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## Grade 1 How might an animal meet its shelter needs?

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### Experience 4: Design Challenge-Build a Bird Nest and/or a Birdhouse

In this set of learning experiences, teachers will guide students using an inquiry model to explore topics such as living and nonliving things, the needs of living things, as well as matter and materials. Students will then apply that knowledge to complete a challenge in which students will use the engineering design process to build a structure for a bird.

There are 4 specific learning experiences outlined in this series and including





Experience 1: Nature Walk Provocation/Outdoor Investigation

Experience 2: Needs of Living Things Snail Investigation

Experience 3: Materials Exploration and Materials Scavenger Hunt

Experience 4: Design Challenge-Build a Bird Nest and/or a Birdhouse

<b>Overview of learning experiences</b>	<p>In this final activity, students will follow the engineering design process to construct a birds nest and/or a birdhouse.</p> <p>In the real world, scientists and engineers need to record their thinking and keep records of their scientific processes and engineering designs for a number of different reasons. In these experiences, students will be using a science journal as a way of tracking their scientific thinking as they emulate scientists and engineers while engaging in the 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. As this set of learning experiences takes place at the beginning of the year, depending on the class, teachers may wish to model the process by creating and recording a class journal of ideas instead.</p> <p><a href="#">Long Range Plan Grade 1 Model 1</a> “September”</p>
<b>Prior Knowledge / Prior Skill Set(s)</b>	<p>The beginning of the year is a great time to define science as a method for acquiring knowledge of the world and review the steps of the scientific process (observation, question, research, hypothesis, experiment, analysis, and conclusion/communication). In this series of learning experiences, the teacher will model the</p>

	<p>scientific process, beginning with what it means to make observations using our senses. Teachers can also consider introducing a science journal as a place to record questions and observations with pictures and notes. It may be helpful to model this process as well, choosing instead to record ideas on a piece of chart paper as a class. As students gain familiarity with the process, journals can be used as a form of assessment.</p> <p>September is also important to establish routines and safety procedures, especially during science investigations. Students should have a thorough understanding of how to safely handle any tools and/or materials.</p> <p>Students do not need any prior knowledge for this series of learning experiences. The provocation activity and subsequent knowledge circle is instead an opportunity for teachers to assess student knowledge about living and nonliving things, and use questions generated from the nature walk to inform the next steps of the inquiry.</p>
<p><b>Strand A - <a href="#">STEM Investigation and Communication Skills</a></b></p>	<p><b>A. STEM Skills and Connections</b></p> <p> <b>A1.1</b> use a scientific research process and associated skills to conduct investigations</p> <p> <b>A1.4</b> 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.</p> <p>  <b>A1.5</b> communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes</p>
<p><b>Overview / Big Ideas/Fundamental Concepts</b></p>	<p>Fundamental Concepts:</p> <ul style="list-style-type: none"> <li>● Systems and Interactions</li> <li>● Structure and Function</li> </ul> <p>In this lesson series, students will make connections between several strands of science including</p> <p>A. STEM Skills and Connections</p>

	<p>B. Life Systems: Needs and Characteristics of Living Things D. Structures and Mechanisms: Everyday Materials, Objects, and Structures</p> <p>Following the steps of the scientific method, students will begin by participating in a nature walk and outdoor investigation, with a strong focus on observation. Students are invited to document what they see, hear, touch and smell. As part of their initial exploration, students may make note of both living and non-living things, natural and built elements of the environment, as well as generate important questions and wonderings that will guide our inquiry. Back in class, students will identify the basic needs of living things, including the need for air, water, food, heat, shelter, and space, and determine how a healthy environment enables living things to meet their needs. In the next activity, students will identify materials that are used to make various everyday objects, including structures. Following a scavenger hunt activity, students will be able to identify properties of materials that enable the objects made from them to perform their intended function. In the final challenge, students will use the engineering design process to construct a birdhouse to consolidate their understanding. Students will present their designs, and materials used, and reflect on the building process.</p>
<p><b>Learning Goals / Success Criteria</b></p>	<p>What is the main goal?</p> <p>By the end of this learning experience students will be able to:</p> <ul style="list-style-type: none"> <li>● Describe the properties of materials</li> <li>● Relate form to function when examining materials used to make different objects including structures</li> <li>● Understand and follow the design and engineering process to build a structure</li> </ul> <p>Educators are encouraged to co-create success criteria with students and share “I Can Statements” based on the curricular expectations. Sharing options can include:</p> <p>In-person:</p> <ul style="list-style-type: none"> <li>● Knowledge Circle</li> <li>● Science Journals</li> <li>● Gallery walks</li> <li>● Presentation</li> </ul> <p>Online:</p> <ul style="list-style-type: none"> <li>● Science Journal</li> </ul>



using natural materials found in their environment. (Optional: Can show pictures/videos of birds' nests sometimes with interesting found objects, e.g., Bowerbird). Today's challenge is going to be to build a bird nest! Nests serve as shelter and protection for birds and their young. What materials found in the natural environment might be good for nest building? (relate to last learning experience regarding properties of materials) Why? What materials found in the natural environment are less conducive to nest building? Why?

Optional: Show the introductory video from the [Ontario Science Centre on Natural Structures](#).

**Action (~25min)**

1. Present students with the challenge: Build a bird nest that will support a toy bird and/or some eggs using the materials provided. (There is lots of teacher flexibility here. Define the challenge parameters to suit your needs, ex. Build a nest that supports a toy bird, fits and holds 2 eggs, limit the use of glue or tape, use only collected natural materials or use any combination of recyclables/class craft materials, or limit materials)

Optional: Take the class outside to a defined area for students to collect materials to build their nest. \*Go over safety reminders about what is and is not appropriate to collect. Provide students with bins to store collected materials and tongs and/or gloves as needed.

Optional: Have students sketch their designs for their nest in their [Science Engineering/Design Journals](#) (Appendix A).

2. Students use a combination of teacher-provided and found materials to construct their nest. You may want to challenge your students to use all-natural fasteners. What building techniques can they use to make materials stay together? What do birds do?

\*Teachers may find it useful to have students build their nests on a plate or piece of cardboard so that it may be easier to move around.

3. Encourage students to test throughout the process. Can it support a bird? An egg? How about two eggs? If so, can the nest stand up against some wind? How might the structure be

improved?

**Consolidation (~10min.)**

Gather students and host a gallery walk. After observing and testing the different nests, engage in a class discussion. What did you notice about the different nests? What worked? What didn't work? How might they be improved? What was the most challenging part of the building process?

**Option 2: Build a Birdhouse**

**Resource:**

[Needs of Living Things from Science North](#)

**Minds On**

1. Review the basic needs of living things (e.g., food, water, air, space/shelter). Many animals build shelters. What kind of shelters do birds build? (Nests) Nests keep birds safe from the elements and from other animals.
2. Introduce today's activity- build a birdhouse! Look at the materials for the project. What properties of these materials make them well-suited for today's project? (Optional) Show students an example birdhouse.

**Action**

1. Guide the students step by step on how to construct the birdhouse, starting with the design of the door or doors, decor (optional), and perch) Remind students how to use tools and materials in a safe manner.

**Consolidation**

1. Gather students and host a gallery walk. After observing the different birdhouses, engage in a class discussion. What did you notice about the different birdhouses? What was the most challenging part of the building process? What worked? What didn't work? Where might you put up your birdhouse?
2. Have students complete the review activity matching animals with their shelters from the resource linked above. Time permitting, they can also write or draw the 4 basic needs of living things on the worksheet (Science North Resource) or in their science journals (see [Appendix B: Science Journals](#)).

**What the students do:**

Initiating and Planning

	<ul style="list-style-type: none"> <li>● Collect materials to build</li> <li>● Plan for the structure</li> </ul> <p>Performing and Recording</p> <ul style="list-style-type: none"> <li>● Build a bird nest/birdhouse</li> </ul> <p>Analyzing and Interpreting</p> <ul style="list-style-type: none"> <li>● Problem solve and use the iterative process to make changes and/or improve the structure during the building process.</li> </ul> <p>Communicating</p> <ul style="list-style-type: none"> <li>● Showcase student structures and have students perform a gallery walk</li> <li>● Reflect on the design engineering process: What worked? What didn't work? And why? How can the structure be improved?</li> </ul>
<p><b>Science and Technology Expectations</b></p>	<p><b>D. Structures and Mechanisms: Everyday Materials, Objects, and Structures</b></p> <p>D2.3 identify materials that are used to make various everyday objects, including structures</p> <p>D2.4 describe observable characteristics of various everyday objects, including structures, using qualitative information gathered through their senses</p> <p>D2.6 identify properties of materials that enable the objects made from them to perform their intended function</p> <p>D2.8 identify sources in nature of some common materials that are used to make various objects, including structures</p>
<p><b>Science and Technology Vocabulary</b></p>	<ul style="list-style-type: none"> <li>● <b>Observe*</b>: to watch carefully, or to make a scientific observation</li> <li>● <b>Object*</b>: something that can be perceived by the senses</li> <li>● <b>Structure</b>: Something made up of parts that are put together in a particular way for a particular purpose or purposes.</li> <li>● <b>Material</b>: Matter from which other things can be made.</li> <li>● <b>Form*</b>: the shape and structure of something as distinguished from its material</li> <li>● <b>Function*</b>: to serve a certain purpose</li> <li>● <b>Natural*</b>: existing in or produced by nature</li> <li>● <b>Synthetic*</b>: produced artificially</li> </ul> <p>*Definitions taken from Britannica Kids Online Dictionary  <a href="https://kids.britannica.com/">https://kids.britannica.com/</a></p>

<p><b>Equipment and Materials</b></p>	<ul style="list-style-type: none"> <li>● Science Journals and worksheets (optional)</li> <li>● Mini toy birds and/or plastic eggs</li> <li>● Feathers, raffia + natural craft materials</li> <li>● Scissors</li> <li>● Glue</li> <li>● Tape</li> <li>● Bird Nest: Natural materials*leaves, sticks, rocks/pebbles, grass clippings, soil, bark, wood chips, seeds, and/or bins to store collected materials</li> <li>● Birdhouse: Milk/juice cartons</li> </ul> <p><b>Experience 4 Design Challenge Option 1: Build a Bird Nest</b></p> <ul style="list-style-type: none"> <li>● Tongs, gloves, and bins for students to collect natural materials like sticks and leaves (Optional)</li> <li>● Natural materials such as A collection of sticks, leaves, pebbles, grass clippings, dried moss, raffia, feathers, etc</li> <li>● Cardboard or plate (1/student) (Optional)</li> <li>● Toy birds and/or toy eggs (Optional)</li> <li>● Planning/Design Template (see <a href="#">Appendix A: Engineering Design Journal</a>)</li> </ul> <p>OR</p> <p><b>Experience 4 Design Challenge Option 2: Build a Birdhouse</b></p> <ul style="list-style-type: none"> <li>● Milk /juice cartons (The number depends on if you would like this to be an individual, partner or group activity)</li> <li>● Scissors</li> <li>● Sticks (chopstick or popsicle stick)</li> <li>● String</li> <li>● Pen</li> <li>● Optional: Paint, paintbrushes, birdseed, decorations, photocopies of the animal shelters review worksheet</li> </ul>
<p><b>Timeline and Preparation</b></p>	<p><b>Lesson 4 Design Challenge: Build a Bird Nest and/or a Birdhouse (~1-2 period(s))</b></p> <p><b>First Steps:</b> Gather tools and materials needed for the building challenge. Additionally, for the Bird Nests Option, gather natural materials (leaves, sticks, stones, grass clippings, etc. for students to work with) For the Birdhouse Option, make an example birdhouse to show students. It may also be helpful to precut a hole in the collected milk cartons.</p>



	<p><b>Next Steps:</b> If possible, hang a birdhouse by a window or in the schoolyard where students can observe it. Especially if birdseed is added, it may be interesting to observe what animals use the birdhouse and/or how it holds up against the elements over the next week(s).</p>
<p><b>Safety Considerations</b></p>	<p><b>Personal Protective Equipment (PPE)</b></p> <ul style="list-style-type: none"> <li>● Tongs and gloves as needed to collect natural materials for building</li> </ul> <p><b>What does the teacher do?</b></p> <ul style="list-style-type: none"> <li>● Ensure students are aware of boundaries and safety expectations for outdoor investigations.</li> <li>● If collecting materials for the building challenge, go over what is and is not appropriate with students (e.g., Garbage, fresh flowers, etc.) and provide tongs and gloves as needed</li> <li>● Handle any available natural structure artifacts with care (e.g., old, abandoned birds nests, wasp nests, etc.) and wear gloves and/or wash hands after</li> <li>● Teach students how to safely use tools for building</li> </ul> <p><b>What do the students do?</b></p> <ul style="list-style-type: none"> <li>● Follow established safety procedures.</li> <li>● Utilize tools and materials in a safe manner.</li> <li>● Wash and clean hands after investigations.</li> </ul> <p>Refer to these Safety resources:</p> <ul style="list-style-type: none"> <li>· <a href="#">Safety in Elementary Science and Technology (STAO)</a></li> <li>· <a href="#">Safe Activity Foundations in Education Document (SAFEdoc) Science and Technology, Grades 1-8 (OCTE)</a></li> <li>· <a href="#">Ontario Curriculum Program Planning – Health and Safety</a></li> </ul>
<p><b>Opportunities For Assessment</b></p>	<p>According to the Ministry of Education Growing Success Document (2010) assessment is about improving student learning!</p> <p><b>Assessment FOR Learning:</b> 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</p>

	<p>differentiate instruction and assessment in response to student needs.</p> <p><b>Assessment AS Learning:</b> Occurs frequently and in an ongoing manner during instruction, with support, modelling, 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.</p> <p><b>Assessment OF Learning:</b> 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</p> <p>Please use the following links for reference:  <a href="https://www.dcp.edu.gov.on.ca/en/assessment-evaluation">https://www.dcp.edu.gov.on.ca/en/assessment-evaluation</a>  <a href="https://www.edu.gov.on.ca/eng/policyfunding/growsuccess.pdf">https://www.edu.gov.on.ca/eng/policyfunding/growsuccess.pdf</a></p> <p>Throughout this series of learning experiences, a combination of observation, discussion, reflections, journals, and student work samples are used to assess learning.</p> <p><b>Lesson 4: Assessment OF Learning Opportunity</b>  The structures students build can be an assessment of learning. Students should be able to articulate how shelters are one of the four basic needs of living things. They should also be able to describe the materials used to build their bird nest or birdhouse and what properties of those materials make it well suited for the function. Students are encouraged to make changes and improvements to their structures, following the design and engineering process.</p>
<p><b>Instructional Strategies and Adaptability</b></p>	<p>Program Planning and Equity and Inclusion and CRP:  <a href="https://www.dcp.edu.gov.on.ca/en/program-planning/considerations-for-program-planning/human-rights-equity-and-inclusive-education">https://www.dcp.edu.gov.on.ca/en/program-planning/considerations-for-program-planning/human-rights-equity-and-inclusive-education</a></p>

	<p>These learning experiences make use of a variety of instructional strategies. You may wish to further adapt, modify or change the lessons as indicated to suit the needs of your students.</p> <p>You may wish to scribe ideas for students who require extra support. Or alternatively, share and journal ideas (questions, observations, etc.) together as a whole class. With practice, students will have a better understanding of what they may want to include.</p> <p>You may wish to partner students up to facilitate more peer support and collaboration.</p> <p>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.</p>
<p><b>Additional Supporting Resources</b></p>	<p><b>Science North</b></p> <ul style="list-style-type: none"> <li>● <a href="#">Needs of Living Things</a></li> </ul> <p><b>Ontario Science Centre</b></p> <ul style="list-style-type: none"> <li>● <a href="#">Natural Structures - Let's Build a Bird Nest</a></li> </ul>
<p><b>Cross-Curricular Opportunities</b></p>	<ul style="list-style-type: none"> <li>● Draw, and label a plan for the structure design challenge</li> <li>● Use a science journal to record observations (mind map of natural and build structures, questions, learning, reflections, etc.)</li> <li>● Practice procedural writing to outline the steps needed to build a structure</li> </ul> <p><b>LANGUAGE:</b></p> <p><b>Oral Communication</b></p> <ul style="list-style-type: none"> <li>● Listen in order to understand classmates when sharing observation journals.</li> <li>● Use speaking skills and strategies appropriately to communicate when in the field and in the classroom.</li> </ul> <p><b>Writing</b></p> <ul style="list-style-type: none"> <li>● Generate, gather, and organize ideas and information to write for an intended purpose and audience.</li> </ul>
<p><b>Future Opportunities / Next Steps</b></p>	<p><b>Further moving forward opportunities for students.</b></p> <ul style="list-style-type: none"> <li>● Research different kinds of bird nests, the materials used, and the construction technique</li> </ul>

- Introduce an unplugged coding activity where students must code a path through a grid, which resembles the sequence of steps required to make a birdhouse.
- Investigate the impact of climate change on local wildlife (e.g. habitat loss, or availability of a plant/material used to build nests, etc.) and positive actions humans can take to protect wildlife (i.e., participate in a garbage clean up, plant native wildflowers as a Monarch waystation, etc.)

**What will learners do when the work is completed/if they finish early?**

- Sketch in their journals different examples of natural and/or human-made structures
- Challenge students to build a structure that can withstand forces of nature (e.g. wind) or to find natural ways to fasten materials (e.g. no use of glue or tape)

**Contributions to Science and Technology**

- Connect with members of the local community to learn more about themes covered in this set of learning experiences (ex. Wildlife Rescue, Veterinarian, Engineer, Scientist, Construction Worker, etc.)
- Explore examples of biomimicry in architecture

## **Appendix A: Science Engineering/Design Journal**

# SCIENCE JOURNAL ENTRY PLAN/DESIGN



Name:

Date:

Share your ideas (Draw, Write, Record, Paste, etc)

**MATERIALS/TOOLS**

## **Appendix B: Science Journal**

# SCIENCE JOURNAL ENTRY DATA RECORDING



Name:

Date:

What Did You Notice?  
(Draw, Write, Record, Paste, etc)

What Do You Wonder?  
(Draw, Write, Record, Paste, etc)