



Grade **3** Plant Growth and Changes

TEACHER'S GUIDE

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Plant Growth and Changes

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Let's Do Science, Newfoundland and Labrador

Grade 3 Unit 4: Plant Growth and Changes Teacher's Guide

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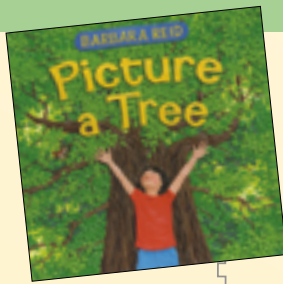
Welcome to the *Plant Growth and Changes* Unit

In this unit, students develop their understanding of the life cycles of plants through a variety of explorations and investigations. Multiple program components will engage students and support learning of the specific science concepts.

Student Magazine

The Student Magazine will support students' exploration of plant growth and changes. The bright, colourful photographs, detailed illustrations, and different text features will engage students and give them multiple opportunities to explore a variety of concepts. A digital version of the magazine is available on the Teacher's Website to be used with an Interactive Whiteboard.





Science Read Aloud

The Read Aloud text allows you to introduce and engage students with science concepts. *Picture a Tree* by Barbara Reid invites readers to use their imagination to picture a tree in different ways and to recognize the changes that take place in each season and through the life cycles of trees.



Anchor Video

The Anchor Video: *Plant Growth and Changes*, found on the Teacher's Website, introduces students to essential questions about how plants grow and change. The video gives a number of examples to activate students' thinking and to promote questions.

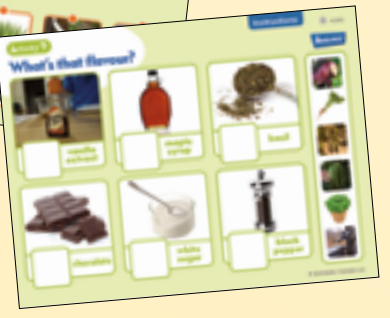
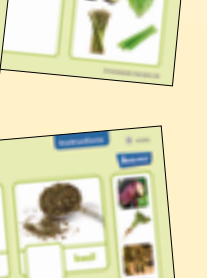
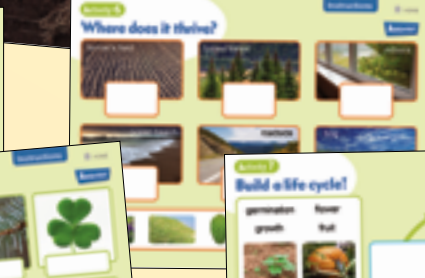
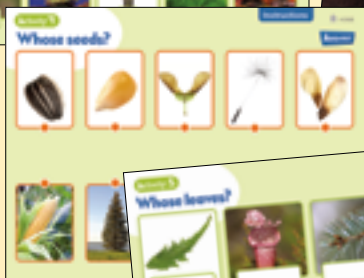
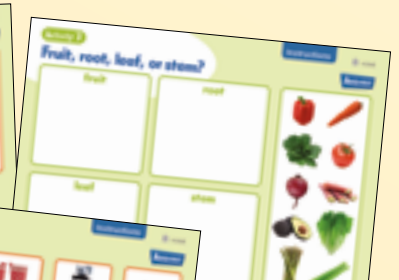
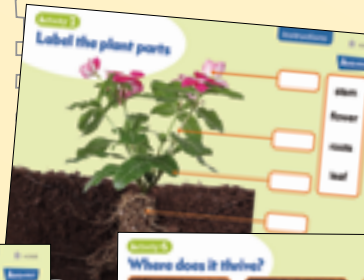
Poster

The poster *What Is the Inquiry Process?* will support students as they follow the steps for guided and open inquiries throughout the unit and learn to question, observe, and explore.



Interactive Whiteboard Activities

There are 9 interactive activities for the Interactive Whiteboard (IWB) found on the Teacher's Website. These activities provide students with a variety of hands-on learning experiences and the opportunity to apply learning in a supported environment. The IWB Activities are tied to the teaching plans to ensure that the learning is done in context.





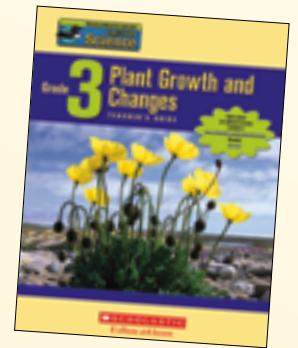
Science Library

The Science Library provides a collection of colourful and engaging non-fiction and fiction texts at a variety of reading levels. These texts support students as they explore various science concepts and skills. See the *Science Library Guide* in the Teacher's Guide Binder or online for general suggestions for using the Science Library titles along with summaries, ties to the curriculum, and suggested reading experiences (e.g., Independent Reading and Shared Reading).

Teacher's Guide

This guide provides detailed suggestions for using all of the program components including the Student Magazine, Anchor Video, reproducible Blackline Masters (BLMs), and IWB Activities with your students. Visual cues such as book covers, thumbnail images, and icons highlight the use of each component along with tools such as Science Folders and Journals, the Word Wall, and I Wonder Wall. Strategies and tools you need to assess students' learning, such as rubrics and checklists, are also included.

Embedded within the teaching plans are connections to Guided, Shared, and Read Aloud texts from *Literacy Place for the Early Years*, Grade 3 that relate to the concepts explored in *Plant Growth and Changes*.



Teacher's Website

In addition to the Student Magazine, Anchor Video, and IWB Activities mentioned above, this website provides a digital copy of the Teacher's Guide for this unit along with access to an image bank containing the variety of photographic images found in the Student Magazine and IWB Activities. These images may be used by teachers to create new IWB Activities or for students to incorporate into presentations. Find the Teacher's Website at

scholastic.ca/education/nlscience

Password: Sci1nL2



Planning Guide for *Plant Growth and Changes*

Teaching Plans	Specific Curriculum Outcomes	Components	Materials	Literacy Place Connections
What Are Plants? Students begin their plant inquiry by investigating how to identify plants.	Skills [GCO 2] • 1.0	• Student Magazine, pages 2–5 • <i>Picture a Tree?</i> (Read Aloud) • Anchor Video: <i>Plant Growth and Changes</i> • IWB Activity 1	• modelling clay • classroom plant or plants • plant-related items for Curiosity Centre • students' Science Journals • digital camera (optional)	
Plant Parts Students explore the function of plant parts and practise identifying plant parts using the appropriate terminology. Teachers model scientific terminology relating to plants.	Skills [GCO 2] • 2.0 STSE/K [GCO 1/3] • 45.0	• Student Magazine, pages 6–11 • IWB Activity 2 • BLM <i>Plant Parts at the Grocery Store</i> • IWB Activity 3 • IWB Activity 4 • IWB Activity 5	• several heads of celery • blue or red food colouring • students' Science Journals • clipboards • crayons • students' Science Folders • newsprint paper • construction paper • bristol board • craft supplies for model construction, e.g., modelling clay, pipe cleaners, tissue paper • fresh flowers	<i>Hungry Plants!</i> (Guided Reading, Level N)

Teaching Plans	Specific Curriculum Outcomes	Components	Materials	Literacy Place Connections
What Do Plants Need? Students identify and investigate life needs of plants.	Skills [GCO 2] • 10.0 • 11.0 • 16.0 • 22.0 • 30.0 • 32.0 • 47.0 STSE/K [GCO 1/3] • 46.0	• Student Magazine, pages 12–17 • <i>What Is the Inquiry Process?</i> poster • BLM <i>Plant Needs Investigation: Plan</i> • IWB Activity 6	• a variety of non-toxic, untreated seeds for display (e.g., bean, radish, pea, carrot, lettuce, popcorn, pumpkin, sunflower, peach) • students' Science Journals • digital camera (optional) • pumpkin seeds and/or purple peacock pole beans and/or seeds of other fast-growing plants • clear self-sealing baggies • paper towel • small watering cans • measuring cups • soil • water • cardboard boxes • tape • vinegar • compost • fertilizer • polystyrene cups • spoons and shovels for planting • egg cartons • seedling trays • craft supplies such as construction paper, scissors, and glue • sealed seed packets for a variety of plants • modelling clay	<i>Plantzilla</i> (Read Aloud–Synthesizing Strategy Unit)
Observing and Recording Plant Growth Students continue to investigate the factors that influence plant growth and health, and explore different ways to measure plant growth.	Skills [GCO 2] • 10.0 • 11.0 • 16.0 • 22.0 • 30.0 • 32.0 • 47.0 STSE/K [GCO 1/3] • 46.0	• Student Magazine, pages 18–19 • BLM <i>Measurement Scavenger Hunt</i>	• large graph paper • metre sticks • small metric rulers • cloth measuring tape • metal measuring tape • modelling clay • digital camera	

Continued on next page...

Planning Guide for *Plant Growth and Changes* (continued)

Teaching Plans	Specific Curriculum Outcomes	Components	Materials	Literacy Place Connections
The Life Cycle of a Flowering Plant Students draw upon their own observations of their plants as well as research and class discussion to explore the life cycle of flowering plants.	STSE/K [GCO 1/3] • 48.0	- Student Magazine, pages 20–23 - IWB Activity 7 - BLM <i>Life Cycle Wheel</i>	- flowers with large stamens and pistils (e.g., lilies, tulips, or buttercups) - glue - old socks - tweezers - white poster board - students' Science Journals - card stock or paper plates - paper fasteners - students' Science Folders	<i>Life Cycle of a Plant</i> (Guided Reading, Level L)
Why Are Plants Important? Students explore the importance of plants to the environment, the ways in which humans use plants, and how we can conserve and replenish plants.	STSE/K [GCO 1/3] • 49.0 • 50.0	- Student Magazine, pages 24–31 - IWB Activity 8 - BLM <i>Plant Scavenger Hunt</i> - BLM <i>Plant Placemat</i> - IWB Activity 9	- plant-based products for artifact box, Curiosity Centre, and plant part activity: fruit, vegetables, spices, shampoo, perfume, elastic bands, cotton and hemp fabric, wooden items, paper items - freshly cut green leaves - large clear bowl - students' Science Journals - large sheet of paper - construction paper for graph - plants for dyeing experiment (e.g., onion skins, tea, turmeric powder, avocado skins, beets, blueberries, and goldenrod) - cheesecloth - large pot - students' Science Folders - digital camera (optional)	<i>Explore! Magazine: Nature Up Close</i> ("Find the Products From Nature," pp. 4–5, Shared Reading–Nature Watch Inquiry Unit) <i>Solomon's Tree</i> (Read Aloud –Making Connections Strategy Unit)

Preparing for the Unit

1. Curiosity Centre

The Curiosity Centre gives students an opportunity to investigate science ideas and tools through active participation, free exploration, and independent play. In this hands-on centre, students can explore objects related to plants.

The Curiosity Centre could have

- fiction and non-fiction texts about plants; if possible, include books on Indigenous people's use of plants
- photographs and posters featuring interesting plants
- potted plants at various stages of their life cycle, including flowering and non-flowering plants
- seeds of various types and sizes
- soil and planting materials (e.g., cups, pots, shovels, watering cans)
- dried fruit and vegetables, herbs and spices, and other edible plants and plant parts
- everyday items made from plants (e.g., cork, cotton, henna dye, rubber, carnauba wax, sisal rope, different types of wood, different types of paper, objects or modes of items made or used by Indigenous peoples, etc.)

Check the centre frequently to ensure that it is well stocked with items. Invite students to contribute to the centre by bringing in items, texts, or images related to plant growth and changes. Remind students to tidy up the centre when they are finished.

Note: You may choose to display new items every few days or introduce items one at a time throughout the unit. Allergy concerns must be considered before adding any item to the centre. Remind students not to taste or consume any items in the Curiosity Centre.

2. Science Journals and Folders



Check that students are recording appropriately in their Science Journals, ensuring that they date each entry and record ideas using sketches with labels, lists of words, or sentences. Continue to encourage them to add new questions or ideas to their Journals as often as they like.

Remind students that they should store completed BLMs, drawings, graphs, etc. that are related to the *Plant Growth and Changes* unit in their Science Folders.

3. Word Wall



Add any relevant science terminology to the Word Wall throughout the unit. Urge students to use the terms as often as possible as they work through the unit.

4. I Wonder Wall



Build the I Wonder Wall throughout the unit by posting students' questions as they arise. Refer to the I Wonder Wall often and select questions that students may be ready to answer.

5. Reading Centre

Add texts (books, magazines, and photographs) relating to materials and structures to the Reading Centre. The titles in the Science Library will help start off a collection of books. Also, refer to the lists of non-fiction texts in the Additional Resources section of this guide (pages 69–71).



Focus: Students begin their plant inquiry by investigating how to identify plants.

Specific Curriculum Outcomes

Students will be expected to:

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

Performance Indicators

Students who achieve these outcomes will be able to:

- ask questions to help them distinguish plants from animals and objects
- list a variety of examples of local plants

NOTES:

Attitude Outcome Statements

Encourage students to:

- recognize the role and contribution of science in their understanding of the world [GCO 4]

Cross-Curricular Connections

Social Studies

Students will be expected to:

- demonstrate an understanding of the geographic features of Newfoundland and Labrador—describe climate and vegetation (examine types of plants that live in their area) [SCO 2.2]

English Language Arts

Students will be expected to:

- communicate information and ideas effectively and clearly, and to respond personally and critically [GCO 2]
- respond personally to a range of texts [GCO 6]
- create texts collaboratively and independently, using a variety of forms for a range of audiences and purposes [GCO 9]

Art

Students will be expected to:

- explore a range of art materials, processes, and vocabulary to develop art making skills [1.3.4]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• Student Magazine, pages 2–5 • <i>Picture a Tree</i> (Read Aloud) • Anchor Video: <i>Plant Growth and Changes</i> • IWB Activity 1	• modelling clay • classroom plant or plants • plant-related items for Curiosity Centre • students' Science Journals • digital camera (optional)	• Arrange for a classroom visit from a person who works with plants. • Prepare digital slideshow and/or collect from magazines images of plants and other living and non-living things.	• plant

Safety

- Remind students to use appropriate senses (not taste) when exploring objects.
- Students should wash their hands after working with plants.
- Be aware of any plant-related allergies that your students may have.

Science Background

- A plant is a living thing that belongs to the plant kingdom.
- Most plants use energy from sunlight to make their own food. This process is called photosynthesis.
- Most plants remain in one place once they have started growing.
- The variety among plants is astonishing. A towering cedar tree, a soft, green carpet of moss, a floating water lily, a bright poppy, a spiny cactus—these are a small sample of the hundreds of thousands of plant species found on Earth.
- There are many ways to classify plants. One way is to classify plants as vascular or non-vascular.
 - Vascular plants have vascular tissues. These are tubes that transport water and nutrients from soil and leaves to the rest of the plant. These tissues are found in roots, stems, and leaves. Trees, wildflowers, and ferns are examples of vascular plants.
 - Non-vascular plants, such as moss, are very simple structurally. They do not have vascular tissues, seeds, or flowers.
- Another way to classify plants is seed plants and non-seed plants. Among vascular plants, flowering plants, such as roses, and conifers, such as firs, are seed plants. Ferns are an example of non-seed plants.

Possible Misconceptions

- Students may believe that mushrooms are plants since they grow in the ground and stay in one place. But mushrooms belong to their own kingdom, the kingdom fungi. Fungi do not make their own food but get their food from decomposing organic matter. Seaweed also resembles plants in many ways—it can carry out photosynthesis, for example—but is classified as algae, belonging to the kingdom of protists. Other ocean organisms such as sea urchins, coral, or anemone resemble plants but are actually animals.

ACTIVATE



Plants All Around: Brainstorming

Introduce the Student Magazine to students. Have them review the Contents page and remind students that the words in bold, red font throughout the magazine are defined in the Glossary.

Share pages 2–3 of the Student Magazine with students. Allow time for students to read the text and examine the photographs. Ask:

- **What plants do you see in these images?**
- **How do you know if something is a plant?**



Discuss students' ideas about what a plant is. Record their ideas on the board. Invite students to discuss the questions in the magazine with a partner. Then, have them add any questions they have to the I Wonder Wall.

Ask:

- **How many different plants can you name?**

Record the list on the board as students brainstorm different plants. Then ask:

- **How are these plants different?**
- **How are they the same?**
- **Are these plants important to us? Are they important to the environment? How?**



Encourage students to ask their own questions about the plants on the list. Have students add all of their questions to the I Wonder Wall. Add the word “plant” to the Word Wall.

Read Aloud: *Picture a Tree*



Summary

This charming text with delightful Plasticine illustrations invites readers to use their imagination to picture a tree in different ways—in every season and from every angle.

Before Reading

Brainstorm with students what they know about trees. Then ask:

- **Is a tree a plant? How do you know?**

Set a focus for listening and viewing by asking students to note how trees change throughout the months of the year (the four seasons) as well as through the various stages of a plant's life cycle.

During Reading

As you read the book to students, pause frequently to discuss the text and illustrations, and to clarify any concepts. Alternate by asking students to respond in a whole group or with a partner. Prompts for discussion could include:

Pages 2–3:

- **What do you think the author means when she says, “There is more than one way to picture a tree”?**

Pages 4–7:

- **How do the trees look in these illustrations?**
- **What season do you think it is? How do you know?**

Page 8:

- **What does “the first few drops of colour” mean?**
- **How have the trees changed?**
- **What season do you think it is now?** (transition into spring)

Page 9:

- **How do the trees look in this image?**
- **What does the author mean by “all the art supplies at once”?**
- **Why would you need more colours to represent nature?**

Pages 10–11:

- **What are the differences between the illustrations on pages 10 and 11?**
- **How does this show a change of season?**

Pages 12–17:

- **What season do you think it is now?**
- **What clues can you see?**
- **What are some of the different ways trees are important to living things?**
(as a home for animals, a place for children to play, and as shade on hot summer days)

Pages 18–19:

- **How are these trees different?**
- **What do you think these differences represent?** (the trees are at different stages of their life cycle—from small saplings or baby trees, to growing, adult, and mature trees)

Pages 20–21:

- **What do you think the author means when she says, “You may see the end of one thing, or the start of something new”?** (the end of summer—when leaves begin to change colour and drop from the trees, and the beginning of a new season—autumn)
- **What do the yellow leaves suggest?** (moving into autumn)

Pages 22–23:

- **Why is this “a wild goodbye party”?**
- **Is this a good description?**

Pages 24–25:

- **What is the “glow in the darkness” the author refers to?**
- **What does she mean by “skeletons”?**
- **How are the “skeleton” trees different from the other trees in the image?**
(evergreens don’t lose their needles)

Pages 26–27:

- **How do the trees look now?**
- **What season is it?**

Pages 28– 29:

- **What do you think the author means by “Every winter tree holds spring, sleeping like a baby”?**

Page 30:

- **What season is it now?**
- **How do you know?**

After Reading

Invite students to create a “claymation” art project by using modelling clay to illustrate the growth of a flowering plant from seed to flowering.

Classroom Plants

Have one or more plants already growing in the classroom at the beginning of the unit. Be aware of any regulations surrounding plants in the classroom and any allergies that students in your class may have. Some possibilities for classroom plants include the following: cactus, fern, spider plant, peace lily, shamrock plant, Venus fly trap, amaryllis, snake plant, golden pothos, bamboo.

Allow students time to examine the classroom plant or plants. Ask students to describe the plants in their own words.



Have students draw each plant in their Science Journals, giving each plant a double page and allowing space for them to be labelled later on. Have each student generate and record in their journals at least one question about each classroom plant.

Curiosity Centre

Allow students time to explore the plants and plant-related items at the Curiosity Centre. Examples could include some of the following:

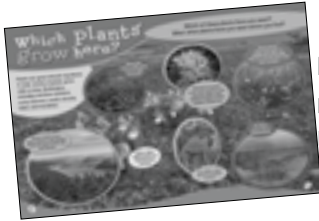
- a variety of non-toxic, uncoated seeds
- dried herbs and dried fruit
- items that are made from plants (e.g., paper, wood, cotton, rubber items, cork, henna dye)
- live flowering and non-flowering plants at various stages
- samples of soil
- items used for working with plants (e.g., pot, trowel, watering can)
- fiction and non-fiction literature about plants
- images of interesting plants



Remind students to use appropriate senses (not taste) when exploring items in the Curiosity Centre and be aware of any allergies in your classroom when choosing items to include.

Invite students to take turns choosing an item to focus on. As a class, discuss if and how the item is related to plants, and why or why not. Do not correct students at this time, or attempt to form a definition of what a plant is. Provide index cards at the Curiosity Centre for students to record questions that arise as they explore. These questions can be added to the I Wonder Wall.

CONNECT



Local Plants

Share pages 4–5 of the Student Magazine with students. Ask:

- Which of these plants have you seen?
- Do any of these plants grow nearby? Which ones?
- What other plants do you see when you go outside?
- What plants do you see at home?

Encourage students to ask questions about the plants in the Student Magazine and to predict what plants grow near the school.



If possible, take students on a nature walk in the neighbourhood. During the walk, have students identify and record in their Science Journals the different plants they see. Students could use digital photography to record images of the different plants.

Students may also collect samples of plants and parts of plants (twigs, fallen leaves, spruce cones, etc.) if it is safe and appropriate for them to do so in the areas you visit. These samples can be added to the Curiosity Centre.

Back in the classroom, have student groups choose a different plant observed on the walk and create a small poster with its name and picture. As a class, generate and record questions about the different plants. Put up the posters along with the questions about each one.

Classroom Visit

Invite a local person who works with plants to visit the classroom. Examples could be someone who works in a nursery, a person who works in the produce section of a grocery store, a florist, an arborist, or an amateur gardener. Before the visit, have a brainstorming session to come up with questions to ask the visitor. Assign each student a question to ask. Encourage students to ask new questions as they arise on the day of the visit.

Anchor Video

Play the Anchor Video: *Plant Growth and Changes*, which is located on the Teacher's Website. Set a focus for viewing by asking students to identify the needs of plants and the different ways that plants help humans and other animals. You may choose to pause the video to allow students to answer questions or to discuss any questions which students may have.



CONSOLIDATE

IWB Activity:

- Challenge students
- to identify which living
- things are plants using
- Activity 1: *Is it a plant?*
- (see the Teacher's
- Website).



Game: Is It a Plant?

Collect pictures of plants, other living things, and non-living things from magazines, or make a digital slide show with images sourced online. Designate one wall “plant” and one wall “not a plant.” As you show the pictures, students move to the appropriate wall when each picture is shown. Include “easy” items such as trees and flowers and cars and people, but also trickier ones such as moss plants and non-plants such as lichen, mushrooms, hydra, stick bugs, coral, anemones, and sea urchins. Encourage students to bring pictures from home to add to each wall.

EXPLORE MORE

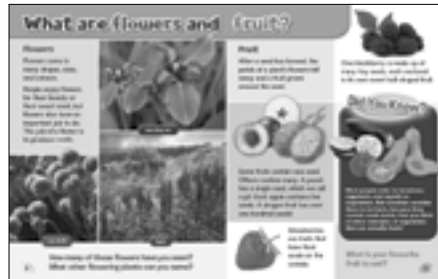
Plants at Home

Have students take an inventory of plants and plant-based items at home with the help of an adult. Have them categorize their list. For example, categories could include: houseplants, plants we eat, clothing made of plants, furniture made of plants, other items made of plants. Encourage students to ask questions while performing their inventory, and to record one of the questions and the answer they received.

Poisonous Plants

Have students research to find out what poisonous or otherwise dangerous plants live locally. What are the best ways to identify and avoid these plants?

Plant Parts



Focus: Students explore the function of plant parts and practise identifying plant parts using the appropriate terminology. Teachers model scientific terminology relating to plants.

Specific Curriculum Outcomes

Students will be expected to:

- 45.0 identify and describe parts of plants and their general function [GCO 1/3]
- 2.0 communicate using scientific terminology [GCO 2]

Performance Indicators

Students who achieve these outcomes will be able to:

- draw and label the parts of a plant
- use modelling clay to create a model of a plant, label its different parts, and explain their purpose

NOTES:

Attitude Outcome Statements

Encourage students to:

- show interest in and curiosity about objects and events within their immediate environment [GCO 4]
- show concern for their safety and that of others in carrying out activities and using materials [GCO 4]

Cross-Curricular Connections

Math

It is expected that students will:

- construct, label, and interpret bar graphs to solve problems [3SP2]

English Language Arts

Students will be expected to:

- explore, extend, clarify, and reflect on their thoughts, ideas, feelings, and experiences [GCO 1]
- interpret, select, and combine information using a variety of strategies, resources, and technologies [GCO 5]

Art

Students will be expected to:

- create art for a variety of purposes and recognize there are many kinds of visual art [2.3.1]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• Student Magazine, pages 6–11 • IWB Activity 2 • BLM <i>Plant Parts at the Grocery Store</i> • IWB Activity 3 • IWB Activity 4 • IWB Activity 5 Literacy Place • <i>Hungry Plants!</i> (Guided Reading, Level N)	• several heads of celery • blue or red food colouring • students' Science Journals • clipboards • crayons • students' Science Folders • newsprint paper • construction paper • bristol board • craft supplies for model construction, e.g., modelling clay, pipe cleaners, tissue paper • fresh flowers	• Collect digital and/or magazine images of familiar items and animals for students to label (e.g., car, house, bird, cat). • Collect digital and/or magazine images of unusual plants (e.g. baseball plant, bottle tree, dragon blood tree). • Collect plant parts and items made from specific plant parts (e.g., carrot, apple, cinnamon stick). • Contact an Elder or Indigenous Knowledge Keeper from a local Indigenous group to arrange for a visit to discuss traditional uses of plants and plant parts, as well as the names of plants in their language.	• bark • branch • bulb • chlorophyll • cone • flower • fruit • leaf • needle • petal • root • seed • stem

Science Background

- Science concepts are more easily understood once students have the appropriate language with which to discuss them.
- It is important that students use the correct terminology when working in any area of science, and that they understand the errors that can occur as a result of using the wrong vocabulary.
- Most plants have the same basic parts: root, stem, leaf, flower, fruit, seed. These parts are very different across different plants and can help identify the plants. For example, the shape of leaves can be used to identify different trees.
- Not all plants have all of the basic plant parts. For example, mosses do not have roots. Ferns and coniferous trees, among other plants, do not have flowers.
- Each plant part has a specific purpose or purposes. Some of these are summarized below:

Plant part	Purpose
root	• anchor and support the plant • absorb water and nutrients from soil
stem	• support aboveground plant structures (e.g., leaves, flowers) • transport nutrients and water from roots to other plant parts • can grow tall in some plants to improve sun exposure • tree stems have thick bark to protect and help support them
leaf	• contain chlorophyll, a pigment essential for photosynthesis • carry out photosynthesis, in which plants use water, carbon dioxide, and energy from sunlight, to produce food (glucose) and release oxygen
flower	• attract insects so that pollination can occur • make seeds
fruit	• protect seeds and provide nutrition for plant embryo • attract animals, which aid in the distribution of seeds in various ways

Possible Misconceptions

- The everyday use of the terms “fruit” and “vegetables” may confuse students. For example, many people would say that red peppers are a vegetable, not a fruit. But from a scientific perspective, the pepper is the fruit of the pepper plant. The everyday term “vegetables” may refer to a variety of different plant parts, including the stem (celery), leaves (lettuce), fruit (eggplant), and roots (carrots).
- Students may have preconceptions about how certain plant parts look. Show students a wide variety of images so they can appreciate how diverse plant parts can appear.
- Students may believe that generalizations about plants and plant parts are immutable rules that are true for all plants. Be sure to point out exceptions. For example, most plants have chlorophyll and make their

own food by photosynthesis. But the ghost plant (so-called because it is almost completely white) does not make its own food—it does not have chlorophyll and does not carry out photosynthesis. Instead, it gets all its food from nearby plants such as trees. Nevertheless, it is classified as a plant. Another “rule” students learn is that coniferous trees, i.e., cone-bearing trees, keep their needles all year round. Coniferous trees do drop their needles, but at a steadier, slower rate throughout the year compared with how deciduous trees lose their leaves. Larches are an exception and drop all of their needles each fall.

ACTIVATE

What Part Is It?

Begin by showing students pictures of familiar items such as a car, house, bicycle, phone, and chair, and familiar animals such as a bird, cat, and fish. Ask:

- **What is this called?**
- **What are its different parts?**
- **What is the purpose of each part?**
- **Why is it helpful to know the correct name for each part?**

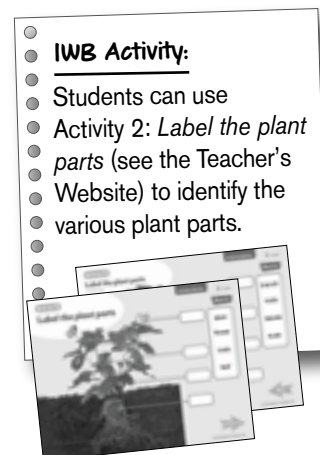
Tell students that they will be learning about the different parts of plants. Bring the class plant to the front of the class and have students identify the parts that they can see. Write the parts on the board or on a chart as students identify them. (Most likely the class plant will at least have visible stems and leaves.) Ask students what plant parts are not visible or present on the class plant. For example, fruit and flowers may not be present and roots may not be visible. For each plant part students identify, ask:

- **What is the purpose of this part of the plant?**
- **What words could you use to describe this plant part?**

Record students’ responses. Then, share pages 6–7 and 8–9 of the Student Magazine with students. Have students describe the plant parts they see on the pages and record any questions students have on the I Wonder Wall. Add terms such as “roots,” “stems,” “leaves,” “flowers,” “fruit,” “petals,” “seeds,” and “chlorophyll” to the Word Wall.

Invite students to make a bar graph to represent favourite fruits to eat.

Allow students time at the Curiosity Centre to explore images of plants and samples of different plant parts.





Weird Plants

Share pages 10–11 of the Student Magazine, which explains how a variety of plants have leaves, flowers, or stems with unusual characteristics that help the plant survive in specific conditions. Show students additional digital images of other unusual plants, such as the baseball plant, the bat plant, the bottle tree, the dragon blood tree, and the rafflesia corpse flower. For each example, challenge students to identify the basic (visible) parts of the plant (stem, leaf, flower). Ask students:

- **What is unusual about this plant?**
- **How could the plant's unusual parts help it grow and survive?**



Have students record questions that arise on the I Wonder Wall.



Literacy Place Connection:

Hungry Plants! (Guided Reading, Level N) provides more information about plants with some unusual parts. Discuss with students why some plants need to get nutrients by digesting animals. (They live in places where there aren't enough nutrients in the soil for them to survive.)

CONNECT

Thirsty Celery

Show students a head of celery. Have them identify the parts of the plant that they can see. Explain to students that the celery sold in grocery stores has the stems and leaves of the celery plant but not the root of the plant. If possible, bring in a celeriac root and tell students that celeriac is a type of celery that is grown for its large, edible root, not its stalk and leaves.

Point out that the individual stems of the celery plant are also called “ribs” and the head is called a “stalk.” However, some people use the term “stalk” to refer to individual ribs. You may wish to point this out to students as an example of the importance of using clear, unambiguous terminology. A soup containing a chopped rib of celery would taste very different from a soup containing an entire head of celery!

Ask students what the purpose of a celery stalk is. Draw out that stems support the leaves of a plant and bring nutrients and water from the roots. Tell students you will be investigating the structure of a celery stem.

Cut a centimetre or two off the end of several celery stalks. Place each stalk in glasses with water and food colouring. Red or blue work best. Have students make predictions about what they think will happen to the celery. Leave the stalks in their glasses overnight.

The next day, have students observe what has happened to the celery stalks. Cut the stalks open and ask students to describe and draw what they see in their Science Journals.





Ask students to explain what they observe. Ask:

- **Why is the inside of the celery coloured?**
- **What does this tell you about how water moves in the celery stalk?**

Ask students what this suggests about how plants get water from their roots to their leaves. Record further questions for the I Wonder Wall.

If you wish, extend the investigation by trying the same process with a white flower, such as a carnation, and a large leaf with prominent veins, such as a maple leaf. Have students record their predictions about what will happen. Lead students to reflect on how their experience with the celery informed their predictions about the other plants.

Leaf and Bark Rubbings

Take students to a park or other location with a variety of trees. Provide students with clipboards, paper, and crayons. Working in groups, students can make rubbings of a variety of fallen leaves and bark that they find. Help students identify the different trees so they can label their rubbings. Students may also collect fallen leaves and bark and other parts of trees to bring back to the classroom. Remind students not to damage living trees.

Back in the classroom, make a display of the rubbings. Ask students:

- **What words would you use to describe tree bark?**
- **What does tree bark do for the tree?**
- **How would you describe leaves?**
- **What do leaves do?**
- **How can you identify a tree by its leaves? By its bark?**

Write students' answers on slips of paper and add to the display. Record any questions that arise for the I Wonder Wall.

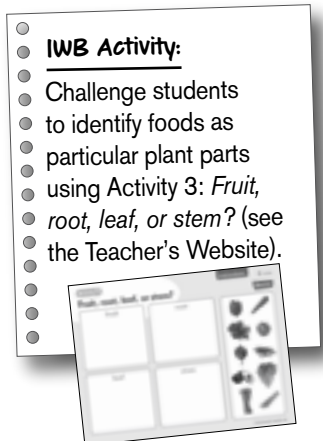


Grocery Store Field Trip

Arrange for a visit to a local grocery store. Have students use BLM *Plant Parts at the Grocery Store* to identify and record plants and their parts (roots, leaves, stems, flowers, and fruit) that they observe while on the trip. Remind students to store their completed BLMs in their Science Folders.

Class Visit

Invite an Elder or Indigenous Knowledge Keeper from a local Indigenous group to visit the class and describe traditional uses of various parts of local plants (e.g., roots, berries, leaves). He or she could also share the names of the plants and plant parts in his or her language.



CONSOLIDATE

IWB Activity:

Using Activity 4: *Whose seeds?* (see the Teacher's Website), students can match seeds with the plants they will grow into.



IWB Activity:

Students can identify leaves and the plants they come from using Activity 5: *Whose leaves?* (see the Teacher's Website).



Plant Parts Booklet

Have students make a booklet to show what they have learned about plant parts. Students can fold a piece of paper in half vertically and draw a flowering plant, including leaves, stem, roots, and flower, on the outside cover, making sure the drawing goes from the very top to the bottom of the page. They can then cut the image into quarters, making flaps. Behind each flap, students can name the plant part and write a sentence about its purpose.

Class Vegetable Collage

Refer students to the two cross-section images on pages 6–7 of the Student Magazine. Explain to students that a cross-section diagram shows what the inside of something would look like if a cut were made through it. Ask students:

- **Where else have you seen a cross-section diagram?**
- **Why are cross-section diagrams useful?**

Tell students that they will be making a giant cross-section collage to show what we would see if we could cut a slice through the soil of a vegetable garden. Use bristol board or construction paper to create a large, long backdrop with brown on the bottom half and blue on the top half. Assign students different vegetables, such as the following:

- carrots
- beets
- beans
- tomatoes
- potatoes
- turnip
- onions
- broccoli
- squash

Students should research to find out what their plant looks like both above and below the ground, and then create a flat image using the medium of their choice to add to the collage. Students can then label the parts of their plant. Help students make connections back to the soil unit and add appropriate elements to the soil, such as worms and pebbles.

Plant Model

Set up a station with craft supplies. Have students choose a plant and make a labelled sketch of it in their Science Journals. Then have students use modelling clay or other materials to make a model of their plant. Put students in pairs and have each student describe their plant and its parts to their partner.

EXPLORE MORE

Pressing Flowers

There are a variety of different ways to press flowers. Have students investigate the different methods and choose one to try. Students should press several flowers of their choice. Once the flower is pressed, have them make a display by mounting the pressed flowers. Students can research the plant and label the parts of their flower, or write a few sentences explaining the significance of a flower's appearance (e.g., bright colours to attract pollinators).

Plant Parts at the Grocery Store

Name: _____

Plant Part	Name of fruit or vegetable	Sketch
Leaf		
Fruit		
Stem		
Root		

What Do Plants Need?



Focus: Students identify and investigate life needs of plants.

Specific Curriculum Outcomes

Students will be expected to:

- 46.0 identify and investigate life needs of plants and describe how plants are affected by the conditions in which they grow [GCO 1/3]
- 16.0 predict based on an observed pattern [GCO 2]
- 10.0 make and record observations and measurements [GCO 2]
- 32.0 follow safety procedures and rules [GCO 2]
- 11.0 construct and label concrete-object graphs, pictographs, or bar graphs [GCO 2]
- 47.0 distinguish between useful and not useful information when answering a science question [GCO 2]
- 22.0 identify and suggest explanations for patterns and discrepancies in objects and events [GCO 2]
- 30.0 respond to the ideas and actions of others and acknowledge their ideas and contributions [GCO 2]

Performance Indicators

Students who achieve these outcomes will be able to:

- plan a simple experiment (a fair test) to investigate plant needs
- explain how to grow a healthy plant from a seed

NOTES:

Attitude Outcome Statements

Encourage students to:

- willingly observe, question, and explore [GCO 4]

Cross-Curricular Connections

English Language Arts

Students will be expected to:

- explore, extend, clarify, and reflect on their thoughts, ideas, feelings, and experiences [GCO 1]
- interact with sensitivity and respect, considering the situation, audience, and purpose [GCO 3]
- use writing and other forms of representation to explore, clarify, and reflect on their thoughts, feelings, experiences, and learnings; and to use their imaginations [GCO 8]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• Student Magazine, pages 12–17 • <i>What Is the Inquiry Process?</i> poster • BLM <i>Plant Needs Investigation: Plan</i> • IWB Activity 6 Literacy Place • <i>Plantzilla</i> (Read Aloud –Synthesizing Strategy Unit)	• a variety of non-toxic, untreated seeds for display (e.g., bean, radish, pea, carrot, lettuce, popcorn, pumpkin, sunflower, peach) • students' Science Journals • digital camera (optional) • pumpkin seeds and/or purple peacock pole beans and/or seeds of other fast-growing plants for student investigation • clear self-sealing baggies • paper towel • small watering cans • measuring cups • soil • water • cardboard boxes • tape • vinegar • compost • fertilizer • polystyrene cups • spoons and shovels for planting • egg cartons • seedling trays • craft supplies such as construction paper, scissors, and glue • sealed seed packets for a variety of plants • modelling clay	• Search online for digital images of a variety of plants, including healthy and unhealthy ones. • Ensure you have plants growing at a variety of stages for students to use in their investigations.	• germinate • germination • sprout • seedling • photosynthesis • fair test • variable

Safety

- Some seeds are toxic. Remind students to use appropriate senses (not taste) when exploring objects.
- If students use small metal trowels or other tools for planting, remind them to use care when doing so.
- Be aware of any allergies to seeds, nuts, or other samples you may plan to bring into the classroom.

Science Background

- **Plant needs:** Plants need air, food, space, sunlight, and water to grow. But different plants need different amounts of each. For example, a willow tree will soak up almost 400 litres of water each day, whereas a potted cactus needs to be watered only about once a week or less to thrive, although they can survive for much longer without water if necessary.
- **Fair testing:** To ensure their results are meaningful, scientists plan their experiments to ensure they are fair tests. In a fair test, all variables (factors) in the experiment except one are kept constant. In this way, scientists ensure that differences they observe among trials are the result of the one variable that is changed in a controlled way. For example, if students want to test how adding vinegar to soil affects plant growth, they must have at least two plants growing in which everything is the same: soil type and amount, seed type, depth of planting, amount of sunlight, amount of watering, etc. The only change is that they will add vinegar to one sample and not the other. To be sure they are conducting a fair test, students must first identify all the factors that will affect plant growth or germination (whichever they are testing), and then ensure they manipulate only one.

Possible Misconceptions

- Students may believe that plants absorb all of their food from soil. In fact, their main food is glucose, which they make themselves via photosynthesis, in which carbon dioxide and water react to form oxygen and glucose. The green pigment chlorophyll facilitates the reaction, which requires energy from sunlight to proceed. Plants absorb water from soil, and also additional nutrients such as nitrogen and phosphorus. Remind students that one of the main differences between plants and animals is that plants make their own food.
- Students may believe that any source of light will keep plants alive. Ensure that at least one group is investigating the question about whether and what type of light plants need.

ACTIVATE



Anchor Video Review

Share the Anchor Video: *Plant Growth and Changes* (see the Teacher's Website) and review with students the needs of plants.

From Seed to Plant

Display a variety of non-toxic, untreated seeds (e.g., bean, radish, pea, carrot, lettuce, popcorn, sunflower) and have students predict what type of plant each will become. The following seeds are pictured on page 12 of the Student Magazine: sunflower seeds, corn kernels, kidney beans, lemon seeds, pumpkin seeds, and apple seeds. Have students practise observing and recording by describing and sketching different seeds in their Science Journals.

Share and discuss pages 12–13 of the Student Magazine with students. Ask:

- **Have you ever planted a seed?**
- **What happened?**
- **What did you do to make sure the seed sprouted into a plant?**
- **How did you take care of the plant?**

Tell students they will be investigating how plants grow and develop from a seed to an adult plant. Introduce the term “germination” (the sprouting of a seedling—a young plant—from a seed) and record this word on the Word Wall. Record any questions students may have on the I Wonder Wall.

Observing Germination

Place several popcorn kernels or bean seeds in a clear, self-sealing baggie, along with a moistened paper towel. Have students predict what will happen to the seeds. Then place them in a warm, sunny location. Check on the seeds each day and, if possible, take digital photos to record the germination process.

Healthy Plants, Unhealthy Plants

Tell students they will be investigating plant needs. Ask:

- **What do you need to be healthy?**
- **What do plants need to be healthy?**
- **How are plant needs the same as ours? How are they different?**
- **What might cause plants to be unhealthy?**

Record students' ideas on the board. Show images of a variety of plants sourced online, including healthy plants and plants that are unhealthy due to lack of sunlight, water, or other factors including disease. Ask students what visual clues tell them whether a plant is healthy or unhealthy.

CONNECT



Plant Needs Investigation, Part 1

1. Ask a question. Make a plan.

Introduce pages 14–15 of the Student Magazine to the students. Allow students time to read the text then, as a class, brainstorm different factors that might influence the germination and growth of plants. Ask:

- What do seeds need to germinate?
- What do plants need to grow?
- What happens if they do not get what they need?

Factors to discuss can include soil type, as well as amount of water, air, space, and sunlight. Define “photosynthesis” and add this word to the Word Wall. Students can also consider how the addition of fertilizers, compost, or other substances such as baking soda or vinegar to the soil might affect growth. Adding vinegar is a way to model a more acidic environment, while adding baking soda makes the soil more alkaline (typical of clay soils). On the board, record the main points from the discussion and any questions that arise.

Review the steps of the *What Is the Inquiry Process?* poster. Then tell students that they will be doing an investigation into plant needs. Explain the concept of fair testing. In science, a fair test is one that changes only one variable, keeping all other variables the same. This ensures that any differences noted among trials are a result of the one changed variable. For example, if students are testing the effects of adding different substances to soil, then other variables, such as seed type, amount of sunlight, type of soil, amount of watering, etc. must be kept constant.

Have students form groups. In their groups, they should use the discussion and questions on the board to frame a testable question about what plants need to germinate and grow to investigate. Visit the groups and help them with their question as necessary. Sample questions are as follows:

- Do seeds need water to germinate?
- How does temperature affect the germination of seeds?
- How does depth of planting affect the germination of seeds?
- Do seeds need soil to germinate?
- How does the number of seeds planted in one container affect growth?
- Do plants grow better in sunlight or darkness?
- Do all plants require the same amount of water to grow?
- How much water do plants need to grow?
- How does soil type affect plant growth?

After the question is framed, have students design a fair test to answer their question. Students can use BLM *Plant Needs Investigation: Our Plan* to structure their design. Students should include a prediction about what they expect to observe.



Approve the plan before students carry it out, ensuring that safety procedures and rules are included as appropriate. Students should list all materials that they will need. (A variety of seeds, seedlings, and healthy plants should be available for groups to study.) Take note of any materials you do not have so that they can be available on the day students begin their investigations.

2. Explore. Record your results.

Students can now follow their plans and carry out their investigations. Help students with their investigation set-up. Students should record their observations in their Science Journals, including descriptive observations, measurements, and sketches. They can also take photographs each day to record what they observe. Discuss with students what measurements and observations are important to answering their question. Students can measure plant height, count number of leaves, count the number of seeds that germinate and record on what day germination occurs, note plant colour (significant in experiments with sunlight and as a way to gauge plant health), and so on.

Note: This investigation is carried through into the next teaching plan as students continue to make measurements and observations, record their results, analyze their results, and draw simple conclusions.

A “Brown Thumb”

Tell students that you have a friend who is terrible with plants and cannot manage to keep them alive. Instead of a green thumb, he has a brown thumb! Describe different things your friend does and ask students to predict what would happen to the plants based on the observations they have been making. For example, he

- tries to grow plants in a dark closet
- forgets to water them for weeks
- waters them five times a day
- “waters” them with cola
- tries to grow plants in pebbles instead of soil
- keeps houseplants outside in the winter
- plants his seeds 1 metre deep in soil
- scatters his seeds across soil without covering them up

Taking Care of Plants

Share pages 16–17 of the Student Magazine with students and ask:

- **What do the plants in this greenhouse need?**
- **How are the plants’ needs being met?**

Have students reflect on what they have learned through their reading and plant needs investigations in preparation for communicating the results of their investigations to the class.





Literacy Place Connection:

Read aloud *Plantzilla* by Jerdine Nolen and David Catrow. Ask:

- What made Plantzilla special?
- What were Plantzilla's needs?
- How did Mortimer care for Plantzilla?
- What did he do to meet Plantzilla's needs?
- How did Plantzilla react to Mortimer's care?

CONSOLIDATE

IWB Activity:

- Challenge students to identify the environments where plants would thrive using Activity 6: *Where does it thrive?* (see the Teacher's Website).



The Happy Gardener

Have students create a booklet or slide show giving advice to novice gardeners about what plants need to be healthy. Students can include tips, labelled illustrations or digital photographs, and a list of "Do's and Don'ts." They can also provide anti-examples describing what might happen if plants' needs are not met.

Plant Needs Game

Provide craft materials for students to make a Plant Needs board game. For example, factors contributing to plant health could be listed on cards or on labelled spaces. Factors such as "sunlight" and "water" move the players forward, and negative factors such as "polluted soil" and "too much fertilizer" move them back.

How to Grow

Present students with a seed packet and allow time for them to read the instructions. Based on the information on the packet, as well as the knowledge gained in their experiments, through class discussion, and in their own experience and research, have students describe orally how they would plant the seeds and care for the growing plants, including safety precautions they would take.

EXPLORE MORE

Fertilizers

Have students research how and why different kinds of fertilizers are used for different kinds of plants. Students can also investigate potential harm involved in using fertilizers, as well as comparing the pros and cons of using homemade compost and commercial fertilizers.

Unusual Needs

Have students ask questions and investigate plants that have unusual needs compared to other plants. For example, why do carnivorous plants such as pitcher plants need to consume insects? Why do willow trees need so much water? Why do cacti and other desert plants need so little?

Plant Needs Investigation: Our Plan

Names: _____

Our question: _____

Our prediction: _____

Our plan: _____

What we will need: _____

The safety rules we will follow: _____

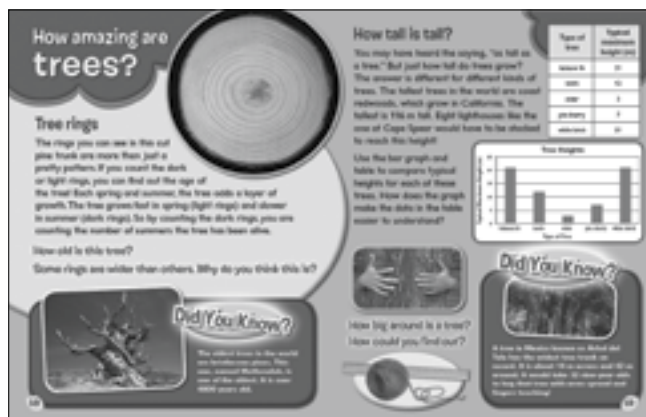
Plant Needs Investigation: Our Plan (Continued)

Names: _____

Here is a sketch of how we will set up our investigation:

Teacher signature: _____

Observing and Recording Plant Growth



Focus: Students continue to investigate the factors that influence plant growth and health, and explore different ways to measure plant growth.

Specific Curriculum Outcomes

Students will be expected to:

- 46.0 identify and investigate life needs of plants and describe how plants are affected by the conditions in which they grow [GCO 1/3]
- 16.0 predict based on an observed pattern [GCO 2]
- 10.0 make and record observations and measurements [GCO 2]
- 32.0 follow safety procedures and rules [GCO 2]
- 11.0 construct and label concrete-object graphs, pictographs, or bar graphs [GCO 2]
- 47.0 distinguish between useful and not useful information when answering a science question [GCO 2]
- 22.0 identify and suggest explanations for patterns and discrepancies in objects and events [GCO 2]
- 30.0 respond to the ideas and actions of others and acknowledge their ideas and contributions [GCO 2]

Performance Indicators

Students who achieve these outcomes will be able to:

- describe several ways to measure and record the growth of different plants
- observe images of unhealthy plants and suggest reasons why they might have failed to thrive

NOTES:

Attitude Outcome Statements

Encourage students to:

- consider their own observations and ideas when drawing a conclusion [GCO 4]
- appreciate the importance of accuracy [GCO 4]
- be open-minded in their explorations [GCO 4]

Cross-Curricular Connections

Math

It is expected that students will:

- demonstrate an understanding of measuring length (cm, m) by measuring and recording length, width, and height [3SS3]
- construct, label, and interpret bar graphs to solve problems [3SP2]

English Language Arts

Students will be expected to:

- communicate information and ideas effectively and clearly, and to respond personally and critically [GCO 2]
- use a range of strategies to develop effective writing and representing and to enhance their clarity, precision, and effectiveness [GCO 10]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• Student Magazine, pages 18–19 • BLM <i>Measurement Scavenger Hunt</i>	• large graph paper • metre sticks • small metric rulers • cloth measuring tape • metal measuring tape • modelling clay • digital camera		• bar graph • centimetre • metre

Safety

- Some seeds are toxic. Remind students to use appropriate senses (not taste) when exploring objects.
- If students use small metal trowels or other tools for planting, remind them to use care when doing so.
- Be aware of any allergies to seeds, nuts, or other samples you may plan to bring into the classroom.

Science Background

- Consistent systems of measurement are important in science because they allow scientists to record and communicate their observations in an

unambiguous way that will be understood by anyone trying to understand their experiment.

Possible Misconceptions

- Students may not incorporate the concept of “amount” into their understanding of plant needs. For example, they may believe that all types of plants require the same amount of water or that because water is good for a plant then more will always help it grow better. By using measured quantities of water for several different plants, and by carefully measuring the plants’ growth, students can make more nuanced conclusions than simply “plants need water.” Help students consider amount by discussing how much food people need, and whether eating too much food or too little food can be harmful.

ACTIVATE



Using Graphs

Share pages 18–19 of the Student Magazine with students. Discuss the various facts and measurements and the ways in which they are presented. Tell students you are going to make a class graph based on students’ favourite trees. On a large sheet of paper with a grid, write five different trees such as apple, maple, spruce, willow, and birch. Display pictures and describe each tree. Then ask students to vote for their favourites and explain their choices. Check off a square for each vote and outline the squares to make a bar graph displaying the data. Discuss with students how graphs can make it easier to understand and compare data.



Measurement Scavenger Hunt

If necessary, use objects in the classroom such as chalk, a desk, a book, etc., to demonstrate how to use various measuring tools to make an accurate measurement. Show students how to use cloth tape measures and metal tape measures as well as standard rulers. Provide copies of BLM *Measurement Scavenger Hunt* for students to record results as they search for and measure items around the classroom and determine classroom dimensions using metre sticks and small rulers.

CONNECT

Plant Needs Investigation, Part 2

Students continue to monitor the germination of their seeds and the growth of their plants. They take measurements relating to their question and record their measurements.

3. Think about the results. Make conclusions.

At the conclusion of their investigation, students should consider what they observed. Have students discuss their results in their groups. If they conducted a fair test, they should be able to summarize how changing one

variable affected their plants. For example, if students were varying the amount of water given to a plant, they may have observed that plants not given much water were shorter and had fewer leaves than those given more water. Plants given no water may have wilted, turned brown, or died. Plants given too much water may also have died. From these results, students could conclude that plants need the right amount of water to survive. They can quantify that amount for their plants based on the amount given to the healthiest plants.

Visit the groups during students' discussions and ask:

- **Which of your observations did you use to come to your conclusion?**
- **Which observations did not relate to your conclusion?**

Have students write their conclusions on large strips of paper and display them at the front of the classroom.

4. Share what you learned.

Have students present their conclusions to the class, describing orally the results of their experiments, and displaying any measurements, charts, or diagrams they made during the course of their investigation. They should tell which plants did well and which did not (or which seeds germinated or did not if they were investigating germination), compare growth, and describe what factors were different in those cases. Students should share what they learned about plant needs during their investigation. Encourage other students to ask questions and make comments about the students' findings. Record any new questions on the I Wonder Wall.



CONSOLIDATE

Graphing Plant Growth

Work with students in their investigation groups to help them use the data from their experiments to make a concrete-object graph, pictograph, or bar graph. Students can use data such as the height of their plants in centimetres, the number of leaves on their plants, the length of roots, or the number of days it took for germination to occur in different conditions. If different groups of students are investigating the same question, those students can pool their data to make a graph together. This is also an opportunity to look at patterns or discrepancies among their data. Display the finished graphs in the classroom.

Stop-Motion Video

Have students plan and execute a brief video, using stop-motion animation and clay models, about a plant and what happens when it is not watered and is left in the dark, but is then given water and exposed to sunshine. Alternatively, students could create a video comparing expected plant growth in different environments (e.g., desert, boreal forest, rainforest).

EXPLORE MORE

Using Graphing Software

Have students gather plant-related data at home, such as number and types of vegetables bought during a shopping trip, fruits eaten in a week, type and number of plants in a garden. Alternatively, they can find some plant-related data online such as the tallest plants or oldest trees. Help students use a spreadsheet or other program to create a simple graph such as a bar graph or pie chart. For example, students can create graphs using the graph option at <https://nces.ed.gov/nceskids/createagraph/>. Ensure they include a title and appropriate labels. Students can then print out and display their graphs.

Measurement Scavenger Hunt

Name: _____

Use a ruler to complete the scavenger hunt!

Find these items and measure them:

length of a crayon: _____ centimetres

length of your Science Journal: _____ centimetres

width of a chair seat: _____ centimetres

length of an eraser: _____ centimetres

(object of my choice) _____ centimetres

length of classroom: _____ metres

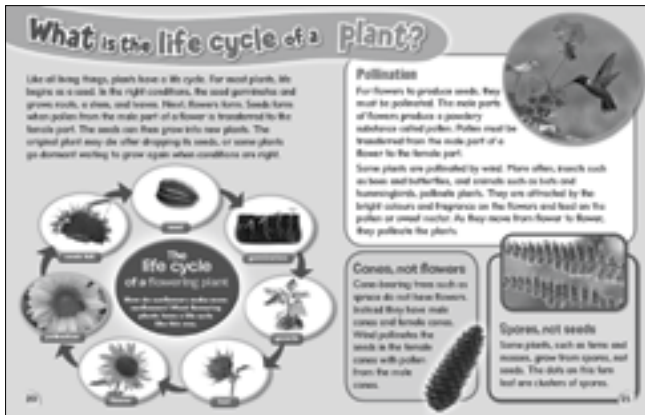
Find these items and identify them:

an object less than
5 centimetres long: _____

an object between
5 and 30 centimetres long: _____

an object larger than
30 centimetres: _____

The Life Cycle of a Flowering Plant



Focus: Students draw upon their own observations of their plants as well as research and class discussion to explore the life cycle of flowering plants.

Specific Curriculum Outcomes

Students will be expected to:

- 48.0 observe and describe changes that occur through the life cycle of a flowering plant [GCO 1/3]

Performance Indicators

Students who achieve these outcomes will be able to:

- describe what happens in each stage of the life cycle of a flowering plant
- illustrate the life cycle of a flowering plant

NOTES:

Attitude Outcome Statements

Encourage students to:

- work with others in exploring and investigating [GCO 4]

Cross-Curricular Connections

English Language Arts

Students will be expected to:

- use writing and other forms of representation to explore, clarify, and reflect on their thoughts, feelings, experiences, and learnings; and to use their imaginations [GCO 8]
- use a range of strategies to develop effective writing and representing and to enhance their clarity, precision, and effectiveness [GCO 10]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• Student Magazine, pages 20–23 • IWB Activity 7 • BLM <i>Life Cycle Wheel</i> Literacy Place • <i>Life Cycle of a Plant</i> (Guided Reading, Level L)	• flowers with large stamens and pistils (e.g., lilies, tulips, or buttercups) • glue • old socks • tweezers • white poster board • students' Science Journals • card stock or paper plates • paper fasteners • students' Science Folders	• Invite an Elder or Indigenous Knowledge Keeper from a local Indigenous group to join the nature walk and talk about how the life cycles of plants affect or influence traditional activities. • Search for photos of the life cycle stages of a variety of plants online and in magazines. • Prepare envelopes containing the images of life cycle stages for individual plants. • Send a note home asking parents or guardians to send in old socks for the sock walk.	• pollen • pollination • pollinator • pistil • stamen • nectar

Safety

- Review safety procedures with students before going on a nature walk.
- Be aware of any allergies your students might have to plants and other items you plan to bring in.

Science Background

- Like all living things, plants have life cycles in which their life begins, they grow, they reproduce, and they die. Some plants go through their complete cycle in a few weeks while others may take years. The stages in a life cycle for a typical flowering plant are noted on the following page.

Life Cycle Stage	Description
seed	A seed can remain dormant for a long time. But when it falls on, or is planted in the ground, and receives the right amount of warmth, water, and (possibly) sunlight, it will begin to germinate.
germination	In germination, the seed absorbs water and swells. Its seed coat splits. The stem and small seed leaves (cotyledons) push up out of the earth and into the sunlight. A small root pushes down. Shortly after, the cotyledons fall off and real leaves begin to grow.
growth	As a plant grows, its roots spread and move deeper into the soil. Root hairs develop—these help to absorb water. The stem continues to grow in the direction of sunlight, and more leaves grow and develop.
flowering	Buds appear on the stem, and these develop into flowers. Flowers have male parts, called stamens, and female parts, called pistils. For a fertilized seed to form, powdery pollen grains must move from the stamen to the pistil in a process called pollination.
pollination	Some plants pollinate themselves, meaning the pollen moves from the stamens to the pistil of the same plant. But many have to be cross-pollinated, meaning the pollen must move from the flower of one plant to another of the same kind. For most flowering plants, pollination occurs with the aid of pollinators such as bees, birds, and bats. Flowers attract pollinators such as bees, birds, and bats in various ways, including bright colours and vivid patterns, and fragrance. The pollinators move from flower to flower, feeding on nectar or collecting pollen. Some pollen becomes attached to the animal, and is transferred to other flowers the animal visits.
production of seeds	When pollination is successful, a fertilized seed forms. At this stage, for some plants, the flower parts fall away and a fruit forms around the seed. In other plants, the flower releases the seed directly. Either way, the seed is released and then the life cycle can begin again.
dormancy	Annuals are flowering plants that live their complete life cycle in one year. The plant dies when the seeds fall. Biennials have a two-year life cycle, blooming in the second year of the cycle. Perennials are flowering plants that bloom year after year. The plant goes dormant in winter but regrows in the spring.

Possible Misconceptions

- Students may believe that all flowering plants have the same life cycle stages, but in fact there are many variations. Here are some examples:
 - Some flowering plants produce fruit (e.g. apple trees, tomato plants), while others do not (dandelion, sunflower).
 - Coniferous trees produce male and female cones, not flowers.
 - Mosses and ferns produce spores, not seeds.
 - Some plants make new plants using structures called runners, which are stem-like growths extending from the parent plant. New plants grow from the stem.

Expose students to as many different plant life cycles as possible, so they are aware of the variety of ways plants grow and reproduce. However, the focus of the teaching plan should be on the life cycle of flowering plants.

ACTIVATE

Human and Animal Life Cycles

Connect to students' prior learning in grade 2 by prompting students to think about and discuss how humans and other animals grow and change. Ask:

- **How does life begin for a chicken? A frog? A butterfly? A human?**
- **What stages does each animal go through during its life?**
- **Why are the stages in an animal's life called a "cycle"?**

Plant Life Cycles

After activating prior knowledge about life cycles, ask students:

- **Do plants have life cycles?**
- **How do you think the life cycles of plants compare to the life cycles of animals?**

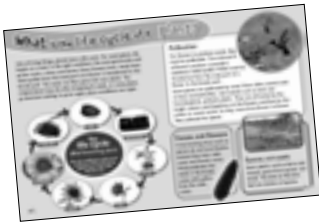
Have students read pages 20–21 of the Student Magazine. Encourage students to ask questions about the life cycle of plants and record these questions on the I Wonder Wall. Add the terms "life cycle," "pollen," "nectar," and "pollination" to the Word Wall.



Plants and the Seasons

Discuss with students the ways an apple tree changes through the seasons. In spring, the tree buds, grows leaves, and then forms flowers. Bees and other pollinators visit the flowers. In summer, the fruit begins to grow. In fall, the fruit ripens and is picked or falls to the ground, giving the seeds in the fruit a chance to grow into new apple trees. In winter, the leaves fall from the tree and the tree becomes dormant for the winter. Ask:

- **What is the first thing you would do if you wanted to grow tomatoes?** (Plant tomato seeds.)
- **In what season would you plant the seeds and why?** (The seeds should be planted in springtime, because the ground has thawed and there are many warm months ahead for the plant to grow.)
- **What happens to the tomato plant during spring?** (The tomato plant begins to grow in the spring. It germinates and grows leaves and a stem. Then flowers bloom on the plant. These flowers may be pollinated.)
- **What happens to the tomato plant during summer?** (The flowers develop into green fruit. The fruit grows and ripens in the summer, eventually forming red, ripe tomatoes.)
- **What happens to the fruit?** (It can be picked and eaten. Fruit that is not eaten will fall to the ground.)
- **What happens in winter and fall?** (The tomato plant turns brown and dies.)



Any seeds that fell to the ground inside the tomatoes may become dormant and sprout new tomato plants in spring.)

If possible, take a nature walk outdoors in a place with a variety of plants. Take note of different plants you see and describe what stages of their life cycle they are at. Invite an Elder or Indigenous Knowledge Keeper from a local Indigenous group to participate in this walk and talk about how the life cycle of plants affected or influenced traditional activities.

CONNECT

Life Cycle Sequencing

Source online photos of the stages of different plant life cycles. You may wish to consider using the following plants:

- tomato plant
- apple tree
- bean plant
- iris
- dandelion

Cut out the images of the stages and put them in envelopes.

On the day of the activity, show a time-lapse video of a plant life cycle. (There are many available online; try searching for “sunflower life cycle time lapse.”) Show the video all the way through, and then replay it, pausing at each stage. Have students describe what is happening each time you pause the video. Next, put students in groups. Distribute the envelopes and have students sequence the stages and justify their choices based on observations they have made of plants in the classroom and outside, plants in books, and plants in the video you showed.

Flower Part Displays

Bring in several different flowers that have large stamens and pistils, such as lilies, tulips, or buttercups. Have students draw or take photos of the intact flower, and then pull off the individual parts. They can mount and label the parts. Have students describe to other classmates what the role of each part is in making seeds. Add “stamen” and “pistil” to the Word Wall.

Sock Walk

Invite students to bring in an old sock, preferably wool. Tell them they will be taking a “sock walk.” Have each student put on the old sock over one of their shoes. As a class, take a walk outside in a grassy area, preferably near trees and other plants. On returning to the classroom, have students use tweezers to remove the seeds from their socks and a magnifying glass to examine them on white paper. (Save one or two socks with seeds on them for the last part of the activity.) In groups, students can make sketches in their Science Journals of the seeds and make predictions about what plants each seed would grow into. Pool the seeds and sort them. Glue the seeds, in their categories, to a piece of white poster board. Groups of students can

IWB Activity:

- Students can use Activity 7: *Build a life cycle!* (see the Teacher's Website) to create the life cycle of a pumpkin plant.



Word





then research to see if their predictions about the identity of the seeds are correct.

Share pages 22–23 of the Student Magazine with students. Ask:

- **What is the benefit of seeds sticking to plants and animals?**
- **What are some other ways that plants get around?**
- **Why is it important that seeds are able to spread away from the parent plant?**

Help students connect back to plant needs. If plant seeds can spread, they will not be competing with their parent plant for sunlight, water, food, space, etc.

If time permits, plant the socks! Take the socks that were set aside and plant them in a large pot with soil and water. (Have students help decide how to plant the socks based on their knowledge of plant needs.) Place the pot in a sunny place and see if the socks sprout.



Literacy Place Connection:

Read or revisit *Life Cycle of a Plant* (Guided Reading, Level L). Discuss the life cycle with students. Review the life cycle of a sunflower shown in the Student Magazine on page 20 and have students compare the two life cycles. Ask:

- **How are they similar?**
- **How are they different?**

CONSOLIDATE

Plant Life Cycle Observations

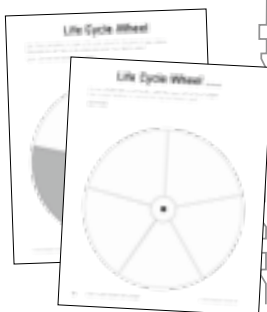
Students can use their observations of the plants they have been growing to produce a digital slide show telling about the life cycle stages of their plants. Students should include photographs and details of the observations they have made. They can include plans for further observation of their plant's life cycle, and predictions about what will happen next.

Plant Life Cycle Play

Place students in small groups. Have students write, practise, and perform a play that demonstrates the life cycle of a flowering plant of their choice.

Life Cycle Wheel

Have students use two pieces of card stock or paper plates and paper fasteners to make a labelled life cycle wheel for the plant of their choice. The bottom part of the wheel should show each stage. The top part of the wheel should include a window through which can be seen one stage of the life cycle at a time. (Use BLM *Life Cycle Wheel* as a template, if you





wish.) Students should research the life cycle of their plant in order to create accurate illustrations and labels. Students should decide on which five stages to include to show the life cycle. Completed life cycle wheels can be stored in the students' Science Folders.

EXPLORE MORE

Seed Vault

Have students research online to find out about the Svalbard Global Seed Vault. Students should find out the following about this seed bank:

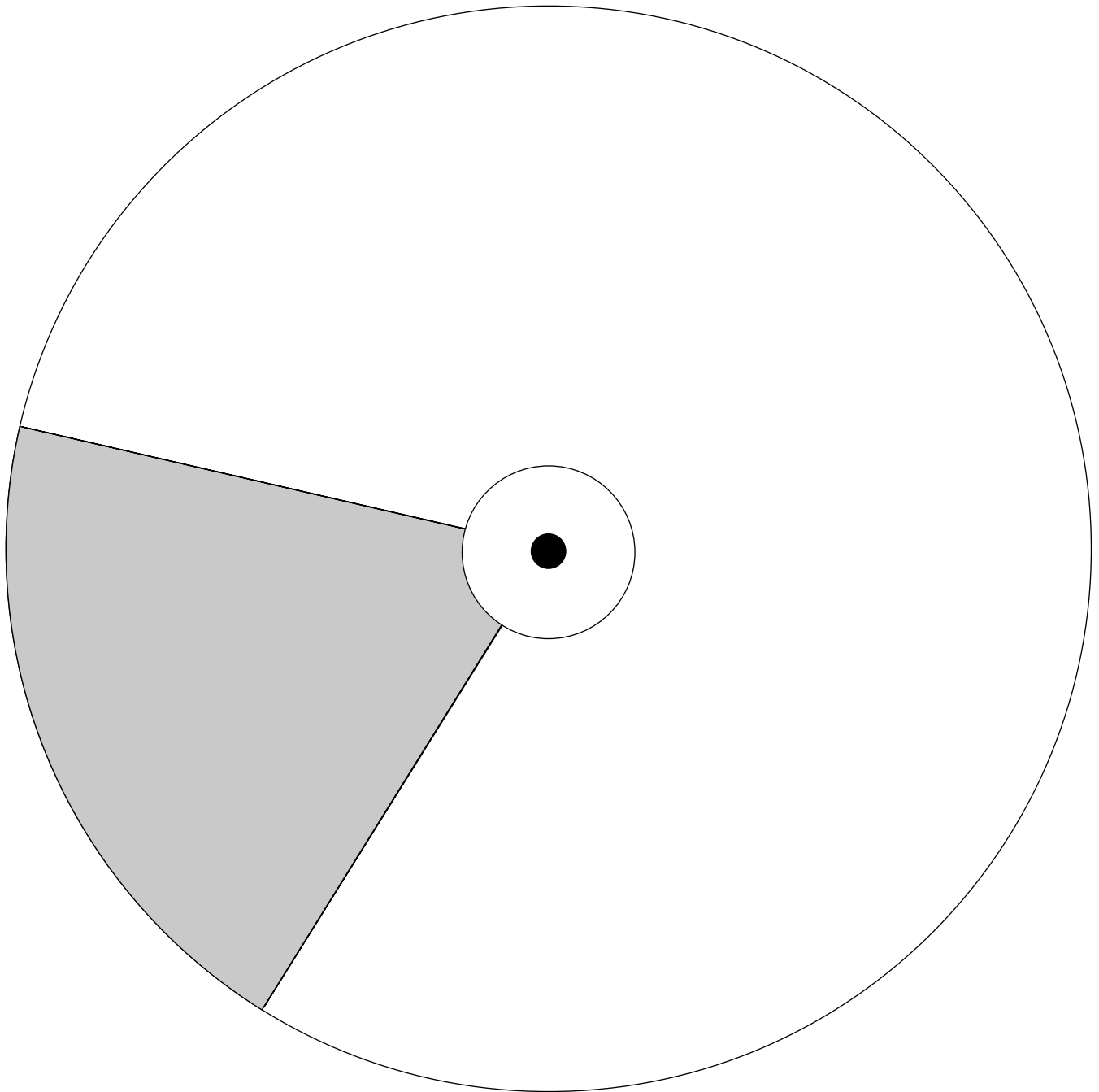
- **What is its purpose?**
- **Which seeds are preserved there and why?**
- **Where on the planet is it located? Why was it built there?**

Have students design their own mini-seed vault and present to the class to explain why they chose the seeds they did, as well as describe the purpose of the Svalbard Global Seed Vault and other seed banks.

Life Cycle Wheel

Use these templates to make a life cycle wheel for the plant of your choice. Decorate the top part of the wheel and write your plant's name.

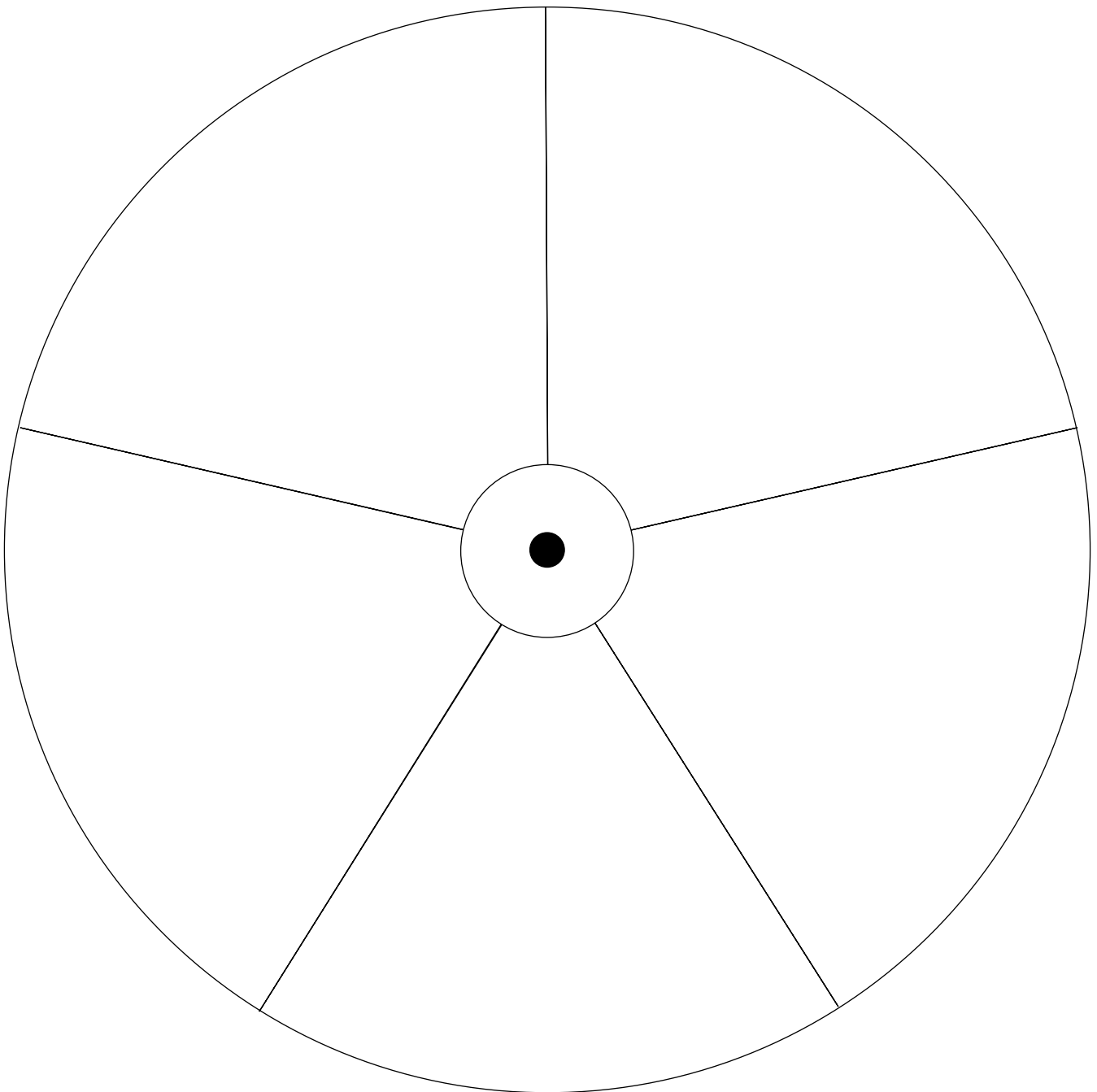
TOP: Cut out one section as shown.



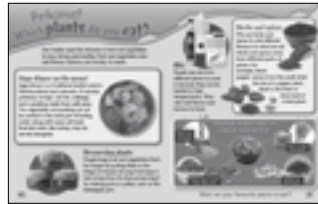
Life Cycle Wheel (Continued)

On the bottom part of the wheel, draw and label the life cycle stages.
Use a paper fastener to connect the top and bottom parts.

BOTTOM.



Why Are Plants Important?



Focus: Students explore the importance of plants to the environment, the ways in which humans use plants, and how we can conserve and replenish plants.

Specific Curriculum Outcomes

Students will be expected to:

- 49.0 describe ways in which plants are important to living things and the environment [GCO 1/3]
- 50.0 identify parts of different plants that provide humans with useful products, and describe the preparation that is required to obtain these products and how our supply of useful plants is replenished [GCO 1/3]

Performance Indicators

Students who achieve these outcomes will be able to:

- list ways in which plants support living things and the environment
- identify and describe useful products made from plants
- discuss how humans can support, conserve, and replace plants we use
- create a poster or collage highlighting how plants help living things and the environment

NOTES:

Attitude Outcome Statements

Encourage students to:

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

Cross-Curricular Connections

Math

It is expected that students will:

- construct, label, and interpret bar graphs to solve problems [3SP2]

English Language Arts

Students will be expected to:

- interact with sensitivity and respect, considering the situation, audience, and purpose [GCO 3]
- create texts collaboratively and independently, using a variety of forms for a range of audiences and purposes [GCO 9]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• Student Magazine, pages 24–31 • IWB Activity 8 • BLM <i>Plant Scavenger Hunt</i> • BLM <i>Plant Placemat</i> • IWB Activity 9 Literacy Place • <i>Explore! Magazine: Nature Up Close</i> (“Find the Products From Nature,” pp. 4–5, Shared Reading—Nature Watch Inquiry Unit) • <i>Solomon’s Tree</i> (Read Aloud—Making Connections Strategy Unit)	• plant-based products for artifact box, Curiosity Centre, and plant part activity: fruit, vegetables, spices, shampoo, perfume, elastic bands, cotton and hemp fabric, wooden items, paper items • freshly cut green leaves • large clear bowl • students’ Science Journals • large sheet of paper • construction paper for graph • plants for dyeing experiment (e.g., onion skins, tea, turmeric powder, avocado skins, beets, blueberries, and goldenrod) • cheesecloth • large pot • students’ Science Folders • digital camera (optional)	• Send a note home asking parents to send in white cloth items for dyeing such as socks, a T-shirt, or a tea towel. • Arrange for a visit from an Elder or Indigenous Knowledge Keeper from a local Indigenous group to discuss uses of local plants and seaweed.	

Safety

- If you do the dyeing activity, be very cautious working with large amounts of hot water.
- Be aware of any allergies students might have when adding materials to the Curiosity Centre or choosing plants to work with.

Science Background

- Plants are essential to all life on Earth. Here are some of the ways plants benefit the environment:
 - Air: plants release oxygen as a by-product of photosynthesis, replenishing the oxygen used by both animals and plants in metabolism.
 - Food: many animals, including humans, depend on plants for food. Animals that eat other animals depend on plants indirectly, since their food eats plants.
 - Water: plants help clean water and move water from soil into the atmosphere.
 - Soil: plant roots prevent erosion; dead plants form humus, enriching the soil.
 - Habitat: many animals depend on plants for shelter.
- Humans use plants in a huge variety of ways: for food and flavourings, for building, for dyes, fuels, fibres, gums and resins, medicines, and perfumes; and to add oxygen within buildings.
- Indigenous peoples made wide use of plants for food, medicine, shelter, and for tracking/hunting animals. They shared this knowledge with the early European settlers which helped them to survive in the new environment.
- Using plants responsibly means finding ways to replenish the plants we consume. For example, on a large scale, seedling trees can be planted to replace trees that have been logged. On a smaller scale, people can plant native plants, vegetable gardens, and trees on their properties.

Possible Misconceptions

- Students may not realize that plants use oxygen as well as produce it. Through photosynthesis, plants use sunlight, water, and carbon dioxide to make their own food—glucose. But like animals, plants use the energy stored as glucose through a process called respiration. In respiration, oxygen is consumed and carbon dioxide is released. However, plants produce more oxygen than they consume, and consume more carbon dioxide than they release, so the overall effect is that oxygen is released and carbon dioxide is consumed. Tell students that plants use energy to grow and do other functions, like animals, and they use oxygen for these processes.

ACTIVATE

Artifact Box

Fill a box with items that are either made of plants or include ingredients made of plants. Include obvious items such as fruit and vegetables, but also include items such as shampoo, spices, and elastic bands that students might not immediately associate with plants. You might check with a local Native Friendship Centre or Indigenous group or person to identify a local item that could be included.

As each item is revealed, ask students:

- **What is this object?**
- **How would you describe it?**
- **What is it used for?**
- **What is it made of?**

After discussing each item, display it on a table. Once all of the items have been displayed, ask students to tell you what they all have in common. Write their ideas on the board. Draw out the idea that all of the items are made of plants or have plant-based ingredients.

Allow time for students to read pages 24–25 of the Student Magazine then ask:

- **Which of these items do you use regularly?**
- **What other things do you use that are made of plants?**

Record students' ideas on the board and have students add any new questions to the I Wonder Wall.



Literacy Place Connection:

Read or revisit “Find the Products From Nature” from *Explore! Magazine: Nature Up Close* (Shared Reading). Challenge students to identify the products made from plants. How many can they find? (See the inside back cover of the magazine for answers.)

Curiosity Centre

Stock the Curiosity Centre with items made from plants. Include items made of cotton, hemp, wood, and paper. Include a variety of spices and herbs. Include dried vegetables and fruit. If possible, include items or models from Indigenous culture. Allow students time for exploration. Remind them to record their questions on the I Wonder Wall.



CONNECT

Bubbling Leaves: Oxygen

Place freshly cut green leaves in a large, clear bowl of water and leave them in the sunlight. Have students observe the leaves carefully. Ask students to predict what, if anything, will happen.

After an hour, have students examine the leaves again. Students should notice small bubbles at the edges of the leaves. Have students record their observations and possible explanations in their Science Journals. Ask:

- **What do you think is causing the bubbles to form?**





IWB Activity:

- Students can use Activity 8: *What is it made of?* (see the Teacher's Website) to match plants and the products made from them.



Students should already be familiar with the idea of photosynthesis. Remind students that through photosynthesis, plants use sunlight and carbon dioxide to make their own food. They give off oxygen, which is essential for humans and all other animals to breathe. Plants in the water also produce oxygen, which is used by fish and other animals that live underwater.

You may wish to explain to students that just like animals, plants also take in oxygen and give off carbon dioxide as they use the food they make. But overall, plants give off more oxygen than they take in.

Eat Your Veggies!

Share pages 26–27 of the Student Magazine with the class and discuss the various ways we use plants for food. Ask students to tell what vegetables they ate yesterday. As a class, brainstorm a list of vegetables. Then have each student tell his or her favourite vegetable on the list and make a checkmark beside the vegetable. Then, as a class, make a bar graph showing how many people in the class liked each one.

Ask students why it is important to eat vegetables. (Vegetables provide dietary fibre, vitamins, minerals, water, and energy.) Record students' answers. Encourage students to ask questions about why vegetables are important to eat and record these questions on the I Wonder Wall.

Dyeing Using Plants

Invite students to bring in old white T-shirts, tea towels, or other white cloth items. As a class, experiment with making dyes from plant materials. Onion skins, tea, turmeric powder, avocado skins, beets, blueberries, and goldenrod all make good dyes.

To make the dye, wrap the plant matter securely in a piece of cheesecloth and tie it shut. Put it in a pot of cold water along with the fabric to be dyed. Heat the contents to a simmer and keep simmering for several hours. (If it is not possible to do this in class, you could send dye bundles home with students with instructions for them to do the activity with an adult.) Check the colour of the cloth periodically by lifting it out of the dye with tongs. When the cloth is done, rinse it in warm water and allow it to air-dry. The leftover dye can be filtered, saved, and used again. Experiment with tie-dyeing effects!

CAUTION: Use caution when working with large amounts of hot water and take steps to avoid spills. Dyes may stain students' clothing so they should wear smocks or old clothes. The dyed cloth will likely not be colourfast and should not be washed with other items that may stain.



Plant Scavenger Hunt

Provide students with copies of BLM *Plant Scavenger Hunt*. Have them complete the BLM by doing a plant scavenger hunt at home with the help of a parent or guardian. Students should find two different examples at home of items made of plants or containing plant materials for each of the six categories:

- things to read (e.g., newspapers, books, and magazines, all made from paper and therefore trees)
- things to wear (e.g., jeans, T-shirts, socks, and dresses may all be made from cotton from the cotton plant)
- things to eat (e.g., fruit and vegetables and anything made from them; herbs and spices; oils; flour; sugar)
- hygiene products (e.g., shampoo containing herbal extracts; scented items containing floral extracts; soothing cream containing aloe)
- furniture (e.g., chairs and tables may be made from wood and therefore trees; furniture may also be made from rattan, made from palm stems)
- parts of your home (e.g., doors, trim, floors, and windows may all be made of wood)



In class, have students tell about what they found and make a class list of different items in the six categories. Completed BLMs can be stored in the students' Science Folders.

Seaweed Facts

If possible, arrange for an Elder or Indigenous Knowledge Keeper from a local Indigenous group to visit and discuss traditional uses of seaweed, as well as ways in which other plants are important to living things and the land and sea, according to traditional knowledge. Encourage students to ask questions.

After the visit, or as an alternative, share pages 28–29 of the Student Magazine to continue the discussion of seaweed. Emphasize the idea that most seaweed is not a true plant, but algae. However, it shares many similarities with plants. Perhaps most importantly, like plants, it takes in carbon dioxide and releases oxygen.



Tree Hunting

Ask students:

- **How do trees help the environment?**

Record students' answers. Then, go for a "tree hunt" in a place outdoors where a variety of trees can be found. Have students observe the trees and think about the ways they are interacting with the environment. Ask:

- **What are these trees doing for the air and earth around them?**
- **How are these trees being used by local animals?**



Students should record their observations and inferences in their Science Journals.



Back in the classroom, add to the existing list based on students' observations. Make a large tree out of construction paper and distribute leaves. On the leaves, students can write different roles of trees in the environment as well as ways people use trees (e.g., shade, animal habitat, soil drainage, supply of food for animals and people, paper, wood, and oxygen production). Ask students:

- **Why do people cut down trees?** (To make room for houses and farms; to make wood, paper, and other products)
- **How can we be more responsible about how we use trees?** (selective cutting instead of clear-cutting; replacing cut trees with seedlings; reducing our use of trees for paper and other uses)

Share pages 30–31 of the Student Magazine. Ask students to consider the uses of plants other than trees. For each plant suggested, ask:

- **How does this plant benefit the environment?**
- **How do people use this plant?**
- **How can we conserve this plant and replenish it when we use it?**

Record students' responses on a chart and add any questions to the I Wonder Wall.

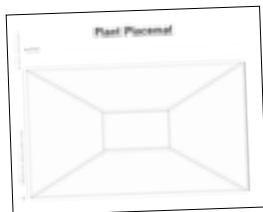


Literacy Place Connection:

Read aloud *Solomon's Tree* by Andrea Spalding and Janet Wilson. Ask:

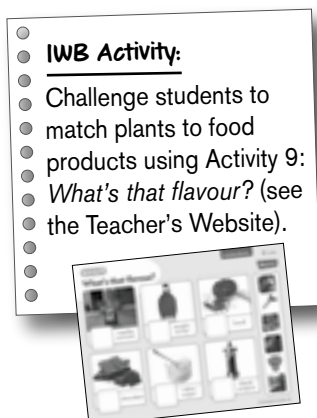
- **How do we know that trees are plants?**
- **How did Solomon's tree change through the seasons?**
- **What do the final words of the story ("A new beginning.") mean?**
- **How did Solomon feel about his tree?**
- **How do we know that it was important to him?**
- **Do you think Solomon saw the spirit of his special tree in the finished mask? How do you know?**

CONSOLIDATE



Placemat Activity

Divide the class into groups of four students and provide each group with BLM *Plant Placemat*. Each group member should think about ways that plants are important to the environment and record their main ideas in one section around the edge of the placemat BLM. As a group, students should agree on the three most significant ways that plants are important to living things and the environment and record these in the centre space. Display the placemats around the classroom.



What Plant Part Is It Made Of?

Bring out a variety of familiar plant parts and products made from plant parts. Ask students to identify what part of the plant they come from. Examples could include:

- carrot (root)
- apple (fruit)
- lettuce (leaf)
- cinnamon stick (bark)
- dried oregano (leaf)
- rose perfume (flower)
- wood (stem)

Assign groups of students plant parts (root, fruit, leaf, bark, flower, stem) and have them make a collage showing examples of products made from that part.

Growing Vegetables

Have students enlist the help of an adult to plant vegetables at home or in the school garden. Have them keep a record of their plantings using digital photography or a written journal with sketches, describing how the plants were planted and tended, tracking plants' growth, and eventually describing how they used the vegetables they grew.

EXPLORE MORE

Joseph Priestley's Candle Experiment

Have students research online to find out about Joseph Priestley's experiment involving a mint plant and a candle. In this experiment, which he carried out in 1771, Priestley put a mint plant in a sealed, clear container along with a burning candle. Eventually, the burning candle went out. About a month later, Priestley relit the candle without opening the container. (He did this by focusing sunlight on the candle wick.) The candle once again burned. This experiment showed that plants changed what was in the air.

Priestley's experiment led him to hypothesize that plants release something that animals need to breathe—the gas we now know as oxygen. Further experiments showed that a mouse kept in a sealed container with a plant would live longer than if there was no plant present. Because of his experiments, Priestley is considered by many to be the discoverer of oxygen.

If time permits, students can make diagrams or models to show what happened in Priestley's experiment.

WRAPPING UP THE UNIT



Revisit any remaining questions posted on the I Wonder Wall and have students discuss answers in small groups or with a partner. If there are questions that cannot be answered at the time, these can remain on the I Wonder Wall for students to research independently.

Discuss what students have learned about plant growth and changes, including parts of plants, how the life of a plant begins, what plants need, life cycles of plants, and how plants are important to people and the environment.

Plant Scavenger Hunt

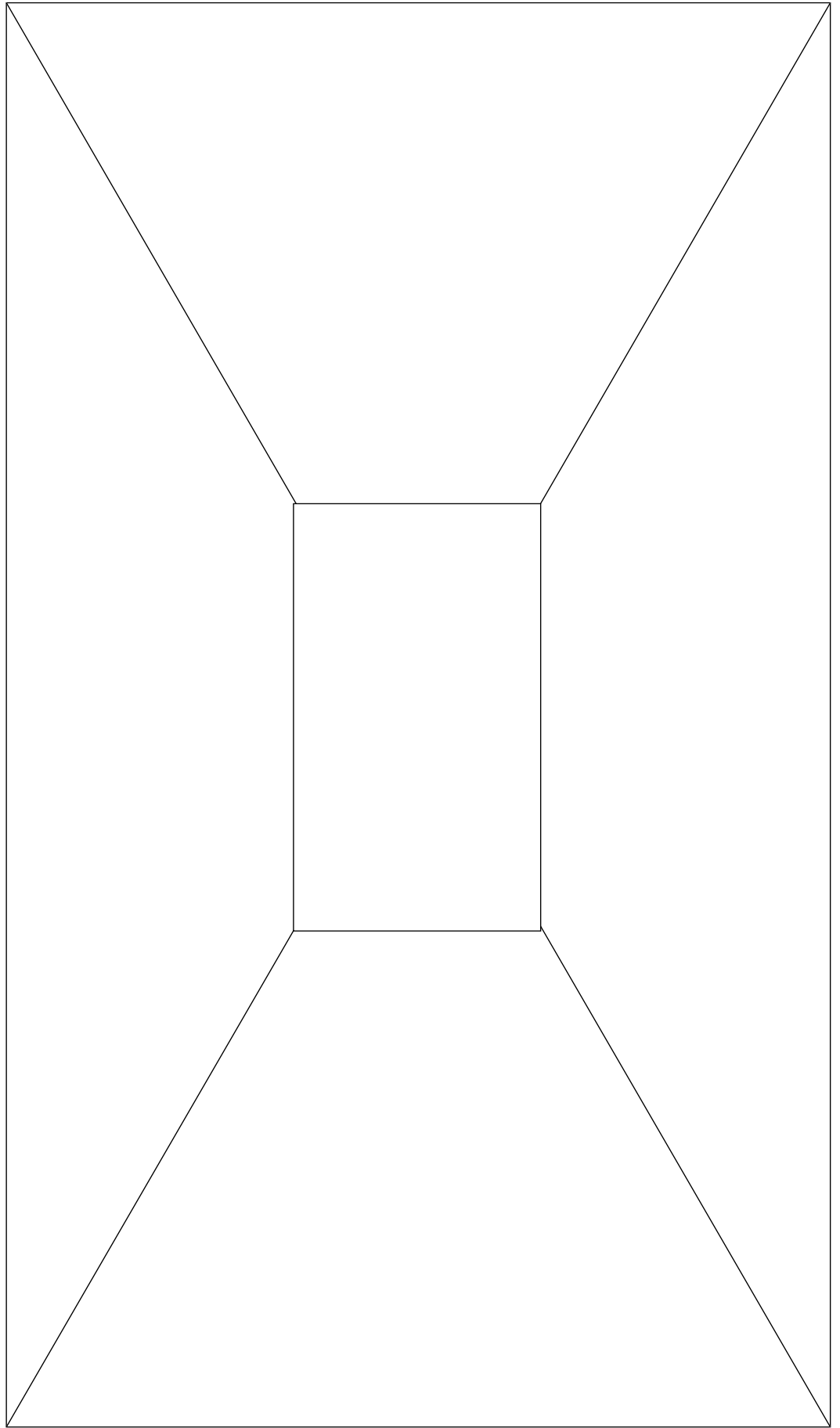
Name: _____

Search your home to find two examples of items made using plants for each category.

Things to read Item 1: What plant is it made from? Item 2: What plant is it made from?	Things to wear Item 1: What plant is it made from? Item 2: What plant is it made from?
Things to eat Item 1: What plant is it made from? Item 2: What plant is it made from?	Hygiene products Item 1: What plant is it made from? Item 2: What plant is it made from?
Furniture Item 1: What plant is it made from? Item 2: What plant is it made from?	Parts of your home Item 1: What plant is it made from? Item 2: What plant is it made from?

Plant Placemat

Names: _____



Specific Curriculum Outcomes Checklist

Name: _____ Date: _____

Rating: 1 – not evident; 2 – with assistance; 3 – mostly on own; 4 – on own consistently

Specific Curriculum Outcomes	Rating and Observations
45.0 identify and describe parts of plants and their general function [GCO 1/3]	
46.0 identify and investigate life needs of plants and describe how plants are affected by the conditions in which they grow [GCO 1/3]	
47.0 distinguish between useful and not useful information when answering a science question [GCO 2]	
48.0 observe and describe changes that occur through the life cycle of a flowering plant [GCO 1/3]	
49.0 describe ways in which plants are important to living things and the environment [GCO 1/3]	
50.0 identify parts of different plants that provide humans with useful products, and describe the preparation that is required to obtain these products and how our supply of useful plants is replenished [GCO 1/3]	
1.0 pose questions that lead to exploration and investigation [GCO 2]	
2.0 communicate using scientific terminology [GCO 2]	
10.0 make and record observations and measurements [GCO 2]	
11.0 construct and label concrete-object graphs, pictographs, or bar graphs [GCO 2]	
16.0 predict based on an observed pattern [GCO 2]	
22.0 identify and suggest explanations for patterns and discrepancies in objects and events [GCO 2]	
30.0 respond to the ideas and actions of others and acknowledge their ideas and contributions [GCO 2]	
32.0 follow safety procedures and rules [GCO 2]	

My Inquiry

Name: _____

My question:

My plan:

My results:

My conclusion:

How I will share what I learned:

Student Self-Assessment of Inquiry Process

Name: _____

Check the box that applies to each statement.

	I'll do better next time	Okay	Awesome
Step 1			
I asked a question.			
I made a plan.			
Step 2			
I followed my plan.			
I recorded my results.			
Step 3			
I thought about my results.			
I made a conclusion.			
Step 4			
I shared what I learned.			

Teacher Assessment of Inquiry Process

Name: _____ Date: _____

	1	2	3	4
Initiating and Planning				
• poses a question that leads to exploration or investigation				
• makes a prediction based on an observed pattern				
• makes a simple plan				
• identifies materials and suggests a plan for how they will be used				
Performing and Recording				
• carries out the plan/follows a simple procedure				
• uses appropriate tools				
• makes and records observations				
• estimates and records measurements				
• uses a variety of sources of science information and ideas				
• follows safety procedures and rules				
Analyzing and Interpreting				
• sequences or groups materials and objects				
• identifies the most useful method of sorting for a specific purpose				
• constructs and labels concrete-object graphs, pictographs, or bar graphs				
• identifies and suggests explanations for patterns and discrepancies in objects and events				
• distinguishes between useful and not useful information when answering a science question				
• proposes an answer to the initial question and draws a simple conclusion				
• poses new questions that arise from what was learned				
Communicating and Teamwork				
• communicates while exploring and investigating				
• communicates using scientific terminology				
• communicates procedures and results				
• responds to ideas and actions of others and acknowledges their ideas and contributions				

Comments:

Inquiry Process Rubric

	Level 1	Level 2	Level 3	Level 4
INITIATING AND PLANNING	talks about things that are of interest makes guesses about the outcome of an inquiry with prompting, offers ideas for a procedure with prompting, identifies some materials which could be used to carry out the plan	asks simple questions about objects and events that are observable makes simple predictions about the outcome of an inquiry, but they may be hoped-for outcomes contributes ideas for a procedure but they may not be complete identifies some materials and describes how they could be used to carry out the plan	uses observations to ask questions to investigate, but questions are not always realistic makes simple predictions about the outcome of an inquiry based on prior observations provides ideas for a simple procedure selects materials and describes how they will be used to carry out the plan	uses observations and prior knowledge to ask questions to investigate makes thoughtful predictions about the outcome of an inquiry based on prior observations and knowledge provides clear, sequential steps for a simple procedure selects appropriate materials to carry out the plan and explains reasons for choice
PERFORMING AND RECORDING	carries out the plan/ follows a simple procedure with prompting with prompting, uses some appropriate tools with assistance makes simple observations using senses and, with prompting, records observations in provided charts or in drawings needs help to estimate measurements and, with prompting, records simple measurements gets information from a teacher-chosen science source needs help to follow safety procedures and rules	carries out the plan/ follows most of a simple procedure selects and uses common tools makes some relevant observations using senses and records observations in provided charts or in drawings estimates measurements but units may not be appropriate, and records measurements which may be incomplete uses some relevant information from familiar science sources needs occasional prompting to follow safety procedures and rules	carries out the plan/follows a simple procedure selects and uses some appropriate tools makes relevant observations using appropriate senses and records observations using suitable method estimates measurements using appropriate units and records measurements accurately uses relevant information from science sources of the same type follows most safety procedures and rules	carries out the plan/ follows a simple procedure, making adjustments as necessary selects and uses all appropriate tools makes relevant, detailed observations using appropriate senses and chooses an effective method for recording observations consistently estimates measurements using the most appropriate units and records measurements accurately in a variety of ways uses relevant information from a variety of science sources follows all safety procedures and rules and explains why they are needed

Inquiry Process Rubric (Continued)

	Level 1	Level 2	Level 3	Level 4
ANALYZING AND INTERPRETING	sequences or groups materials and objects based on simple teacher-chosen attributes needs help to sort materials according to simple criteria with prompting, constructs a concrete-object graph, pictograph, or bar graph with prompting, identifies some patterns and discrepancies in objects and events with prompting, distinguishes between some useful and not useful information when answering a science question describes what happened with prompting, identifies some new questions but they may not be about this inquiry	sequences or groups materials and objects based on a few simple attributes sorts materials according to some of the criteria constructs a concrete-object graph, pictograph, or bar graph but title and labels may be missing or inappropriate identifies and suggests simple explanations for some patterns and discrepancies in objects and events distinguishes between some useful and not useful information when answering a science question but not all information may be relevant draws a simple conclusion based on observations but may not link conclusion to the initial question identifies some simple new questions on the topic of this inquiry	sequences or groups materials and objects based on multiple attributes identifies a method of sorting materials according to the criteria constructs a concrete-object graph, pictograph, or bar graph with appropriate title and labels identifies and suggests explanations for most patterns and discrepancies in objects and events focuses on relevant information and distinguishes between useful and not useful information when answering a science question draws a conclusion based on observations which link to the initial question identifies some new questions on the topic of this inquiry that could be investigated	accurately sequences or groups materials and objects based on multiple attributes identifies the most useful method of sorting materials according to the criteria constructs a concrete-object graph, pictograph, or bar graph with appropriate title and labels to accurately reflect results identifies and suggests clear explanations for patterns and discrepancies in objects and events consistently distinguishes between useful and not useful information by focusing on strictly relevant information when answering a science question draws a conclusion based on observations and states if it supports or refutes their prediction identifies new questions on the topic of this inquiry and suggests how they could be investigated

Continued on next page...

Inquiry Process Rubric (Continued)

	Level 1	Level 2	Level 3	Level 4
COMMUNICATING AND TEAMWORK	willingly asks for help and accepts help from other group members understands some scientific terminology but rarely uses it with prompting, describes the result and some of the procedures listens to others and learns from their observations	makes suggestions to group members as to what should be done understands simple scientific terminology but does not always use it correctly communicates basic information about the result and most of the procedures listens to others and learns from their observations, and draws on their language use	communicates with group members, sometimes with problems usually uses scientific terminology appropriately communicates most of the information about the result and procedures considers and responds to the ideas of others and learns from their observations and descriptions	communicates and works effectively with group members consistently uses scientific terminology appropriately accurately communicates the information about the result and procedures considers and responds to the ideas of others and applies the observations and descriptions to their own ideas and understandings

Additional Resources

Non-fiction Books

- Be a Friend to Trees* by Patricia Lauber (HarperCollins, 1994)
- Fascinating Science Projects: Plants* by Sally Hewitt (Copper Beech Books, 2002)
- From Seed to Plant* by Gail Gibbons (Holiday House, 1993)
- From Seed to Pumpkin* by Wendy Pfeffer (HarperCollins, 2015)
- Make It Work: Plants* by Andrew Haslam, Claire Watts, Alexandra Parsons, and Wendy Baker (World Book Inc, 1997)
- One Bean* by Anne Rockwell (Walker Childrens, 1999)
- Pick, Pull, Snap! Where Once a Flower Bloomed* by Lola Schaeffer (Greenwillow Books, 2003)
- Planting a Rainbow* by Lois Ehlert (HMH Books for Young Readers, 2003)
- Plants: A Resource Our World Depends On* by Ian Graham (Heinemann-Raintree, 2005)
- Plants* by Jonathan Bocknek (Weigl Publishers, 2007)
- Plants* by the Ontario Science Centre and Ray Boudreau (Kids Can Press, 1998)
- Plants* by Kathryn Williams (National Geographic Children's Books, 2017)
- A Tree Is a Plant* by Clyde Robert Bulla (HarperCollins, 2016)
- The Vegetables We Eat* by Gail Gibbons (Holiday House, 2008)

Picture Books

- The Dandelion Seed* by Joseph Anthony (Dawn Publications, 1997)
- The Enormous Turnip* by Alexei Tolstoy (HMH Books for Young Readers, 2003)
- The Giving Tree* by Shel Silverstein (Harper & Row, 1964)
- Jack's Garden* by Henry Cole (Greenwillow Books, 1997)
- The Magic School Bus Plants Seeds* by Patricia Relf, Joanna Cole, and John Spiers (Scholastic, 1995)
- Picture a Tree* by Barbara Reid (North Winds Press, 2011)
- The Tiny Seed* by Eric Carle (Simon & Schuster, 1991)
- To Be Like the Sun* by Susan Marie Swanson (HMH, 2008)
- Tops and Bottoms* by Janet Stevens (HMH Books for Young Readers, 2001)
- The Tree* by Dana Lyons (Hushion House, 2002)

Websites for Students

General

Science Kids

www.sciencekids.co.nz

Science for Kids Club

<http://www.scienceforkidsclub.com/plants.html>

Brainpop

<https://www.brainpop.com/>

Wonderopolis

<https://wonderopolis.org/>

Plant Life Cycles

Bitesize Science—Plant Life Cycles

http://www.bbc.co.uk/bitesize/ks2/science/living_things/plant_life_cycles/read/1/

Time-lapse video of a sunflower growing from seedling to flower stage

<https://www.youtube.com/watch?v=Z-iPp6yn0hw>

Time-lapse video showing germination of a runner bean

<https://www.youtube.com/watch?v=oDBX2gCXxYw>

Websites for Teachers

General

Science A-Z

<https://www.sciencea-z.com/>

Kidsgardening.org—Resources for creating gardening programs in the classroom

<https://kidsgardening.org/educator-resources/>

Tomatosphere—A program for learning about plants in space, right here on Earth

<http://tomatosphere.org/>

Plants of Newfoundland and Labrador

A Digital Flora—Images of vascular plants of Newfoundland and Labrador

<http://www.digitalnaturalhistory.com/flora.htm>

Northern Bushcraft—Wild Edible Plants of Newfoundland

http://northernbushcraft.com/guide.php?ctgy=edible_plants®ion=nl

Plantwatch—Learn about the Plants of Newfoundland and Labrador

<https://www.naturewatch.ca/plantwatch/newfoundland-and-labrador/>

The Wildflower Society of Newfoundland and Labrador—Information and galleries of photos of NL wildflowers

<http://www.wildflowersocietynl.ca/news/news.html>

Sciencing—Plant Adaptations in the Tundra

<https://sciencing.com/plant-adaptations-tundra-8042887.html>

Plant Facts

The Canadian Encyclopedia—Botany

<http://www.thecanadianencyclopedia.ca/en/collection/botany>

National Geographic News—Weird Plants

<http://news.nationalgeographic.com/news/2003/08/photogalleries/weirdplants/index.html>

The Science of Tree Rings

<http://web.utk.edu/~grissino/>

Arbor Day Foundation—Trees

<https://www.arborday.org/trees/>

Dear parents and caregivers,

We are about to start a new unit in science in which we will be exploring plant growth and changes. Through a variety of hands-on activities and investigations, your child will be learning about how plants grow and change, why plants are important, and how people can help plants.

You can talk to your child at home about plants. At mealtimes, ask your child to identify the different plants that make up the meal. When walking outside, point out different kinds of plants that you see. Talk to children about the plants used to make the things they use every day, such as the cotton used to make jeans, the trees used to make wooden and paper items, plant oils in soaps and shampoos, and plants used to make dyes.

You can plan some activities with your child to focus on plants, for example:

- Grow plants from seeds either indoors or outdoors.
- Visit a local park or garden and make a list of all the plants you see.
- At the grocery store, let your child choose two or three fruits or vegetables that you would not normally try.
- Visit a garden centre and let your child take pictures of interesting plants you see.
- Let your child help you plan and cook a meal that includes three or more fruits or vegetables.
- Work with your child to make a plan to reduce your use of paper products in your household.

To ensure a wide range of experiences and make connections between this topic and your child's world, he/she may choose to bring one or more personal items to school for exploration during in-class activities. These items will be returned home once explorations are completed. To determine whether the item(s) is appropriate please contact me, your child's teacher.

Sincerely,



Grade **3** Components

- **Overview Guide**
- **Read Aloud Collection**
- **4 Unit Guides**
- **4 Student Magazines**
- **Science Library Collection and Guide**
- **Teacher's Website**
 - Interactive Whiteboard Activities
 - 4 Anchor Videos
 - Image Bank
 - Digital version of: Overview Guide, 4 Unit Guides, 4 Student Magazines, and Science Library Guide
- **2 Classroom Posters**
 - What Is the Inquiry Process?
 - What Is the Design Process?



 **SCHOLASTIC**
Education