

Anglophone School District - North



Grade 3 Science - Unit Lesson Guide

Plant Growth and Changes

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The Aim of Science Education - Scientific Literacy

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

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

The Three Processes of Scientific Literacy

An individual can be considered Scientifically Literate when he/she is familiar with, and able to engage in, three processes: Inquiry, problem solving, and decision making.

Inquiry

Scientific inquiry involves posing questions and developing explanation for phenomena. While there is a general agreement that there is no such thing as the scientific method, students require certain skills to participate in the activities of science. Skills such as questioning, observing, inferring, predicting, measuring, hypothesizing, classifying, designing experiments, collecting data, analysing data, and interpreting data are fundamental to engaging science. These activities provide students with opportunities to understand and practise the process of theory development in science and the nature of science.

Problem Solving

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

Decision Making

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

Science Assessment Overview

Science is a hybrid term that houses different disciplines such as: Physics, Chemistry, Biology, Environmental Studies, Engineering, Math, etc. Given this broad spectrum, it is not realistic that we can paint science assessment with a single brush in terms of probes that work for every science activity. However, regardless of school subject, let alone science, the frequency of assessment should be unbalanced with formative assessment occupying 80% of practise and summative with the remaining 20%.

80% Formative - 20% Summative

Formative Assessment

Formative assessment is a range of formal and informal assessment procedures employed by teachers during their learning process in order to modify teaching and learning activities to improve student attainment. It typically involves qualitative feedback (rather than scores) for both students and teacher that focuses on the detail of content and performance. Feedback is the central function of formative assessment. It typically involves a focus on the detailed content of what is being learnt.

Science Formative Assessment falls into 2 distinct categories, and they are divided about how feedback is given. Please be aware that an activity could be informal or formal, it is the purpose of the task that determines purpose.

Informal Formative

Informal Formative Science Assessment acts as a monitoring probe and is distinct because it is not graded.

Formal Formative

Formal Formative Science Assessment provides specific feedback to students, the teachers corresponds via anecdotal feedback, rubrics, and written responses to offer progress to student attainment.

Summative Assessment

Summative assessment seeks to monitor educational outcomes, often for the purposes of external accountability. Usually occurring at the end of a learning unit and determines if the content being taught was retained.

Plant Growth and Changes

Focus and Context

This unit starts off with an inquiry focus, as students investigate how various conditions affect plant growth, and explore the life cycles of plants. The unit then proceeds to introduce technologies that provide products and processes using plants to meet the needs of people.



Unit Instructional Overview

Investigating Germination and Growing Conditions for Plants*	The Life Cycle of a Plant	Uses for Plants
Access Prior Knowledge	Investigation - Option A - Long-term Flowering plant Option B- Tomatosphere	Lesson 1 - Importance of Plants
1st Cycle - Activity - Seeds		Lesson 2 - How Humans use Plants
2nd Cycle - Activity - Planting Seeds and Growing Plants		
3rd Cycle - Activity - Traveling Seeds		

* - EECD Grade 3 Inquiry package - available at <https://portal.nbed.nb.ca/tr/lr/k-8Science/Pages/default.aspx>

Plant Growth and Changes- Curriculum Outcomes

Investigating Germination and Growing Conditions for Plants	The Life Cycle of a Plant	Uses for Plants
202-2 Place seeds in groups according to one or more attributes	100-30, 201-5 Observe and describe changes using written language, pictures, and charts, that occur through the life cycle of a flowering plant	102-12 Describe ways in which plants are important to living things and the environment
200-1 Ask questions to investigate related to growing conditions for plants	201-6 Estimate measurements of the plant as it grows	102-13 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
200-3 Make predictions about which conditions will be the best for plant growth		
201-5 Make and record relevant observations and measurements of plant growth during their investigations		203-5 Respond to the ideas and actions of others and acknowledge their ideas about the uses and replenishing of plants
202-4 Construct and label bar graphs that show plant growth under different conditions		
100-29 Draw inference that identify and investigate life needs of plants and describe how plants are affected by the conditions in which they grow		
202-5 Identify and suggest explanations for patterns and discrepancies in the growth rate of similar plants grown in varying conditions		
100-28, 203-2 Identify and suggest explanations for patterns and discrepancies in the growth rate of similar plants grown in varying conditions.		

Plants Growth and Changes

Strand - Investigating Germination and Growing Conditions for Plants

General Curriculum Outcomes	Specific Curriculum Outcomes
202-2 Place materials and objects in a sequence or in groups according to one or more attributes	202-2 Place seeds in groups according to one or more attributes
200-1 Ask questions that lead to exploration and investigation	200-1 Ask questions to investigate related to growing conditions for plants
200-3 Make predictions, based on an observed pattern	200-3 Make predictions about which conditions will be the best for plant growth
201-5 Make and record relevant observations and measurements, using written language, pictures, and charts	201-5 Make and record relevant observations and measurements of plant growth during their investigations
202-4 Construct and label concrete-object graphs, pictographs, or bar graphs	202-4 Construct and label bar graphs that show plant growth under different conditions
100-29 Draw inference that identify and investigate life needs of plants and describe how plants are affected by the conditions in which they grow	100-29 Draw inference that identify and investigate life needs of plants and describe how plants are affected by the conditions in which they grow
202-5 Identify and suggest explanations for patterns and discrepancies in observed objects and events	202-5 Identify and suggest explanations for patterns and discrepancies in the growth rate of similar plants grown in varying conditions
100-28 Identify and describe parts of plants and their general form	100-28, 203-2 Identify and suggest explanations for patterns and discrepancies in the growth rate of similar plants grown in varying conditions.
203-2 Identify common objects and events, using terminology and language that others understand	

Science Resource Package: Grade 3

***Plant Growth and
Changes: Investigating
Germination and
Growing Conditions for
Plants***

New Brunswick Department of Education

December 2009

Instructional Plan

Access Prior Knowledge

Ask students to bring a plant or a picture of a plant from home. You may want to specify that it can be part of a plant so you do not end up with 30 potted plants or phone calls from parents.

Put students into small groups to share their samples with a partner and talk about similarities between their plant samples.

With their partners, they will make a list of the similarities.

Then have students share with the whole class and record the information in a class chart or tally table. As each similarity is shared the teacher could ask: *How many of you have plants with . . . ?*

A possible start to a tally chart:

Has brown stem	
Has green stem	
Has small leaves	
Leaves have teeth	
Has a flower	
Was found inside the house	

Bring in different samples like pineapples, moss, dulse, etc. Ask: *Are these plants? What makes a plant a plant?*


Ask the students which samples are whole plants and which are parts of a plant. How can they tell the difference?

✓ Assessment:

Note the concepts and misconceptions students are expressing. You will need to know these to plan effective questions for subsequent activities and discussions so that students will examine and adjust their alternate conceptions.

The idea of what makes a plant a plant can be extended by using the video “Plant Parts and Their Uses” from <http://learning.aliant.net/>. Use this as an introduction and do not expect that students will understand all the details. Ideas and terms are introduced that will be addressed throughout the plant unit.

To access the video, type the title into the search box. Videos are available free of charge at this site. You will need to register, however registration is free. If you try to watch the video without logging in, you will be prompted to do so. Note that a table of contents opens beside the video so that you may select only certain sections for viewing if you wish. There is also an option to watch the video full screen.

 **Post student versions of curricular outcomes on chart paper (see page 23 of EECD Plant Growth and Changes document). Inform students that these outcomes will be addressed over the next portion of the unit. Point out to students which outcomes are being addressed in each activity.**

1st Cycle

✪ Curriculum Outcomes

- | 100-28 Identify and describe parts of plants and their general function
- | 201-5 Make and record relevant observations and measurements, using written language, pictures, and charts
- | 202-2 Place materials and objects in a sequence or in groups according to one or more attributes
- | 203-2 Identify common objects and events, using terminology and language that others understand
- | 203-5 Respond to the ideas and actions of others and acknowledge their ideas and contributions

As part of this unit, Jack and the Beanstalk or other fictional stories with plants and seeds could be read.

Provide students with a baggie and ask them to collect seeds from home. A sample letter can be found on page 24 of EECD Plant Growth and Changes document. Seeds may come from house plants, weeds, bushes, or trees outside, or from fruits and vegetables. The following activities can be done in sequence or as stations.

Activity - Seeds

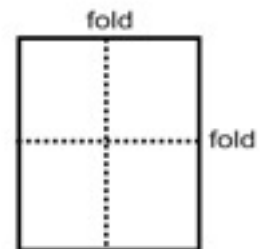
Materials:

- A variety of seeds in each bag
- White Paper
- Pictures of seeds
- Pencil
- Seeds that have been soaked overnight such as soldier beans, pumpkin seeds, sunflower seeds, orange seeds

Part 1

Have students work in pairs or small groups to develop a sorting rule for sorting their bag of seeds. Examples may include: Size, shape, colour, and appearance.

They should draw how they grouped their seeds and label each group with the sorting rule(s). One recording method is to have students fold a piece of paper in half twice to create four sections. Each section can be labelled with the sorting rule and the seeds that follow that rule drawn in that section. If there are less than four groups of seeds, a section can be used for a title or left blank. If there are more than four groups, use a second sheet of paper.



✓ **Assessment:**

Look at the sorting rules developed by each group. Do they understand that different plants have different seeds?

Storage options for foldables:

- Insert into a large zippered plastic bag. The bag can be hole-punched and put inside a duotang or binder. A strip of wide tape folded over the left edge of the bag before punching the holes will keep the bag from ripping
- Glue into notebooks or duotangs
- Display them on bulletin boards

Part 2

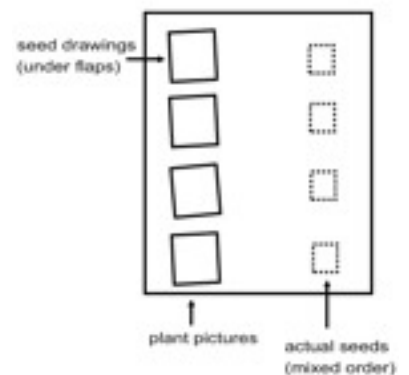
Students will make a matching game they can share with other students. Have students find pictures on the Internet or in magazines of the plant that makes the seeds they have in their bag.

On a piece of paper, students will glue just the top edge of the pictures down the side of one page (this creates a flap).

Underneath each picture, they can write the name of the plant and draw a picture of the seed.

Across from each picture, draw a box to place or glue each seed. As this is to be a matching game, the seeds are placed in a different order from the pictures. A piece of yarn can be glued near each picture and used by the students to match the picture with its seed.

To find out if they matched the plants and seeds correctly, they can lift the picture flap to see a picture of the seed.



✓ **Assessment:**

Do students understand that plants grow from seeds? And that plants produce seeds that can grow into plants?

Part 3

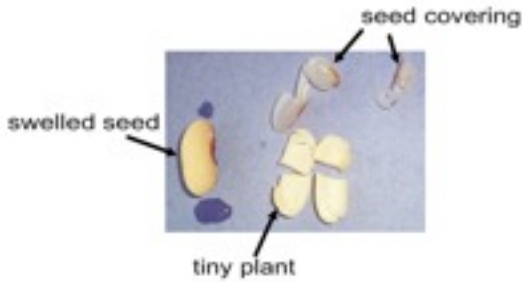
Soak beans in a bowl of water overnight. The next morning they should have swelled and be easy to split.



Soldier beans:
swelled and dried

Have students remove the outer covering and, then split the seed in half to examine the inside of the seed. Magnifying glasses should be provided. Can students find anything inside? Do seeds have

different parts? should be able to see the tiny plant (embryo) and stored food.



Try out different types of seeds to see if they will also work (e.g. sunflower seeds, pumpkin seeds, or orange seeds)

Have students draw and label the contents of each seed.

✓ **Assessment:**

Have students been able to identify the tiny plant in the seeds?

✓ **Assessment:**

During the student activity, make notes on outcomes (or parts of outcomes) you observe being addressed. Process skill outcomes are part of the curriculum and should be assessed. Using the observation chart or the checklist (see pages 27 to 29) on a clipboard may be helpful to you. Develop your own code for quick notes.

A suggested code:

- ✓ for observed and appropriate,
- WD with difficulty,
- A absent.

This chart may be used on multiple days, using a different coloured pen or pencil each day and putting the date in the corner. You may not have a symbol or note for every child every day. Some teachers like to focus on a group or two each time. However you choose to record your observations, you will always have a sense of who you need to take more notice of and who might need extra support. The information will also help you when it is reporting time.

Reflection: Class Discussion

- Introduce vocabulary associated with this topic as necessary (plant and seed).
- Have groups share their sorting rules.

Ask: *How are each group's rules similar? Different?*

Are there advantages to one way of grouping over another? What characteristics of seeds do you think are important to notice?

- Have groups share their matching games.
- *What kinds of plants do the different seeds come from?*
- *Do small seeds make small plants? Do big seeds make big plants?* (The size of the seed does not always determine the size of the plant.)
- Have groups share what they observed inside seeds.
- *What is inside of seeds?*
- Revisit the Accessing Prior Knowledge activity (page 5). Ask: *Are there any items that should be added to or revised. Is there other information we could add?* Students may identify some of their samples as particular parts of the plant or know what kinds of seed they make after doing the 1st Cycle. Remind your class about respectful discussion. The discussion tips on pages 20-21 of EECD Plant Growth and Changes document may be helpful.

Reflection: Journaling

Draw a picture of one seed you brought in (or one examined in the classroom) and the plant that it came from. What is this plant used for? (For example: to give shade, to eat, is a weed) Use words to describe the seed and the plant.

✓ **Assessment:**

Journal entries should not receive a score or mark. A positive comment followed by a question to refocus attention or suggest the next step in learning is very effective.

Note whether students can identify what plant the seed came from even if it is vague such as my mom's plant or our dinner. Are students able to identify if and how the plant is used?

2nd Cycle

Curriculum Outcomes

- | 100-28 Identify and describe parts of plants and their general function
- | 100-29 Identify and investigate life needs of plants and describe how plants are affected by the conditions in which they grow
- | 100-30 Observe and describe changes that occur through the life cycle of a flowering plant
- | 200-1 Ask questions that lead to exploration and investigation
- | 200-3 Make predictions, based on an observed pattern
- | 201-5 Make and record relevant observations and measurements, using written language, pictures, and charts
- | 201-6 Estimate measurements
- | 202-4 Construct and label concrete-object graphs, pictographs, or bar graphs
- | 202-5 Identify and suggest explanations for patterns and discrepancies in observed objects and events
- | 203-2 Identify common objects and events, using terminology and language that others understand
- | 203-5 Respond to the ideas and actions of others and acknowledge their ideas and contributions

Students will plant seeds under different conditions and compare their growth to that of controls (the plants taken care of “properly”) to determine what affects plant growth.



Activity: Planting Seeds and Growing Plants

Materials:

Various seeds such as beans, sunflower seeds, pumpkin seeds, orange seeds

Bowl

Water

Magnifying glass

Paper towel

Tweezers

Cups for planting seeds (Will want containers to all be the same for a fair test)

Fertilizer

Measuring cups for water

Camera for pictures of progress

Rulers

As a class, brainstorm what conditions plants need to grow. For example: specific amounts of light, soil, water, temperature, air, different containers, size of containers, drainage.

i Teacher note: As an alternative to growing seeds/plants in soil, seeds can be placed on a wet paper towel and put into a clear plastic container. Students can observe what is happening. This could also be used as an option for students who would like to test if soil is necessary for growing plants.

Ideally, each group should have a control and another pot that will be tested. Every control in the class should be treated the same. For example, how much water they receive, where the pots are placed for light, the temperature, the amount of soil, and how deep the seed is planted should be consistent for all controls.

If you are very limited for space in your classroom, several seeds could be planted and used as the “controls” for the entire class, then each group can choose what they would like to do with their own pots.

Ask students to predict how long it will take for them to see their plants start to grow (sprout). A student sheet this prediction as well as for stating what they plan to do with their plants can be found on p. 25 of EECD Plant Growth and Changes document.

Have students check their seeds/plants every other day. Have students keep a journal or provide students with the table on p. 26. They will record their observations by drawing, writing, and with measurements. One space is for a drawing, another for a description and another to measure the height of their plants once they start to grow. If you or the students grow a plant using a wet paper towel instead of soil, the length of the root can also be measured. Have students label their diagrams (root, sprout, stem, leaves, etc.)

Group observations or pictures of the pots (drawings or digital photos) could be mounted on the wall either individually or as a class table allowing everyone to see changes or progress under different conditions.

At the end of the activity, students can construct a bar graph showing the growth of their plants under different conditions.

✓ Assessment:

On observation chart (or other record), note how students are performing on the skill outcomes.

Reflection: Class Discussion – Ongoing

Note that there will be opportunities to have some discussions throughout the growing process. Student thinking should be recorded on charts or in other ways that allow ideas to be revisited.

Clarify the plant parts (root, stem, leaf, flower) and their functions as the plants grow and ask students to predict what they will see the next time they make observations. These can be made as a class or as individuals. To reinforce that plants have all these parts, at the following site a plant can be created by selecting all the necessary parts <http://virtualmuseum.ca/Exhibitions/Flora/english/games.html> choose Create-a-Plant.

The information from this website <http://www.primaryresources.co.uk/science/plants.htm> could be posted in the classroom or done as a foldable with one flap for each plant part. The name of the part could be written or a picture could be drawn on the flap and a simplified or shorter description than that on the website written under the appropriate flap.

Reflection: Class Discussion – End of Cycle

For discussions at the end of the growing process, bar graphs and pictures generated by students can be used to help students determine the answers to the questions below.

Results that appear not to agree are excellent for getting rich discussion among your students. *Why do you think that happened? What could we ask that would help us know what is happening?* Being able to generate questions is an important scientific skill. As a class you may want to conduct further investigations to find the answers. One example would be if experimental plants (i.e. non-control plants) can be “rescued” by proper treatment.

- *What factors affected plant growth? Can we make a list of what is needed?*
- *Which conditions do you think make the plants grow better?*
- *Do different plants prefer different conditions?*

There is a simulation at <http://www.explorelearning.com/index.cfm?method=cResource.dspResourcesForCourse&CourseID=355> which will allow your class to simulate growing plants under various conditions. The factors that may be varied are the kind of seed, the amount of water, light, fertilizer, and compost. Search for “Growing Plants”. *Do the results agree with your classroom results?*

The “Gizmo” site allows unregistered users to run each Gizmo for 5 minutes a day. It is also possible to sign up for a free trial. Membership is not free.

Ask students to name some of their favourite fruits and vegetables. Do they know where they are grown? Why are some plants only able to grow in other parts of the world or under very special conditions here?

This website has a section concerning plant adaptations <http://www.mbgnet.net/bioplants/adapt.html>

Clicking on the picture brings up more specific information about that type of area, adaptations plants have to live there, as well as a few pictures. The extra information is good, but too detailed for students. If you choose to use this site with the students, focus on one or two specific conditions, such as very little precipitation in the desert, and plants having needles rather than leaves to save water.

Revisit the Accessing Prior Knowledge activity. Ask: *Are there any items that should be added to or revised. Is there other information we could add?* Remind your class about respectful discussion. The discussion tips on pages 20-21 of EECD Plant Growth and Changes document may be helpful.

The video “Plant Life Cycles” from <http://learning.aliant.net/> may be useful at this point. To access the video, type the title into the search box. Videos are available free of charge at this site. You will need to register, however registration is free. If you try to watch the video without logging in, you will be prompted to do so. Note that a table of contents opens beside the video so that you may select only certain sections for viewing if you wish. There is also an option to watch the video full screen.

Reflection: Journaling

Elizabeth tried to grow a cactus in the same way she grew a bean plant. She watered it with 2 scoops of water every day. The cactus didn't grow. What should she have done differently to make it grow? Why?

✓ **Assessment:**

Journal entries should not receive a score or mark. A positive comment followed by a question to refocus attention or suggest the next step in learning is very effective.

Note whether students can explain that different plants grow under different conditions.



Think like a scientist

Asking good questions is an important skill in science. Initially students will need support. Model the skill with the whole class and students will begin to have the confidence to contribute. After some practice, students will be able to generate questions successfully individually.

Present students with a situation and ask them to generate questions that could be investigated scientifically. (These situations and questions do not have to be limited to those that can be done in a classroom.)

Situation:

The bark of the Pacific Yew tree has an important chemical called taxol that fights cancer. These trees only grow in one area of Canada.

What is one question concerning the growth of Pacific Yew trees that could be investigated scientifically?

For example:

What conditions (light, sun, heat) do the trees need to grow?

Could the Pacific Yew tree be grown in other areas of Canada?

Possible Extension:

- Research how to grow plants hydroponically. What does it mean? How is it possible?
- There is a simulation at <http://www.explorellearning.com/index.cfm?method=cResource.dspResourcesForCourse&CourseID=355> in which seed germination can be explored. The factors that may be varied are the kind of seed, the amount of water, light, and heat. Search for “Germination”. Which conditions give the best germination rate for each kind of seed?
The “Gizmo” site allows unregistered users to run each Gizmo for 5 minutes a day. It is also possible to sign up for a free trial. Membership is not free.
- This site describes how to germinate acorns by simulating natural conditions <http://virtualmuseum.ca/Exhibitions/Flora/english/activity-6-elementary.html>

Seeds to plants

I think it will take _____ for our plants to start to grow.

We will do something different to our plant. We will

Name: _____ Date: _____


Picture of seed/ plant that is being treated normally		Picture of seed/plant treated differently	
Describe the seed or plant being treated normally		Describe the seed or plant that is being treated differently	
Measure your plant that is being treated normally		Measure your plant that is being treated differently	

3rd Cycle

Curriculum Outcomes

- | 100-28 Identify and describe parts of plants and their general function
- | 100-29 Identify and investigate life needs of plants and describe how plants are affected by the conditions in which they grow
- | 200-1 Ask questions that lead to exploration and investigation
- | 200-3 Make predictions, based on an observed pattern
- | 201-5 Make and record relevant observations and measurements, using written language, pictures, and charts
- | 201-6 Estimate measurements
- | 202-2 Place materials and objects in a sequence or in groups according to one or more attributes
- | 202-5 Identify and suggest explanations for patterns and discrepancies in observed objects and events
- | 203-2 Identify common objects and events, using terminology and language that others understand
- | 203-5 Respond to the ideas and actions of others and acknowledge their ideas and contributions

This activity can be done using the seeds the students brought in for the 1st cycle. Just in case, it would be prudent to collect seeds that move in a variety of ways such as the burdock seeds that cling, dandelion seeds that float, maple seeds that are like helicopters, acorns or berries that animals eat, and coconuts that are moved by water.

 **Teacher note:** Be aware of any allergies in your class that may influence the types of seeds used in this activity.

Note that because the sprouting of seeds and growth of plants takes time, this activity may occur before full discussion of the second cycle happens.

Travelling Seeds Activity

Talk to students about what they have done up to this point – they started with seeds, planted them, grew plants.

Ask students: *How do we get new plants? If plants don't move, how do we get the same plants in different places? Do all plants spread the same way?*

Plants produce seeds to make new plants. It is an advantage to have the new plants at a distance from the parent plant because they will not need to compete for light, water, and nutrients.

Materials:

Baggie of variety of seeds

Small dish of water

Cloth (to determine “stickiness” of seeds)

Tape measure

- Ask students to conduct tests to determine how each kind of seed could be spread away from the parent plant. Students should be provided with materials without explaining what kinds of tests they should do.
- Students should draw and/or identify the seed, list all methods tried and the results of each test. (You may wish to have a discussion of ways of recording observations students have used or seen before, but allow them to choose. Pros and cons of these may be highlighted as students work.)

✓ **Assessment:**
On observation chart (or other record), note how students are performing on the skill outcomes.

 **Reflection: Class Discussion**

Students can share their methods of organizing their experimental observations. Ask: *Which one might you try another time? Why?*

Students will share their suggestions for the best methods of movement of different types of seeds. Summarize in a class chart with the type of movements as the headings. For example:

By water	By air	By animals - eating	By animals - sticking

Some seeds may be under more than one heading, for example dandelions seeds can be blown by a breeze or float on water should they land on it.

Ask: *What characteristics are needed by seeds to be moved by water? By wind? By animals?* Answers can be added to the chart.

Revisit the Accessing Prior Knowledge activity (page 5). Ask: *Are there any items that should be added to or revised. Is there other information we could add?* Remind your

class about respectful discussion. The discussion tips on pages 20-21 of EECED Plant Growth and Changes document may be helpful.

Other resources that might be useful at this time:

This website has a section about seed dispersal with three excellent video clips. <http://www.mbgnet.net/bioplants/seed.html>

This clip is a cute but informative cartoon that summarizes seed dispersal. <http://www.youtube.com/watch?v=XETgoSgEJmE&NR=1>

From the Bill Nye video “Plants”, the section called *Consider the Following: The Fruit From Plants* and from the Bill Nye video “Flowers”, the section called *Seed Dispersal*. Both are available from <http://learning.aliant.net/>

To access Aliant videos, type the title into the search box. Videos are available free of charge at this site. You will need to register, however registration is free. If you try to watch the video without logging in, you will be prompted to do so. Note that a table of contents opens beside the video so that you may select only certain sections for viewing if you wish. There is also an option to watch the video full screen.

 **Reflection: Skit**

Develop a skit to show how the seeds move. Assign each group or pair of students a particular seed.

✓ **Assessment:**

Note whether students have identified and portrayed characteristics of seeds that would allow them to move in the way they have selected. (or can they explain the characteristics they would need)

 **Reflection: Journaling**

You are a plant that lives in a place where the wind never blows. What kind of seeds would you make? Why?

✓ **Assessment:**

Journal entries should not receive a score or mark. A positive comment followed by a question to refocus attention or suggest the next step in learning is very effective.

Note whether students can identify characteristics of seeds that would allow them to move without wind.

As a wrap up to this part of the plant unit, the following video from National Geographic shows the inter-connectedness of plants and animals.

It provides a large amount of information but the overall message of the reliance of plants on animals and vice versa provides a good context for the plants unit.

<http://video.nationalgeographic.com/video/player/kids/green-kids/plants-kids.html>

Ideas for next steps:

- This website has a quiz where students have to guess which part of the plant each picture represents. Pictures are of fruits and vegetables from the grocery store. Be aware that many items we call vegetables are actually plant fruits because a fruit is the part of the plant that contains the seeds.

<http://www.mbgnet.net/bioplants/supermkt.html>

- Provide students with the chance to grow their own gardens with this interactive website:

<http://www.primarygames.com/science/flowers/games/gardengrow/start.htm>

- The video “The Importance of Plants” is available from <http://learning.aliant.net/> It is about the uses of plants and discusses plants used for food, clothing, shelter and power generation.

Plants Growth and Changes

Strand - The Life Cycle of a Plant

General Curriculum Outcomes	Specific Curriculum Outcomes
100-30 Observe and describe changes that occur through the life cycle of a flowering plant	100-30, 201-5 Observe and describe changes using written language, pictures, and charts, that occur through the life cycle of a flowering plant
201-5 Make and record relevant observations and measurements, using written language, pictures, and chart	
201-6 Estimate measurements	201-6 Estimate measurements of the plant as it grows

Growing Plants

Outcomes:

- Observe and describe changes that occur through the life cycle of a flowering plant (100-30)
- Make and record relevant observations using written language, pictures, and charts, that occur through the life cycle of a flowering plant (201-5)
- Estimate measurements of the plant as it grows (201-6)

Connections Previous Learning:

- Seed identification
- Growing conditions of plants
- How seeds travel

Connection to next steps:

- Human use of plants
- Use of plants in the Environment

Lesson Activity Overview:

Students have previously engaged in growing conditions for plants and therefore are now ready to invest in a long-term investigation of the lifecycle of a plant. It should be noted that this activity will be conducted for a minimum of 3 months and therefore students will continue to track this data even after this unit has wrapped up and a new one is being studied. **If this investigation is conducted during Cycle 2 - Growing Conditions of Plants activity then the estimation (201-6) and observation (201-5) skills outcomes should be respected.** It is recommended that students should be given the opportunity to fully investigate the life cycle of the flowering plant, especially the plant of their choice. Simply, this investigation should be considered an extension activity to the Cycle 2 activity in the previous leaning strand.

Option A

Design an investigation where each student chooses a type of flowering plant.

This would involve each student being able to select the type of flowering plant that they would like to grow. In this model, each student would be responsible for justification of the growing conditions for their flowering plant. Once the plant has been selected, then materials will be collected*.

Have students complete their Investigation Design - Flowering Plant Worksheet before beginning working with the plant. This worksheet is formal formative assessment (to the set standards agreed upon by the class) and placed in their assessment notebook.

Once the students have agreed on the materials necessary and conditions to grow the plants then the seeds can be prepared for germination. This step should be logical based on what was learned in Cycle 2 - Growing Conditions for Plants in the previous strand.

To satisfy the outcomes of this section students should track the changes to the plant over a minimum of 12 week. Students can use the Data Tracking - Flowering Plant form to record observations and estimate the growth and changes to the flowering plant. This form should be reproduced based on an agreed upon time-frame of observation. It is suggested that students complete this activity once a week for the duration of the 12 week observation period. This form is on-going informal formative assessment and should be placed in their assessment notebook.

Option B

Tomatosphere

Although outcome 100-3 emphasizes a flowering plant should be investigated. EECD has endorsed using the Canadian Space Agencies Tomatosphere Project*. For more information regarding this project teachers should go to <http://www.tomatosphere.org/>

*Every school is different so teachers should act in advance to collect the general materials that students will need. Depending on School, District, and EECD policy schools may provide any/all materials or students may be responsible for any/all materials. Teachers should consult with their school administration on this issue.

Investigation Design - Flowering Plant - Worksheet

What type of plant did I choose?

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What do the Seeds look like?

What is the best type of Soil to grow my plant?

How much Water does my plant need?

How often does it need to be Watered?

How much Sunlight does my plant need?

What is the best Temperature to grow my plant?

What should my Flower look like during 3 phases of its lifecycle?

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Data Tracking - Flowering plant

Week _____

What does my plant look like?

What do I expect my plant will look like in a week?

What changes do I notice to my plant?

Monday	Tuesday	Wednesday	Thursday	Friday

Notes/Things I have Learned

Resources:

<http://www.tomatosphere.org/>

Assessment:

Option A

1. Investigation Design - Flowering Plant Worksheet

Assessment Type - Formal Formative Assessment

This worksheet will yield direct feedback to the students. Students will need to communicate that they understand the basic needs of the plant and that they are designing an investigation that satisfies the best growing conditions for their flowering plant. Teachers will have to make an effort to determine the best conditions for all the different flowering plants that are selected by students. These standards should be agreed upon by all students and teachers so that regardless of plant type everyone is working with agreed upon standards.

2. Data Tracking - Flowering Plant

Assessment Type - Informal Formative Assessment

Students should be tracking data on an agreed upon schedule. Each of these forms should be looked at by the teacher to make sure that students are performing the task.

Plants Growth and Changes

Strand - Uses for Plants

General Curriculum Outcomes	Specific Curriculum Outcomes
102-12 Describe ways in which plants are important to living things and the environment	102-12 Describe ways in which plants are important to living things and the environment
102-13 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	102-13 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
203-5 Respond to the ideas and actions of others and acknowledge their ideas and contributions	203-5 Respond to the ideas and actions of others and acknowledge their ideas about the uses and replenishing of plants

Uses for Plants

Outcomes:

- Describe ways in which plants are important to living things and the environment (102-12)
- 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 (102-13)
- Respond to the ideas and actions of others and acknowledge their ideas about the uses and replenishing of plants (203-5)

Connections Previous Learning:

- Seed identification
- Growing conditions of plants
- How seeds travel

On-going Learning:

- Lifecycle of a Flowering Plant

Lesson Activity Overview:

Lesson 1 - Importance of Plants

Lesson Outcome:

- Describe ways in which plants are important to living things and the environment (102-12)

The focus of this lesson should be how plants impact local wildlife. Lesson 2 will focus on impact to humans. Rather than opening this discussion to the world, it would be suggested that dialogue should be local.

1. Consult with your local Department of Natural Resources and/or Department of Fisheries and Ocean to invite a guest speaker to speak to this curricular outcome.
2. Another option would be to have students select local wildlife and work to identify the plants that are important that animals life. Its suggested to establish a class criteria of what should be looked for in terms of plants interactions with wildlife.

Assessment:

1. Guest Speaker - Students would be responsible to create journal entry based on the info presented by Speaker
2. Guest Speaker - Teacher can create a task sheet for students to complete based on a pre-conference with the guest speaker
3. Research - Students will be formally formatively assessed throughout the course of the research based on the established criteria

How Humans use Plants

Outcomes:

- 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 (102-13)
- Respond to the ideas and actions of others and acknowledge their ideas about the uses and replenishing of plants (203-5)

Lesson Activity Overview

1. Consult with Public Health Nurse to invite a Dietician from Horizon Health as a guest speaker. The focus of the Dietician talk would be connect vegetables (emphasis on local options) as useful plants. Another focus of discussion should be on difference in preparation of fresh, frozen, canned and pickled vegetables and how that effects the nutritional value.
2. The second part of the outcome looks at the replenishing of our supply of plants (Vegetables). This outcome also connects to having students respond to actions and ideas of others. Therefore there must be discussion amongst the class. A KWL activity would be possible.
 - KWL - Prior Knowledge and Misconceptions are what should be the teachers focus. Have students share and discuss their prior knowledge. Be aware to allow misconception to be presented but make a note to teach to the misconceptions. Outcome 203-5 comes into play in this dialogue between students. As some misconceptions for students are presented it is important for the ideas to be heard and not be shut down. The misconceptions should be changed during learning not by arguments.
 - Based on the concepts raised by students the teacher should arrange the remaining lesson based on the items that student need to learn. It make little sense to invest a lot of class time into teaching about what students already know about replenishing of plants. The instructional model should be based on what students have difficulty. this section will vary depending on what students have identified in the KWL.

Assessment:

1. Guest Speaker - Students would be responsible to create journal entry based on the info presented by Speaker
2. Guest Speaker - Teacher can create a task sheet for students to complete based on a pre-conference with the guest speaker
3. KWL - Students would be responsible to create journal entry based on what they learned from the prior knowledge discussion.
4. KWL - Students should be evaluated based on their individual role in outcome 203-5