Grade 1 Learning Experiences: Seasonal Changes

Experience 2: How Do Living Things Adapt to Seasonal Changes?

This series of learning experiences will introduce students to seasonal changes from a scientific approach as they observe changes in the weather throughout the school year (with opportunities to connect to other science strands and other curriculum expectations). Students will engage in the driving question “How Do Living Things Adapt to Seasonal Changes?” through a provocation activity to get them to share what they already know about the four seasons and what they wonder about seasonal changes. Students will then engage in the Engineering Design Process by designing and constructing a variety of devices to collect information about the weather that will contribute to a classroom indoor/outdoor weather station. The goal of the weather station is to help students observe, track and monitor the weather throughout the school year so they can witness firsthand the seasonal changes and how it impacts the world around us. A variety of extensions and cross-curricular opportunities will allow teachers to customize these experiences to suit their students' needs and learning styles while allowing for authentic assessment for, as, and of learning.

In the real world, scientists and engineers need to record their thinking and keep records of their scientific processes and engineering designs for several different reasons. In these experiences, students will be using a science journal to track their scientific thinking as they emulate scientists and engineers while learning to make predictions, record processes, and observations, and draw conclusions about scientific phenomena. The journal will also be used during STEM investigations as a place for solving solutions to real-world problems (brainstorming, describing plans, and drawing designs for prototypes) and will be an evidence-based source of assessment information

Long Range Plan Grade 1 - Model 2

Overview of learning experiences – why these activities	In this learning experience, students will have the opportunity to participate in the Engineering Design Process by constructing a variety of devices to collect information about the weather that will contribute to a classroom indoor/outdoor weather station. Students will start by using their initial plan/design from the previous learning experience to build, test, and make improvements when necessary to their devices. These learning experiences link to the Long Range Plan Grade 1 - Model 2 Long Range Plan Grade 1 Model 2, found in September.

Prior Knowledge / Prior Skill Set(s)	Teachers may wish to use or introduce a science journal for students to record their questions, observations, designs and to communicate their learning/ideas. If this is the first activity that the students will be using a science journal, consider a modeled or shared approach to completing the journal until the students can complete a journal activity on their own. The journal can then be used as a form of assessment throughout the lesson series. Teachers may use their own journal template or use Appendix B: Science Journal Entry. Teachers may also want to establish a series of expectations for students about collaboration, self-regulation, and initiative when participating in "maker" activities such as this. Students should be familiar with the different forms of weather that they experience in their communities.
Strand A - STEM Investigation and Communication Skills	**A1.1** use a scientific research process and associated skills to conduct investigations **A1.2** use a scientific experimentation process and associated skills to conduct investigations. **A1.3** use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems. **A1.4** follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials. **A1.5** communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes **A2.2** identify and describe impacts of coding and of emerging technologies on everyday life

	 **A3.1** describe practical applications of science and technology concepts in their home and community, and how these applications address real-world problems **A3.2** investigate how science and technology can be used with other subject areas to address real-world problems **A3.3** analyze contributions to science and technology from various communities
Overview / Big Ideas/Fundamental Concepts	Throughout the course of a year, living things in our province experience four seasonal changes and have a variety of ways to adapt to them. In this learning experience, students will work to build and test their design to find a solution to the driving question, "How Do Living Things Adapt to Seasonal Changes?". Once their device is complete and works successfully, students will continue to use it throughout the year to track, monitor, and observe weather, nature, and the world around them.
Learning Goals / Success Criteria	Students will design and build a weather station to track seasonal changes. The station can include a variety of tracking tools or devices that will monitor and observe information such as temperature, wind direction, and precipitation. The success criteria template (see Appendix A: Co-Created Success Criteria) can be used as a starting point when collaborating and co-creating learning goals based on curricular expectations. Further evidence for assessment can be observed through ● Scientific Journals ● Student Conferences ● Nature Walks ● Presentations ● Peer Discussions **Ministry of Education Key Points:** ● STEM Skills & Connections ● Research & Experimentation Processes ● Engineering Design Process ● Hands-On Experiential Learning ● Coding ● Contributions to Science and Technology

Learning Experience(s)	When it comes to understanding Earth systems and our changing world, our best resource is nature itself. During these learning experiences, students will immerse in the scientific experimentation process and the engineering design process to create their own weather station to track seasonal changes in their communities and determine how living things adapt to them. In this learning experience, students will continue to develop a prototype to contribute to the weather station. As students create, build, test and improve their projects, they will demonstrate and communicate their thinking and understanding with their peers and educators. This portion of the learning experience may take longer than the time suggested below. How students move through the process may vary, therefore use professional judgment on how much time is appropriate for students.
 **A1.3, A1.4, A1.5, A3.1, A3.2**	**Minds On** **What the Teacher Does:** 1. Invite the students to participate in a group discussion and display the same infographic of the Engineering Design Process from Learning Experience 1. 2. Remind students that they've completed the first phases of the process and that they are ready to develop, build or create their prototype/device to contribute to the classroom weather station. 3. Before the creating, building, and testing begins, co-create success criteria so that expectations are clear for students. The success criteria can include details about the prototype itself and about how this time should look so students are collaborative, productive, and safe (see Appendix A: Co-Created Success Criteria). 4. Inform students that they may feel stuck or overwhelmed while testing and creating their device/prototype and remind them that failing and trying again is part of the Engineer's Design Process. It is a natural progression to the final stages, and it is how we can learn new skills. **What the Students Do:** Thinking & Investigating:

	● Use of initiating and planning skills and strategies. ● Use of critical/creative thinking processes, skills, and strategies. Communication: ● expression and organization of ideas in oral, visual, and/or written forms. **Assessment for Learning Opportunity:** Students and teachers will co-create success criteria for their prototypes. Appendix A - Co-Created Success Criteria can be used as a starting point, but classes are encouraged to add their own expectations. As students work through the Engineering Design Process, there are opportunities to observe, assess and identify the learning skills. **Action** **What the Teacher Does:** 1. As students are immersed in the creative process of building and creating, the teacher can circulate around the space and tune into the conversations students are having or prompt them by asking them about their plans, and what they intend to do. 2. With the co-created success criteria in mind, the teacher can assess the students' progress and what skills and expectations they are demonstrating, giving students multiple opportunities to express and communicate their thinking. 3. If a student is having challenges with their prototype, be sure to support their process but not take over. Empower students by asking them questions, having other students share their thinking or strategies, or using prompts to help guide the student along. “I wonder what would happen if…” “I wonder if you tried a different material?” “In what ways can I help you?” 4. Give students time updates, until the class time is over. **What Students Do:** Knowledge & Understanding: ● Knowledge of content Thinking & Investigating: ● Use of processing skills and strategies. ● Use of critical/creative thinking processes, skills, and strategies. Communication:

	● expression and organization of ideas in oral, visual, and/or written forms. ● Use of conventions, vocabulary, and terminology of the discipline in oral, visual, and/or written forms. Application: ● proposing courses of action to deal with problems relating to our changing world. **Assessment FOR/AS Learning Opportunity:** The students' science journal pages can be used as an example to assess student thinking, application, and communication. Be sure to check in with students during the action portion of the experience to allow them to share their ideas orally in case their recordings are unclear. **Consolidation (10-15 mins)** **What the Teacher Does:** 1. The final stage of the Engineer's Design Process is "Communicate the solution." Choose a form of communication that is appropriate for the students. Teachers can consider an oral presentation, gallery walk/ jigsaw, or a science journal submission. 2. Depending on the form of communication, give students the opportunity to provide and receive feedback on one another's prototypes through the same media. Oral discussion with prompts (I like../I wonder..), post-its/stickers for journal submissions. 3. Once the prototypes are completed, the weather station is ready to be assembled based on the initial plan for its location. Some prototypes may be used indoors, while others may need to be used outdoors to collect the information students need to track and monitor seasonal changes. *Steps 1 & 2 of the consolidation can be used throughout the creation and testing process then move towards Step 3 once the prototypes are complete. **What the Students Do:** Knowledge & Understanding: ● Knowledge of Content ● Understanding of Content

	Communication: ● Expression and organization of ideas and information in oral, visual, and/or written forms. ● Communication for different audiences and purposes in oral, visual, and/or written forms. ● Use of conventions, vocabulary, and terminology of the discipline in oral, visual, and/or written forms. Application: ● Transfer of knowledge and skills to new contexts. **Assessment as/for/of Learning Opportunity:** The entire final product that students contribute to the weather station can be an assessment of learning. Students should be able to articulate how their product/invention/tool tracks weather and seasonal changes and are encouraged to self-assess and make changes to make it better, if need be, as it is a component of the Engineer's Design Process. As students continue to track and monitor the weather and seasonal changes, give them opportunities through the student science journal, and class discussions to communicate their own discoveries, conclusions, and understanding.
Science and Technology Expectations	**C. Matter and Energy** - C2.6 describe seasonal differences in how we use energy and in the forms of energy we use. **D. Structures and Mechanisms** - D2.1 describe objects as things that are made of one or more materials. - D2.2 identify structures that are objects designed to support a load, including those acting as supporting frameworks for objects. - D2.3 identify materials that are used to make various everyday objects, including structures. - D2.4 describe observable characteristics of various everyday objects, including structures, using qualitative information gathered through their senses. - D2.6 describe purposes for everyday objects, including structures - D2.8 identify sources in nature of some common materials that are used to make various objects, including structures.
Science and Technology Vocabulary	**Temperature:** a measure of how hot or how cold something is. We can measure temperature by using degrees Celsius.

	Thermometer: a device used to measure temperature. **Meteorologist:** a scientist who studies processes in the earth's atmosphere that cause weather conditions. **Precipitation:** water that falls to the earth as rain, sleet, hail, mist, or snow. **Wind:** is the movement of air on the Earth's surface. The most powerful wind happens during storms. Changes in the temperature of air, land, and water cause wind. **Prototype:** a simple model that to test an idea. **Prototype Testing:** the process of demonstrating the functionality of a prototype and deciding on how it can be improved to make it better.
Equipment and Materials	● Science Journal and/or Journal Handout (see Appendix B: Science Journal Entry) ● Variety of loose parts or materials, some suggestions are ○ Straws ○ Dixie Cups ○ Elastic Bands ○ Buttons ○ Cardboard ○ Recycled Materials ○ Water Bottles ○ Tape ● Glue ● Markers ● Rulers ● Scissors
Timeline and Preparation	**Minds On (15mins)** **Action (30mins)** **Consolidation(10-15mins)** **Preparation(15mins):** To prepare for this learning experience, gather the required materials, and organize the learning space so students can collect what items they need and have enough space to build and test their prototype. **Next Steps** Designate an area inside the classroom/school that models how students can track that data each day in their science journals (see Appendix C: My Daily Weather Tracker).
Safety Considerations	**What does the teacher do?**

	Ensure students are aware of expectations surrounding safety when using the materials and tools to create and test their prototype (i.e., no running with scissors). Assign students areas to work that are large enough and a fair distance away from other students so everyone can maneuver around the space without tripping or running into another student's prototype. **What do the students do?** Be mindful of their space and use the tools and materials needed to create their prototype. Refer to these safety resources: • Safety in Elementary Science and Technology (STAO) • Safe Activity Foundations in Education Document (SAFEdoc) Science and Technology, Grades 1-8 (OCTE) • Ontario Curriculum Program Planning – Health and Safety
Opportunities For Assessment	According to the Ministry of Education Growing Success Document (2010) assessment is about improving student learning: **Assessment FOR Learning:** Occurs frequently and in an ongoing manner during instruction, while students are still gaining knowledge and practicing skills and is used by teachers to monitor students' progress towards achieving the overall and specific expectations so that teachers can provide timely and specific descriptive feedback to students, scaffold next steps, and differentiate instruction and assessment in response to student needs. **Assessment AS Learning:** Occurs frequently and in an ongoing manner during instruction, with support, modeling, and guidance from the teacher, and is used by students to provide feedback to other students (peer assessment), monitor their own progress towards achieving their learning goals (self-assessment), make adjustments in their learning approaches, reflect on their learning, and set individual goals for learning. **Assessment OF Learning:** Occurs at or near the end of a period of learning and may be used to inform further instruction and is used by the

	teacher to summarize learning at a given point in time. This summary is used to make judgments about the quality of student learning on the basis of established criteria, to assign a value to represent that quality, and to support the communication of information about achievement to students themselves, parents, teachers, and others **NOTE:** The assessment in the learning experiences are intentionally assessment **for** learning and assessment **as** learning. The assessment modality is intentionally conversations and observations. This is to help move away from only product-based assessment. Throughout the learning experiences, students will have many opportunities to demonstrate their understanding through doing, talking, and engaging in self-assessment. By collecting assessment for/as learning data teachers can be responsive and provide meaningful feedback. Teachers have been provided with assessment tools to collect evidence of student learning. Assessment opportunities are embedded throughout the learning experiences. Please use the following links for further reference: https://www.dcp.edu.gov.on.ca/en/assessment-evaluation https://www.edu.gov.on.ca/eng/policyfunding/growsuccess.pdf
Instructional Strategies and Adaptability	This learning experience makes use of a variety of instructional strategies. The teacher may wish to adapt or change the strategy as indicated in the instructions section of this document. Students will move through the Engineer's Design Process at varied lengths, teachers may wish to give students more time to complete and test their prototype. Students may require multiple options to communicate their ideas in their science journal (i.e., draw pictures, take a picture and add it to the journal, use a digital journal, record voice memos, etc.) The teacher may also need to scribe ideas or journals for students who require extra support. Some students may benefit from having the vocabulary and definitions on a handout sheet as well as being able to see and refer to them on a bulletin board.
Additional Supporting Resources	**Weather Station Ideas:**

	• Inventors of Tomorrow – Weather Station for Kids • Inventors of Tomorrow – DIY Weathervane and Anemometer Appendix A: Co-Created Success Criteria Appendix B: Science Journal Entry Appendix C: My Daily Weather Tracker
Cross-Curricular Opportunities	**The Arts** Visual Arts: creatively build and create a prototype. • apply the creative process to produce a variety of two and three-dimensional artworks, using elements, principles, and techniques of visual arts to communicate feelings, ideas, and understandings. **Mathematics** Geometric and Spatial Reasoning: describe their final product/invention as they design and plan it. **Language** • Oral Communication: communicate ideas and brainstorm strategies with teachers and peers. • Writing: record ideas, record the procedure for the plan, label designs, and make a list of materials.
Future Opportunities / Next Steps	After students have completed their prototype and contribution to the weather station. Educators should decide on a location and plan/schedule for when students can track or record their findings from the weather station. In the next/final learning experience, students will begin observing, recording, and monitoring their prototypes and collect data on the weather and seasonal changes. Before commencing the next learning experience, teachers can model and share their observations and questions of the weather and seasonal changes for students.

Appendix A - Co-Created Success Criteria

Name: _____

Co-Created Success Criteria – Grade One: How Do Living Things Adapt to Seasonal Changes?

Knowledge and Understanding

I Can:	**Not Yet**	**Met**
Build a tool/device for the weather station by following the safety procedures for science.		
Describe changes in appearance or behaviour of living things that are adaptations to seasonal changes.		

Thinking

I Can:	**Not Yet**	**Met**
Identify and plan strategies to gather information to assess the impact on society, the environment, and living things in the natural environment.		
Use creative thinking processes, skills, and strategies to solve a learning task.		

Communication

I Can:	Not Yet	Met
Express and organize my observations to communicate my understanding (using pictures, words, or verbally) to my peers and my teacher.		
Justify and prove my conclusions and solutions.		

Application

I Can:	Not Yet	Met
Apply the engineer's design process to build a device/weather station that can withstand external forces using the techniques I have learned.		
Transfer my knowledge and skills to solve real-world problems by making connections between other subject areas.		

Descriptive Feedback:

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Appendix B: Science Journal Entry - Plan and Design

Name: _____

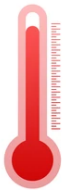
Date: _____

Science Journal Entry: Plan/Design

My Ideas (Draw, Write, Record, Paste, etc.)

What I Need (Draw, Write, Record, Paste, etc.)

Appendix C: My Daily Weather Tracker



Hot

Snow

Thunder & Lightening

Rain

Light Rain

Dry

Windy

Fair

MY DAILY

Breeze

Date:

Cold

Sunny

Partly Cloudy

Cloudy

Foggy

No Wind