



Date: _____

Tree Tapping

 Math

ACKNOWLEDGEMENT

Please read this Acknowledgement before the start of this lesson to respect the knowledge that is being shared and the Land of the People where the knowledge originates.:

This lesson plan was created by faculty, students, and partner school boards of Trent University's School of Education and Professional Learning. We recognize and honour Traditional Knowledge carriers - Anishinaabe Elder Doug Williams, of Curve Lake First Nation, and Potawatomi faculty Barbara Wall, of the Chanie Wenjack School for Indigenous Studies at Trent University.

Origin
Elders and Traditional Knowledge carriers involved with Trent University and Curve Lake First Nation
Peterborough
Ontario

LEARNING OUTCOMES

Upon successful completion of this lesson plan, students will be able to:

1. Use non-standard units (a hug/body/arms) to measure the circumference of a tree.
2. Explain the importance of the tree's maturity within the context of harvesting sweet water.
3. Explain the importance of caring for maple trees throughout the year, so that everyone can enjoy maple syrup.
4. Count the age of a maple tree using the growth rings.

Learning Level / Grade

2

Also: 1

 **95 mins**

LIST OF ACTIVITIES

1. Nanaboozo and the Maple Trees
2. Tree Hugging
3. Consolidation and Reflection
4. Extensions and Cross-Curricular Links

Related Subjects
Nutrition, Science, Indigenous Ways of Knowing & Being, History, Social Studies, Biology, Indigenous Language

MATERIALS

- Story: Nanaboozo and the Maple Trees
- Maple Sugar Videos
- Supplies: string; cross-section of a tree - real, printed, or digital
- One source for information on tree rings: Tree Growth and Structure

DESCRIPTION

This lesson plan explores how we know when a maple tree is mature enough for tapping to collect sweet water. Attention to a tree's indicators will be observed, such as circumference and texture of bark, as well as exploring the different ways of 'knowing' when determining if maple trees are mature enough to tap.

HOLISM AND ALL OUR RELATIONS

This lesson plan has been developed with an Indigenous lens that is holistic in nature, a way of being and knowing that acknowledges our relationships with 'all our relations', including plants and animals, other human beings, the water, land, wind, sun, moon, stars, and more - everything seen and unseen. With 'all our relations' in mind, this lesson plan has been developed with a focus on:

- Language and Culture
- Participatory and experiential learning activities
- Intergenerational learning with Elders/Knowledge Holders
- Different learning styles; attention given to mind, body, and spirit
- Connections are made with everyday life
- Ethics in the classroom: care, truthfulness and trust, respect, integrity
- Relationship with the land
- Personal reflection time (connecting with thoughts and feelings)

TEACHERS' GUIDE

Background/Foundational Information

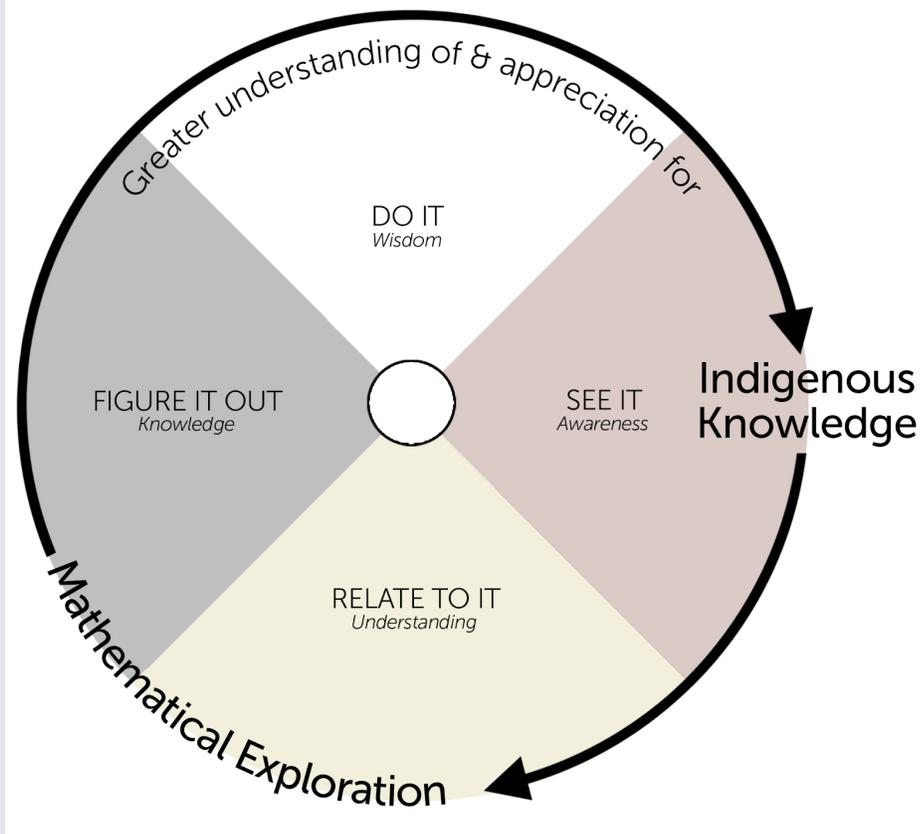
- This lesson plan was designed according to the Medicine Wheel diagram produced by Anishinaabe faculty in Trent University's School of Education and Professional Learning, Dr. Nicole Bell (see figure below). We recommend educators familiarize themselves with the Medicine Wheel and how learning commences through each of the four quadrants (<https://www.edcan.ca/articles/teaching-by-the-medicine-wheel>). Through using the Medicine Wheel as a theoretical framework for inquiry-based learning, each lesson starts and concludes with Indigenous Knowledge by watching a video (<https://vimeopro.com/paradigmpost/maple-videos>; see the 'Materials' section in the Activities for more information about the videos).

The objective of this lesson is for students to form a greater appreciation and deeper understanding of Indigenous Knowledge as transmitted through the act of making maple sugar or maple syrup. In essence, this is land-based education.

Familiarity in the following resources is also recommended: "Nanaboozo and the Maple Tree" in *Keepers of the Earth: Native American Stories and Environmental Activities for Children*, M. J. Caduto & J. Bruchac (1997) and "Nanaboozo Saves Nokomis" in *Tales of Nanabozho*, D. M. Reid (1963).

Educators should take additional time to study and learn about the importance of storytelling according to Anishinaabe ways of knowing. It is evident across many Indigenous cultures that while storytelling is an art, more importantly, stories emerge from Land and they embody ancestral knowledge and intelligence of Indigenous people that stretches back centuries.

We strongly recommend building relationships with Elders, Knowledge Holders, and your local Indigenous community. Please seek advice for protocols in storytelling; some stories are recited at certain times of the year (e.g. Nanabozho stories are only recited when Creation is resting during the winter months).



Connections to Curriculum (Ontario Curriculum Guidelines)

Note: page numbers noted below are found in this document
<http://www.edu.gov.on.ca/eng/Curriculum/elementary/math18curr.pdf>

Grade 1 (Mathematics)

Overall Expectation(s) addressed:

Estimate, measure, and describe length, area, mass, capacity, time, and temperature, using non-standard units of the same size;

Compare, describe, and order objects, using attributes measured in non-standard units (p.35).

Specific Expectation(s) addressed:

Demonstrate an understanding of the use of non-standard units of the same size (p. 35).

Grade 2 (Mathematics)

Overall Expectation(s) addressed:

Estimate, measure, and record length, perimeter, area, mass, capacity, time, and temperature, using non-standard units and standard units;

Compare, describe, and order objects, using attributes measured in non-standard units and standard units (p.45).

Specific Expectation(s) addressed:

Choose benchmarks – in this case, personal referents – for a centimetre and a metre to help students perform measurement tasks;

Estimate and measure length, height, and distance, using standard units and non-standard units (p.45).

ACTIVITIES

1 - Nanaboozo and the Maple Trees

Purpose

This is a story that tells of the origins of sweet water. It can be shared with students as a foundation before gathering sweet water or tapping trees.

Time: 20 mins

Activity Instructions

Depending on the age of the students, they or the educator reads *Keepers of the Earth - Nanaboozo and the Maple Tree*.

As a class, students watch related parts of the videos "The Trees" and "Collecting the Maple Sap" to explore how maple trees are identified and what the process is for harvesting sweet water, using both the traditional and modern techniques.

Educators use prompt questions to stimulate thinking and discussion:

"What do you notice?" "What do you wonder?"

Guiding question for the educator:

"How are your students 'seeing it' (the vision)?"

This activity is designed to connect with learners with these learning styles...

- Spiritual (e.g., Relational) Learners
- Physical (e.g., Tactile, Experiential, Visual) Learners
- Intellectual (e.g., Rational, Logical) Learners
- Emotional (e.g., Feeling, Intuitive) Learners

... in the following ways:

Spiritual learners - Sharing a Nanaboozo story about the gift of maple syrup helps students in building and recognizing their relationship with the natural world.

Emotional learners - Can relate to how Nanaboozo felt when people were lying on the ground.

Physical learners - The videos provide a visual representation of how to identify sugar maple trees and how to gather sweet water.

Intellectual learners - Can compare and contrast different techniques of gathering sweet water.

Materials

Click the 'Link' to open and view videos.

To open and print files, please go to the 'files' folder accompanying this downloaded lesson plan.

Resource Title	Type
Story: Nanaboozo and the Maple Trees	Link 
See if your library has the book, <i>Keepers of the Earth</i> (by Michael J. Caduto and Joseph Bruchac), where this story is found. Otherwise, here is a link to the story re-printed on-line.	
Maple Sugar Videos	Link 

Resource Title	Type
<p>These videos provide a general overview in the process of making maple syrup from start (tree identification) to common practices for storing maple sugar. Each video is approximately 10-12 minutes in length, which is ideal for learners of all ages.</p> <ol style="list-style-type: none"><li data-bbox="185 268 358 296">1. Stories (11:41)<li data-bbox="185 300 386 327">2. Language (7:43)<li data-bbox="185 331 451 359">3. Collecting Sap (12:48)<li data-bbox="185 363 350 390">4. Trees (11:20)<li data-bbox="185 394 431 422">5. Maple Sugar (14:25)	

TEACHING NOTES

2 - Tree Hugging

Purpose

Through using our physical bodies, or other non-standard units of measurement, this activity explores how to determine when a tree is mature enough to be tapped.

Time: 60 mins

Activity Instructions

Take the students outside (on school property) to explore both processes: the hugging (Indigenous ways) and diameter measurement (Settler ways).

1. Hugging the trees:

How do we know if a tree is mature enough to tap? Settler knowledge uses a diameter of 30 cm, whereas Indigenous Peoples believe one hug means one tap.

2. Measure trees using items like string before returning to the classroom and figuring out the measurement.

3. Have students work with their assigned tree and 'form a relationship' with their assigned tree. Inquiry-based learning: Direct students to learn everything about their tree(s) before measuring the tree.

Extension:

Look at a cross section of a tree - either real, printed, or digital. Count the rings to gain an appreciation for age. Students will be amazed at the age a tree needs to be to be old enough to tap.

Guiding questions to the educator:

"How are your students 'relating to' the vision?"

"How are your students 'figuring it (the vision) out'?"

This activity is designed to connect with learners with these learning styles...

- Spiritual (e.g., Relational) Learners
- Physical (e.g., Tactile, Experiential, Visual) Learners
- Intellectual (e.g., Rational, Logical) Learners
- Emotional (e.g., Feeling, Intuitive) Learners

... in the following ways:

Spiritual and emotional learners - Hugging a tree allows students to reflect upon the importance of our relationship with trees. Students will be encouraged to learn that all people have a physical relationship with trees and Creation.

Physical learners - This activity brings students outside to interact with trees and other tactile objects that teachers can bring into the classroom, such as a cross section of a tree, an tree log, and/or images of trees (showing growth rings) via the Internet.

Intellectual learners - can explore the relationship between the two measurement systems. Intellectual challenges here may include helping students recognize/learn that there are different ways to determine when trees are mature and that there is no "right way".

Materials

Click the 'Link' to open and view videos.

To open and print files, please go to the 'files' folder accompanying this downloaded lesson plan.

Resource Title	Type
Supplies: string; cross-section of a tree - real, printed, or digital	Supplies 📦
These supplies are needed for different parts of this activity.	
One source for information on tree rings: Tree Growth and Structure	Link 🔗

Resource Title**Type**

If you do not have access to a real cross-section of a tree, here is an example of a digital source with information about tree rings and what one will see when looking at a cross-section of a tree.

TEACHING NOTES

3 - Consolidation and Reflection

Purpose

This activity provides time for students to consolidate their learning and reflect on the lesson.

Time: 15 mins

Activity Instructions

Educators guide a discussion with the students to reflect upon their learning, using leading questions such as:

"What is the significance of holding trees or maintaining a physical relationship with trees and Creation?"

"What does this practice tell us about Anishinaabe Peoples' relationship with Creation?"

"What actions can we do today to take care of trees long-term to ensure they grow old enough to be tapped?"

"Through using non-standard units of measurement (such as in this activity), when is it 'okay' to tap a maple tree?"

Guided question to the educator:

"How are your students 'doing' the vision?"

This activity is designed to connect with learners with these learning styles...

- Spiritual (e.g., Relational) Learners
- Physical (e.g., Tactile, Experiential, Visual) Learners
- Intellectual (e.g., Rational, Logical) Learners
- Emotional (e.g., Feeling, Intuitive) Learners

... in the following ways:

Spiritual learners - reflect upon the gift of maple syrup. The goal is for students to learn and recognize that trees have spirits and are living beings. This is an opportunity for students to form a strong relationship with the natural world in which their school is located.

Physical and Emotional learners - reflect upon our relationship with trees. Students reflect on their emotional and physical learning from the relationship they built with their assigned tree 'buddy' and through measuring trees.

Intellectual learners - reflect upon the different ways people can determine when trees are mature enough to begin tapping in order to collect sap or sweet water.

TEACHING NOTES

4 - Extensions and Cross-Curricular Links

Purpose

This is a list of optional extension activities and cross-curricular links that may be explored to extend learning in Science and Technology, Social Studies, and Language.

Time: 30 mins

Activity Instructions

Note: The numbering below corresponds to the related 'Expectation' found in the Ontario Curriculum Guidelines at: <http://www.edu.gov.on.ca/eng/Curriculum/elementary/grade1.html>

A. Science and Technology (2007)

Grade 1 'Understanding Life Systems'

Overall Expectations:

1. Investigate needs and characteristics of plants and animals, including humans;
2. Demonstrate an understanding of the basic needs and characteristics of plants and animals, including humans.

Specific Expectations:

2.3 Investigate and compare the physical characteristics of a variety of plants and animals, including humans (*e.g., some plants produce flowers and some do not; most plants have roots; some animals have two legs, while others have four; all animals have sense organs*);

2.4 Investigate the physical characteristics of plants (*e.g., basic parts, size, shape, colour*) and explain how they help the plant meet its basic needs (*e.g., roots anchor the plant and help provide the plant with food and water; some plants have brightly coloured flowers to attract bees*), using a variety of methods and resources (*e.g., direct observation of live plants in the classroom and in the schoolyard, prior knowledge, personal experience, diagrams and/or charts*);

3.6 Identify what living things provide for other living things (*e.g., trees produce the oxygen that other living things breathe; plants such as tomatoes and apple trees and animals such as cows and fish provide food for humans and for other animals; a tree stump provides a home for a chipmunk; porcupines chew off the tips of hemlock limbs, providing food for deer in winter*).

Grade 1 'Understanding Matter and Energy: Energy in our Lives'

Overall Expectation:

3. Demonstrate an understanding that energy is something that is needed to make things happen, and that the sun is the principal source of energy for the earth.

Specific Expectations:

3.1 Demonstrate an understanding that energy is what makes the things that humans and animals do or see happen;

3.2 Demonstrate an understanding that the sun, as the earth's principal source of energy, warms the air, land, and water; is a source of light for the earth; and makes it possible to grow food.

B. Social Studies (2018)

Grade 2

Overall Expectation:

B1. Application: describe some similarities and differences in the ways in which people in two or more communities in different parts of the world meet their needs and have adapted to the location, climate, and physical features of their regions.

Specific Expectations:

B1.2 Describe some of the ways in which two or more distinct communities have adapted to their location, climate, and physical features;

B1.3 Demonstrate an understanding of the importance of sustainability in people's interrelationship with their natural environment and of some of the consequences of sustainable and/or non-sustainable actions.

C. Language

- procedural writing for tapping a tree

TEACHING NOTES

ASSESSMENT

This section contains information for assessing progress in students' learning. While Indigenous approaches to assessment may be highlighted, conventional assessment methods may also be discussed.

There is no formal summative assessment ('Assessment of Learning') with this lesson, rather, assessment is integrated within the learning tasks to inform the next steps of the lesson. It is a supportive learning situation that is not focused on specific task outcomes, but on developing an understanding of the importance of relationship with the trees. However, one potential form of Indigenous assessment is holding a sharing circle in which students are asked to share what they learned. Prompting questions (in the 'Activities' section of this lesson plan) can easily be adapted to 'Assessment for, as, and of Learning'.

ADDITIONAL RESOURCES

Click the 'Link' to open and view videos.

To open and print files, please go to the 'files' folder accompanying this downloaded lesson plan.

Resource Title	Type
Teaching by the Medicine Wheel: An Anishinaabe Framework for Indigenous Education	Link 
This article by Dr. Nicole Bell provides educators with an opportunity to familiarize themselves with the Medicine Wheel and how learning commences through each of the four quadrants.	
Maple Sugar Videos	Link 
<p>These videos provide a general overview in the process of making maple syrup from start (tree identification) to common practices for storing maple sugar. Each video is approximately 10-12 minutes in length, which is ideal for learners of all ages.</p> <ol style="list-style-type: none"> 1. Stories (11:41) 2. Language (7:43) 3. Collecting Sap (12:48) 4. Trees (11:20) 5. Maple Sugar (14:25) 	

HOLISM AND ALL OUR RELATIONS

This lesson plan has been developed with an Indigenous lens that is holistic in nature, a way of being and knowing that acknowledges our relationships with 'all our relations', including plants and animals, other human beings, the water, land, wind, sun, moon, stars, and more - everything seen and unseen. With 'all our relations' in mind, this lesson plan has been developed with a focus on:

Relationship with the land
<p>Through their explorations of maple trees, consideration of care for the trees, and sharing, students will develop a relationship with the Land and Creation. Students will also recognize that we are only to collect what the trees give us and we must be careful in not over-harvesting so future generations can reap the same benefits.</p> <p>This lesson will also help students realize that trees and plants are living beings, they are our teachers because they carry so much knowledge. More importantly, physical relationships are at the core of how Indigenous Peoples traditionally measured trees through using their bodies.</p>
Participatory and experiential learning activities
Language and Culture
Depending upon the video used, the Ojibwe language can be introduced, explored, and developed through this lesson.
Connections are made with everyday life

Maple syrup has become a staple of Canadian homes. This lesson aims to develop a greater understanding of and appreciation for the Indigenous Knowledge that underpins the making of maple syrup. Trees, in addition to providing maple syrup, help clean our air and they provide us with material that heats our homes or 'warm bodies when the wind becomes cold'.

Intergenerational learning with Elders/Knowledge Holders

Were Elders or Knowledge Holders involved in the development of this Lesson Plan? Yes
 Can Elders or Knowledge Holders be invited to help teach part of this lesson plan? Yes

Intergenerational learning with Elders/Knowledge Holders

Ethics in the classroom: care, truthfulness and trust, respect, integrity

Care and Respect - care and respect for the trees, the need to look after and nurture the trees for future generations, to not take from trees which are not yet mature.
 Truthfulness and Trust - the trust that is placed in us all to look after and not exploit the gifts of the trees.
 Integrity - that we will do the right thing in our relationship with the trees.

Different learning styles; attention given to mind, body, and spirit

Healthy relationship with self and identity

Students will recognize an important worldview that we, as people, are the youngest of Creation. We have much learning to do and our learning takes place by spending time (re)building our relationship with Creation. This is applicable to all peoples since we all depend on the natural world for our survival.

Personal reflection time (connecting with thoughts and feelings)

This lesson plan is aimed at young students. The reflection is a guided part of the consolidation of the learning, for example, asking the children about how we need to treat the trees, relating this to how we treat our friends, how we don't just take from our friends but also share with them. For reflective assignments, educators can have students do a writing activity with prompts such as: "today I learned..." or students can verbally share their learning and identify new information.

OTHER DETAILS

This Lesson Plan aims to meet curriculum expectations or outcomes for: Ontario Yes

Stream: Na

RELATED LESSON PLANS

- Measuring Sweet Water and Maple Syrup
- Ratios of Maple Syrup and Sweet Water
- Maple Syrup and Climate Change
- Sirop d'érable et changements climatiques
- The Seasons

CONTRIBUTORS

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QUESTIONS/MORE DETAILS

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