hands-on
science
and Technology
An Inquiry Approach

Grade 3

Series Editor
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Hands-On Science and Technology, Grade 3
An Inquiry Approach

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Introduction to Hands-On Science and Technology

Program Introduction

Hands-On Science and Technology helps develop students' scientific and technological literacy through active inquiry, problem solving, and decision making. With each activity in the program, students are encouraged to explore, investigate, and ask questions as a means of heightening their own curiosity about the world around them. Students solve problems through firsthand experiences, and by observing and examining objects within their environment. In order for young students to develop scientific and technological literacy, concrete experience is of utmost importance—in fact, it is essential.

The Inquiry Approach to Science and Technology

As students explore science and technology concepts, they should be encouraged to ask questions to guide their own learning. The inquiry model is based on five components:

1. formulating questions
2. gathering and organizing information, evidence, or data
3. interpreting and analyzing information, evidence, or data
4. evaluating information, evidence, or data, and drawing conclusions
5. communicating findings

Using this model, the teacher becomes the facilitator of the learning process, and students initiate questions; gather, organize, interpret, and analyze information; evaluate findings and draw conclusions; and communicate their learning. As such, the process focuses on students' self-reflections as they ask questions, discover answers, and communicate their understanding.

Using an inquiry approach involves beginning with more structured inquiry, and moving to guided inquiry and, finally, open inquiry.

- In structured inquiry, the teacher may provide the initial question and structure the procedures to answer that question. Students follow the given procedures and draw conclusions to answer the given question.
- In guided inquiry, the teacher provides the research question, but students are involved in designing ways to answer the question and communicate their findings.
- In open inquiry, students formulate their own question(s), design and follow through with a developed procedure, and communicate their findings and results. According to Banchi and Bell (2008), "Open inquiry activities are only successful if students are motivated by intrinsic interests and if they are equipped with the skills to conduct their own research study."

In implementing an inquiry approach to science and technology, questions and ideas form the foundation of the teaching and learning process. The following excerpt from the Ontario Literacy and Numeracy Secretariat speaks clearly to this approach:

> While all students ask questions and express interests in world phenomena, it takes creative and responsive teaching to transform wonder into knowledge. To begin, inquiry works best in a classroom in which ideas are placed at the centre. Establishing a culture in which students are encouraged to express ideas but also to respectfully challenge and test one another's ideas is an important first step in the inquiry process. This spirit of inquiry is achieved by welcoming ideas and trusting that even the simplest questions can lead to something greater and not yet evident. Like any good growing system, these questions need time to germinate. Students' ideas can be expressed in many forms (questions, comments, diagrams, pictures, dance, etc.) and serve the important purpose of advancing student understanding of a topic. When the classroom culture is one that views ideas as improvable,

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> students work hard to continuously improve the quality, coherence and utility of ideas—both individually and collectively (Scardamalia 2002).

21st Century Teaching and Learning

In this rapidly changing and globalized world, it is more important than ever to prepare students to lead fulfilling lives, be productive contributors, and thrive in our society. Educators are responding to this challenge through evolving practice that challenges students in engaging and meaningful ways. The **Hands-On Science and Technology** program responds to this challenge by ensuring it reflects best practices that focus on 21st Century Competencies. According to Michael Fullan (2013), these competencies are:

- **Critical thinking:** Critical thinking is the ability to explore problems, weigh alternate solutions, and arrive at solutions. It also involves problem solving and making effective decisions, and applying them to real-world contexts.
- **Communication:** Communication refers to the ability to communicate effectively through reading, writing, speaking, listening, viewing, and representing. It also involves the ability to use a variety of information sources and digital tools.
- **Collaboration:** Collaboration requires the ability to work in teams, learning from and contributing to the learning of others.
- **Creativity:** Creativity involves exploring new ideas, being innovative, and thinking outside the box. Being creative also means looking at novel ideas and finding ways to put ideas into action.
- **Citizenship:** Citizenship involves thinking like a local and a global citizen, considering the values and worldviews of others, and having a genuine interest in solving complex real-world problems that affect human and environmental sustainability.
- **Character:** Character involves specific traits such as perseverance, resilience, and being a life-long learner.

These competencies are the foundation of the inquiry-based approach used in **Hands-On Science and Technology**. As such, teachers take on a facilitation role as students use these skills to explore, investigate, research, design, create, and solve problems in the world around them. To provide a connection between science and technology activities and 21st Century Competencies, each lesson in ***Hands-On Science and Technology, Grade 3*** identifies one or more competencies that teachers may focus on during the activity. This provides teachers with the opportunity to make ongoing links between the science and technology curriculum and 21st century classroom teaching and learning.

The Goals of the Science and Technology Program

Science and technology play fundamental roles in the lives of Canadians. In the introduction to *The Ontario Curriculum, Grades 1–8: Science and Technology* (2007, 3), the Ministry of Education states:

> During the twentieth century, science and technology played an increasingly important role in the lives of all Canadians. Science and technology underpin much of what we take for granted, including clean water, the places in which we live and work, and the ways in which we communicate with others. The impact of science and technology on our lives will continue to grow. Consequently, scientific and technological literacy for all has become the overarching objective of science and technology education throughout the world.

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The Ontario Curriculum identifies three goals that form the foundation of the science and technology program. In keeping with this focus on scientific and technological literacy, these goals are the bases for the lessons in the **Hands-On Science and Technology** program:

Goal 1
to relate science and technology to society and the environment

Goal 2
to develop the skills, strategies, and habits of mind required for scientific inquiry and technological problem solving

Goal 3
to understand the basic concepts of science and technology

Hands-On Science and Technology Strands and Expectations

The Ontario science and technology curriculum for all grade levels is organized into four strands, as follows:

1. Understanding Life Systems
2. Understanding Structures and Mechanisms
3. Understanding Matter and Energy
4. Understanding Earth and Space Systems

Two sets of expectations are listed for each grade in each strand: (1) overall expectations, and (2) specific expectations.

The overall expectations describe, in general terms, the knowledge and skills that students are expected to demonstrate by the end of each grade. There are three overall expectations for each strand in each grade in science and technology.

The specific expectations describe the expected knowledge and skills in greater detail.

NOTE: The overall and specific expectations must all be accounted for in instruction and assessment, but evaluation focuses on the three overall expectations (Ontario Ministry of Education 2010, 38).

The overall and specific expectations for each strand are presented in chart format in the introduction to each unit. Alongside each specific expectation, corresponding lessons are identified.

Hands-On Science and Technology Fundamental Concepts and Big Ideas

Fundamental concepts are key ideas that provide a framework for the acquisition of all scientific and technological knowledge. These concepts also help students to integrate scientific and technological knowledge with knowledge in other subject areas, such as mathematics and social studies. The fundamental concepts addressed in the curriculum for science and technology are:

- matter
- energy
- systems and interactions
- structure and function
- sustainability and stewardship
- change and continuity

Big ideas are the enduring understandings that students carry with them into the future. Big ideas are often transferable to other subjects and to real-life experiences.

The fundamental concepts and big ideas for each grade and strand can be found in a chart in the introduction to each unit of the **Hands-On Science and Technology** program.

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Hands-On Science and Technology Program Principles

- Effective science and technology programs involve hands-on inquiry, problem solving, and decision making.
- The development of students' skills, attitudes, knowledge, and understanding of Science, Technology, Society, and the Environment (STSE) issues form the foundation of the science and technology program.
- Children have a natural curiosity about science and the world around them. This curiosity must be maintained, fostered, and enhanced through active learning.
- Science and technology activities must be meaningful, worthwhile, and relate to real-life experiences.
- The teacher's role in science and technology education is to facilitate activities and encourage critical thinking and reflection. Children learn best by doing, rather than by just listening. Instead of simply telling, the teacher, therefore, should focus on formulating and asking questions, setting the conditions so that students ask their own questions, and helping students to make sense of the events and phenomena they have experienced.
- Science and technology should be taught in conjunction with other school subjects. Themes and topics of study should integrate ideas and skills from several core areas whenever possible.
- The science and technology program should encompass, and draw on, a wide range of educational resources, including literature, nonfiction research material, audio-visual resources, and technology, as well as people and places in the local community.
- The science and technology program should be infused with knowledge and worldviews of Indigenous peoples, as well as with other diverse multicultural perspectives.
- Assessment of student learning in science and technology should be designed to focus on performance and understanding, and should be conducted through meaningful assessment techniques carried out throughout each unit of study.

Infusing Indigenous Perspectives

Indigenous peoples are central to the Canadian context, and it is important to infuse their knowledge into the learning experiences of all students. The intentional integration of Indigenous knowledge in the **Hands-On Science and Technology** series helps to address the Calls to Action of the Truth and Reconciliation Commission of Canada (2015), particularly the call to "integrate Indigenous knowledge and teaching methods into classrooms" (Action 62) and the call for "building student capacity for intercultural understanding, empathy, and mutual respect" (Action 63).

Indigenous peoples of the past depended on the natural environment to survive. The environment shaped their way of life: geography, vegetation, climate, and natural resources of the land determined the ways they survived. By observing the land and its animal inhabitants, the environment also taught them to survive. The traditional territories of the First Nations and Métis peoples cover Ontario, and many Inuit have moved to urban centres in the province. The worldviews of these peoples and their approaches and contributions to science and technology are now being acknowledged and incorporated into educational programs. It is also important to recognize the diversity of Ontario's Indigenous peoples and to focus on both the traditions and contemporary lives

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of the Indigenous communities in your area. Contact personnel in your school district—Indigenous consultants and/or those responsible for Indigenous education—to find out what resources (e.g., people, books, videos) are available to you and your students.

In incorporating Indigenous perspectives, it is important to value Traditional Ecological Knowledge (TEK). TEK has been defined as:

> …the knowledge base acquired by indigenous and local people over many hundreds of years through direct contact with the environment. It includes an intimate and detailed knowledge of plants, animals, and natural phenomena, the development and use of appropriate technologies for hunting, fishing, trapping, agriculture, and forestry and a holistic knowledge, or "worldview" which parallels the scientific disciplines of ecology (Inglis 1993).

Indigenous peoples developed technologies and survived on this land for millennia because, in part, they were good scientists. They used observation and experimentation to refine their technologies such as building canoes and tipis and discovering food-preservation techniques. As such, TEK serves as an invaluable resource for students and teachers of science and technology.

Throughout the **Hands-On Science and Technology** program, there are many opportunities to incorporate culturally appropriate teaching methodologies from Indigenous worldviews. First Peoples Pedagogy indicates that making connections to the local community is central to learning (First Nations Education Steering Committee 2016). As one example, both Elders and Métis Senators offer a wealth of knowledge that can be shared with students. Consider inviting an Elder or a Métis Senator as a guest into the classroom in connection with specific topics being studied (as identified within the given lessons throughout the unit). An Elder or a Métis Senator can guide a nature walk, share stories and experiences, share traditional technologies, and help students understand Indigenous peoples' perspectives of the natural world. Elders and Métis Senators will provide guidance for learners and opportunities to build bridges between the school and the community. Here are a few suggestions about working with Elders and Métis Senators:

- Some Indigenous keepers of knowledge are more comfortable being called "Knowledge Keepers" than "Elders" or "Métis Senators." Be sensitive to their preferences.
- It is important to properly acknowledge any visiting Elders and Métis Senators and their knowledge, as they have traditionally been and are recognized within Indigenous communities as highly esteemed individuals. There are certain protocols that should be followed when inviting an Elder or a Métis Senator into your classroom. The Lakehead District School Board has protocols available at: <https://www.lakeheadschools.ca/aboriginal-education/>.
- It is especially important to connect with Indigenous peoples and Elders and Métis Senators in your local area, and to study local issues related to Indigenous peoples in Ontario. Consider contacting Indigenous education consultants within your local school district or with the Ontario Ministry of Education to access referrals. Also, consider contacting local Indigenous organizations for referrals to Elders and Métis Senators, and other knowledge keepers. Such organizations may also be able to offer resources and opportunities for field trips and land-based learning.

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Cultural Connections

To acknowledge and celebrate the cultural diversity represented in Canadian classrooms, it is important to infuse cultural connections into classroom learning experiences. It is essential for teachers to be aware of the cultural makeup of their class, and to celebrate these diverse cultures by making connections to curricular outcomes. In the same way, it is important to explore other cultures represented in the community and beyond, to encourage intercultural understanding and harmony.

Throughout the **Hands-On Science and Technology** program, suggestions are made for connecting science and technology topics to cultural explorations and activities.

Land-Based Learning

Land-based learning replaces the classroom walls with the natural land. For all students, land-based learning offers firsthand opportunities to observe, explore, and investigate the land, waters, and atmosphere of the natural world. Land-based learning promotes a healthy interplay between society and nature and helps students envision a world where there is meaningful appreciation and respect for our natural environment—an environment that sustains all life forms. Many lessons in ***Hands-On Science and Technology, Grade 3*** incorporate land-based learning activities, whether it be a casual walk around the neighbourhood to examine trees or a more involved exploration of local waterways. When land-based learning connections are made in ***Hands-On Science and Technology, Grade 3*** lessons, the following icon is used:

Technology

Digital learning, or learning with information and communication technology (LwICT), is an important component of any classroom. As such, technological supports available in schools—including digital cameras, computers/tablets, interactive whiteboards (IWB), projectors, document cameras, audio-recording devices, and even calculators—can be used with and by students to enhance their learning experiences. When technology connections are made in ***Hands-On Science and Technology, Grade 3*** lessons, the following icon is used:

Sustainability

The **Hands-On Science and Technology** program provides numerous opportunities for students to investigate issues related to sustainable development. Asking students the following question can often help to clarify for them what is meant by sustainability: "Is there enough for everyone, forever?" Exploring sustainability also connects to Indigenous worldviews about respecting and caring for the Earth. The three pillars of sustainability are the environment, society, and the economy. When sustainability links are made in ***Hands-On Science and Technology, Grade 3*** lessons, any or all of the sustainability pillars may be the focus of this connection, and are identified by the following icon:

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The Hands-On Science and Technology Assessment Plan

The **Hands-On Science and Technology** program provides a variety of assessment tools that enable teachers to build a comprehensive and authentic daily assessment plan for students. Based on current research about the value of quality classroom assessment (Davies 2011), suggestions are provided for authentic assessment, which includes assessment *for* learning, assessment *as* learning, and assessment *of* learning.

Ontario's policy on assessment is outlined in the document *Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools* (see: <www.edu.gov.on.ca/eng/policyfunding/success.html>). The document (2010) outlines a fundamental shift in the roles of teachers and students in the learning process:

> In a traditional assessment paradigm, the teacher is perceived as the active agent in the process, determining goals and criteria for successful achievement, delivering instruction, and evaluating student achievement at the end of a period of learning. The use of assessment for the purpose of improving learning and helping students become independent learners requires a culture in which student and teacher learn together in a collaborative relationship, each playing an active role in setting learning goals, developing success criteria, giving and receiving feedback, monitoring progress, and adjusting learning strategies. The teacher acts as a "lead learner," providing support while gradually releasing more and more responsibility to the student, as the student develops the knowledge and skills needed to become an independent learner.

The primary purpose of assessment is to improve student learning. Assessment *for* learning provides students with descriptive feedback and coaching for improvement. Assessment *as* learning helps students self-assess by developing their capacity to set their own goals, monitor their own progress, determine their next steps in learning, and reflect on their learning. Assessment *of* learning is summative in nature and is intended to identify student progress in relation to learning expectations. The challenge for educators is to integrate assessment seamlessly with other learning goals. The Ontario assessment model uses the following process:

- **Establish learning goals from curriculum expectations.** Lessons include learning goals in student-friendly language that have been developed from curriculum expectations. These learning goals are shared with students and used to guide instruction.
- **Develop success criteria.** These descriptors are written in student-friendly language to help students understand what successful learning looks like. Criteria can be established by the teacher, using assessment task exemplars of student work, or by using the Achievement Chart from *The Ontario Curriculum, Grades 1–8: Science and Technology* (2007, 26–27). Success criteria can also be determined in collaboration with students.
- **Provide descriptive feedback.** In conversations with students, identify what criteria they have and have not met, and provide any needed instruction. At this stage, teachers work with students to identify next steps to determine how students may improve. This may include differentiating instruction.
- **Use information for peer and self-assessment.** Students assess their own work and the work of others to determine what still needs to be done.
- **Establish individual goals.** Students determine what they need to learn next and how to get there.

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The **Hands-On Science and Technology** program provides assessment suggestions, rubrics, and templates for use during the teaching/learning process. These suggestions include tasks related to assessment *for* learning, assessment *as* learning, and assessment *of* learning.

Assessment *for* Learning

It is important for teachers to assess students' understanding before, during, and after a lesson. The information gathered helps teachers determine students' needs and then plan the next steps in instruction. Students may come into class with misconceptions about science and technology concepts. By identifying what they already know, teachers can help students make connections and address any challenging issues.

To assess students as they work, use the assessment *for* learning suggestions provided with many of the activities.

While observing and conversing with students, teachers may use the **Anecdotal Record** template and/or the **Individual Student Observations** template to record assessment *for* learning data.

- **Anecdotal Record:** To gain an authentic view of a student's progress, it is critical to record observations *during* lessons. The **Anecdotal Record** template, on page 26, provides the teacher with a format for recording individual or group observations.
- **Individual Student Observations:** When teachers wish to focus more on individual students for a longer period of time, consider using the **Individual Student Observations** template, on page 27. This template provides more space for comments and is especially useful during conferences, interviews, or individual student performance tasks.

Assessment *as* Learning

It is important for students to reflect on their own learning in relation to science and technology. For this purpose, teachers will find a **Student Self-Assessment** template, on page 31, as well as a **Student Reflections** template on page 32.

In addition, the **Science and Technology Journal**, on page 28, will encourage students to reflect on their own learning. Teachers can copy several sheets for each student, cut the sheets in half, add a cover, and bind the sheets together. Students can then create their own title pages for their journals. For variety, you may also have students use the blank reverse side of each page for other reflections, such as drawing or writing about:

- new science and technology challenges
- favourite science and technology activities
- real-life experiences with science and technology
- new terminology
- new places explored during investigations

Students may also journal in other ways, such as by adding notes to their portfolios, or by keeping online science and technology blogs or journals to record successes, challenges, and next steps relating to the learning goals.

NOTE: This Science and Technology Journal template is provided as a suggestion, but journals can also be made from simple notebooks or recycled paper.

Another component of assessment *as* learning involves opportunities for students to reflect on their use of 21st Century Competencies. During each lesson, teachers should spend time discussing and reflecting on the competencies being focused on. The intent here is to enhance students' understanding of how and when

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they use the competencies during the inquiry process. For this purpose, teachers may project a copy of the **21st Century Competencies Reflection** template, on page 29, and complete it as a class, using words and pictures to communicate students' reflections. A completed **Sample 21st Century Competencies Reflection** is included on page 30.

NOTE: Since no lesson addresses all six competencies, teachers can focus specifically on those covered in a lesson. Students can then explore the meaning of those skills at a deeper level.

Another component of assessment *as* learning utilizes the **21st Century Competencies Student/Teacher Reflection** template, which is found on page 33. This is completed by students at the end of the unit, in order to encourage them to reflect on how they have used the competencies. Students record their reflections in the rectangles on the template, and teachers provide descriptive feedback in the outer ovals.

NOTE: Depending on their literacy level, students may complete the assessment in various ways. For example, the sheets may be used as guides for oral conferences between teacher and student, or an adult may act as a scribe for the student, recording their responses. Alternatively, students may complete the sheets independently or with guidance and support as needed.

NOTE: This descriptive feedback from teachers may also be considered assessment ***for*** learning. Even though this feedback is provided at the end of the unit, students will consider the anecdotal comments as they continue to develop their 21st Century Competencies.

Students should also be encouraged to reflect on their cooperative group work skills, as these are directly related to 21st Century Competencies, as well as to the skills scientists use as they collaborate in team settings. For this purpose, a **Cooperative Skills Self-Assessment** template is on page 34.

Student reflections can also be done in many ways other than by using these templates. For example, students can do the following:

- Interview one another to share their reflections on science and technology.
- Write an outline or brief script and make a video reflection.
- Create an electronic slide show with an audio recording of their reflections.

Assessment *of* Learning AOL

Assessment *of* learning provides a summary of student progress related to the accomplishments of the learning goals at a particular point in time. It is important to gather a variety of assessment data to draw conclusions about what a student knows and can do. As such, consider collecting student products, observing processes, and having conversations with students. Teachers should also consider which student work is formative and which is summative. Only the most recent and consistent evidence should be used.

Assessment *of* learning suggestions are provided with the culminating lesson of each unit of the **Hands-On Science and Technology** program. Teachers may use the **Anecdotal Record** template, on page 26, the **Individual Student Observations** template, on page 27, and the **Rubric**, on page 36, to record student results.

Always assess a student's individual accomplishments, not group work. However, you may assess how an individual student works within a group. Such skill development includes the ability to listen to others respectfully, share ideas, and participate actively in the inquiry process. For this purpose, use

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the **Cooperative Skills Teacher Assessment** template on page 37.

Performance Assessment

Both assessment *for* learning and assessment *of* learning include performance assessment. Performance assessment is planned, systematic observation and assessment based on students actually doing a specific science and technology activity. Teacher- or teacher/student-created rubrics can be used to assess student performance.

A **Sample Rubric** and a **Rubric** template for teacher use are on pages 35 and 36. For any specific activity, before the work begins, the teacher and students should together discuss success criteria for completing the task. This will ensure that the success criteria relate to the lesson's learning goals. The teacher can then record these criteria on the rubric.

When conducting assessment *for* learning, the rubric can be reviewed with students to determine strengths, challenges, and next steps related to learning goals.

When conducting assessment *of* learning, the rubric can be used to determine summative data. For example, teachers can use the rubric criteria to assess student performance, and students can receive a check mark for each criterion accomplished to determine a rubric score from a total of four marks. These rubric scores can then be transferred to the **Rubric Class Record** template, on page 38.

When using the rubric for assessment *of* learning, consider using four levels of achievement to correlate with the Ontario Science and Technology Achievement Chart (see pages 26 and 27 of *The Ontario Curriculum*).

For example:

1. achievement that falls much below the provincial standard
2. achievement that approaches the provincial standard
3. achievement that meets the provincial standard
4. achievement that surpasses the provincial standard

The **Hands-On Science and Technology** program provides numerous opportunities for students to apply their skills. By considering the same levels of achievement throughout the year, teachers should be able to track student learning and determine when students have a thorough understanding and demonstrate in-depth application of concepts and skills.

Portfolios

A portfolio is a collection of work that shows evidence of a student's learning. There are many types of portfolios—the showcase portfolio and the progress portfolio are two popular formats. Showcase portfolios highlight the best of students' work, with students involved in the selection of pieces and justification for choices. Progress portfolios reflect students' progress as their work improves and aim to demonstrate in-depth understanding of the materials over time.

Select, with student input, work to include in a science and technology portfolio or in a science and technology section of a multi-subject portfolio. Selections should include representative samples of student work in all types of science and technology activities. Templates are included to organize the portfolio (**Portfolio Table of Contents** is on page 39, and **Portfolio Entry Record** is on page 40).

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NOTE: In an Indigenous context, portfolio creation may differ in that the student and teacher may select completed work from a coming-to-know perspective that reflects participatory learning. Students reflect on their own understanding of the world around them or have a sense of negotiating another point of view.

Evidence of Student Achievement Levels for Evaluation

At the end of each unit, the teacher can determine achievement levels for each student. Assessment *of* learning information gathered throughout the unit can be used to identify these levels, according to the Ontario Science and Technology Achievement Chart.

The most recent and consistent assessment information should be used to determine levels of achievement. A reproducible, **Achievement Chart for Science & Technology**, on page 41 and 42, is included for teacher reference.

Important Note to Teachers

Throughout the **Hands-On Science and Technology** program, suggestions are provided for assessment *for* learning, assessment *as* learning, and assessment *of* learning. Keep in mind that these are merely suggestions. Teachers are encouraged to use the assessment strategies presented in a wide variety of ways, and to ensure that they build an effective assessment plan using these assessment ideas, as well as their own valuable experiences as educators.

NOTE: From an Indigenous perspective, assessment is community-based, qualitative, and holistic, and includes input from all the people who influence an individual student's learning—parents, caregivers, Elders, Métis Senators, community members, and educators. An assessment that includes all these perspectives provides a balanced understanding of what represents success for Indigenous students and their families/community. A strong partnership between parents/guardians/communities and school improves student achievement. Teachers should be aware that some Indigenous students may feel apprehensive about a formal process of assessment; others may find that Western achievement goals do not fit their worldviews.

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Curriculum Correlation

Specific Expectation	Lesson														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Relating Science and Technology to Society and the Environment															
1.1 Assess ways in which plants are important to humans and other living things, taking different points of view into consideration, and suggest ways in which humans can protect plants.						√	√		√	√				√	√
1.2 Assess the impact of different human activities on plants, and list personal actions they can engage in to minimize harmful effects and enhance good effects.										√				√	
2. Developing Investigation and Communication Skills															
2.1 Follow established safety procedures during science and technology investigations.	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
2.2 Observe and compare the parts of a variety of plants.		√	√												
2.3 Germinate seeds and record similarities and differences as seedlings develop.			√		√										
2.4 Investigate ways in which a variety of plants adapt and/or react to their environment, including changes in their environment, using a variety of methods.			√	√				√							
2.5 Use scientific inquiry/ experimentation skills, and knowledge acquired from previous investigations, to investigate a variety of ways in which plants meet their basic needs.			√		√			√			√				
2.6 Use appropriate science and technology vocabulary, including *stem, leaf, root, pistil, stamen, flower, adaptation,* and *germination,* in oral and written communication.	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
2.7 Use a variety of forms to communicate with different audiences and for a variety of purposes.	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

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Specific Expectation	Lesson														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
3. Understanding Basic Concepts															
3.1 Describe the basic needs of plants, including air, water, light, warmth, and space.	√							√							
3.2 Identify the major parts of plants, including root, stem, flower, stamen, pistil, leaf, seed, and fruit, and describe how each contributes to the plant's survival within the plant's environment.	√	√	√	√		√									
3.3 Describe the changes that different plants undergo in their life cycles.					√										
3.4 Describe how most plants get energy to live directly from the sun and how plants help other living things to get energy from the sun.	√		√												
3.5 Describe ways in which humans from various cultures, including Indigenous peoples, use plants for food, shelter, medicine, and clothing.						√	√			√	√				√
3.6 Describe ways in which plants and animals depend on each other.							√		√			√			
3.7 Describe the different ways in which plants are grown for food, and explain the advantages and disadvantages of locally grown and organically produced food, including environmental benefits.						√	√						√		
3.8 Identify examples of environmental conditions that may threaten plant and animal survival.													√	√	√

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Curriculum Correlation

Specific Expectation	Lesson										
	1	2	3	4	5	6	7	8	9	10	11
1. Relating Science and Technology to Society and the Environment											
1.1 Assess effects of strong and stable structures on society and the environment.		√					√	√	√		√
1.2 Assess the environmental impact of structures built by various animals and those built by humans.		√					√	√	√		√
2. Developing Investigation and Communication Skills											
2.1 Follow established safety procedures during science and technology investigations.	√	√	√	√	√	√	√	√	√	√	√
2.2 Investigate, through experimentation, how various materials and construction techniques can be used to add strength to structures.				√	√	√					
2.3 Investigate, through experimentation, the effects of pushing, pulling, and other forces on the shape and stability of simple structures.				√	√	√					
2.4 Use technological problem-solving skills, and knowledge acquired from previous investigations, to design and build a strong and stable structure that serves a purpose.										√	
2.5 Use appropriate science and technology vocabulary, including *compression, tension, strut, ties, strength,* and *stability*, in oral and written communication.	√	√	√	√	√	√	√	√	√	√	√
2.6 Use a variety of forms to communicate with different audiences and for a variety of purposes.	√	√	√	√	√	√	√	√	√	√	√
3. Understanding Basic Concepts											
3.1 Define a structure as a supporting framework, with a definite size, shape, and purpose, that holds a load.	√										
3.2 Identify structures in the natural environment and in the built environment.		√					√	√			√
3.3 Identify the strength of a structure as its ability to support a load.	√				√						
3.4 Identify the stability of a structure as its ability to maintain balance and stay fixed in one spot.	√				√	√					
3.5 Identify properties of materials that need to be considered when building structures.			√								
3.6 Describe ways in which the strength of different materials can be altered.				√	√	√					
3.7 Describe ways to improve a structure's strength and stability.				√	√	√					
3.8 Explain how strength and stability enable a structure to perform a specific function.				√	√	√					
3.9 Describe ways in which different forces can affect the shape, balance, or position of structures.				√	√	√					
3.10 Identify the role of struts and ties in structures under load.				√	√	√					

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Curriculum Correlation

Specific Expectation	Lesson																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Relating Science and Technology to Society and the Environment																	
1.1 Assess the effects of the action of forces in nature (natural phenomena) on the natural and built environment, and identify ways in which human activities can reduce or enhance this impact.							√			√			√	√			
1.2 Assess the impact of safety devices that minimize the effects of forces in various human activities.																√	
2. Developing Investigation and Communication Skills																	
2.1 Follow established safety procedures during science and technology investigations.	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
2.2 Investigate forces that cause an object to start moving, stop moving, or change direction.	√			√		√			√	√	√	√	√	√	√	√	√
2.3 Conduct investigations to determine the effects of increasing or decreasing the amount of force applied to an object.			√	√		√			√	√	√	√	√	√			√
2.4 Use technological problem-solving skills, and knowledge acquired from previous investigations, to design and build devices that use forces to create controlled movement.					√							√			√		√
2.5 Use appropriate science and technology vocabulary, including *push, pull, load, distance*, and *speed*, in oral and written communication.	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
2.6 Use a variety of forms to communicate with different audiences and for a variety of purposes.	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
3. Understanding Basic Concepts																	
3.1 Identify a force as a push or a pull that causes an object to move.	√	√		√												√	√
3.2 Identify different kinds of forces.				√				√					√			√	√
3.3 Describe how different forces applied to an object at rest can cause the object to start, stop, attract, repel, or change direction.			√	√		√		√			√	√	√				√
3.4 Explain how forces are exerted through direct contact or through interaction at a distance.		√	√	√		√		√			√	√	√			√	√
3.5 Identify ways in which forces are used in their daily lives.				√		√		√			√		√			√	√

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Curriculum Correlation

Specific Expectation	Lesson									
	1	2	3	4	5	6	7	8	9	10
1. Relating Science and Technology to Society and the Environment										
1.1 Assess the impact of soils on society and the environment, and suggest ways in which humans can enhance positive effects and/or lessen or prevent harmful effects.			√	√	√	√	√		√	√
1.2 Assess the impact of human action on soils, and suggest ways in which humans can affect soils positively and/or lessen or prevent harmful effects on soils.			√				√	√	√	√
2. Developing Investigation and Communication Skills										
2.1 Follow established safety procedures during science and technology investigations.	√	√	√	√	√	√	√	√	√	√
2.2 Investigate the components of soil, the condition of soil, and additives found in soil, using a variety of soil samples from different local environments, and explain how the different amounts of these components in a soil sample determine how the soil can be used.		√	√		√		√		√	√
2.3 Use scientific inquiry/experimentation skills, and knowledge and skills acquired from previous investigations, to determine which type(s) of soil will sustain life.				√	√		√			
2.4 Investigate the process of composting, and explain some advantages and disadvantages of composting.								√		
2.5 Use appropriate science and technology vocabulary, in oral and written communication.	√	√	√	√	√	√	√	√	√	√
2.6 Use a variety of forms to communicate with different audiences and for a variety of purposes.	√	√	√	√	√	√	√	√	√	√
3. Understanding Basic Concepts										
3.1 Identify and describe the different types of soils.	√	√	√	√	√				√	
3.2 Identify additives that might be in soil but that cannot always be seen.			√							
3.3 Describe the interdependence between the living and non-living things that make up soil.			√			√				
3.4 Describe ways in which the components of various soils enable the soil to provide shelter/ homes and/or nutrients for different kinds of living things.			√		√					

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Unit 1

Growth and Changes in Plants

Introduction

This unit of ***Hands-On Science and Technology, Grade 3***, focuses on the study of plants: their physical characteristics, along with each characteristic's specific function, the requirements plants need to survive, and their patterns of growth. Students will investigate, grow, and observe plants in their local environment. They will learn about similarities and differences in the physical characteristics of different plant species, as well as the changes that take place in different plants as they grow. Students will also learn about the importance of plants for the survival of humans and other animals, and the effects of both human activities and changes in environmental conditions on plants.

Planning Tips for Teachers

- Collect a variety of live plants and an assortment of seeds and bulbs for examination and use in the classroom. Bean plants grow well and quickly, so students can observe them develop from seed to adult plant in a reasonably short period of time.
- Collect a variety of containers in which to put soil, as well as to grow the plants.
- Consider setting up a plant centre in a sunny area of the classroom, or at another location in the school, where students can observe, record, and discuss changes in plants on a regular basis.
- Collect numerous photos and pictures of plants for use in lesson activities and at learning centres. Resources for collecting pictures include:
  - wall calendars (current or outdated)
  - departments of forestry and natural resources
  - seed catalogues
  - forestry and environmental associations
  - gardening and plant magazines
  - horticultural societies
  - brochures and flyers
  - simplified plant guides/books
  - gardening books
  - nature-walk brochures from local, provincial, and national parks
  - photographs from home (Some images should be digital for use with a whiteboard/projection system.)
- Contact government departments and associations well in advance of studying the unit. Teachers may be able to obtain other related materials and services such as booklets, posters, videos, and presentations for classroom use.
- It is not necessary to teach this unit (or any other unit) in one block. Some teachers might consider splitting up the unit's activities to focus on plants during fall and spring when outdoor plant life is abundant; others might choose to study plants on an ongoing basis throughout the year. Nor is there a need to teach each unit of the curriculum as a discrete unit. Many meaningful links can be made by teaching this unit in conjunction with Soils in the Environment (unit 4).
- Develop a Makerspace centre. Classroom Makerspaces are usually designed as centres where students learn together and collaborate on do-it-yourself projects. Students are given the opportunity to work with a variety of age-appropriate tools, as well as everyday and recycled materials. Additionally, arts-and-crafts are often integrated into Makerspace offerings.

  For this unit, set up a Makerspace centre in your classroom that encourages informal learning about plants. Include general materials, such as those listed in the Introduction to ***Hands-On Science and Technology, Grade 3***, as well as unit-specific materials. For example, provide a large collection of live plants, as well as

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plant parts (e.g., slices of tree trunks, seeds, leaves, bark, fruit, and vegetables). Also, provide magnifiers, tweezers, soil samples, spray bottles, containers, and water.

Do-it-yourself projects may include anything related to the concepts within this unit. Projects that students might initiate include (but are not limited to):

- creating a field guide for local plants, edible plants, weeds, trees, or flowers
- creating a mosaic out of plant parts such as seeds, leaves, grasses, and bark
- designing and constructing a diorama featuring models of a variety of local plants
- creating models of trees in the different seasons
- creating a model of a neighbourhood that has a unique layout re: trees, plants, grasses, etc.
- creating a device or structure that helps to protect plants when they are young
- using what they know about the basic needs of plants, creating a device or structure that will help speed the growth of plants
- creating a model of a plant that displays their knowledge of plant parts (*stem, leaf, root, pistil, stamen, flower, adaptation)*
- creating a model greenhouse
- creating a device that automatically waters a plant
- examining slices of tree trunks and researching to discover what the rings tell you
- creating terrariums, or use glass jars in order to see roots growing (bulbs)
- using wet paper towels to sprout seeds
- using food colouring to see if they can change the colour of flowers (white carnations work well)

Literacy connections that might inspire projects include:

- *The Giving Tree* by Shel Silverstein
- *The Tiny Seed* by Eric Carle
- *A Fruit Is a Suitcase for Seeds* by Jean Richards
- *Pick, Pull, Snap!: Where Once a Flower Bloomed* by Lola M. Schaefer
- *Sunflower House* by Eve Bunting
- *Plants Can't Sit Still* by Rebecca E. Hirsch
- *Lola Plants a Garden* by Anna McQuinn
- *Finding Wild* by Megan Wagner Lloyd
- *The Reason for a Flower* by Ruth Heller

As inquiry questions are posed with each lesson, you will find these questions inspire other do-it-yourself projects related to the unit. Students may determine solutions to these questions through the creating they do at the Makerspace centre. Remember to not direct the learning here; simply create conditions for learning to happen.

Indigenous Worldviews

Indigenous perspectives on the natural environment are based on the idea of sustainability. Many plants traditionally used by Indigenous peoples in Ontario are either no longer in existence or in danger of being lost forever. Indigenous perspectives, which are common to many other cultures as well, are embedded throughout this unit of ***Hands-On Science and Technology, Grade 3*** with the following understandings in mind:

- People from all cultures respect and appreciate nature's gifts.
- All life forms, no matter how small, are considered important and significant.
- By respecting plants, we are protecting the Earth.
- Plants have homes and communities just like animals and people do.

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- Plants have powers to heal. Plants help animals and people survive.
- Indigenous science helps us understand how plants grow and develop.
- Western science helps us understand how plants grow and develop.
- We can learn about plants from each other.

Indigenous Peoples' Uses for Plants

Food: The Indigenous peoples of North America farmed and gathered wild plants for food. Eastern Woodlands people cultivated maize (corn), beans, and squash (known as the Three Sisters). Sagamite, a soup made of cornmeal, with added fish, meat, or squash, was a staple. There is also evidence of similar crops grown among the Prairies people farther west, in the area where the Red and Assiniboine rivers meet. Tobacco and sunflowers were also grown in the Prairies.

Hundreds of species of wild plants were gathered for food. These included seeds, nuts, and grains (e.g., whitebark pine seeds, hazelnuts, acorns, and wild rice). Berries and fleshy fruits (e.g., saskatoons, blueberries, huckleberries, crabapples, rosehips, wild cherries) were important sources of vitamins along with wild greens, the shoots and leaves of various plants, and leaf vegetables (e.g., mustard greens, lamb's quarters, watercress). Roots (e.g., wild onion, balsam root, wild turnip) were harvested later in summer. Fungi, such as wild mushrooms, and certain tree barks were also eaten. In northern areas, people ate lichens; in coastal areas, they ate certain species of algae and seaweed.

Medicinal plants: Many plants can be used to treat illnesses and ailments. Some can be administered as teas (e.g., Labrador tea is used for kidney ailments and yarrow is used to treat colds and fever). Some plants are used as inhalants or as poultices applied to a certain part of the body (a poultice from the purple coneflower root, for example, treats sores and swelling). Others are mixed with fats to make ointments. Some plants are used as smudges in healing ceremonies (see sacred plants, below).

Sacred plants: Tobacco, sweetgrass, cedar, and sage are known as the four sacred medicines by the Anishinaabe people, though they are also used by other First Nations peoples in North America. These medicines are used mainly in smudging, where the smoke they produce is part of prayer and cleansing ceremonies. Some people believe the smoke from the sacred plants summons spirits that people can communicate with. Tobacco is the first medicine offered in a ceremony to communicate with the spirit world. Sweetgrass is used for healing and purification. Sage is known for its physical healing properties, and cedar is used for both purification and as a guardian spirit.

Utility plants: Plants were essential for day-to-day life. Wood from various trees was used to build structures (e.g., shelters, frames for wigwams); for transportation (e.g., canoes, snowshoe frames, toboggans); for tools and implements (e.g., arrow and spear shafts, digging sticks, chisel and adze handles); and toys and games. Bark was used to create containers, canoes, and as wrapping and lining. Plant fibres were used to make rope, fabric, mats, and baskets. Moss was used to line diapers. Many plants were used as dyes.

Science and Technology Vocabulary

Throughout this unit teachers should use, and encourage students to use, vocabulary such as:

- *adaptation, air, basic needs, carbon dioxide, coniferous, deciduous, fibrous, flowers, leaves, life cycle, light, nutrients, ovule, oxygen, photosynthesis, pistil, pollen, root, seeds, soil, space, stamen, stem, taproot, water*

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In lesson 1, students start a Science and Technology Glossary in which they record new vocabulary introduced throughout the unit. Also in lesson 1, teachers create a class word wall for the unit. The word wall can be created on a bulletin board, or simply on a sheet of poster paper, so as not to take up too much space. On the bulletin board or poster paper, record new vocabulary as it is introduced throughout the unit. Ensure the word wall is placed in a location where all students can see it and refer to the words during activities and discussion.

Teachers should also consider including vocabulary related to scientific inquiry skills, which includes terms such as:

- *access, ask, brainstorm, collect, compare, connect, consider, construct, cooperate, create, describe, develop, diagram, display, draw, estimate, examine, explain, explore, find, follow, graph, identify, improve, investigate, label, measure, observe, order, plan, predict, recognize, record, repeat, research, respond, select, sequence, test*

These terms might be displayed in the classroom as they relate to inquiry skills used throughout the year. Students can then brainstorm which skills they are using as they work through particular lessons. They could also discuss what the skill looks and sounds like as they explore and investigate.

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Unit Overview

Fundamental Concepts	Big Ideas
Systems and Interactions	■ Plants have distinct characteristics. ■ There are similarities and differences among various types of plants.
Sustainability and Stewardship	■ Plants are the primary source of food for humans. ■ Humans need to protect plants and their habitats. ■ Plants are important to the planet.

Overall Expectations

By the end of Grade 3, students will:

1. Assess ways in which plants have an impact on society and the environment, and ways in which human activity has an impact on plants and plant habitats.
2. Investigate similarities and differences in the characteristics of various plants, and ways in which the characteristics of plants relate to the environment in which they grow.
3. Demonstrate an understanding that plants grow and change and have distinct characteristics.

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12 How Do Plants and Animals Depend on Each Other?

21st Century Competencies

Creativity, **Communication**, and **Character**: After looking at ways that plants and animals depend on each other, students will create and illustrate a page of a book that shows these interrelationships.

Materials

- digital camera
- stories (including Indigenous stories) about the interdependence of plants and animals (e.g., The Anishnaubaemowin series: *Living in Harmony* by Basil Johnston; *Living Sunlight: How Plants Bring the Earth to Life* by Molly Bang; *Food Chains* by Brenda Boreham)
- computer/tablet with Internet access
- art supplies (e.g., pencil crayons, markers, oil pastels)
- drawing paper
- rulers
- Activity Sheet: How Do Plants and Animals Depend on Each Other? (1.12.1)
- Learning-Centre Task Card: I Am an Illustrator (1.12.2)
- KWHL chart (from lesson 1)
- Science and Technology Glossary (1.1.1)

Activate

As a class, review all the things a plant needs in order to survive. Also, review (from grades 1 and 2) what animals (including humans) need in order to survive. Ask:

- Which needs are similar, and why?
- Which needs are different, and why?
- What would happen to plants if there were no animals?
- What would happen to animals if there were no plants?

Introduce the guided inquiry question: **How do plants and animals depend on each other?**

Action: Part One

Plan a nature walk to a local park, forest, or preserve. Have students look for examples and evidence of how plants and animals are interdependent. For example:

- birds and squirrels living in trees
- worms living in soil (enriching the soil for plant life)
- bees pollinating plants
- fish feeding on water plants

Take pictures of students' examples for use back in the classroom.

Consider having an Elder or a Métis Senator guide the nature walk and share knowledge about how plants and animals depend on each other. They may be able to tell traditional stories related to these topics.

Follow up the land-based learning experience by reading Indigenous stories and other books about the interdependence of plants and animals. For example:

- The Anishnaubaemowin series: *Living in Harmony* by Basil Johnston. A story of Mother Earth and the changes in plants and animals as they balance in nature.
- *Living Sunlight: How Plants Bring the Earth to Life* by Molly Bang
- *Food Chains* by Brenda Boreham

Follow up these stories with an exploration of the Haudenosaunee Thanksgiving Address, which speaks to the interrelationship of all things. It specifically addresses plants, fish, and animals. Use the book, *Giving Thanks: A Native American Good Morning Message* by Chief Jake Swamp or go to: <www.akwesasne.ca/node/253>.

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Action: Part Two

Divide the class into two groups. Label one group "Plants" and the other group "Animals." Have the groups stand on opposite sides of the classroom. Explain that they are going to play a game. The goal of the game is for all students to meet in the centre of the room. In order to move from one side of the room to the centre, a student must fulfill one requirement: each "animal" must say how they can help a plant, and each "plant" must say how they can help an animal.

Have "Plants" students and "Animals" students take turns sharing ideas of how they can help each other (one student at a time). Encourage students to use first person (see examples below). As students are speaking, encourage them to show actions that represent the plant or animal's actions. Have students hold hands when they get into the centre of the room. Examples:

> **Plant:** I provide food for animals. Food gives animals energy.
> **Animal:** As a squirrel, I carry seeds (e.g., acorns) for you from one place to another, so a new tree can be planted somewhere else.
> **Plant:** As a tree (or bush), I provide shade for you on a hot summer day.
> **Animal:** I am a bee, and I help pollinate your flowers so that apples can grow.
> **Plant:** You need me to make interesting colour dyes for your clothing.
> **Animal:** I am a gardener, and I take care of plants.

If students begin to have difficulties coming up with responses, encourage them to seek help from others in their group.

Action: Part Three

Once all students are at the centre of the room, holding hands in a circle, ask:

- Why do you think we held hands when we got to the centre of the room?
- How do plants and animals depend on each other?

Discuss the importance of plants to animals and animals to plants. The hand-holding represents the ways in which plants and animals are interconnected.

Distribute a copy of Activity Sheet: How Do Plants and Animals Depend on Each Other? (1.12.1) to each student, and have students identify how each plant depends on animals, and how each animal depends on plants.

Activity Sheet
Directions to students:
For each animal, think of how it depends on plants to survive. For each plant, think of how it depends on animals to survive. Record your ideas in complete sentences (1.12.1).

Learning Centre 

At the learning centre, provide art supplies (e.g., pencils, crayons, markers, pencil crayons) and rulers, along with drawing paper and a copy of the Learning-Centre Task Card: I Am an Illustrator (1.12.2).

Have each student create and illustrate one page for a big class book titled *We Depend on Each Other*. Each page will depict how an animal helps a plant, or how a plant helps an animal.

Assign one student to create the cover for the book. Bind the pages together and display the book in the classroom or school library.

Alternatively, the pages can be scanned and incorporated into a slide show. In this case, students could also create their pages on the computer.

If possible, have students share the completed book (or slide show) with a grade 1 class studying "Characteristics and Needs of Living Things."

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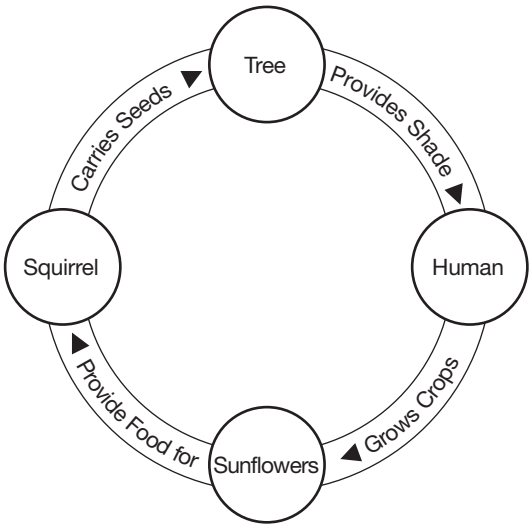
Consolidate and Debrief

- Revisit the guided inquiry question: **How do plants and animals depend on each other?** Have students share their knowledge, provide examples, and ask further inquiry questions.
- Add to the KWHL chart as students learn new concepts, answer some of their own inquiry questions, and ask new inquiry questions.
- Add new terms and illustrations to the class word wall. Include the words in other languages, as appropriate.
- Have students add new terms, definitions, and illustrations to their Science and Technology Glossary (1.1.1). When possible, encourage them to add words (and examples) in other languages, including Indigenous languages, reflective of the classroom population.

Enhance

- To reinforce plant and animal interdependence, create word cycles with students. For example:



- Play a game version of the preceding word-cycle activity. Give students a deck of index cards, with plant names on some of the cards, and animal names on others. Have students manipulate the cards to make a word cycle. Ask them to explain the connections.
- Use technology to create word cycles and concept maps with connections.
- Discuss the concept of photosynthesis with students. Research and discuss the importance of plants in producing oxygen for animals.
- Read *Plantzilla* by Jerdine Nolen, to students. Have students write a letter from the perspective of Plantzilla.
- Access the interactive activity, Plants and Animals Working Together, in the Grade 3, Unit 1 folder of the ***Hands-On Interactive for Science and Technology, Grade 3*** download. Find this download at: <www.portageandmainpress.com/product/hands-on-interactive-for-science-and-technology-grade-3/>.
- Have students continue their do-it-yourself projects at the Makerspace centre.

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Date: _____ **Name:** _____

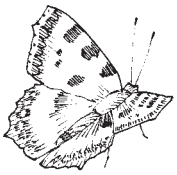
How Do Plants and Animals Depend on Each Other?

depends on plants for

_____

_____

_____

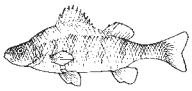


depends on plants for

_____

_____

_____



depends on plants for

_____

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depends on plants for

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depends on animals for

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depends on animals for

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I Am an Illustrator

You and your classmates have been selected to be the illustrators of a new book called *We Depend On Each Other.*

Draw a picture to show how an animal helps a plant, or how a plant helps an animal.

You may use any of the art materials provided.

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Appendix

Images in this appendix are for the Image Banks referenced in the lessons. Corresponding full-page, high-resolution images can be printed or projected for the related lessons, and are found on the Portage & Main Press website at: <www.portageandmainpress.com/product/xxxxxxxx/>. Use the password **xxxxxxxxxx** to access the download for free.

Unit 1: Growth and Changes in Plants

Lesson 1: What Do We Know About Plants and Their Needs?

Local and Exotic Plants

1. Wild Rice in Lake

2. Wild Rice Plant

3. Corn Plant with Cobs

4. Corn Field

5. Squash Plant

6. Flowering Zucchini Squash Plant

7. Growing Bean Plant

8. Highbush Cranberries

9. Blueberry Plant

10. Sage Plant

11. Cedar Tree

12. Tobacco Plant

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About the Contributors

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Brad Parolin is a junior division teacher at John A. Leslie Public School located in Scarborough, Ontario. Formerly, he was an Instructional Leader for Science and Technology with the Toronto District School Board.

Kevin Reed is the Indigenous Education Consultant for the Limestone District School Board in Kingston, Ontario. He is the the author of *Aboriginal Peoples: Building for the Future* and co-author of *Aboriginal Peoples in Canada*. He received a Prime Minister's Award for Teaching Excellence in 2008. He is a member of the Nacho Nyak Dun First Nation.

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