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Science 1

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# Science 1

Curriculum Guide 2019

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### **Outcomes and Indicators**

Citizenship (CZ) Communication (COM) Creativity and Innovation (CI) Critical Thinking (CT) Personal Career Development (PCD)Technological Fluency (TF)

### Learners will analyse daily and seasonal change in the environment.

Indicators:

- Investigate the effect of weather on the environment and on living things (CZ, COM, CT, TF)
- Investigate the effect of seasons on the environment and on living things (CZ, COM, CT, TF)
- Compare weather observed in seasons (COM, CT, TF)
- Investigate weather and seasonal preparedness (CZ, COM, CT, PCD, TF)
- Investigate the interconnectiveness of living things and seasonal cycles (CZ, COM, CT)

#### Learners will analyse interconnectiveness of living things and the environment.

Indicators:

- Investigate the needs of living things (CZ, COM, PCD, CT)
- Classify living things (COM, CI, CT, TF)
- Investigate living things within the environment, inclusive of a Mi'kmaw perspective (CZ, COM, CT, PCD)
- Investigate personal actions that can contribute to a healthy environment (CZ, COM, CT, PCD, TF)

#### Learners will construct a device in response to a problem.

Indicators:

- Investigate materials and their properties (COM, CT, TF)
- Investigate change in properties of materials (COM, CT, TF)
- Evaluate materials used in device construction (CZ, COM, CI, CT, PCD, TF)
- Investigate how recycled materials can be used differently in the construction of devices (CZ, COM, CI, CT, PCD, TF)

# Learners will analyse daily and seasonal change in the environment.

### Background

A close observation of the environment allows learners to become aware of changes; changes in physical factors, such as temperature, wind, or light, and changes in plants and animals. Learners will discover that changes often occur in cycles, including the relatively short cycle of day and night and the longer cycle of the seasons. Recognizing these patterns prepares learners to make predictions about how animals and plants adapt for seasonal change. This unit allows for data collection over time, preferably over the whole school year, as learners collect and record weather and seasonal observations

#### Indicators

- Investigate the effect of weather on the environment and on living things (CZ, COM, CT, TF)
- Investigate the effect of seasons on the environment and on living things (CZ, COM, CT, TF)
- Compare weather observed in seasons (COM, CT, TF)
- Investigate weather and seasonal preparedness (CZ, COM, CT, PCD, TF)
- Investigate the interconnectiveness of living things and seasonal cycles (CZ, COM, CT)

### Concepts (and Guiding Questions)

Effect of weather on living things

- How does weather affect living things?
- How do plants change when it is sunny?
- How does animal behaviour change in different weather?
- How do temperature and sunlight change throughout the day?

Effect of seasons on the environment and living things

- How do animals and plants change their behaviours or appearance for different seasons?
- How do the activities I do change with the seasons?

#### Weather observed in seasons

- How do temperature and sunlight change with the seasons?
- How can I predict when it will be warm? When it will rain a lot?

#### Weather and seasonal preparedness

- How can I prepare to stay safe in various seasons?
- How can I predict what weather protection I need each day?

#### Interconnectiveness of living things and seasonal cycles

- How do living things show interconnectiveness?
- How do seasonal cycles affect living things?

#### Skills

Analyse

• Gather and select information. Reflect on the information. Communicate findings.

#### Investigate

- Ask a question; locate 4-5 obvious details to support an answer; communicate findings.
- Compare
- Make observations; begin to identify similarities and differences beyond the obvious; reflect on the findings.

#### Elaborations—Strategies for Learning and Teaching

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

Students and teachers can discuss how they are going to describe the changes that occur on a daily and seasonal basis. Discussion should focus on the types of language, drawings, and non-standard measurements that can be used to describe temperature (hot, warm, cold), light (light or dark, cloudy or sunny), position of the sun (drawing a picture of what they see when they look out the window and then drawing the sun at various times of the day), and types of precipitation (rain, fog, snow, sleet; perhaps using a bucket to measure the amount of rain or snow). This will prepare them for observing and recording environmental changes that occur in daily and seasonal cycles.

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

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

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

Students can also note the position of the sun in the sky at different times of the day.

Where does the sun rise? Where does it set? Students can note these daily changes and do activities to see how their shadows change over the course of a day. To highlight daily changes in shadows, students could trace the shadow of a short straw that has been erected on a piece of paper by a window. The students could come back at another time of the day and trace the shadow again. Teachers may wish to encourage students to notice the differences in the position of the sun as it sets over the course of the school year. To highlight seasonal changes in the position of the sun and the resulting shadows (if

desired), students could repeat the straw activity using a different piece of paper for each month and comparing the shadow lengths. The focus in these activities is on observing the position of the sun and the length of the shadows at various times, but not on explaining why this happens. When students investigate space in grade 6, they will explore the rotation of the Earth around the sun and propose explanations for shadow lengths.

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

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

#### Daily changes

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

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

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

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

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

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

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

Teachers might prompt the discussion by asking questions such as, Are there things you do everyday? What are things plants might do every day? What about dogs or cats?

#### Seasonal changes

As the school year progresses from late summer to fall, winter, and then spring, the various seasons can be highlighted throughout the classroom with pictures, displays, and outdoor walks. Students could identify questions about how living things cope with seasonal changes in temperature and the amount of light that happens in a season. The characteristics, behaviours, and locations of living things could be described by answering questions about them.

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

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

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

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

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

Students could group pictures to depict the season they represent. Students should do various graphs and use the sorting rings to classify objects.

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

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

### Tasks for Instruction and/or Assessment

- What would you wear for this weather?
- Make a poster showing the kind of clothing worn in July and in December.
- Draw the position of the sun relative to a landmark such as a tree or mountain at various times during the day (morning, noon, and afternoon). (Repeat this activity for a week so that children will notice a movement pattern of the sun.)
- With a partner and a piece of chalk, trace your feet on the pavement outside your school on a sunny day. Standing straight and still, ask your partner to mark on the pavement the end of your shadow. Repeat this at various times during the day, making sure to stand the same way each time. Answer the questions:
  - Is your shadow pointing the same way all day?
  - What happens to the length of your shadow during the day?
- Reflect: What happens to the sun as I go through my day? Where is it when I get on the bus? have my lunch? go to bed?
- What would the weather be like during the winter break? What might the weather be like at Halloween?
- When, during the day, is it usually warmer? When night comes, does it usually get warmer or colder?
- Cut out pictures of various types of clothes from advertising flyers. Sort and group the clothing
  according to seasonal use and different weather conditions. Create a poster from print resources to
  show the groupings.
- What kind of things do you do at the same time each day or night (e.g., going to bed at night and getting up in the morning, eating breakfast)?
- Do animals or plants do the same things at about the same time each day? Are there any plants or animals we could investigate to see if they have a daily routine too? What could we watch for?
- Do birds sing when it is dark? Are there any animals that sleep during the day and are awake at night? What happens to flowers in the dark? What happens to flowers when the sun shines? (This should lead students to see that the time of day and sun affect the activity of plants and animals.)
- Select a tree in your community or at home. Observe it throughout the year, and draw the changes in the table or on a poster. Photographs may be used to show changes.
- Prompt: What happens in the fall? Do all trees lose their leaves? What do bears do to prepare for winter? What do rabbits do? What do geese do? What do people do? Have you noticed any changes in your pet? (This should lead to an understanding that animals will hibernate, migrate, or change their coats; some trees lose leaves.)
- How does the way we dress depend on the weather?
- Predict the season:
  - leaves fall off the tree
    - bears hibernate
    - squirrels start to hide their nuts and acorns
  - buds form on trees
- Create posters to show behaviours or changes in living things in summer and winter (fish, bears, birds, trees, humans, etc.).
- Collect a variety of seasonal pictures and group them by the season they represent.
- Draw pictures to show what you do each season.

### <u>Learners will analyse interconnectiveness of living things and the</u> <u>environment</u>

### Background

A study of living things provides an opportunity for learners to discover many different forms of life. Learners will investigate similarities and differences to develop an understanding of the general characteristics of living things. Learners will discover that all living things have needs; some of these needs are similar and some are unique. Learners should have opportunities to make first-hand observations of plants and animals. These observations will lead to grouping organisms based on similar characteristics, the beginnings of classification. Through investigations, learners will gain an awareness of the dynamic nature of life and the idea that all living things are interconnected. Learners will also explore the idea of stewardship of the earth and gain an appreciation of our shared responsibility for protecting living things and the environment.

### Indicators

- Investigate the needs of living things (CZ, COM, PCD, CT)
- Classify living things (COM, CI, CT, TF)
- Investigate living things within the environment, inclusive of a Mi'kmaw perspective (CZ, COM, CT, PCD)
- Investigate personal actions that can contribute to a healthy environment (CZ, COM, CT, PCD, TF)

### Concepts (and Guiding Questions)

**Requirements for life** 

- How does my favourite animal or plant get nourishment?
- How are plants and animals affected when they don't get the nourishment they need?

#### Classification of living things

- How are living things similar? How are they different?
- How can living things be classified?

Interconnectiveness of living things of the environment

- How does the environment help my favourite plant or animal survive?
- How do animals and plants interact?
- How do animals and plants interact with their environment?

Personal actions that can contribute to a healthy environment

- How can my actions hurt the environment?
- How can I keep the environment healthy?

#### Skills

#### Analyse

Gather and select information. Reflect on the information. Communicate findings.

#### Investigate

Ask a question; locate 4-5 obvious details to support an answer; communicate findings.

#### Classify

Identify attributes and select criteria for groupings; sort based on selected criteria and reflect on the grouping(s); incorporate a new item in a group, offer a reason for the choice.

#### Elaborations—Strategies for Learning and Teaching

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

Terms such as legs, wings, ears, roots, and stems could be used to describe living things. A bird feeder set up at home or at school could attract various types of birds for students to observe and note their characteristics. Students could collect insects in clear, plastic bottles with holes in the lids and observe them, taking note of things such as the number of wings, legs, and antennae, and then return the insects after observation. These experiences can be extended with visits to farms, aquariums, a zoo or zoos, nature parks, or any other setting with live animals and plants. This will encourage students to show interest and curiosity about living things within their immediate environment.

Other extensions could include the use of print resources, videos, and software.

In the classroom, teachers model recording strategies as they use tallies to create concrete graphs, picture graphs, and pictographs. For example, students could use pictures of chickens, pigs, and cows to make a picture graph of the number of animals at a farm they visited. They could use non-standard units of measuring, such as "longer stem" or "shorter ears." They could make a concrete graph using themselves to illustrate the number of students in the class with certain eye colours. This could be done with one half of the class at a time so that the other half can see the graph.

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

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

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

Classroom discussion will generate questions such as, Which of these things is alive? and What does it need to live? These questions can provide a focus for this part of the unit. Living things grow and change, require air, food and water. Some questions that might be posed are, How do they eat? How often should I water this plant? or How much water do I use? Students could discuss how they care for a pet and/or plants. Students could observe and care for their classroom and/or visiting animals or plants, as well as focus on a wide range of animals using a variety of resources (film, software, print), to learn how animals meet their needs. Students could explore ways in which different animals adapt to changes in temperature (hibernation, migration) and the ways in which the various animals move (flying, swimming, running) that help them live in their environments. Similarities and differences in the ways in which different animals get their food and protect themselves from danger can be explored. Students can also grow simple plants from seeds, take care of the plants as they grow, and see what their needs are.

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

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

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

When exploring interconnectiveness, students should start to explore how important it is to take care of plant and animal habitats. Teachers can incorporate their class or school's environmental projects or initiatives into this unit.

#### Tasks for Instruction and/or Assessment

- Have students collect pictures of plants or animals highlighting specific characteristics and display them in a collage format.
- Group pictures of animals according to their characteristic.
- Sort plants into groups. Describe the characteristics that you used to group them to your classmates.
- Tell us about your favourite animal or plant.
  - What type of animal/plant did you choose?
  - Where does your animal/plant live?
  - Where does your animal/plant get nourishment?
  - How does your animal/plant breathe?
- Note the types of questions that students ask about living things.
- Look at pictures of different animals and describe how they move.
- Plant a seed (e.g., bean) and use your knowledge of needs of living things to care for it.
- Take a walk around your school yard, looking for signs of pollution. Draw pictures of what you saw.
- What kind of things would you do to take care of a plant? What would you do differently if you had to take care of a horse?
- In what different ways do animals move to get food or escape from other animals?
- How would a bird move from one tree to another?
- How would a baby girl or boy get to its toy?
- How could you find additional information about plants/or animals?

### Learners will construct a device in response to a problem

### Background

An investigation of materials and their properties will prepare learners to select appropriate materials for constructing a device to solve a problem. Examples of problems or tasks learners may solve include: design and create a device that can make a variety of sounds; design and create a container that can hold sand; design and create a container that can hold the most marbles; or design a house for the three little pigs. An investigation of how the properties of materials can change will allow learners to explore how objects can be made from recycled or reused materials. Learners will employ problem solving skills as they construct their devices.

#### Indicators

- Investigate materials and their properties (COM, CT, TF)
- Investigate change in properties of materials (COM, CT, TF)
- Evaluate materials used in device construction (CZ, COM, CI, CT, PCD, TF)
- Investigate how recycled materials can be used differently in the construction of devices (CZ, COM, CI, CT, PCD, TF)

### Concepts (and Guiding Questions)

Properties of materials for device construction

- How are the objects I use everyday made?
- How can I test the properties of various materials?
- How can I determine which materials are best suited for various purposes?
- How do the materials I choose for device construction relate to the intended purpose of my device?
- How can I determine which materials I will use to construct my device?

#### Properties of materials can change

- How can I change the properties of various materials?
- How can I restore the original properties? Why or why not?
- How does water change the properties of materials?

#### Materials can be recycled for different purposes

- How can I build something new from something older?
- How will I join various materials together?

#### Skills

#### Construct

• Respond to a given purpose; brainstorm ideas; identify a plan; build a model; test and revise, modify as necessary; reflect on the results

Investigate

• Ask a question; locate 4-5 obvious details to support an answer; communicate findings.

#### Evaluate

• Review steps and results from an investigation or problem solving; Reflect on and communicate solutions or findings.

#### Elaborations-Strategies for Learning and Teaching

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

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

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

When students have identified that various materials have certain properties, they should then be prepared to use these properties to select appropriate materials for the objects that they will construct.

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

The focus should be on taking an object and seeing that it is made up of parts. Each of these parts is made with different materials. Students can observe with all of their senses and name the various parts of familiar objects (e.g., the legs of a chair, windows in a house, the eraser on a pencil). As they are describing the objects, they can use a variety of senses. Students could collect and display a variety of similar objects that are made of different materials: writing instruments, books/magazines, shoes, leaves, containers.

Introduce students to the concept of a concrete object graph by putting, for example, pencils made of wood in one line, mechanical pencils in another line. Students can count the number of objects made from the same material, for example, the number of wooden pencils and the number of coloured pencils. Alternatively, they can organize pictures of different kinds of pencils in a pictograph.

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

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

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

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

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

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

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

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

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

#### Tasks for Instruction and/or Assessment

- Observe students as they explore materials.
- Observe as students share information with his/her classmates.
- Prompt students to make suggestions as to how to improve a test or procedure.
- Sort materials from the strongest to the weakest. Which of the materials here do you think is the strongest? Have students make a prediction. (Provide students with a variety of materials, such as paper, cardboard, paper towel.)
- Balance each piece of material over the ends of two paper cups, placed about 4 cm apart. Add pennies or washers, one at a time, until the material breaks or caves in.
- In a concrete-object chart, lay the pennies or washers that it took to break or bend each material.
- How are these things alike? How are they different?
- Provide students with a variety of materials, including materials for joining and cutting, such as glue, twist ties, marshmallows.
- Which materials seem to join the best? Which hold really well?
- Use a variety of materials to construct a structure. Students will discuss the appropriateness and performance of the selected materials.
- Using a variety of materials, design a tower that is strong enough to balance a book on.

- In this unit, I built a ... I learned all about ... I liked building the ... because ... (Students may draw pictures, and choose words from a list.)
- Tell me some of the problems that you had while you were constructing your ... How did you solve them?
- Create a poster that shows pictures or drawings of things that can be recycled and things that can be reused.

### Appendix A

# Experiences for Earth and Space Science—Daily and Seasonal Changes

### Activity 1: What Season Is It?

Assessment	Observe student participation in this activity. Assess the results of the student activity sheet. Students are able to describe the various seasons. Students are able to build a sight vocabulary for each season.
Question	Are students able to describe the differences between each season? Are they able to develop and use a sight vocabulary as it relates to each season?
Materials	Posters/cards showing the seasons
Procedure	<ul> <li>Take the students outdoors and discuss the weather with them. Have them describe the environment around them. Discuss with children the types of weather and temperature, that might take place during the various seasons. Develop a list of sight words for each season. Have the words listed under the season. Questions to discuss with children could include the following (have them explain their answers):</li> <li>What do you like about summer, winter, spring, fall?</li> <li>What things do you not like?</li> <li>Is it important to have different seasons?</li> <li>Have the students complete the activity sheet provided. The sheets for various seasons could be completed as each season arrives. The sheets could be kept in the students'</li> </ul>

science journals.

**Teacher Note**: This activity may be done at one time or spread out during the year, with each season being discussed at the time it arrives.

### Activity 2: My Shadow

Observe student participation in this activity. Assessment Students are able to describe changes they observed in their shadows. Were students able to see a change in the position of their shadows? Question Sidewalk chalk Materials Procedure Ask students what they know about shadows. Take them outside on a sunny day and have them look for shadows. See if they notice their own shadow. Have students start tracing their shadow in the morning. Divide students into groups of two. Explain to them that they are going outside to trace their shadows. Explain that they need to mark where they are standing before they trace the shadow. Make sure they put their names on the shadows. Take the students out a few hours later and have them stand where they were in the morning and have them trace their shadows again. Have the students measure their shadows after they have been traced, using nonstandard units. Discuss with the students any changes they noticed. Ask students, "What happened to the position of your shadow? Was your shadow longer/shorter? What did you notice about the position of the sun?" Take the students out again and have them trace their shadows on large paper. Have them create designs on the tracings using various media.

# Activity 3: Geometric Shadows

Assessment	Observe student participation in this activity. Students are able to distinguish geometric shapes by their shadows. Students are able to observe and record their observations.
Question	Are students willing to participate in discussions? How were students able to distinguish their geometric solids by observing their shadows?
Materials	Paper Pencils Geometric solids
Procedure	This lesson would be a follow-up to the lesson on "My Shadow." Discuss with students what they have learned about shadows. Have them predict what shadows of geometric solids would look like. Have students recognize and describe 3-D shapes. Have students take a variety of geometric solids outdoors to observe and trace their shadows. Use large paper for them to trace the shadows. Ask them to discuss what they observed about the shadows compared to the actual geometric solids. Have the students compare the geometric solids to the tracings of their shadows. Are they the same? What, if any, are the differences? Have them colour in their shadows and name the 2-D shapes. Have them recognize 2-D and 3-D shapes in the environment.

# Activity 4: The Warmth of the Sun

Assessment	Students are able to observe through touch what effect the sun has on changing the temperature of water.
Question	What happened to the water? How did the temperature change?
Materials	Clear plastic cups Water
Procedure	Discuss with children what they think happens to water after it has rained. What do they think the sun does to the water? Give students two plastic glasses per group and have them fill them half full with water. Have them put one glass in the sunlight and the other glass in the shade (by a window and in a dark area in the classroom). After a while, have them check them to see which one is cooler. Discuss with students what differences (if any) that they noticed. Ask them what they think happened.

# Activity 5: Snow

Assessment	Students will be able to predict what will happen to snow when it is put in a warm room/place. Students will be able to see the difference in the amount of snow a container holds before and after it has melted. Using non-standard units, students will be able to record their observations.
Question	What did the students observe about the snow as it was placed in a warm area? What was the difference in the amount of snow before it melted compared to after it melted? Was there a difference in their masses? How were they able to tell?
Materials	Containers to hold snow Snow Warm area Balances
Procedure	Discuss with students where snow comes from and what type of temperature needs to be outside before it snows. Have students predict what will happen to the snow when they bring it in from outdoors. Have students decide if they are going to pack the snow in the container or just put it in loosely. Have them predict how long it will take before anything happens. Have students go outside to collect their snow. Have them bring it inside. Time how long it takes for the snow to melt. Ask students to discuss what they are observing. Have students compare how heavy the snow was before and after it melted. Have the students fill in the chart and describe what they observed. Discuss with students what happened. Would it be better to have snow or rain to help farmers' fields and wells have enough water? Read the book <i>Frosty the Snowman</i> .

# Activity 6: White Snow or Not?

Assessment	Students are able to follow simple directions to carry out an experiment. Students are able to observe what snow is made up of and why they shouldn't eat it.
Question	What did the snow look like before it melted? What did students notice in/on the filter paper or in the water?
Materials	Clear cups/containers Freshly fallen snow Optional: filter paper/coffee filters and funnels
Procedure	<ul> <li>Review with students where snow comes from and what happens to it when it is heated/warmed. Have them describe the colour of freshly fallen snow.</li> <li>Have students collect freshly fallen snow in their clear containers. Have them draw and describe it. Have students observe the water that snow turned into and draw and describe what they saw.</li> <li><b>Option</b>: filter paper could be used to better observe the particles in the snow. Discuss with students what they observed. Ask questions such as</li> <li>How do the particles get in the snow?</li> <li>Where do they come from?</li> <li>Should we eat snow?</li> <li>Explain the reasoning behind their responses. Discuss what that says about our environment. Would they have the same results if they tried this activity in the country</li> </ul>

away from cars, factories?

# Activity 7: My Tree or Bush

Assessment	Students are able to predict the changes in their tree/bush over the four seasons. Students record their observations of the changes in their tree/bush over the four seasons.
Question	What did the students notice about their bush? What changes did they observe as the seasons changed?
Materials	Trees or bushes Chart or method for recording
Procedure	Discuss with students changes they have noticed in trees and bushes during the various seasons. Take the students outside and have them choose a tree or bush they want to observe over the year. Discuss with them that they are going to first predict what will happen to their tree/ bush during the seasons and record their predictions. Discuss with students how they came up with their predictions. Discuss with students that they are going to keep an actual record of their tree or bush during the seasons. A discussion question might be, "What might happen to the same bush or tree in Florida? the Yukon?" This could lend to setting up pen pals on the Internet with a class in another area of the country or world.

# Activity 8: Dress for the Season

Assessment	Students will be able to demonstrate, through drawings or dress, proper clothing and safety measures needed for each season.
Question	What types of clothing do we need to wear to be "safe" in various seasons?
Materials	Paper Crayons Clothing and protective items (e.g., sunglasses, sunscreen, boots)
Procedure	<ul> <li>Have students bring in clothes to depict various seasons. They might do skits to act out the season and safety procedures needed for each season (summer—sun screen, swimming safety). Students may also wish to illustrate dress and safety for various seasons. The following questions could help to lead discussions:</li> <li>What causes us to need different clothing for each season?</li> <li>What safety procedures might we need to follow in the various seasons?</li> <li>Are there some that are the same for all seasons? If so, which ones?</li> <li>This activity could be used to talk about some animals and the changes in their fur during the various seasons.</li> </ul>

### Appendix B

Experiences for Life Science—Needs and Characteristics of Living Things

### Activity 9: The Bird Feeder

Students are able to follow simple directions to build a bird feeder. Assessment Students are able to distinguish various parts of a bird after observing them. Students are able to describe differences between a bird and a human. Question What type of food should be put in the bird feeder? What are some of the main characteristics of birds that make them unique? How are birds different from humans in their appearance? 250-mL milk cartons Materials Scissors Twine Bird food Hole punch Procedure The first part of this activity is for students to make a simple bird feeder that they can hang outside in the school yard. Have students cut an opening in the side of a milk carton. Have them use a hole punch to make an opening at the top of the milk carton to tie the twine to. Have the students take their bird feeders outside and with the help of an adult hang them from a branch on a tree. Have them put bird seed in them. Teacher Note: For environmental reasons the bird feeders should be taken down and recycled after they have been used. The second part of this activity is for students to observe their bird feeders and the birds that come to feed from them. Characteristics of the birds should be noted. Students should be given the opportunity to record their observations in their science journals both in written and diagram form. Prior to their recording, brainstorm with the class their knowledge of characteristics of birds. Develop a vocabulary list and have it posted in the classroom. Have students discuss the characteristics of humans. Have them compare the similarities and differences between birds and humans. This activity can be used with plants and fish as well as other animals. The important point to note is that, where possible, students should be able to observe live plants, animals, etc. Allergies and safety must be taken into consideration when doing this activity. As a follow-up, students could write about what it would be like to be a bird.

# Activity 10: Hungry Plants

Assessment	Observe students making observations; note the vocabulary they use. Record observations.
Question	What happens after a few days? What happens after a few weeks? How do you think the two plants are different? Tell me your reasons. Do you think plants need minerals (food) to grow? Tell me your reasons. What are the names of the various parts of the radish?
Materials	Radish seeds Sand Containers Minerals (plant food) Water
Procedure	Grow two radish plants in different containers of clean sand. Make a solution of water and minerals (plant food) according to the directions on the package. Give one plant water with minerals and one plant with just water. Have students observe the growth of the plants. Have them measure the growth over a period of time and keep a record of the growth. Give students the opportunity discuss the various parts of the plant.

# Activity 11: Topsy Turvy

Assessment	Make drawings at different stages of discovery. Name and/or label parts of the plants. Communicate what they learned about plant growth.
Question	Are you able to grow a plant upside down? How do you know? What happened to the plant when it was turned upside down? How many days did it take for the radish to sprout? Would seeds sprout if put on paper towel? In which direction are the roots and leaves growing? What does a seed need to sprout?
Materials	Blotter paper (paper towel) Pencils (or strips of wood) A glass bottle Tape Radish seeds Water
Procedure	Roll blotter paper (paper towel) around the inside of a glass bottle. Fasten with tape. Place seeds between the glass and the paper near the top. Keep the water level in the glass just below radish seeds for a few days. After a few days the seeds will sprout. Where do the roots grow? Where do the stem and leaves grow? As soon as the leaves of one radish plant get above the top of the glass pour out the water, turn the glass upside down and place the rim on the pencils or strips of wood. Keep the blotter moist by adding water several times a day.

# Activity 12: Sorting Rule

Assessment	Students are able to sort animals and plants and describe the sorting rule they used.
Question	What sorting rule did you use? How are the animals/plants in the various sorting groups unique to each other?
Materials	Pictures of a variety of plants and animals
Procedure	Give each group a variety of pictures with different types of plants or animals. Have them develop a sorting rule and have them sort the pictures. For example they could sort plants by ones that have flowers and ones that do not. Have the groups of children explain their sorting rules to the class. Challenge students to use the same pictures, but use a different sorting rule. This activity could also be done through a nature walk around the school area or in a local park or public gardens.

# Appendix C

# Experiences for Physical Science—Materials, Objects, and Devices

# Activity 13: Changing Materials

Assessment	Students are able to demonstrate and describe ways in which materials can be changed to alter their appearance. Students are able to demonstrate and describe ways in which materials can be altered to change their texture.
Question	How were you able to change the texture and appearance of your objects? What words did you use to describe the changes? What senses did you use to describe the changes?
Materials	Aluminum foil Crayons Pencils Water Bars of unscented soap Carrot/cheese graters Pencil sharper
Procedure	Have the students describe the texture and appearance of a flat sheet of aluminum foil. After they have described its appearance and texture have them crumble it up. Now have them describe the change in the texture and appearance. Have students describe the texture and appearance of a bar of soap. Now have the students use a grater to make the soap bar into small pieces. Have them describe the change in appearance and texture.

# Activity 14: What Am I Made From?

Assessment	Students are able to recognize that various objects are made of different materials. Students are able to use their senses to make observations about the objects they are viewing.
Question	What types of materials are the objects made of that you have observed? How have your senses helped to make your observations? What senses did you use to make your observations?
Materials	Pencils Rulers (they do not have to be made of the same material) Desks Chairs
Procedure	This lesson could be used as an introduction to the outcomes mentioned. Have students look at the objects mentioned under materials and have them discuss what they are made of, where they would be used, and what sense(s) they used to make their observations. Have students do this in groups. Have students discuss their findings as a class. It is important for students to recognize the importance of their senses in making observations. Further discussions on objects and what they are made of and how they are used should be carried out.

### Activity 15: Objects and Their Uses

Assessment	Students are able to recognize that various objects are made of different materials. Students are able to use their senses to make observations about the objects they are viewing. Students are able to identify what objects are used for.
Question	What types of materials are the objects made of that you have observed? How have your senses helped to make your observations? What senses did you use to make your observations? What uses do the objects have that you observed?
Materials	A variety of objects that students bring in Objects observed on a field trip
Procedure	<ul> <li>This activity is a continuation of Activity 14 (What Am I Made From?) In this activity students are invited to explore objects they have brought from home or from within the classroom. Students could work in groups to explore the objects brought in or students could talk about their objects in a "show and tell" format, having come prepared from home to answer the following questions:</li> <li>What types of materials are the objects made of that you have brought in?</li> <li>What uses do the objects have that you brought in?</li> <li>How have your senses helped to make your observations?</li> <li>What senses did you use to make your observations?</li> </ul>

Follow-up discussions on objects, their uses, and what they are made of should be done after the group work. Students' ideas should be shared with the whole class. Students should be given the opportunity to illustrate and record their findings in their science journals. Students could write stories about one of their objects and what it would be like to be that object.

# Activity 16: Similar Objects/Different Materials

Assessment	Students are able to recognize that various objects are made of different materials. Students are able to describe and sort objects according to their similarities and differences.
Question	What rule(s) did you use to sort your objects? How were the objects the same that you sorted together? How were the objects different that you sorted together?
Materials	A variety of objects that are similar, but made of different materials A variety of objects that are similar, but have different uses Sorting rings/attribute hoops
Procedure	This activity gives students an opportunity to sort objects in a variety of ways. It gives them an opportunity to explain their sorting rules and to problem solve. Have a variety of materials that have the same use, but are made of different materials. For example, give each group of students a variety of school supplies made of different materials; give groups of students a variety of clips (paper clips made of metal, plastic, bull dog clips, etc.); give each group of students a variety of containers made of different and like materials. Follow-up discussions on the variety of similar objects that we have that are made of different materials, but have the same use, should be carried out as a class discussion. Students should record their experiences in their science journals. This could be in written, illustrated, or in both forms.

# Activity 17: To Hold or Not to Hold

Assessment	Students are able to recognize that materials that appear to be the same may have different strengths. Students are able to describe and sort materials by their strength. Students are able to follow directions in a step-by-step process. Students are able to make predictions based on the amount of weight the towels will hold.
Question	What did you observe regarding the brand of paper towel and how much it could hold? How did your predictions match up to your actual findings? Which paper towel would you recommend using around your home?
Materials	A variety of brands of paper towels Materials to use as weights (washers, pennies, centicubes, Cube-A-Links, Unifix cubes, standard masses)
Procedure	This activity gives students the opportunity to test the strength of various brands of paper towel. Prior to the lesson, a discussion could take place around commercials for paper towels and what they claim they can do. As well, discussions could take place on what the students know about paper towels and if, indeed, they know that there are a variety of different brands. Each group of students should be given one sheet of a certain brand of paper towel. They should be instructed to hold it tightly by the ends while another student adds weights on top of it. Students should record the number of weights the towel will hold before it rips. After students have completed the activity, they should have an opportunity to discuss their results. Comparisons of results between groups should be discussed. From their explorations students could recommend which paper towel they would use. For language arts, students could be introduced to commercials and language they use to promote a product. Students could develop their own commercial.

# Activity 18: Properties of Materials

Assessment	The ability to sort materials with similar properties and/or to be able to choose an appropriate material would be evidence that students are comfortable with the concepts.
Question	What are the properties of your material?
Materials	A bag containing various construction materials such as countertop, flooring, tiles, wood, Styrofoam, Cellophane, construction paper, glass (with smooth or tapered edges), iron
Procedure	Students can examine a material and discuss words that describe it. From these, students might suggest what the properties are for their material. The properties might suggest a use(s) for the material. Additional words can be added to their senses charts.

### Activity 19: Handmade Paper

Students should be able to create paper. Assessment Can you make paper? Question Materials Frame Screen Shredded paper Shredded fibres (dried lint works well) A bucket Dry sheets of cloth Drying rack Mix the fibres and pulp into a bucket to make a slurry. Scoop the pulp and fibres onto Procedure the screen and frame. Put it on top of a sheet of dry cloth. Put another piece of cloth on top of the paper. Squeeze excess water out of the wet paper. Place the paper on the drying rack to dry.

# Activity 20: Build It!

Assessment	Students should be able to collaborate, design, and build an object that fits the criteria in the procedure.
Question	What did you build? What, if any, problems did you have building it?
Materials	A collection of recyclable materials such as milk cartons, plastic drinking bottles, wooden blocks, plastic building blocks, tape, string, toothpicks, dried peas
Procedure	<ul> <li>Bridge</li> <li>Using some of the materials on this table and your imagination, design and create a bridge for the Three Billy Goats Gruff.</li> <li>Sand container</li> <li>Using some of the materials on this table and your imagination, design and create a container to hold sand.</li> <li>House</li> <li>Using some of the materials on this table and your imagination, design and create a house for the Three Little Pigs.</li> <li>Mat</li> <li>Using some of the materials on this table and your imagination, design and create a mat to keep your feet warm.</li> <li>Marble container</li> <li>Using some of the materials on this table and your imagination, design and create a container to hold as many marbles as possible without breaking.</li> <li>Sound device</li> <li>Using some of the materials on this table and your imagination, design and create a container to hold as many marbles as possible without breaking.</li> </ul>