Treasure Ship*
- *Goodnight, Goodnight, Construction Site*
- *Where’s Walrus? And Penguin?*
Investigating Patterns of Movement

Outcomes

Students will be expected to
38.0 investigate different patterns of movement [GCO 1/3]

Focus for Learning

Objects and living things move in many different ways (e.g., a ball bounces, a tire rotates, a pendulum swings, a child jumps, a black bear climbs); they have different patterns of movement. These patterns can be described using movement-related terminology
• bouncing, fluttering, rotating/spinning, sliding, swinging, rolling;
• climbing, crawling, flying, hopping/jumping, running, shaking, skipping, swimming, walking; and
• forward, backward, straight, zigzag, up and down, back and forth, round and round.

Students should investigate different patterns of movement and discover how the forces of push or pull are necessary to initiate them.

Cross curricular connections may be made to Physical Education outcomes related to demonstrating locomotor (e.g., walking, climbing, running) and non-locomotor (i.e., bending, twisting, curling, swaying) skills.

While investigating patterns of movement, students should predict how objects and living things may move. Their predictions should be reasoned statements based on prior knowledge or an observed pattern. Students should be expected to explain their reasoning. A student could, for example, predict that
• a toy rolls because it has wheels,
• the great auk flew because it had wings or was flightless because it looks like a flightless penguin (i.e., it has very small wings),
• a manual hand mixer spins because it looks similar to an electric mixer which spins, or
• an arctic hare hops because it has large hind feet like a snowshoe hare and snowshoe hares hop.

Attitude

Encourage students to work with others in exploring and investigating. [GCO 4]

Sample Performance Indicator

Investigate various pieces of equipment at the playground (e.g., swing, merry go round, see saw, slide, spring rider, fireman’s pole, monkey bars) and answer the following:
• Using movement-related terminology, describe the ways several pieces of equipment move or how you move when playing on them.
• For pieces of equipment that move, what starts them moving? How can you make them move faster? How can you stop them?
• Does playing on specific pieces of equipment involve a pushing force, a pulling force, or both?
Investigating Patterns of Movement

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Lead a game of “Simon Says” to explore patterns of movement (e.g., Simon says jump up and down, spin around, walk in a straight line, swing your arms back and forth). After several rounds, invite student volunteers to lead the game.
- Place a toy that moves on a stationary table/surface and tell it to move. When it doesn’t, ask students to suggest ways to make it move. Try plausible suggestions noting the push or pull applied.

Connection

Teachers may

- Present images of familiar objects and living things and ask students to sort them, using a sorting chart, according to descriptions of their pattern of movement (e.g., rotate/spin, swing, bounce, slide, roll, fly, climb, jump/hop, crawl, swim, shake).
- Present an object that may be unfamiliar (e.g., salad spinner, cork screw, manual hand mixer) or an image of an unfamiliar animal. Ask students to predict the pattern of movement and explain why.
- Provide movement dice (i.e., one labelled - crawl, jump, shake, skip, spin, walk and the other labelled - fast, slow, forward, backward, in a straight line, in a zigzag pattern). Ask students to take turns rolling the dice and making the different movements.

Students may

- Play a game of animal “Charades”; imitating the movement patterns of various familiar animals.
- Take turns leading the class in exercise breaks that incorporate different patterns of movement.

Consolidation

Teachers may

- Add objects that move to the curiosity centre (e.g., spin top, wind up toy, jack in the box, slinky, balls, toy helicopter, pendulum clock) for students to investigate their pattern of movement.

Students may

- Use playground equipment (e.g., monkey bars, see-saw, swings, slide, merry-go-round) to investigate the forces of push and pull and their affect on motion.

Extension

- Explore technologies that allow students to move in different ways or on different surfaces (e.g., crutches, wheel chair, toboggan, pogo stick, swim fins, crampons, roller blades, snowshoes).

Resources and Notes

Authorized

*Let’s Do Science (TR)*
- *Relative Position and Motion*
  - pp. 9-13, 30-35
- *Science Cards 1, 2, 3, 7, & 8*
- *Teachers Website*
  - BLM - Sorting Chart
  - IWB Activities 1, 2 and 6

Teaching and Learning Strategies

  - Relative Position and Motion Unit Overview

Supplementary

Science Library

- *Clap Your Hands*
- *Push and Pull*
- *Zip and Zoom: Toys That Roll*

Suggested


- Skill - Predicting

Other curriculum resources

- *Literacy Place for the Early Years Grade 2 (ELA 2)*
  - *Come to the Pow-wow! (Synthesizing Strategy Unit)*

Children’s Literature

- *This is the Way*, by C. Fuge
- *And Everyone Shouted, “Pull!”*, by C. Llewellyn
- *Forces Make Things Move*, by K. Brubaker Bradley
- *Move It!: Motion, Forces and You*, by A. Mason
# What Factors Affect Movement?

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Focus for Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Students will be expected to</strong></td>
<td>Students should use the inquiry process to investigate how various factors affect the movement of objects (i.e., causing them to speed up, slow down, stop, or change direction).</td>
</tr>
<tr>
<td>39.0 investigate factors that affect movement [GCO 1/3]</td>
<td>Students could investigate factors that affect movement when • rolling objects (e.g., toy cars, balls, cans) up and down ramps; • playing with wind up toys • engaging in a tug of war; or • snowshoeing, tobogganing, riding a bicycle, ice skating, or swimming.</td>
</tr>
<tr>
<td></td>
<td>Students should, in small collaborative groups, generate “I Wonder” questions to investigate and design and carry out simple procedures to find answers to their questions. Students could investigate, for example, how different surfaces affect the movement of a toy car. They could give one push to a toy car over varied surfaces (e.g., carpet, crushed stone, grass, pavement, tile floor) and measure how far it rolls. Alternatively, they could go tobogganing and investigate how the type of toboggan, steepness of the slope, number of riders, initial pushing force, or snow conditions affect the speed of motion.</td>
</tr>
<tr>
<td>14.0 communicate procedures and results [GCO 2]</td>
<td>Following completion of their inquiry investigations, students should communicate to classmates what their initial question was, what they did (i.e., their procedure), and what they found out (i.e., their results). They should answer their initial question and draw simple conclusions from their results (e.g., toy cars roll farther on smooth surfaces).</td>
</tr>
<tr>
<td>9.0 propose an answer to an initial question or problem and draw a simple conclusion [GCO 2]</td>
<td>Investigating inquiry questions naturally leads to new questions. Students should routinely identify and communicate new questions arising from what was learned. Having investigated the movement of a toy car over different surfaces, for example, they may question how wheel size affects the movement on different surfaces. It is through this iterative inquiry process that students construct knowledge of the world around them.</td>
</tr>
<tr>
<td>40.0 pose new questions that arise from what was learned [GCO 2]</td>
<td><strong>Attitude</strong></td>
</tr>
<tr>
<td></td>
<td>Encourage students to consider their observations and their own ideas when drawing a conclusion. [GCO 4]</td>
</tr>
<tr>
<td></td>
<td><strong>Sample Performance Indicator</strong></td>
</tr>
<tr>
<td></td>
<td>Independently design and carry out an investigation to determine if the number of times the key on a wind up toy is turned affects how far it moves. Upon completion, communicate aloud the procedure followed and the results obtained. Draw a simple conclusion relating the turning of the key to movement of the wind up toy and communicate new inquiry questions to investigate that arise from what was learned.</td>
</tr>
</tbody>
</table>
What Factors Affect Movement?

Sample Teaching and Assessment Strategies

**Activation**

Teachers may

- Provide visuals and ask students to identify factors that affect the movement of various objects (e.g., flag, swings, toy trains on a train track, spin top, curling stones, bocce balls).

**Connection**

Teachers may

- Organize a tug-of-war game. After the game, ask students to discuss factors that could affect the outcome of a tug-of-war (e.g., sloped ground, dry vs wet ground, uneven numbers of participants, gloves vs no gloves, one-hand vs two-hands on the rope, shoes, no shoes). Test some of the suggested factors.
- Provide pairs of students with two pieces of string (2 m long) and a sturdy paper cup with a large hole in the bottom. Pull both strings through the cup and have students hold an end in each hand. Students will work together to move the cup back and forth at different speeds, by pulling the ends apart and pushing them back together. They can also try to stop the cup in the middle of the strings. Students should make simple conclusions about how moving their hands affects the movement of the cup.
- Provide an image of a bicycle. Ask students to explain ways to get a bicycle to start, speed up, slow down, stop, turn left, or turn right.

**Consolidation**

Students may

- Use straws to investigate how blown air affects the movement of a table tennis ball and explore ways to increase the pushing force of the air. Conduct races to move a table tennis ball through a maze or into a drinking glass laid on its side.
- Investigate how different surfaces affect the movement of a toy car or marble. Predict the affect different surfaces (e.g., bath towel, cardboard, carpet, sandpaper, tile floor) will have. Roll the object down a ramp and across the different surfaces, measuring the distance travelled using a non-standard unit. Communicate procedures and results, draw a simple conclusion, and pose new inquiry questions.
- Investigate factors that speed them up, slow them down, stop them, or change their direction while tobogganing on a hill, riding a bicycle, scooter, or skateboarding.
- Attach a bendable drinking straw to a desk top with the longer end extending over the edge of the desk. Bend the shorter end upward and balance a table tennis ball upon it. Investigate the amount of force needed to lift, suspend, and lower the table tennis ball.

Resources and Notes

**Authorized**

*Let's Do Science (TR)*

- *Relative Position and Motion*
  - pp. 36-41
- *Science Cards 9 and 10*
- *Teachers Website*
  - IWB Activities 7 and 8

**Teaching and Learning Strategies**

  - Relative Position and Motion Unit Overview

**Supplementary**

*Science Library*

- *Push and Pull*
- *Zip and Zoom: Toys That Roll*

*What Is the Inquiry Process? (poster)*
## Design Challenge: Building a Roller Coaster

### Outcomes

**Students will be expected to**

1. **16.0 use appropriate tools**
   
   [GCO 2]

### Focus for Learning

Address these skill outcomes through a design challenge. In small collaborative groups, students should design and construct their own roller coaster from found and recycled materials. A marble could be used to represent a roller coaster car.

The roller coaster should meet design criteria that are collaboratively established. The marble, for example, must

- start moving without a push or a pull;
- complete the entire ride without stopping;
- move up, down, to the left, to the right, and in a circle;
- slow down at the end of the ride; and
- stop on a carpet square.

Additional criteria related to the speed or height of the roller coaster could be established.

Students should follow a problem solving design process. They should

- brainstorm roller coaster design ideas and select one to try,
- explore the utility of various tools and materials and select those they wish to use,
- construct a prototype of their roller coaster,
- test their roller coaster and use the results to suggest improvements to the prototype,
- redesign/modify their roller coaster and retest until finalized,
- evaluate their roller coaster in relation to the design criteria, and
- describe how they overcame those failures.

While engaged in design challenges, students should work collaboratively and communicate aloud their questions, ideas, and intentions. They should listen to classmates, respond to their suggestions and actions, and acknowledge their ideas and contributions.

Following completion of the design challenge, students should evaluate their own roller coaster, and those of other groups in relation to the established design criteria. Suggestions for improvement could be identified and communicated.

### Attitude

Encourage students to show concern for their safety and that of others in carrying out activities and using materials. [GCO 4]
Design Challenge: Building a Roller Coaster

Sample Teaching and Assessment Strategies

**Activation**

Teachers may

- Use relevant children’s literature to introduce or revisit the design process and highlight the importance of failure in the process.

Students may

- View online videos of roller coasters to identify their patterns of movement and explore factors that affect their movement.

**Connection**

Teachers may

- Provide a wide variety of found and recycled materials and tools for students to explore, select, and use in constructing their marble roller coaster. Suggestions include:
  - cardboard rolls, PVC pipe, plastic tubing, pool noodles, rain gutters, foam pipe insulation, Hot Wheels™ tracks, funnels, craft sticks, plates (e.g., paper, aluminum, Styrofoam), sockets
  - tape (e.g., duct, electrical, packing, painters), glue (e.g., stick, white, wood), staples, Velcro, string, wool, ribbon, paper clips, paper fasteners, clothespins, sticky tack, pipe cleaners, ties (e.g., plastic, twist, cable), wire.
- Read aloud *Hot Rod Hamster and the Wacky Whatever Race!* identifying the design criteria for the race. Then, collaboratively establish design criteria for the marble roller coaster design challenge.

**Consolidation**

Students may

- Follow an engineering design process to collaboratively construct a marble roller coaster that meets the established design criteria.
- Engage in a “scouts out” activity during construction. When indicated by the teacher, one student from each group can scout out what other groups are doing, without interrupting, and then return to their groups and report on what they observed. Groups can decide whether or not to incorporate learnings into their design.
- Demonstrate their final marble roller coaster to classmates, identifying initial design challenges and how they overcame them.
- Evaluate the marble roller coasters of classmates in relation to the design criteria and offer feedback and suggestions for improvement using the “Two Stars and a Wish” BLM.

Resources and Notes

**Authorized**

*Let’s Do Science* (TR)

- *Relative Position and Motion* pp. 42-46
- *Science Cards 11 and 12*
- *Teachers Website*
  - BLM Two Stars and a Wish
  - IWB Activity 9

**Teaching and Learning Strategies**

- Relative Position and Motion Unit Overview
- Considerations for Teaching the Relative Position and Motion Unit

**Supplementary**

**Science Library**

- *Hot Rod Hamster and the Wacky Whatever Race!*

**What Is the Design Process?** (poster)

**Suggested**


- Roller coaster resources (videos)

**Children’s Literature**

- *Rosie Revere, Engineer,* by A. Beaty
- *The Magnificent Tree,* by N. Bland
- *Those Darn Squirrels!*, by A. Rubin
Section Three: Specific Curriculum Outcomes

Unit 4: Animal Growth and Changes
Focus

All animals grow and change from their earliest beginnings until they reach their full adult condition. The form and pattern of this growth distinguishes 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. Students may, for example, raise a butterfly from caterpillar to adult. The growth and development of the butterfly is then compared to that of other animals and to themselves, and opportunity is provided for children to identify the conditions needed to support healthy growth.

Scientific inquiry is the focus of the Animal Growth and Changes unit. Students will investigate what animals need from their natural environment, changes in the appearance and activity different animals go through during their life cycle, and changes in humans’ physical and behavioural traits as they grow and develop. The unit further develops skills related to identifying and using a variety of sources of science information, posing questions, making predictions, sequencing and grouping, drawing conclusions, and posing new questions that arise from what was learned.

Outcomes Framework

GCO 1 (STSE): 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.

GCO 3 (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.

41.0 investigate changes in the appearance and activity of an animal as it goes through its life cycle
42.0 describe features of natural and human-made environments that support the health and growth of some animals
43.0 compare the life cycles of various animals
44.0 group animals according to the similarities and differences of their life cycles
45.0 analyze constant and changing traits in humans and other animals as they grow and develop
46.0 investigate changes in humans as they grow and develop
47.0 compare human growth and development to that of other animals
48.0 examine the implications of food choices and eating habits on human growth and development
49.0 examine the implications of actions and decisions that support a healthy lifestyle
SECTION THREE: SPECIFIC CURRICULUM OUTCOMES

**GCO 2 (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.

1.0 pose questions that lead to exploration and investigation
2.0 communicate using scientific terminology
6.0 predict based on an observed pattern
7.0 make and record observations and measurements
9.0 propose an answer to an initial question or problem and draw a simple conclusion
10.0 sequence or group materials and objects
14.0 communicate procedures and results
19.0 select and use materials to carry out their own explorations and investigations
30.0 identify and use a variety of sources of science information and ideas
31.0 respond to the ideas and actions of others and acknowledge their ideas and contributions
40.0 pose new questions that arise from what was learned

**GCO 4 (Attitude):** 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.

- recognize the role and contribution of science in their understanding of the world
- show interest in and curiosity about objects and events within the immediate environment
- willingly observe, question, and explore
- consider their observations and their own ideas when drawing a conclusion
- be open-minded in their explorations and investigations
- work with others in exploring and investigating
- be sensitive to the needs of other people, other living things, and the local environment
SCCO Continuum

GCO 1 (STSE): 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.

GCO 3 (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.

<table>
<thead>
<tr>
<th>Science 1</th>
<th>Science 2</th>
<th>Science 3</th>
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<tbody>
<tr>
<td>Needs and Characteristics of Living Things</td>
<td>Animal Growth and Changes</td>
<td>Plant Growth and Changes</td>
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</tbody>
</table>
|  • identify and describe common characteristics of humans and other animals, and identify variations making each person and animal unique  
  • observe and identify similarities and differences in the needs of living things  
  • describe ways plants and animals meet their needs  
  • describe ways animals move to meet their needs  
  • describe ways humans use their knowledge of living things in meeting their own needs and the needs of plants and animals  
  • recognize living things depend on their environment  
  • identify personal actions contributing to a healthy environment |  • investigate changes in appearance and activity as animals go through their life cycle  
  • describe features of environments that support animal health and growth  
  • compare life cycles of various animals  
  • group animals according to their life cycles  
  • analyze constant and changing traits in humans and other animals as they grow and develop  
  • compare the growth and development of humans to that of other animals  
  • examine implications of food choice and eating habits on growth and development  
  • examine the implications of actions and decisions that support a healthy lifestyle |  • investigate life needs of plants  
  • describe how plants are affected by the conditions in which they grow  
  • investigate changes that occur through the life cycle of a flowering plant  
  • describe ways in which plants are important to living things and their environment  
  • identify different parts of plants that provide humans with useful products and describe the preparation required to obtain these products  
  • describe how our supply of useful plants is replenished |
### Science 2 Curriculum Guide 2016

**GCO 2 (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.

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### Suggested Unit Plan

**Animal Growth and Changes** is the life science unit of Science 2. It is positioned at the end of the year to capitalize on opportunities for outdoor learning; observing animals in their natural environments.

<table>
<thead>
<tr>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>January</th>
<th>February</th>
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<th>April</th>
<th>May</th>
<th>June</th>
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<tbody>
<tr>
<td>Animal Growth and Changes</td>
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</table>
### What is a Life Cycle?

**Outcomes**

<table>
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<th>Students will be expected to</th>
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<tr>
<td>1.0 pose questions that lead to exploration and investigation</td>
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</table>

**Focus for Learning**

Skill outcome 1.0 was previously addressed. Refer to the elaboration provided on pages 32-33.

All living things pass through a series of stages from the beginning of their life until their death. For any particular animal, these stages are known as that animal’s life cycle. The darkling beetle, for example, has 4 stages in its life cycle; egg, larva (i.e., mealworm), pupa, and adult beetle.

Students are expected to pose questions related to the growth, changes, and life cycles of humans and other animals:

- Can all animals have babies?
- What is a life cycle? Does every animal have one? Are life cycles all the same?
- Which animals lay eggs? Which ones give birth to their young?
- What are the babies of different animals called? How many do they have? Do the babies look like their parents? How long does it take to mature?
- How does an animal grow and change during its life cycle? How does a ladybug (dragonfly, earthworm, mealworm, frog, salmon, chicken, or dog) grow and change? What are the stages of different life cycles called?
- Does the way an animal looks or acts change as the animal grows and develops? Which traits change? Which ones stay the same?
- How do humans grow and develop? How does our life cycle compare with those of other animals? How long does it take to be a grown up?
- What healthy choices can we make to help us grow and develop properly?

Cross curricular connections may be made to English Language Arts 2 outcomes related to formulating questions that lead to inquiry.

**Attitude**

Encourage students to recognize the role and contribution of science in their understanding of the world. [GCO 4]
What is a Life Cycle?

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Create a “Curiosity Centre” containing
  - live animals (e.g., butterflies, meal worms, earthworms, snails, tadpoles, salmon fry, aquarium fish);
  - empty butterfly houses, bug boxes, terrariums, aquariums, fish bowls, mason jars, plastic containers;
  - magnification tools, butterfly nets;
  - toy models of different animal classes, life cycle diagrams and books;
  - objects or images related to both infant and elderly stages of the human life cycle (e.g., rattle, soother, diaper, cane, hearing aid, bifocal glasses, dentures);
  - images of humans at various life cycle stages;
  - mirrors, human growth charts, measuring tools; and
  - copies of Canada’s food guide, cook books, plastic food.
- Introduce children’s literature from the science library related to animal life cycles. After reading, ask students to record in their "I Wonder " journal any questions that they have.

Connection

Teachers may

- Play the anchor video Animal Growth and Changes. Ask students to think about how animals change and grow from babies to adults. Pause frequently to allow students to pose and discuss questions raised.
- Allow time for students to explore the live animals and objects at the curiosity centre. Provide index cards or sticky notes at the centre for students to record questions that arise as they explore. Questions can later be added to the “I Wonder” wall.

Students may

- View labelled life cycle diagrams of various animals and pose questions that arise.

Consolidation

Students may

- Investigate/research a selected inquiry question from the “I Wonder” wall. A RAN strategy may be used to organize their thinking and record what they find out.

Resources and Notes

Authorized

Let’s Do Science (Teachers Resource [TR])

- Animal Growth and Changes
  - pp. 10-15
- Science Cards 1 and 2
- Teachers Website
  - Anchor Video - Animal Growth and Changes
  - IWB Activity 1
  - BLM - My Life Cycle Question
  - Image bank

Teaching and Learning Strategies

- Inquiry-Based Teaching and Learning
- Considerations for Teaching Science in an Inquiry-Based Classroom

Supplementary

Science Library

- An Earthworm’s Life
- Animal Babies
- From Tadpole to Frog
- How Kids Grow
- Puppies and Kittens

What Is the Inquiry Process? (poster)

Suggested

Children’s Literature

- Chickens Aren’t the Only Ones, by R. Heller
Outcomes

Students will be expected to
30.0 identify and use a variety of sources of science information and ideas [GCO 2]

Focus for Learning

Students are expected to identify various sources of science information about life cycles and use them to find answers to their selected question. Identified sources may include

- the Internet (Caution: teachers should discuss with students that not all Internet sites provide valid information);
- nonfiction books;
- science magazines;
- pet stores or animals hospitals;
- aquariums, insectariums, nature parks, farms, museums;
- discussions with knowledgeable community members (e.g., family members, indigenous knowledge keepers, farmers, wildlife officers, veterinarians); and
- personal observations of people, pets at home, and animals in nature.

Students should communicate what they have learned and identify any new questions they have.

Cross curricular connections may be made to English Language Arts 2 outcomes related to interpreting, selecting, and combining information using a variety of strategies, resources, and technologies.

Students are expected to use appropriate scientific terminology when communicating about the growth, changes, and life cycles of humans and other animals. Memorizing definitions is not an expectation.

Consistently model the use of scientific terminology, integrate new terminology as the need emerges, and encourage students to use appropriate scientific terms.

Unit terminology may include

- question, explore, investigate, predict, observe, measure, record, compare, conclude, communicate;
- life cycle, life span, appearance, diet, habitat, environment;
- insect, fish, bird, amphibian, reptile, mammal;
- vocabulary related to the life cycle stages of humans (e.g., newborn, infant, baby, toddler, child, teenager, adult, elderly);
- vocabulary related to the life cycle stages of other animals investigated (e.g., egg, caterpillar [larva], chrysalis [pupa], butterfly);
- constant trait, changing trait, inherit;
- nutrient, carbohydrate, protein, fat, water, vitamin, mineral; and
germs, hygiene.

Sample Performance Indicator

Use various sources of science information (e.g., nonfiction book, web page, video) to determine the life cycle of a ladybug. Record what is learned in the My Life Cycle Question - BLM.
What is a Life Cycle?

Sample Teaching and Assessment Strategies

Communicating using appropriate scientific terminology is a constant expectation. Throughout the unit, whenever students are exploring, investigating, or problem solving, their use of appropriate terminology when communicating can be assessed.

Activation

Teachers may

- Facilitate a brainstorming session to identify potential sources of science information about life cycles both inside and outside the classroom. Sources identified could be recorded on a research anchor chart.
- Introduce life cycle-related terminology through relevant children’s literature (e.g., egg, larva, hard shell - Ladybug Life Cycle).
- Create anchor charts of unit terminology or add terms to pre-existing word walls.

Connection

Teachers may

- Provide a set of unit terms to small groups of students. Ask students to organize the terms using their own classification system.
- Continue to introduce and model use of scientific terminology by teaching life cycle poems and songs that students can recite and sing.

Students may

- Engage in a book walk through See Me Grow and Animal Babies from the science library and identify new scientific terminology.
- Create a personal glossary of unit terminology. As new terms are encountered, students should record the term on an index card with supporting words or drawings pictures. Index cards can be hole punched and connected with a shower curtain ring.

Consolidation

Students may

- Use multiple sources of science information to find and confirm answers to questions about the life cycles of humans and other animals.
- Create a print and/or digital collection of resources related to the life cycle of a specific animal. Print collections can be housed in file folders and used throughout the unit when investigating/researching specific questions.

Resources and Notes

Authorized

Let’s Do Science (TR)
- Animal Growth and Changes
  - pp. 10-15
- Science Cards 1 and 2
- Teachers Website
  - Anchor Video - Animal Growth and Changes
  - IWB Activity 1
  - BLM - My Life Cycle Question

Supplementary

Science Library
- An Earthworm’s Life
- Animal Babies
- From Tadpole to Frog
- Gotta Go! Gotta Go!
- How Kids Grow
- Ladybug Life Cycle
- Life Cycles
- Puppies and Kittens
- See Me Grow

What Is the Inquiry Design Process? (poster)

Suggested

Children’s Literature
- From Caterpillar To Butterfly, by D. Heiligman
- From Tadpole To Frog, by W. Pfeffer
- Science Vocabulary Readers Set: Life Cycles, by various authors
- The Very Hungry Caterpillar, by E. Carle
How Can We Observe A Life Cycle?

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Focus for Learning</th>
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<tbody>
<tr>
<td><strong>Students will be expected to</strong></td>
<td>Students are expected to observe the life cycle of a live animal housed in a classroom habitat. Live animals can be ordered from science suppliers or purchased from local pet stores. Suggested animals for this purpose include caterpillars, guppies, mealworms, snails, and tadpoles. Considering availability, cost, housing requirements, daily needs, and the length of time required to observe life cycle stages, investigating mealworms (darkling beetles) is a good choice.</td>
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<tr>
<td>41.0 investigate changes in the appearance and activity of an animal as it goes through its life cycle [GCO 1/3]</td>
<td>Students should, over an extended period, observe and describe changes in the animal’s appearance and habits as it progresses through its life cycle. Students should discuss how they will observe the animal, how often they should observe, and how they will record their observations. Note, that depending on the animal chosen, students may not get to observe the egg stage of the life cycle. Mealworms, for example, are the second (larva) stage of the darkling beetle life cycle. Collaboratively, students should set up the classroom habitat according to any instructions provided by the supplier. Additionally, they should devise and carry out simple investigations to answer questions related to housing requirements and daily needs of their animal. For example:</td>
</tr>
<tr>
<td>7.0 make and record observations and measurements [GCO 2]</td>
<td>• I wonder what type of food substrate mealworms prefer (e.g., wheat bran, oatmeal, Cheerios™, Wheaties™)?</td>
</tr>
<tr>
<td>6.0 predict based on an observed pattern [GCO 2]</td>
<td>• I wonder what kind of fruit or vegetable mealworms prefer (e.g., potatoes, apples, carrots, lettuce)?</td>
</tr>
<tr>
<td>9.0 propose an answer to an initial question or problem and draw a simple conclusion [GCO 2]</td>
<td>• I wonder what type of light conditions mealworms prefer (e.g., dark, bright, in between)?</td>
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<td>• I wonder if mealworms prefer wet, damp, or dry conditions?</td>
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<td>Alternatively, investigations to answer questions related to an animal’s housing requirements and daily needs can be carried out on collected insects or small animals (e.g., snails, slugs, carpenters, earthworms) later in the unit. Prior to carrying out investigations, students should make predictions regarding the outcome. Refer to the previous elaborations of this outcome (pp. 40, 98). Following their investigations, students should propose answers to the questions investigated, based on their collected evidence. What is learned through investigation should be applied to the setup of the classroom habitat.</td>
</tr>
<tr>
<td><strong>Attitude</strong></td>
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<td>• willingly observe, question, and explore; and</td>
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<td>• be open-minded in their explorations and investigations. [GCO 4]</td>
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How Can We Observe A Life Cycle?
How Can We Observe A Life Cycle?

Sample Teaching and Assessment Strategies

Activation

Teachers may
• Read aloud Alligator Baby. Ask students to predict the baby animals based on their appearance and actions.
• Assemble an artifact box with clues about the animal in the classroom habitat. If choosing mealworms, for example, teachers could include a small bag of oatmeal (food substrate), a gummy worm (hint for the shape), and a toy beetle (mealworms are larva of darkling beetles). Allow students to make predictions based on the artifacts, and then reveal the animal to be investigated.

Connection

Students may
• Observe the animals in the classroom habitat daily and record changes noticed in their science journals, and/or by taking digital images or short videos with mobile devices. A class chart can be used to record what is happening with the animals (e.g., four mealworms entered the pupa stage, one darkling beetle emerged from its pupa).
• View time lapse videos of the life cycles of different animals, pausing frequently to predict what will happen next.
• Play “life cycle tag” to model the changes that the animal investigated is undergoing. If investigating mealworms, for example, students can crouch down like little eggs. When tagged by “It”, they become wiggling worms. When tagged a second time they must lie still with their arms wrapped around them (i.e., pupa stage). When tagged again they can crawl like a beetle.

Consolidation

Students may
• Pose and investigate “I Wonder” inquiry questions related to the needs and preferences of the chosen classroom animal.
• Create a model on a paper plate to represent each stage of an animal’s life cycle.
• Use digital images and video collected of the classroom animal at various stages of its life cycle to create a movie describing the changes in appearance and activity observed.

Resources and Notes

Authorized

Let’s Do Science (TR)
• Animal Growth and Changes
  - pp. 16-22
• Science Card 3
Read Aloud
• Alligator Baby

Teaching and Learning Strategies
• www.k12pl.nl.ca/curr/k-6/sci/science-2/teaching-and-learning-strategies.html
• Inquiry-Based Teaching and Learning
• Considerations for Teaching Science in an Inquiry-Based Classroom

Supplementary

Science Library (nonfiction and fiction texts)

What Is the Inquiry Process? (poster)

Suggested

• Science suppliers (websites)

Other curriculum resources
• Literacy Place for the Early Years Grade 2 (ELA 2)
  - Starting Life: Crocodile (Sequencing Strategy)
  - Dragonflies are Amazing! (Guided Reading)

Children’s Literature
• Diary of a Worm, by D. Cronin
• The Very Hungry Caterpillar, by E. Carle
What Do Animals Need From Their Environments?

**Outcomes**

Students will be expected to
42.0 describe features of natural and human-made environments that support the health and growth of some animals [GCO 1/3]

**Focus for Learning**

In Science 1, students described the needs of living things and recognized how living things depend on their environment.

Students should investigate/research animals found in local habitats (e.g., arctic, oceans and coastlines, forest, freshwater, urban) and identify what they eat and drink, and how they breathe, move, and shelter themselves. They should identify and describe features in these natural environments that enable specific animals to survive and thrive. Similarly, students should investigate/research the features of human-made environments (e.g., food source, water source, shelter) that support the health and growth needs of animals housed within these artificial environments (e.g., tropical fish housed in a classroom aquarium, reptiles housed at home in a vivarium, earthworms in a vermicomposters, animals housed on farms, or in nature parks and zoos).

Additionally, students should apply what is learned, to create an artificial habitat for live insects or other small animals (e.g., centipedes, earthworms, slugs, snails) that are personally collected. Students could devise and carry out simple investigations to determine the habitat needs of their personally collected animal (e.g., preferred food, bedding, lighting, and moisture level). What is learned through investigation should be applied to the creation and maintenance of the artificial environment.

Animals should be returned to the area where they were collected following use.

**Attitude**

Encourage students to be sensitive to the needs of other people, other living things, and the local environment. [GCO 4]

**Sample Performance Indicator**

Collect some slugs, or other similar small animals, and carry out a plan to create a “zoo in a jar” to temporarily house them for a couple of days. Describe the features of your “zoo” and explain how each feature supports the health and growth of your animal. What changes would you make to your “zoo” to permanently house your animal?
## What Do Animals Need From Their Environments?

### Sample Teaching and Assessment Strategies

#### Activation

Teachers may
- Read aloud *The Great Kapok Tree* and discuss the importance of the natural environment to the animals in the book. Extend discussion to local environments and the animals that live within them.

#### Connection

Teachers may
- Facilitate a student walk, if possible, to a natural area (e.g., field, pond, marsh, wooded area, beach) to observe evidence of local animals. Students should record, in a T-chart, the animals observed and the features of the environment. Upon return to the classroom, students could consider what specific animals need to survive and what environmental features help meet those needs.
- Facilitate, if possible, a trip to a farm, aquarium, insectarium, aquaculture farm, or nature park to determine how the needs of animals are met in these human-made environments.

Students may
- Match images of local animals to the appropriate local habitat (e.g., arctic, forest, freshwater, ocean and coastline, urban)
- Explore images or videos of animals in their natural environments and generate a list of features required to house these animals in human-made environments.

### Consolidation

Students may
- Collaboratively investigate/research the needs of “red wigglers” (composting earthworms) then create and maintain a classroom vermicomposter. As the need arises, make adjustments to the environmental features within the vermicomposter to ensure the earthworms survive and thrive.
- Create a physical model of an animal’s natural environment. Include all the features necessary to support the health and growth of the animal. Communicate the features of the environment to classmates.

### Resources and Notes

#### Authorized

*Let’s Do Science* (TR)
- *Animal Growth and Changes*
  - pp. 23-31
  - Science Cards 4 and 5
- Teachers Website
  - IWB Activity 2
  - Image bank

#### Teaching and Learning Strategies

- Inquiry-Based Teaching and Learning

#### Supplementary

What Is the Inquiry Process? (poster)

#### Suggested

Other curriculum resources
- *Literacy Place for the Early Years Grade 2* (ELA 2)
  - *We Are Wolves* (Read Aloud - Analyzing Strategy Unit)
- *Read Aloud (Science 1)*
  - *Ordinary Amos and the Amazing Fish*, by E. Fernandes
  - *The Very Hungry Bear*, by N. Bland

Children’s Literature
- *Animal Homes*, by S. Hewitt
- *Each Living Thing*, by J. Ryder
- *The Great Kapok Tree*, by L. Cherry
What Are the Life Cycles of Different Animals?

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Focus for Learning</th>
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<tbody>
<tr>
<td>Students will be expected to 43.0 compare the life cycles of various animals [GCO 1/3]</td>
<td>All living things grow and change, however, they grow and change in different ways. Students should investigate and compare the life cycles of varied animals:</td>
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<tr>
<td></td>
<td>• Bees, butterflies, darkling beetles, and ladybugs are insects that undergo complete metamorphosis. The stages of their life cycles are egg, larva, pupa, and adult.</td>
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<td></td>
<td>• Dragonflies and grasshoppers are insects that undergo incomplete metamorphosis. Their life cycle stages are egg, nymph, and adult. The nymph resembles the adult.</td>
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<td></td>
<td>• Frogs are amphibians. Their eggs, which are laid in water, hatch into tadpoles (i.e., larvae). The tadpoles live underwater. They undergo metamorphosis (i.e., grow legs, lose tail, develop lungs) which allows them to live and breathe on land as adults.</td>
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<tr>
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<td>• Dogs, humpback whales, snowshoe hares, and other mammals are live born. Their young have many different names. Young require parental care to grow, develop, and become adults.</td>
</tr>
<tr>
<td></td>
<td>• Salmon, Atlantic cod, and capelin are fish. Fish deposit their eggs (spawn) in water. Their eggs hatch and grow into adults, usually without parental care.</td>
</tr>
<tr>
<td></td>
<td>• Birds, such as bald eagles, chickens, and puffins, lay hard shelled eggs. Chicks hatch from the eggs and grow into adults. Most birds provide parental care.</td>
</tr>
<tr>
<td></td>
<td>• Sea turtles and garter snakes are reptiles. Most reptiles lay eggs, which are sometimes soft, on land. Young emerge from the eggs and develop into adults, usually without parental care.</td>
</tr>
<tr>
<td></td>
<td>Students should identify similarities and differences among the life cycles investigated (e.g., similar stages, whether young are live born or hatch from eggs, whether offspring resemble their parents or undergo dramatic changes in appearance, whether parental care is required for growth and development, life cycle length). Memorizing the stages of specific life cycles is not an expectation.</td>
</tr>
<tr>
<td></td>
<td>The life cycle of humans will be investigated later in the unit.</td>
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<tr>
<td></td>
<td>Cross curricular connections may be made to English Language Arts 2 outcomes related to selecting, reading, and viewing a range of literature, information, media, and visual text.</td>
</tr>
<tr>
<td></td>
<td><strong>Attitude</strong></td>
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<td></td>
<td>Encourage students to show interest in and curiosity about objects and events within their immediate environment. [GCO 4]</td>
</tr>
<tr>
<td></td>
<td><strong>Sample Performance Indicator</strong></td>
</tr>
<tr>
<td></td>
<td>View science cards 2, 6, and 7. Compare the life cycles of the two animals depicted on each card and describe their similarities and differences.</td>
</tr>
</tbody>
</table>
What Are the Life Cycles of Different Animals?

Sample Teaching and Assessment Strategies

Treatment of this outcome provides opportunity for teachers to assess student abilities to identify and use a variety of sources of science information and to communicate using scientific terminology.

Activation

• Read aloud *Life Cycles* from the science library highlighting similarities and differences in life cycles of butterflies, frogs, chickens, and dogs.

Connections

Teachers may

• Read aloud selected titles from the Science library (e.g., *An Earthworm’s Life, Gotta Go! Gotta Go!, Ladybug Life Cycle*) and ask students to represent the life cycle of each animal in a diagram.

• Facilitate a cooperative jigsaw activity. Organize students into home groups then reorganize them into “expert” groups that include one member from each home group. Assign each “expert” group a different animal and provide sources of science information for them to learn about its life cycle. Once finished, students return to their home group and share what they have learned, using appropriate scientific terminology.

Consolidation

Students may

• Create stations around the classroom with various sources of science information (e.g., books, models, pictures, posters) related to life cycles. Information at each station should be limited to two different animals. In small collaborative groups, students should compare the life cycles of the two different animals and discuss among peers how they are the same and how they are different.

• Compare the life cycles of two different animals using a Venn diagram (e.g., butterfly and darkling beetle, ladybug and dragonfly, frog and duck, salmon and frog, bat and puffin, humpback whale and dogfish (shark)).

• Create a matching game using print or digital images of different animals at various points of their life cycles.

Resources and Notes

Authorized

*Let’s Do Science (TR)*

- Animal Growth and Changes - pp. 32-37
- Science Cards 2, 6, and 7
- Teachers Website
  - IWB Activities 3, 4, and 5
  - Image bank

Supplementary

Science Library

- *An Earthworm’s Life*
- Animal Babies
- From Tadpole to Frog
- Gotta Go! Gotta Go!
- Ladybug Life Cycle
- Life Cycles
- Puppies and Kittens
- See Me Grow

Suggested


- Sequence Organizer
- Skill - Classifying and Organizing

Other curriculum resources

- Literacy Place for the Early Years Grade 2 (ELA 2)
  - Frog Life Cycle (Active Learning Kit)
  - Who Laid These Eggs? (Guided Reading)

Children’s Literature

- *One Tiny Turtle*, by N. Davies
- *Science Vocabulary Readers Set: Life Cycles*, by various authors
ANIMAL GROWTH AND CHANGES

**Grouping Animals Based on Their Life Cycles**

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Focus for Learning</th>
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</thead>
</table>
| Students will be expected to group animals according to the similarities and differences of their life cycles [GCO1/3] | Students have investigated and compared the life cycles of varied animals and identified similarities and differences among them. Students are now expected to group animals based on those identified similarities and differences. Animals could be grouped according to whether • they have similar life cycle stages, • they lay eggs or bear live young, • their eggs are laid on land or in water, • their eggs are tended or left unattended by the parent, • their young receive parental care or fend for themselves, or • their young resemble the parent or undergo a dramatic change in appearance during their life cycle.  
It is important to expose students to many varied life cycles so that it is more likely they will identify similarities among them. While each animal has a characteristic life cycle, significant similarities exist among animals of the same biological class (e.g., mammals, reptiles, amphibians, birds, fish, insects). Mammals, for example, give birth to live young which resemble the parents. Newborns are nursed by the mother and continue to grow and develop under protective parental care. Before reaching adulthood, offspring pass through an adolescent stage where they change and mature. 
This skill outcome was previously addressed. In the context of this unit, students should • sequence the stages of animal life cycles using images and/or labels (e.g., egg, mealworm, pupa, darkling beetle), and • group animals according to the similarities and differences of their life cycles (e.g., a dog’s life cycle is similar to that of a whale and different from that of a salmon). |
| 10.0 sequence or group materials and objects [GCO 2] | Attitude 
Encourage students to consider their observations and their own ideas when drawing a conclusion. [GCO 4] |

**Sample Performance Indicator**

View the animal life cycles presented in See Me Grow (i.e., rabbit, frog, kangaroo, shark, bee, alligator, clown fish, horse, robin) one at a time, compare it with the life cycles depicted on science cards 2, 6, and 7, and indicate which animal’s life cycle it most closely resembles. Is the life cycle of a shark, for example, most like that of a butterfly, dragonfly, dog, salmon, chicken, or sea turtle? Explain the reasons for your choice.
Grouping Animals Based on Their Life Cycles

Sample Teaching and Assessment Strategies

Activation

Teachers may
- Provide a collection of images of mammals, fish, and birds. Ask students to group them according to their body covering (e.g., fur, feathers, scales, exoskeleton/shell), environment they live in, the way they move, what they eat, or number of legs.
- Gather images of animals in 3 or 4 stages of their life cycle. Pass out images, ensuring that there is one for each student. Ask students to find classmates with other images of their animal and to sequence themselves based on the life cycle stages (e.g., dragonfly egg, nymph and adult, darkling beetle egg, mealworm, pupa, adult).

Connection

Teacher may
- Provide a collection of images of animals from different classes (e.g., insects, fish, birds, amphibians, reptiles, mammals) and ask students to group them according to whether
  - they lay eggs or bear live young,
  - their offspring look like the parent or not,
  - their young require parental care or look after themselves,
  - their life cycle has a pupa stage,
  - they undergo dramatic change in their appearance or habits during their life cycle.
  Include images of some animals whose life cycles may be unfamiliar to students (e.g., lobster) requiring them to make predictions which can be confirmed through investigation.

Students may
- Discuss, in small collaborative groups, if
  - all animals with wings lay eggs
  - all animals that live in water lay eggs
  - all animals with fur give birth to live young
  - similar looking animals have similar life cycles
  - you can predict an animal’s life cycle from its physical traits.

Consolidation

Students may
- Discuss and respond, in small collaborative groups, to the following questions and explain the reasons for their choices
  - Is a ladybug life cycle more like the life cycle of a frog or a dragonfly?
  - Is a coyote life cycle more like the life cycle of a gull or a cod?
How Do Traits Change as Animals Grow and Develop?

Outcomes

Students will be expected to analyze constant and changing traits in humans and other animals as they grow and develop [GCO 1/3]

Focus for Learning

Students should explore constant and changing traits in humans and other animals as they grow and develop, with a focus on humans.

Some traits (i.e., constant traits) do not change as an animal grows and develops (e.g., human handedness, eye colour), while other traits change over time (e.g., human height). Focusing on traits that change over time can help students analyze the ways humans and other animals change during their life cycle.

Teachers should note that the human life cycle is investigated and compared to other animal life cycles in subsequent outcomes. Teachers may wish to address these outcomes simultaneously.

Sample Performance Indicator

Analyze the recreated childhood photos provided and identify the constant and changing traits observed in the photos.

Note, recreated childhood photos are an Internet meme in which adults attempt to replicate their childhood photos by wearing the same clothing and posing in the same way.
### Sample Teaching and Assessment Strategies

#### Activation

**Teachers may**

- Display personal images of themselves at different stages of development; from infancy to the present day. In small groups, encourage students to observe the images in detail and ask them to identify and communicate how you have changed and how you have stayed the same. Through discussion, introduce the terms constant and changing traits.

#### Connection

**Teachers may**

- Ask students to bring in a baby picture of themselves. Place the pictures on a wall and give students time to examine the pictures and attempt to guess the identity of each baby. After revealing the identities, select a few students to stand with their baby picture and, as a class, discuss the constant and changing traits of each person.
- Play a modified version of “What doesn’t belong?”. Identify four different human traits (i.e., three constant and one changing, or one constant and three changing). Ask students to identify which trait doesn’t belong (e.g., foot size, height, leg length, number of eyes).
- Take digital pictures of students against a wall mounted growth chart ruler. Students should compare current pictures with ones taken in the same location on the first day of school.

#### Consolidation

**Teacher may**

- Label one wall constant traits and another changing traits. Call out characteristics (e.g., eye colour, hand size, number of limbs, arm span) and ask students to move to the appropriate wall to indicate whether the characteristic is a constant or changing trait.

**Students may**

- Using the BLM *Constant and Changing Traits*, complete the chart for an assigned animal listing its constant and changing traits.

### Resources and Notes

#### Authorized

*Let’s Do Science* (TR)

- *Animal Growth and Changes*  
  - pp. 44-48
- Science Card 9
- Teachers Website
  - BLM - Constant and Changing Traits
  - Image bank

#### Supplementary

Science Library

- *Animal Babies*
- *From Tadpole to Frog*
- *Gifts*
- *Life Cycles*

#### Suggested

Children’s Literature

- *Arms and Legs and Other Limbs*, by A. Fowler

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*How Do Traits Change as Animals Grow and Develop?*
How Do Humans Grow and Develop?

**Outcomes**

Students will be expected to

46.0 investigate changes in humans as they grow and develop  
[GCO 1/3]

19.0 select and use materials to carry out their own explorations and investigations  
[GCO 2]

14.0 communicate procedures and results  
[GCO 2]

40.0 pose new questions that arise from what was learned  
[GCO 2]

47.0 compare human growth and development to that of other animals  
[GCO 1/3]

---

**Focus for Learning**

Students are expected to investigate changes in humans as they grow and develop. Changes should include both physical traits (e.g., hand span, foot length, head circumference) and behavioural traits (i.e., things humans learn to do at different ages - sit up, crawl, walk, read).

In addressing outcome 46.0, student should, in small collaborative groups, conduct open inquiry investigations related to physical changes as humans age.

Students should

- select the physical trait they wish to investigate (e.g., head circumference, leg length, foot length, hand span, height, arm span);
- phrase their testable question (i.e., How does [physical trait] change as people grow?) and make a prediction;
- devise a simple plan to investigate their question (i.e., Who will they measure? What will they measure? How will they measure? What materials will they use? How many measurements will they take? How will they record their observations?);
- carry out their plan to measure a selected physical trait;
- propose an answer to their question;
- communicate to others their question, what they did, and what they found out; and
- pose new questions to investigate arising from what was learned.

Cross curricular connections may be made to Social Studies 2 outcomes related to describing different stages of their life and Health 2 outcomes related to recognizing physical growth changes.

Students should compare the growth and development of humans to that of other animals (i.e., other mammals and animals from other classes). Students could compare

- life cycle stages,
- time needed to reach adulthood,
- whether offspring resemble their parents,
- how newborns obtain food,
- level and length of parental care, and
- length of the life cycle.

**Attitude**

Encourage students to work with others in exploring and investigating.  
[GCO 4]

**Sample Performance Indicator**

Listen to the reading of *Whales* and describe how a whale’s development is similar to and different from that of a human.
How Do Humans Grow and Develop?

Sample Teaching and Assessment Strategies

Activation

Teachers may

• Read aloud *Our Love Grows*. After reading, discuss with students how Pip has changed over time.
• Lead a modified game of “Simon Says” calling out behaviours humans display at different ages (e.g., crawl like a baby, walk with a cane, drink from a baby bottle, rock a newborn baby).
• Provide a large collection of images of people at various ages. Ask students to sequence the images from youngest to oldest.

Connection

Teachers may

• Invite people of different ages to visit the class (e.g., mother with a new born, adolescent, elderly person) to describe how they are changing as they age.
• Read aloud *Gifts* from the science library and ask students to view the illustrations and note how the granddaughter changes over time.
• Read aloud *How Kids Grow*. Using a T-chart, ask students to record the age of each child from the text in the left hand column and one or more things they have learned to do in the right hand column.
• Divide students into small groups and assign each group one animal other than humans. Ask students to research to find out how long their animal looks after its young and what it does. Once completed, students can share what they learned and compare to similar information for humans.

Students may

• Investigate how foot length, hand width, or arm length changes over time by measuring representative students from different grades. Graph the collected data on a concrete-object graph.
• Create a print or digital display representing people at different stages of development (i.e., newborn, infant, toddler, child, adolescent, adult, elderly). Annotate the display, indicating physical and behavioural changes observed at each stage.

Consolidation

Students may

• Conduct open inquiry investigations related to physical changes as humans grow and develop. Students should plan and carry out simple investigations to find answers to their chosen question.

Resources and Notes

Authorized

*Let’s Do Science* (TR)

• *Animal Growth and Changes* - pp. 49-59
• Science Card 10
• Teachers Website - IWB Activity 7
• Read aloud - *Our Love Grows*

Supplementary

Science Library

• *Animal Babies*
• *Gifts*
• *How Kids Grow*

What Is the Inquiry Process? (poster)

Suggested


• Aging (video and mobile device applications)

Other curriculum resources

• *Literacy Place for the Early Years Grade 2* (ELA 2)
  - *Whales (Guided Reading)*
• *Look At How I’ve Grown* poster (Social Studies 2)

Children’s Literature

• *Angelina’s Baby Sister*, by K. Holabird
• *Love you Forever*, by R. Munsch
Why Are Food Choices Important?

Outcomes

Students will be expected to

48.0 examine the implications of food choices and eating habits on human growth and development [GCO 1/3]

Focus for Learning

Students should learn how their food choices and eating habits (e.g., portion size, food preparation method, meal frequency and timing) may affect their growth and development.

Treatment of this outcome should:

• introduce students to the different kinds of nutrients the human body needs, in varying amounts, to do its work (i.e., carbohydrates, protein, fat, water, vitamins, minerals);

• relate types of nutrients to their role in growth and development (e.g., protein supplies energy and builds and repairs muscles, bones and organs);

• promote the importance of breast feeding during growth and development during early childhood (i.e., breast milk provides all the nutrients and water babies need, protects them from illnesses, and improves brain development); and

• promote the Canada Food Guide as a tool to ensure that people, of varying ages, get the right amount of each type of nutrient, by eating the recommended number of daily servings of vegetables and fruit, grain products, milk and alternatives, meat and alternatives, and oils and fats.

Cross curricular connections can be made to numerous Health 2 outcomes (e.g., demonstrating awareness of various foods within food groups, knowing the health benefits of drinking water to satisfy thirst, understanding that healthy eating promotes healthy teeth and gums). Teachers may choose to address this outcome in conjunction with Health outcomes.

Sample Performance Indicator

Listen to the reading of Good Enough to Eat: A Kid’s Guide to Food and Nutrition. After the reading of specific spreads, answer the following questions:

• Spread 6 - How might getting most of their carbohydrates from sweet, and very sweet foods affect someone’s energy levels?

• Spread 7 - How might a lack of protein in their diet affect someone’s growth and development?

• Spread 8 - How might a high fat diet affect someone?

• Spreads 11-12 - How might a lack of vitamins and minerals affect someone’s growth and development? What is the best way for children to get all the vitamins and minerals they need?
### Why Are Food Choices Important?

#### Sample Teaching and Assessment Strategies

<table>
<thead>
<tr>
<th>Activation</th>
<th>Resources and Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers may</td>
<td><strong>Authorized</strong></td>
</tr>
<tr>
<td>• Introduce an artifact box filled with a variety of foods that support good health, and some which do not. Include foods from different food groups. Ask students if the food is healthy or unhealthy.</td>
<td><em>Let's Do Science (TR)</em></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Connection</th>
<th><strong>Supplementary</strong></th>
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<tbody>
<tr>
<td>Teachers may</td>
<td><em>Science Library</em></td>
</tr>
<tr>
<td>• Read aloud <em>Good Enough to Eat: A Kid's Guide to Food and Nutrition</em>, from the science library, pausing frequently to discuss concepts presented in the text. Through discussion, examine - what food allows students to do (Spread 3 [S3]); - the importance of choosing nutrient rich foods (S4); - the difference in energy from starchy, sweet, and very sweet foods (S6); - the role of proteins to body growth and repair (S7); - the implication of eating too many fatty foods (S8); - the need to drink water (S9); and - the roles of vitamins and minerals (S10 and 11).</td>
<td><em>Good Enough to Eat: A Kid’s Guide to Food and Nutrition</em></td>
</tr>
<tr>
<td>• Facilitate, if possible, a field trip to a local grocery store to observe a wide variety of foods from each food group in the supermarket to learn about the different foods and food groups.</td>
<td><strong>Suggested</strong></td>
</tr>
<tr>
<td>• Invite a dietitian to present to the class on the importance of healthy eating or planning/making a healthy school lunch.</td>
<td><em>Resource Links: <a href="http://www.k12pl.nl.ca/curr/k-6/sci/science-2/resource-links.html">www.k12pl.nl.ca/curr/k-6/sci/science-2/resource-links.html</a></em></td>
</tr>
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<table>
<thead>
<tr>
<th>Students may</th>
<th><strong>Other curriculum resources</strong></th>
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<tbody>
<tr>
<td>• Brainstorm different foods that cause allergies and determine the type of nutrients they contain. Suggest alternative food containing the same nutrients that could be eaten to replace the allergy causing food.</td>
<td><em>Healthy Foods for You (Health 2)</em></td>
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<tr>
<th>Consolidation</th>
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<tbody>
<tr>
<td>Students may</td>
<td><strong>Authorized</strong></td>
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<tr>
<td>• Apply what is learned to plan a healthy lunch. Provide a rationale for each food choice, indicating its role in growth and development.</td>
<td><em>Let’s Do Science (TR)</em></td>
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</tbody>
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*| | **Supplementary** |
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<tbody>
<tr>
<td><strong>Science Library</strong></td>
<td><em>Good Enough to Eat: A Kid’s Guide to Food and Nutrition</em></td>
</tr>
<tr>
<td><strong>Suggested</strong></td>
<td><em>Resource Links: <a href="http://www.k12pl.nl.ca/curr/k-6/sci/science-2/resource-links.html">www.k12pl.nl.ca/curr/k-6/sci/science-2/resource-links.html</a></em></td>
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### What Choices Can We Make to Stay Healthy?

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Focus for Learning</th>
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<tbody>
<tr>
<td>Students will be expected to 49.0 examine the implications of actions and decisions that support a healthy lifestyle [GCO 1/3]</td>
<td>Students should examine how actions and decisions may affect their personal health and describe ways they can incorporate healthy lifestyle choices into their daily routine.</td>
</tr>
<tr>
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<td>Actions and decisions that support a healthy lifestyle include</td>
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<tr>
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<td>• eating healthy foods,</td>
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<td>• drinking water,</td>
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<td>• practising good hygiene,</td>
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<td>• getting proper rest and sleep,</td>
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<td>• being physically active,</td>
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<td>• keeping ourselves safe, and</td>
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<td>• maintaining a healthy environment.</td>
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<td></td>
<td>Cross curricular connections can be made to Health 2 outcomes related to examining personal practices that contribute to a healthy body. Teachers may choose to address this outcome in conjunction with Health outcomes.</td>
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<tr>
<td></td>
<td>When discussing personal food choices, eating habitats, and healthful actions and decisions, students should be sensitive to individual and cultural differences and respond respectfully.</td>
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<tr>
<td>31.0 respond to the ideas and actions of others and acknowledge their ideas and contributions [GCO 2]</td>
<td>Sample Performance Indicator</td>
</tr>
<tr>
<td></td>
<td>Read the poem Doing the Right Thing, found on page 23 of Taking Care of Ourselves, and identify all the “right things” that support a healthy lifestyle.</td>
</tr>
</tbody>
</table>
What Choices Can We Make to Stay Healthy?

Sample Teaching and Assessment Strategies

Activation

Teachers may
• Sprinkle glitter on their hands and shake hands with several students. Encourage students to shake hands with each other and interact with items at the curiosity table. After five minutes, bring the students together at the curiosity table and discuss how easily the glitter spread. Inform students that the glitter could represent how germs are transferred from person to person. Students could extend the activity to investigate the best way to remove “glitter germs” from their hands. Students could compare rubbing their hands together, wiping them with a paper towel, rinsing them under water, and washing them with soap and water.

Connection

Teachers may
• Organize a number of physical activities into the daily routine to illustrate how easy it is to support a healthy lifestyle (e.g., take a quick walk during a think-pair-share activity).
• Set up a concrete object graph to track class activity levels. List physical activities on the y-axis (e.g., swimming, playing outside, bike riding). Each morning ask students to place a single sticky note beside the activities they participated in the previous day.

Students may
• Brainstorm actions and decisions that they could take to support a healthier lifestyle and discuss ways they might incorporate their changes into their day.
• Discuss in small groups what is meant by the phrase “practising good hygiene”.
• Describe good teeth brushing techniques.

Consolidation

Students may
• Pretend they are a coach and create a week long rest and exercise plan for an athlete their age.
• Complete the BLM My Favourite Way to Move, describing their favourite exercise and explaining why it is a part of a healthy lifestyle.

Resources and Notes

Authorized

Let’s Do Science (TR)
• Animal Growth and Changes
  - pp. 68-74
• Science Card 12
• Teachers Website
  - BLM - My Favourite Way to Move

Supplementary

Science Library
• Good Enough to Eat: A Kid’s Guide to Food and Nutrition

What Is the Inquiry Process? (poster)

Suggested

• Explorations and Investigations
• Food Guides (websites)

Other curriculum resources
• Selected Big Books, Readers, and Children’s Literature Pack titles (Health 2)
  - Get Up and Go!
  - Keeping Clean and Fit
  - Safety and You
  - Taking Care of Ourselves
  - Your Body