Anglophone School District - North

Grade 3 Science - Unit Lesson Guide

Exploring Soils

Table of Contents

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 sing 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.

Exploring Soils

Focus and Context

Inquiry is the focus of this unit. Students should be many opportunities to observe, manipulate, and test various soil samples to explore their composition, water absorption, drainage, and how they erode. The importance of soils to living things. and how technological processes transform soil into other products is also emphasized.

Unit Instructional Overview

Interactions of Living Things and Soils	Investigating Soil Composition*	Water Absorption of Soils	Moving Water and Soil	Interactions of Living Things and Soils	Technological Products and Processes Related to Soil
Activity - Composting	Access Prior Knowledge - Activity - The Four Senses of Soils	Activity - Moistures Effect on Soil	Activity - Moving Water and Soil	Activity - Living Things Found in Soil	Activity - Materials that come from Earth
	1st Cycle - Activity - Exploring Earth's Soils	Activity - Water Absorption of Soils - (Follow Up)		Activity - How Plants Interact with Soil	
	2nd Cycle - Activity - Characteristics of Soils				
	3rd Cycle - Activity - Soil and Water				
	Alternative Lesson - Digging into Soil				

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

Exploring Soils- Curriculum Outcomes

Investigating Soil Composition	Water Absorption of Soils	Moving Water and Soil	Interactions of Living Things and Soils	Technological Products and Processes Related to Soil
200-1, 200-3 Ask questions and make predictions that lead to explorations and investigations about the soil composition of soil	100-38a Describe the effect of moisture on characteristics of the soil	100-39 Observe and describe the effects of moving water on different types of soils	100-35 Investigate and describe how living things affect and are affected by soils	101-12 Demonstrate and describe ways of using earth materials to make useful objects
100-36 Explore and describe a variety of soils and find similarities and differences among them	200-3 Make predictions about the absorption of water by different types of soils and test these through exploration and investigation		201-7 Identify and use a variety of sources of science information to gather information about how living things affect and are affected by soils	203-1 Communicate questions, ideas, and intentions while using earth materials to make useful objects
100-37, 201-3 Investigate and describe soil components using appropriate tools such as spoons, magnifying glasses, jars, and filters	100-38b Compare the absorption of water by different soils			
201-5 Make and record observations and measurements in investigations related to soil composition	202-4 Construct and label bar graphs to show the amount of water absorbed by different soil samples			
202-7 Propose an answer to initial question related to soil composition based on their investigations	202-2 Place soil samples in order of their ability to absorb water			
	203-3 Communicate procedures and results of investigations related to the testing of water absorption of soils, using drawings, demonstrations, and/or written or oral descriptions			

Composting

Outcomes:

• Investigate and describe how living things affect and are affected by soils (100-35)
• Identify and use a variety of sources of science information to gather information about how living things affect and area affected by soils (201-7)

Lesson Activity Overview

This outcome will be studied in 3 different contexts:
• Living Things Found in Soil
• How Plants interact with Soil
• **Composting**

This lesson is a long-term investigation. Students should be involved in every aspect:
Creating the container
Adding the Food Scraps
Adding Water
Adding Worms. Bugs, Beetles
Creating Leaf Litter

Classroom Compost
Students can make a classroom compost by collecting vegetable and/or fruit food scraps (such as apple cores, banana peels) from lunches and putting them in a plastic ice cream container. Add a layer of soil on top. They need to put some holes in the top so air can get in and out, add in some bugs/worms to the container, and then let the food decompose. The compost container can be kept outside, but since the months schools are open are fairly cold, it should be kept inside for short periods of time to speed up the process. Store the container in a warm place for a a couple of months. Stir things around daily and add small amounts of water.

Record observations through writing and drawing once a week during these months.

Students can explore the advantages of composting, and the uses for compost materials

Assessment: Informal Formative
The long-term observations every week of the changes students document to the compost bin.

School Yard Compost
Students could also explore the decomposing of materials by making a leaf litter. In the fall, students can pile up fallen leaves, and then in the spring, they can dig around them to see how much has decomposed.

Before students go out in the spring to investigate the leaf litter, they should be encouraged to make predictions of what they expect to find under the leaf litter.

Students should then record their observations of what they find as they dig into the leaf litter.

Assessment: Formal Formative
Based on their observations, students should reflect on their predictions and identify what was different from what they expected and highlight how their thinking has changed in terms of the value of compost.

Lesson:
Students can use other sources of information to learn more about how living things affect and are affected by soil:
Internet
Videos
Articles
that highlight beetles, worms, slugs, or other soil creatures.

Extension:
After the compost process if finished, investigate the value of compost for plant growth. In one cup, plant seeds in regular potting soil or dirt from around the school or your home. In a second cut, mix your compost material with the soil, and plant the same kinds of seeds. Care for both cups the same way, and record your observations in a chart

Date		**Potting Soil or Dirt**	**Potting Soil with Compost**
Date	Observations		
	Growth Measurement		
Date	Observations		
	Growth Measurement		
Date	Observations		
	Growth Measurement		

Exploring Soils

Strand - Investigating Soil Composition

General Curriculum Outcomes	Specific Curriculum Outcomes
200-1 Ask questions that lead to exploration and investigation	200-1, 200-3 Ask questions and make predictions that lead to explorations and investigations about the soil composition of soil
200-3 Make predictions, based on an observed pattern	
100-36 Explore and describe a variety of soils and find similarities and differences among them	100-36 Explore and describe a variety of soils and find similarities and differences among them
100-37 Investigate and describe soil components	100-37, 201-3 Investigate and describe soil components using appropriate tools such as spoons, magnifying glasses, jars, and filters
201-3 Use appropriate tools for manipulating and observing materials and in building simple models	
201-5 Make and record relevant observations and measurements, using written language, pictures,and charts	201-5 Make and record observations and measurements in investigations related to soil composition
202-7 Propose an answer to an initial question or problem and draw simple conclusions based on observations or research	202-7 Propose an answer to initial question related to soil composition based on their investigations

New Nouveau Brunswick
Be...in this place • Être...ici on le peut

Science Resource Package: Grade 3

Exploring Soils: Investigating Soil Composition

New Brunswick Department of Education

December 2009

Instructional Plan

Access Prior Knowledge

Cross-curricular links:
ELA
3a. Students will be expected to:
Use basic courtesies and conventions of conversation in group work

Activity - The Four Senses of Soils

To determine the level of knowledge and any misconceptions:

Prepare a class chart with four of the five senses listed (not taste).

Ask students to work in pairs or small groups to brainstorm words or phrases that describe what soil is like. For example, soil sounds crunchy, looks red, feels slippery, etc.

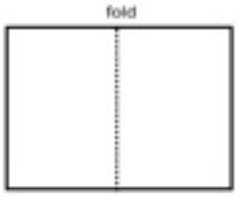
Students can also be asked to explain how they know these things (their source of information like their parents, TV, or books). Students can record their answers on a four-tab foldable before the discussion to share their answers with the class.

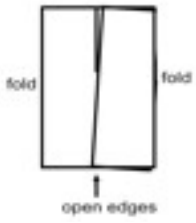
To make the foldable:

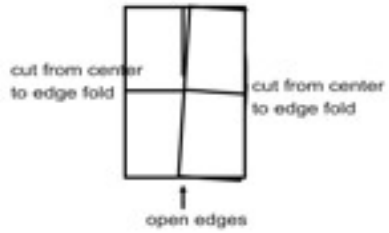
Fold a sheet of paper in half. Make sure there is a visible crease line in the middle. Unfold.

Fold the outside edges to the center fold line.

Cut each folded flap in half to make four flaps. Label each with one of the senses. Students can write their thoughts under the flaps.







✓ **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.

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

Post student versions of curricular outcomes on chart paper (see page 20 of EECD Exploring Soils Booklet). 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.

ⓘ Teacher note: To help keep the students clean, ask them to bring in a shirt from home (like dad's old shirt) or a second hand shirt. This can be their "science shirt" that they wear when they are doing messy science activities.

Students often think that scientists wear lab jackets as part of the job (a stereotype). The purpose for lab jackets is to protect clothing when working with messy or dangerous samples, but they are not worn all of the time.

1st Cycle

✪ Curriculum Outcomes

100-36 Explore and describe a variety of soils and find similarities and differences among them
100-37 Investigate and describe soil components
201-5 Make and record relevant observations and measurements, using written language, pictures, and charts
203-1 Communicate questions, ideas, and intentions while conducting their explorations
203-3 Communicate procedures and results, using drawings, demonstrations, and written and oral descriptions

Exploring Earth's Soils Activity

Safety note on the handling of soil: wash hands after handling or wear gloves. Samples can also be placed in a freezer for 3 days to kill off living organisms that may be in the soil. Hands and desks should still be cleaned after touching soil in case there are chemicals in the soil.

Materials:

Baggies

Newspapers

Magnifying glasses

Optional: teacher brings samples that they know have a lot of clay, a lot of sand, a lot of silt

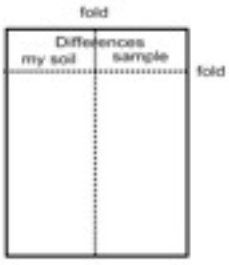
Ask students to bring in baggies of different types of soil from home or to collect soils from the school yard. (A letter asking parents to help their children collect a soil sample has been included on page 24 of EECD Exploring Soils Booklet).).

Place newspapers on the desk and ask students to scoop one handful of the soil sample onto the newspaper.

Students will investigate their soil samples for several minutes, using their four senses. Students should be provided with magnifying glasses so they can take a closer look.

Then have students rotate around the room to compare their soil samples with their classmates.

Similarities and differences among the soils can be recorded on the foldable. Horizontal folds can be used to separate the "differences" comparisons making a grid chart.



Cross-curricular links:
ELA
8a. Students will be expected to:
Use writing and other forms of representation to
- generate and organize language and ideas
- record experiences
- explore how and what they learn

✓ **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 30 to 32) on a clipboard may be helpful to you. Develop your own code for quick notes.

A suggested code:
√ 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 make note of 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

- Ask students:

  What was the same in the soil samples? What were some differences you noticed?

  What were the different textures, colours and smells of the soils?

- Introduce students to the vocabulary used to describe different soil components such as: sand, silt, clay, rock, humus, organic matter

- Revisit the "Four Senses of Soil" chart created in 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 Exploring Soils Booklet may be helpful.

A useful resource at this time is a storybook "The Scoop on Soils" available (in French as well as English) from http://www.globe.gov/fsl/html/templ.cgi?EG_soil&lang=en&nav=1 to print or display electronically. Three children follow a dog and see the soil profiles in different locations by examining the holes the dog digs. There is also background information on soils and activities.

Cross-curricular links:

ELA

1. Students will be expected to:
   a. Describe, share, and discuss thoughts, feelings, and experiences and consider others' ideas
   b. Ask and respond to questions to clarify information and to explore possibilities or solutions to problems
   c. Express and explain opinions and respond to the questions and reactions of others
   d. Listen critically to others' ideas and opinions
2. Students will be expected to:
   a. Participate in conversation, small-group and whole group discussion, understanding when to speak and when to listen
   b. Adapt volume, projection, facial expression, gestures, and tone of voice to the speaking occasion

Health

Demonstrate the ability to interact effectively with others, showing an insight into their emotions and the ability to express their feelings clearly (Explain the importance of communication skills, as well as demonstrate the effective use of these)

Show respect for and attempt to understand the ideas, opinions and feelings of others

The section *Soil Profile* in the Bill Nye video “Rocks and Soil” found at http://learning.aliant.net/ may be useful at this time.

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.

Cross-curricular links:
ELA
8a. Students will be expected to:
Use writing and other forms of representation to
- generate and organize language and ideas
- record experiences
- explore how and what they learn

Reflection: Journal

Explain with words and pictures which other soil sample in the classroom is most like yours.

✓ **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 recognize that not all soils look the same.

2nd Cycle

✪ Curriculum Outcomes

100-36 Explore and describe a variety of soils and find similarities and differences among them
100-37 Investigate and describe soil components
100-38a Describe the effect of moisture on characteristics (e.g., cohesion-ability to hold together, texture, colour of the soils)
200-1 Ask questions that lead to exploration and investigation
200-3 Make predictions based on an observed pattern
201-3 Use appropriate tools for manipulating and observing materials and in building simple models
201-5 Make and record relevant observations and measurements, using written language, pictures, and charts
203-1 Communicate questions, ideas, and intentions while conducting their explorations
203-3 Communicate procedures and results, using drawings, demonstrations, and

Characteristics of Soils Activities

These activities can be done by students with their own soil samples or you can make a point of choosing soil samples that appear different from each other. They are set up as stations to reduce the amount of equipment needed. Depending on class size, you may wish to have two of each station.

During these activities encourage students to use the vocabulary: rocks, sand, silt, clay, organic matter

Cross-curricular links:
ELA
2c. Students will be expected to:
Give and follow instructions and respond to questions and directions
3a. Students will be expected to:
Use basic courtesies and conventions of conversation in group work
Math
SS4 Demonstrate an understanding of measuring mass by:
- Estimating mass using referents
- Measuring and recording mass

SP2 Construct, label and interpret bar graphs to solve problems.

Station 1 – Can you make soil balls?

Materials	Test	Teacher note
Tray or newspaper Soil that is sand or mostly sand Soil that is clay or mostly clay Soil that is loam Water	Put a small pile of soil on the tray. Add a small amount of water so the soil is damp. Try to roll a small ball of soil. Repeat for other types of soil. Record results with words and pictures.	Sand is crumbly. Clayey soil forms a ball. Loam sort of sticks together but tends to crumble.

This site has diagrams of possible shapes formed by different types of soil. http://92.52.112.178/web/sa/saweb.nsf/ed0930aa86103d8380256aa70054918d/7e4791970c3850c980256ab2005202ec?OpenDocument

Station 2 – Separating soil with sieves

Materials	Test	Teacher note
Various sieves Dry soil samples Tray	Break apart any soil lumps in the sample. Pour the sample into the sieve with the largest holes. Shake over the tray until all the smaller particles have gone through the holes. Dump the soil particles still in the sieve onto a sheet of white paper. Put the material on the tray into the sieve with the next smallest holes and shake. Again put what remains in the sieve onto a sheet of paper. Continue using a smaller sieve each time. Repeat the process with other soils. (Or have each group do a different soil sample.) Record your results with words and pictures. Use a balance to determine how many grams of soil in each size range. Create a bar graph showing amounts of soil particles in each size range for each location (see page 28).	Rocks will be separated out first. Sand particles are the next smallest, then silt and clay particles are the smallest. See elaboration on pages 34-35 of the curriculum guide and the background notes on page 18 of the *Down Under Teacher's Guide* Taking pictures of the separated portions of the soil is useful for later comparisons and discussion (see below).

For example: soil from the shoulder of the road

Sampled site

First sieve

Second sieve

Third sieve

Fourth sieve

through the smallest sieve

Station 3 – Mixing soil and water

Materials	Test	Teacher note
Waterproof container Soil Water	Put soil in the container until it is about half to two-thirds full. Add water slowly until it is almost at the top of the jar. Record your observations.	Air bubbles should be observed rising to the surface of the water.

Station 4 – Separating soil with water

Materials	Test	Teacher note
Jar with clear sides and tight lid (tall and narrow is better than wide) Soil Water	Put soil in the container until it is about half to two-thirds full. Fill the jar, almost to the top with water and screw the lid on tight. (You may wish to check.) Students will mix the soil and water by turning it over, shaking and swirling. Then place it on the counter or table to settle. Observe when settled.	There is a similar activity in the student book on page 17, however too much information is given. This activity is also described on pages 34-35 of the curriculum document. Pictures can be taken of each settled jar to refer to later. Students could be asked to predict by drawing, what they think they will see when the soil settles.

ⓘ Teacher note: Each sample will look different with varying numbers and thicknesses of layers. They should settle in this order, from bottom to top:
Gravel - large visible rocks
Sand – coarser grains
Silt – Mud formed from tiny pieces of rocks, finer grains than sand
Clay – slippery, slimy and made of very fine particles, smaller than sand and silt
Humus – dark, moist soil made when food, leaves, sticks, roots and insects die and rot

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

Reflection: Class Discussion

To clarify and consolidate vocabulary from the “Four Senses of Soils” activity and also other vocabulary associated with soil (such as sand, silt, clay, rock, organic matter), use the vocabulary during the discussion as it applies to different samples.

Have students share results from station 1. Record their results for sample A, B and C on a class chart. Is there agreement or do students need to discuss their evidence? This is easy to revisit if necessary. Ask:

Are all soils the same?

What kinds of soils fall apart? Make a ball?

Could this be used as a test for soil type?

Have students share results from station 2. Ask:

What did you notice about soils taken from different locations?

Did they have similar amounts of the different particles?

How are they the same and different?

What does this tell us about soils?

Have students share results from station 3:

Why do you think you saw bubbles come up?

What do you think the bubbles contain?

Where do the bubbles come from?

What can we infer is in soil?

Have students share results from station 4. Ask the students:

What happened?

Do all of the jars look the same?

Why does the soil form layers when we shake it and let it settle?

Draw attention to the idea of having a “fair test”. *Was this a fair test?* Did you use about the same amount of soil and water in the jars? Was there anything that wasn’t the same? (You may have different sized jars that would affect the activity).

What conclusions can we make about soils from all our work? This is information that may need to be added to the ongoing chart begun in the Accessing Prior Knowledge Activity, “Four Senses of Soils” (page 5).

Cross-curricular links:

ELA

1. Students will be expected to:
   a. Describe, share, and discuss thoughts, feelings, and experiences and consider others’ ideas
   b. Ask and respond to questions to clarify information and to explore possibilities or solutions to problems
   c. Express and explain opinions and respond to the questions and reactions of others
   d. Listen critically to others’ ideas and opinions
2. Students will be expected to:
   a. Participate in conversation, small-group and whole group discussion, understanding when to speak and when to listen
   b. Adapt volume, projection, facial expression, gestures, and tone of voice to the speaking occasion

Health

Demonstrate the ability to interact effectively with others, showing an insight into their emotions and the ability to express their feelings clearly (Explain the importance of communication skills, as well as demonstrate the effective use of these)

Show respect for and attempt to understand the ideas, opinions and feelings of others

Most soils are a mixture of sand, silt and clay particles, possibly with a few rocks. The following website shows how to make a model for soil with different sized balls and beads. The model also shows how there is room for air and water in soil.
http://www.wtamu.edu/~crobinson/DrDirt/SSTA_TX08.html#balls

Also revisit the "Four Senses of Soils" chart to see if changes need to be made to information already there. 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 Exploring Soils document may be helpful.

The video "Getting to Know Soil" can be found at http://learning.aliant.net/. The sections beginning at *Soil Properties – Soil Types* through to *Let's Review* are particularly useful at this time as they discuss the various types of soil.

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

- Draw, label and talk about what happens when you shake up soil and water and let it settle.

  or

- Streams usually have sandy bottoms while ponds often have soft, mucky bottoms. Why do you think that might be?

Cross-curricular links:
ELA
8a. Students will be expected to:
Use writing and other forms of representation to
- generate and organize language and ideas
- record experiences
- explore how and what they learn

✓ **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 that soil has different components with different-sized particles. These heavier particles settle to the bottom first (or stay put in a stream), the lighter particles settle on top (or have the opportunity to settle in a pond with little current).

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:

> Barn swallows build mud nests on barns and other structures. The nest is built under an overhang to protect it from the rain. Hundreds of trips are needed to carry the mud to build the cup-shaped nest.
>
> What is one question concerning soil and barn swallow nests that could be investigated scientifically?

For example:

> Is there a variety of different-sized soil particles used in the nest?
> Which size of soil particle is most common?
> Do barn swallows get the soil all from one place?

Possible Extension Activity:

Create edible soils for the students using the recipe from http://www.thekidsgarden.co.uk/TeachingKidsAboutSoil.html

Scroll down to find it under “Fun Activities”

Characteristics of Soils Activities

Station 1

- Put a small pile of soil on the tray.
- Add enough water to make the soil moist.
- Try to roll a small ball of soil.
- Try to roll a worm of soil.
- Record the result with words and pictures.
- Repeat this for two other types of soil.

Can balls or worms be made with all the soils?

What sorts of soils seem to make the best balls or worms?

Would you expect other soils with those characteristics to make good balls or worms?

Station 2

- Break apart any lumps in the dried soil sample.
- Put the sample into the sieve with the largest holes. Shake over the tray until all the smaller particles have gone through the holes.
- Dump the soil particles still in the sieve onto a sheet of white paper.
- Put the material on the tray into the sieve with the next smallest holes and shake over the tray until all the smaller particles have gone through the holes.
- Put what remains in the sieve onto another sheet of paper.
- Continue sifting using a sieve with smaller holes each time.
- Record your results with words and pictures.
- Use a balance to determine the mass of soil particles on each piece of paper (different sizes). Create a bar graph of the amounts of soil from each sieve.
- Repeat the procedure for two other types of soils.

What do you notice? How are the graphs the same and different?

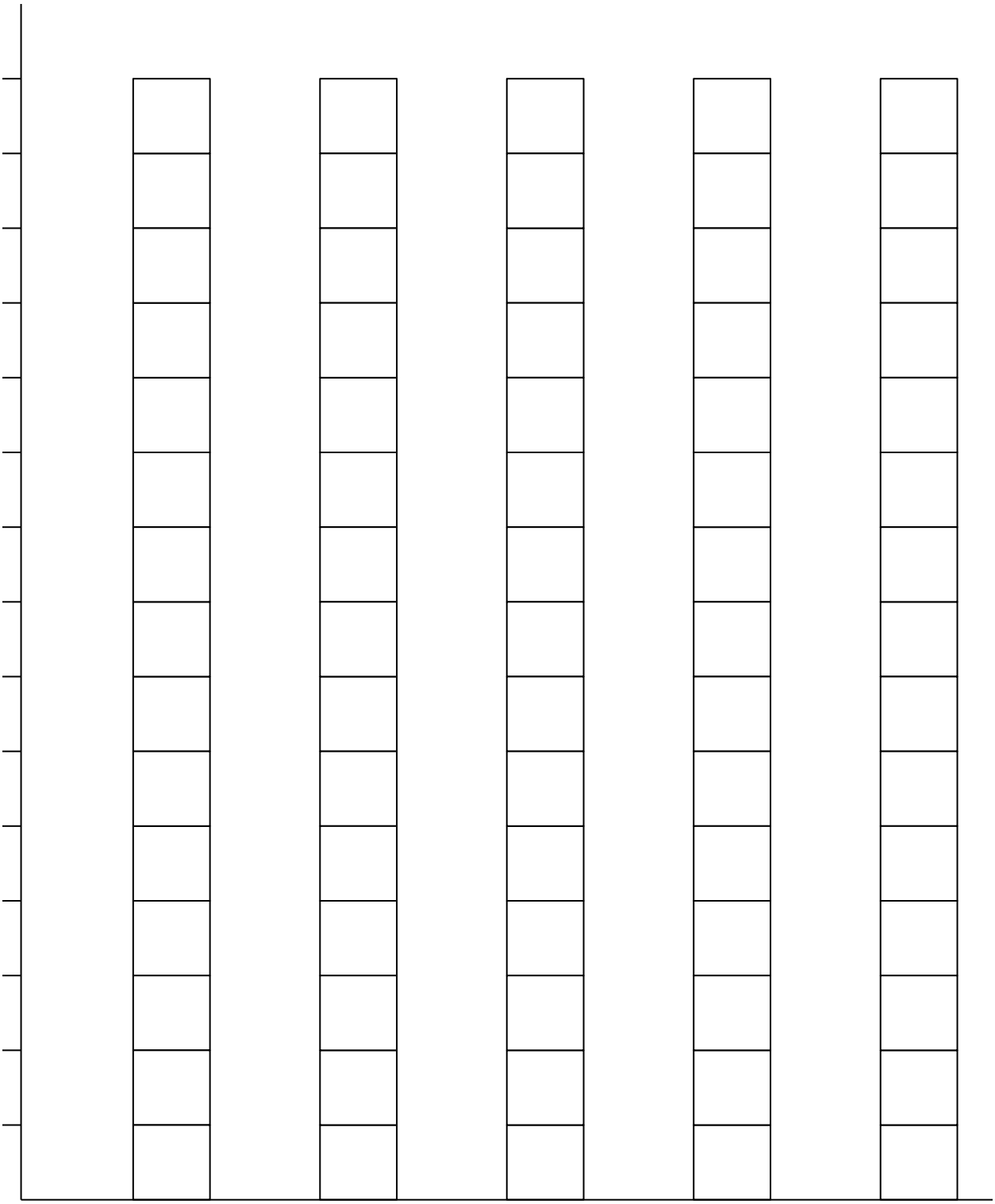
Station 3

- Put soil into a waterproof container until it is about one-half to two-thirds full.
- Add water slowly until it is about 2 cm from the top of the container.
- Record what you see happening with words and pictures.

Station 4

- Put soil into the container until it is about one-half to two-thirds full.
- Fill the jar almost to the top with water and screw the cover on tight.
- Mix the soil and water by turning the container upside down, shaking it and swirling it.
- Place the container on a counter or table to settle.
- Record your observations with words and pictures.
- Repeat with other soil samples.

What happened? Why do you think it happened? Do all of the jars look the same?



3rd Cycle

✪ Curriculum Outcomes

100-37 Investigate and describe soil components
100-38b Compare the absorption of water by different soils
200-1 Ask questions that lead to exploration and investigation
201-3 Use appropriate tools for manipulating and observing materials and in building simple models
201-5 Make and record relevant observations and measurements, using written language, pictures, and charts
203-1 Communicate questions, ideas, and intentions while conducting their explorations
203-3 Communicate procedures and results, using drawings, demonstrations and written and oral descriptions

Soil and Water Activity

* This activity will be used in the next learning strand so please do not discard the soil.

Cross-curricular links:
ELA
2c. Students will be expected to:
Give and follow instructions and respond to questions and directions
3a. Students will be expected to:
Use basic courtesies and conventions of conversation in group work
Math
N9 Demonstrate an understanding of addition and subtraction of numbers with answers to 1000
- Using personal strategies for adding and subtracting

SS4 Demonstrate an understanding of measuring mass by:
- Estimating mass using referents
- Measuring and recording mass

Students can work in pairs or small groups to carry out these activities. The students will pour water through samples of soils. By doing this the students will determine which soils absorb the most water. The students will do this twice. In the first test the variables will not be controlled and in the second test the variables will be controlled. The variables are the amount of water and soil. Not only are we determining which soil absorbs the most water, we are also exploring the idea of a fair test.

Ask students: *Did you notice some soils are wet and some are dry? I wonder how much water soil can hold?*

Materials:

Dry soil samples (sandy soil, clay soil, humus, silt)
Plastic pop bottles with the top portion cut off to be a funnel
Coffee filter
Measuring cups or scoops
Water

Part 1

1. Ask students to place the coffee filter into the funnel part of the bottle. It rests in the bottle portion of the bottle. (The photo shows 1L bottle but students would find it easier to use a 2L bottle because of the wider opening.)

2. Have them put some soil into the coffee filter. Let them decide how much they would like to use. (Optional: students could use a balance to determine the mass of the soil or water)
3. Provide students with a cup or scoop of water to pour onto the soil sample. Each group could be given a different size of scoop or spoon or amount of water in a cup to ensure there is a wide variety of results observed. (This will enrich the discussion about conducting a fair test.)
4. The absorption of water by the soil sample can be measured by the amount of water caught in the lower cup. (Optional: have students use a balance to find the mass of the soil sample now or the amount of water that comes out)

Ask students to compare the amount of water they put on the soil with the amount that comes through the soil. The water may need to be transferred to a different sort of container for this comparison to be made. *How much water did each group's soil hold? Why are there differences?*

Discuss why this was not a fair test. Different amounts of water were used. Different amounts of soil were used. Develop a fair procedure together as a class (the same amount of soil and the same amount of water used for each sample tested).

Part 2

Ask students to use the method developed by the class to test a variety of soils to see how much water different soils hold.

Make a class chart of results.

ⓘ Teacher note: Clay samples may already contain a lot of water and not provide a very good indication of its ability to hold water. This activity works best if soils are dry to begin with.

Reflection: Class Discussion

Have students discuss the class results. Ask:

What kind of soil absorbed the most water? The least?

*Why might one soil absorb more water than another? (*A reference could be made to the balls in a beaker model from Cycle 2.)

Do the different types of soils have different purposes? (This could be tied to where the samples would be located naturally.)

When/where would you want to have soil that absorbs/holds a lot of water?

Would you rather build your house on well drained soil or wet soil?

If willow trees need a lot of water to grow, what sort of soil might it like best?

Cross-curricular links:

ELA

1. Students will be expected to:
   a. Describe, share, and discuss thoughts, feelings, and experiences and consider others' ideas
   b. Ask and respond to questions to clarify information and to explore possibilities or solutions to problems
   c. Express and explain opinions and respond to the questions and reactions of others
   d. Listen critically to others' ideas and opinions
2. Students will be expected to:
   a. Participate in conversation, small-group and whole group discussion, understanding when to speak and when to listen
   b. Adapt volume, projection, facial expression, gestures, and tone of voice to the speaking occasion

Health

Demonstrate the ability to interact effectively with others, showing an insight into their emotions and the ability to express their feelings clearly (Explain the importance of communication skills, as well as demonstrate the effective use of these)

Show respect for and attempt to understand the ideas, opinions and feelings of others

Why might soil be different in different places?

Students' attention could also be drawn to the rate at which the water moves through different types of soils. While not required information for this unit, rate of movement is important for water filtration by rocks and soils.

Revisit the "Four Senses of Soils" chart created in 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. This is also a good time to point out that the discussion of evidence leads scientists to change their minds. We can, like scientists, also change our minds.

Cross-curricular links:
ELA
8a. Students will be expected to:
Use writing and other forms of representation to
- generate and organize language and ideas
- record experiences
- explore how and what they learn

Reflection: Journaling

If you were a groundhog in NB, what sort of soil would you like to dig your home in? Explain 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 correctly identify one or two properties of the soil component chosen for their groundhog home.

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:

> In Italy the Tower of Pisa has been gradually tipping sideways. One side was sinking into the soil.
>
> What is one question concerning the soil and the tipping of the tower that could be investigated scientifically?

For example:

> Does the soil under the tower have a lot of water in it?
> What size of soil particles are in the soil around the tower?
> What are the components of the soil in that spot?

This site may be helpful to review and summarize ideas learned about soil. S.K.Worm, the official annelid, or worm, of the Natural Resources Conservation Service answers students' questions about soil. http://www.nrcs.usda.gov/feature/education/squirm/skworm.html

Possible Extensions:

It is possible to search http://www.cbc.ca/news/ to find news items relating to the topic(s) under study to discuss as a class. For example:

Floods, mudslides and avalanches close B.C. highways

http://www.cbc.ca/canada/british-columbia/story/2009/01/07/bc-heavy-rains-avalanche-risk-close-highways.html

Hundreds rescued from Taiwan mudslides – also talks about the death toll which might not be appropriate. There is a good picture.

http://www.cbc.ca/world/story/2009/08/11/taiwan-typhoon-china-011.html

Greens see red over soil erosion – case of wind blowing soil from a farmer's field into an adjacent yard in PEI.

http://www.cbc.ca/canada/prince-edward-island/story/2007/02/16/greens-soil.html

Anti-erosion plan simple but effective – a case of minimizing soil erosion from a farm

http://www.cbc.ca/news/story/2000/04/24/peiErosion24apr00.html

Soil and Water Activity

- Place a coffee filter into the funnel-shaped part of the pop bottle. Set it into the bottom part of the pop bottle.
- Put some soil into the coffee filter.
- Pour some water onto the soil, being careful to keep it inside the coffee filter.
- Compare the amount of water that soaks through with the amount you put in.

Compare your results to the results of other groups.

Digging Into Soil

Outcomes
100-36 Explore and describe a variety of soils and find similarities and differences among them
- Describe, compare, and reach conclusions about the composition of the three soil samples
- Estimate component percentages of the three soil samples

Materials:
- Soil samples (from three depths : 3 cm, 50 cm, and 1 m)
- Beaker or other measuring device
- Hand Lenses (5x or 10x are adequate)
- Markers or pens
- Large plastic cups
- Metric rulers
- Graph paper
- Newsprint or butcher paper

Inquiry Lesson:
1. Ask Student what they know about Soil:
    - Is it the same thing as dirt?
    - Does it matter to us? Why or why not?
    - Have you ever taken a close look at soil?

Explain to students that they will look closely at soil from the same location but from three different depths: 3 cm, 50 cm, and 1 m. Ask student,
    - What do you think you'll observe?
    - Will the soil samples vary at the three depths?
    - How will they vary?

Have students record their predictions in Table 1. Ask students what they expect to find in terms of texture, color, odor, inclusions (e.g., rocks and sticks), life-forms, and other factors.
Give each group a hand lens and a 250ml sample (use a beaker to measure; loosely packed) of the surface soil (top 3 cm) in a large plastic cup or other suitable container and have them make and record their observations in Table 1 . Repeat with the 50 cm depth and the 1m depth soil samples. Be sure that groups keep all three samples (make the cups accordingly). After students observe all three samples, ask students to describe what they found. Ask,
    - Did you see what they expected to see?
    - How did your predictions differ from your actual observations?

2. In this procedure, students count and compare the number of rock inclusions in each of the three samples. Direct students groups to count the number of rocks greater than or equal to 3 cm in diameter (they will need a metric ruler) in each sample and

record their data in Table 2. Have each group make a bar graph of the number of rocks counted in each of the three samples. Ask students,

- What conclusion can you reach by looking at your data represented in graphic form?
- Do you find that the bar graph helps make sense of the data? How?

Students may respond that it is easier to understand the evidence when they can see it represented in a bar graph.

Ask students to describe the components of the soil samples. Encourage qualitative and quantitative responses. Offer descriptions of *gravel, silt, sand, and clay*. Direct each group to spread our each sample, one sample at a time, on a large sheet of plain paper (newsprint or butcher paper). For each sample, have students estimate the percentage of each sample that is rock, gravel, sand, silt, clay, organic material, and other substances. Students may find it useful to try separating those component parts, at least roughly, to help with the estimation process. Students should record their estimates in Table 3. Ask them,

- What can you conclude from your data?
- What else would you like to know about soil?

Extension:

1. Student can collect and compare soil samples from different locations: various spots around the school grounds, the neighborhood, students' yard, and nearby natural areas. Students can also conduct research, via the library or internet, on how soil varies around the world.
2. Ask students to use the internet or library to investigate the importance of soil in agriculture. Students can also conduct research on what types of organisms live in the soil.

Discussion Questions:

1. How were your observations of the soil different from what you expected to see?

2. Which soil depth contained the most rocks? How do you know?

3. How can you tell the difference between the different soil components?

Assessment:

1. Were students able to effectively describe what they observed in the soil samples and compare their predictions to what they actually observed? (Use student responses to Discussion Questions 1 and 2 during the activity as embedded evidence, or use those questions as prompts for science journal entries.)

2. Could students reach meaningful conclusions about the differences between the three different samples? (Use Discussion Question 3 during the activity or concluding analysis as an embedded assessment or as a science journal entry.)

3. Were students able to successfully estimate component percentages of the samples? (Observe student activity during Procedure 3 and use that embedded evidence as a form of performance assessment.)

Rubric:

	Developing 1	Proficient 2	Exemplary 3
Were students able to effectively describe what they observed in the soil samples and compare their predictions to what they actually observed?	Attempted but were unable to adequately make this comparison	Successfully described their soil samples and compared those observations with predicted outcomes	Successfully and extensively described their soil samples and comprehensively compared those observations with predicted outcomes
Could students reach meaningful conclusions about the differences between the three different samples?	Attempted but were unsuccessful in reaching meaningful conclusions	Successfully communicated meaningful conclusions regarding the three soil samples	Successfully communicated meaningful conclusions regarding the three soil samples, including significant discussions of quantitative data
Were students able to successfully estimate component percentages or the samples?	Attempted this estimation but unsuccessfully	Successfully estimated the component percentages	Successfully estimated the component percentages, including significant discussion of quantitative data

Activity Sheets - Tables
Table 1

Soil Observations

Soil Samples	Predictions	Actual Observations					
		Texture	Color	Odor	Inclusion	Life-Forms	Other
Top 3 cm							
50 cm deep							
1 m deep							

How did your predictions differ from your actual observations?

Table 2

How many rocks (≥3 cm in diameter) were in each sample?

Soil Samples	Number of Rocks
Top 3 cm	
50 cm deep	
1 m deep	

On a separate piece of paper or on the back of this sheet, make a bar graph of your data.

Table 3

Estimate the component percentages of each sample.

Estimate Percentages							
Soil Samples	Rock	Gravel	Sand	Silt	Clay	Organic	Other
Top 3 cm							
50 cm deep							
1 m deep							

Exploring Soils

Strand - Water Absorption of Soils

General Curriculum Outcomes	Specific Curriculum Outcomes
100-38a Describe the effect of moisture on characteristics of the soil	100-38a Describe the effect of moisture on characteristics of the soil
200-3 Make predictions, based on an observed pattern	200-3 Make predictions about the absorption of water by different types of soils and test these through exploration and investigation
100-38b Compare the absorption of water by different soils	100-38b Compare the absorption of water by different soils
202-4 Construct and label concrete-object graphs, pictographs, or bar graphs	202-4 Construct and label bar graphs to show the amount of water absorbed by different soil samples
202-2 Place materials and objects in a sequence or in groups according to one or more attributes	202-2 Place soil samples in order of their ability to absorb water
203-3 Communicate procedures and results, using drawings, demonstrations, and written and oral descriptions	203-3 Communicate procedures and results of investigations related to the testing of water absorption of soils, using drawings, demonstrations, and/or written or oral descriptions

Moistures Effect on Soil

Outcomes:

• Describe the effect of moisture on characteristics of the soil (100-38a)

Connections Previous Learning:

3rd Cycle - Activity - Water and Soil

✪ Curriculum Outcomes

100-37 Investigate and describe soil components
100-38b Compare the absorption of water by different soils
200-1 Ask questions that lead to exploration and investigation
201-3 Use appropriate tools for manipulating and observing materials and in building simple models
201-5 Make and record relevant observations and measurements, using written language, pictures, and charts
203-1 Communicate questions, ideas, and intentions while conducting their explorations
203-3 Communicate procedures and results, using drawings, demonstrations and written and oral descriptions

Connection to next steps:

• Compare the absorption of water by different soils (100-38b)
• Construct and label bar graphs to show the amount of water absorbed by different soil samples (202-4)
• Place soil samples in order of their ability to absorb water
• 203-3 Communicate procedures and results of investigations related to the testing of water absorption of soils, using drawings, demonstrations, and/or written or oral descriptions (203-3)

Lesson Activity Overview:

Students have previously completed the inquiry documents, specifically the final cycle activity of water and soil in which they have targeted the absorption of water with different soil types. This activity will act as a follow up to that activity. The focus of this activity will be to describe how the different types of soils react to moisture (water).

Keep the activity design of the previous activity (water and soil) so that students will have the opportunity to describe the effects of moisture on the tested soil types. The focus should be placed on how the students are observing the soil and thus communicating those visuals to their notebook.

Assessment: Formal Formative
Entry/Exit Card - Provide feedback to students to determine if their written observations meet the characteristics of moisture and soil. If written notes are not detailed enough have students add to the entry. The goal should be to ensure that what students observe gets communicated in written form.

Water Absorption of Soils (Follow-Up)

Outcomes:

• Compare the absorption of water by different soils (100-38b)
• Construct and label bar graphs to show the amount of water absorbed by different soil samples (202-4)
• Place soil samples in order of their ability to absorb water (202-2)
• Communicate procedures and results of investigations related to the testing of water absorption of soils, using drawings, demonstrations, and/or written or oral descriptions (203-3)

Connections Previous Learning:

•Describe the effect of moisture on characteristics of the soil (100-38a)

3rd Cycle - Activity - Water and Soil

✪ Curriculum Outcomes

100-37 Investigate and describe soil components
100-38b Compare the absorption of water by different soils
200-1 Ask questions that lead to exploration and investigation
201-3 Use appropriate tools for manipulating and observing materials and in building simple models
201-5 Make and record relevant observations and measurements, using written language, pictures, and charts
203-1 Communicate questions, ideas, and intentions while conducting their explorations
203-3 Communicate procedures and results, using drawings, demonstrations and written and oral descriptions

Connection to next steps:
• Observe and describe the effects of moving water on different types of soils (100-39)

Lesson Activity Overview:

Continuing with the follow-up to the water and soil activity from the inquiry package, particular science skills are identified as curricular outcomes and follow-up to that initial activity should be completed.

The previous activity design is sufficient to complete these science skills. However, since we will not be retesting (to avoid redundancy) we will not be making predictions (outcome 200-3).

1. There are two levels to the extension of the water and soil inquiry activity. Students will work on analyzing and

interpreting outcomes (202-2, 202-4) and a communication and teamwork outcome (203-3).

Based on the evidence of soil and water activity students will then be asked to rearrange the canisters in the investigation in a sequence according to the their ability to absorb water (one attribute).

Assessment: Formal Formative
Students should display evidence that they understand how much water was absorbed in different soil types based on the categorization of the canisters.

2. Once students have the correct sequence of the canisters they should then be given the task to construct a labeled bar graph that then demonstrates the amount of water absorbed by the different soil types. The class should have a cross-curricular standard for expectable standards for labeled bar graphs that should be enforced in this scenario.

Assessment: Formal Formative
Students will submit a labeled bar graph that demonstrates their understanding of water absorption of different soil types and that meets the math/science standards of labeled bar graphs.

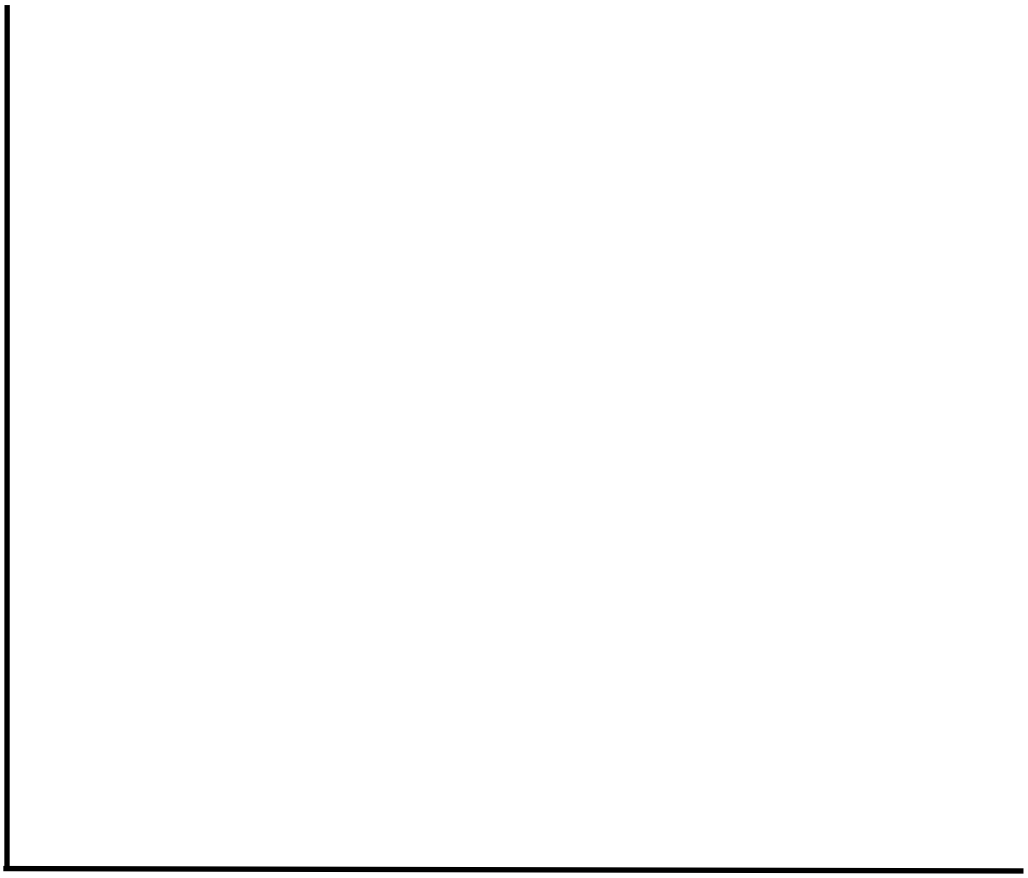
3. The final extension to the soil and water activity is to communicate the results in written form. Since there was no formal prediction/hypothesis then we cannot strictly evaluate the results as a conclusion. However, the spirit of the outcome is for students to detail what they have learned in written form. The expectation would be that students can give multiple examples of items that they did not understand or expect before and how the activity has changed their thinking. The difficult task is for students to admit that they did not understand before, they sometimes feel that this means they were wrong. The case is for them to be encouraged to share all their learnings in this task.

Assessment: Informal Formative or Formal Formative
The type of assessment will depend on the intent.
Regardless of the assessment type the students will communicate the results of their soil and water activity.
Informal Formative Assessment will mean that the teacher simple looks to see if the students has completed the task and briefs over the results to justify that they have gone into depth.
Formal Formative Assessment ensures that the teachers reads the entire set of results and offers feedback to the student.

Water Absorption of Soils (Follow-Up)

Water Absorption of Soils - Bar Graph

•Construct and label bar graphs to show the amount of water absorbed by different soil samples (202-4)



Water Absorption of Soils (Follow-Up)

Water Absorption of Soils - Communication of Results

•Communicate procedures and results of investigations related to the testing of water absorption of soils, using drawings, demonstrations, and/or written or oral descriptions (203-3)

Exploring Soils

Strand - Moving Water and Soil

General Curriculum Outcomes	Specific Curriculum Outcomes
100-39 Observe and describe the effects of moving water on different types of soils	100-39 Observe and describe the effects of moving water on different types of soils

Moving Water and Soil

Outcomes:

• Observe and describe the effects of moving water on different types of soils (100-39)

Connections Previous Learning:

• Describe the effect of moisture on characteristics of the soil (100-38a)
• Compare the absorption of water by different soils (100-38b)

Lesson Activity Overview:

1. From personal experiences have students discuss possible effects of moving water on various types of soil. A small group discussion to share initial ideas is a good starting point. Once sufficient time has been given, then items should be shared as a class. A Volleyball discussion should be promoted.

2. Students can explore which soil materials move readily due to water movement and those that do not.

A. Pour water form a watering can on a pile of soil that contains a range of particle sizes, and record observations.

B. Pour water at one end of a cake pan containing soil or sand, and observe and describe what happens to the soil. The pan should be slightly tilted. Students should record their procedures and investigations using drawings, demonstrations and written/oral presentation - see attached worksheet.

C. Students may be given the opportunity to observe the effects of moving water on soil in their community and record observations
   i. If the weather cooperates and is raining, then search in the school yard for different examples of changes.
   ii. Using multi-media record examples of moving water on river banks, creeks, streams and culverts.

Assessment: Informal Formative

2 A. Ensure that students have recorded observations based on the set up of the activity
2 C. Ensure that students have recorded observations based on the observations of the various activities.

Assessment: Formal Formative

2 B. Evaluate the responses to the worksheet - Moving Water and Soil

Students will have sufficient experience to then create a journal entry to demonstrate how their understanding of moving water and soil have changed their thinking.

Moving Water and Soil

•Observe and describe the effects of moving water on different types of soils (100-39)

Task:
Pour water at one end of a cake pan containing soil or sand, and observe and describe what happens to the soil.

1. Draw what your tilted cake pan looks like from the side

2. Draw what your cake pan looks like before you add water to the soil

3. How do you think pouring water will change the way the soil looks in the cake pan?

_____

_____

_____

4. Record your observations of how the soil has changed when water was poured in the cake pan

Exploring Soils

Strand - Interactions of Living Things and Soils

General Curriculum Outcomes	Specific Curriculum Outcomes
100-39 Investigate and describe how living things affect and are affected by soils	100-35 Investigate and describe how living things affect and are affected by soils
201-7 Identify and use a variety of sources of science information and ideas	201-7 Identify and use a variety of sources of science information to gather information about how living things affect and are affected by soils

Living Things Found in Soil

Outcomes:

• Investigate and describe how living things affect and are affected by soils (100-35)

Lesson Activity Overview

This outcome will be studied in 3 different contexts:
• **Living Things Found in Soil**
• How Plants interact with Soil
• Composting

This lesson focusses on the organisms that live in the soil. The organism most familiar for students will be earthworms and insects like ants. Depending on what materials you have access to and the ecology of your local school community teachers can choose from any or all of these inquiry activities. The goal should be to have as much natural setting investigation as possible.

Investigation A - Night Crawlers in Class

Go to the local fishing sales company or dig for earthworms in the community and get enough night crawlers so that each group will have 3 or 4 worms to observe.
Students can spread a sample of soil on a clear sheet of plastic and observe what crawls out of an through the soil.
Students should be encouraged to record their observations.

Investigation B - Night Crawlers long term

Go to the local fishing sales company or dig for earthworms in the community and get night crawlers in soil. Transfer the soil and worms into a clear container. Pack the soil down fairly tightly. Observe the worms periodically throughout the next couple of days.

Investigation C -

An ant farm or a plastic bag or device (made with two sheets of plexiglass help about 2 cm apart) containing insects, worms, and grubs would provide opportunities for closer observation. Where appropriate, have students observe in a natural setting

Regardless of the activities that are chosen to investigate, students should be encouraged to observe how the organisms move thought the soil, what they seem to be eating, and any signs of droppings.

Assessment: Informal Formative
Investigation A - Observations recorded by students should be informally assessed.

Investigation B - Day to day observations recorded by students should be informally assessed.

Investigation C - Observations recorded by students should be informally assessed.

Assessment: Formal Formative
Investigation B - At the end of the observation period and working based on the observations that were informally assessed, students should respond to the following questions:
What happens to the soil over the two days?
Why do you think worms are good for soil?

How Plants Interact with Soil

Outcomes:

• Investigate and describe how living things affect and are affected by soils (100-35)

Lesson Activity Overview

This outcome will be studied in 3 different contexts:
• Living Things Found in Soil
• **How Plants interact with Soil**
• Composting

This lesson focus on how plants use soil. This section will use an in class investigation as well as use the long-term investigation of the germinating plant (Plant Growth and Changes - Inquiry Package Activity).

In-class investigation - This should be prepped several days ahead of time.
Students can investigate plant roots and describe how they spread through the soil. One way of doing this is to place moist paper towel inside a glass jar or plastic bag. Place popcorn (unpopped) between the glass/plastic and paper towel. Popcorn will sprout and roots and leaves will be visible to observe.

Extension: If the plant that was grown in class is still observable. Students should look for evidence of the roots through the cup, and draw what you observe.

Assessment: informal Formative
Observations recorded on worksheet by students should be informally assessed.

Assessment: Formal Formative
At the end of the observation period and working based on the observations that were informally assessed, students should respond to the following question:
Why do you think roots need soil?

How Plants Interact with Soil

• Investigate and describe how living things affect and are affected by soils (100-35)

Record how the roots look in the soil

Exploring Soils

Strand - Technological Products and Processes Related to Soil

General Curriculum Outcomes	Specific Curriculum Outcomes
101-12 Demonstrate and describe ways of using earth materials to make useful objects	101-12 Demonstrate and describe ways of using earth materials to make useful objects
203-1 Communicate questions, ideas, and intensions while conducting their explorations	203-1 Communicate questions, ideas, and intentions while using earth materials to make useful objects

Materials that come from Earth

Outcomes:

• Demonstrate and describe ways of using Earth materials to make useful objects (101-12)
• Communicate questions, ideas, and intentions while using Earth materials to make useful objects (203-1)

Lesson Activity Overview

Investigation A - focus on 101-12
In a group of two or three, choose an “earth” product to make and display for the class. Alternatively, this activity could have everyone making the same type of product. This activity can provide opportunities for connections to art and social studies outcomes.

Investigation B - focus on 203-1
Bring an earth product from home. Find out where the product was made, what it was made from, and what it is used for (see attached worksheet). All students products should be included in a class display of earth products.

Assessment: Informal Formative
Investigation A - Students will make any object that their group chooses, ensure the product is created from earth materials.

Assessment: Formal Formative
Investigation B - Evaluate the answers from the worksheet. This worksheet along with the product itself will be displayed. So students should have feedback given before completion and display.

Earth Product from Home

•Demonstrate and describe ways of using Earth materials to make useful objects (101-12)
• Communicate questions, ideas, and intentions while using Earth materials to make useful objects (203-1)

What is your Product?

_____

Draw or insert a picture of your Product

Where was the product made?

_____

_____

What is the product made from?

_____

_____

What is the product use for?

_____

_____

_____