



HARVEST LESSONS

THIS MONTHS CROP:

Maple

LESSON PLAN



HARVEST LESSONS ARE A FUN WAY FOR K-8 STUDENTS TO EXPLORE, TASTE AND LEARN ABOUT EATING MORE FRUITS AND VEGETABLES EVERY DAY.

ACTIVITY SUMMARY

ACTIVITY	GRADE LEVEL	CURRICULUM CONNECTION	TIME
INTRO	ALL	Literacy: speaking, listening Science & Social Studies: evaluating claims to determine whether or not they are true	10 min
#1: Maple Field Trip Toolkit	ALL	Science: Cycles, reactions, Math: Ratios, measurements Place-based education, community connection	
#2 The Story of Gluskabe and Maple	3 - 5	Literacy: listening comprehension, vocabulary, analysis, summarizing	30 min
#3 Be a Sugarmaker	K - 2	Science: Exploring processes, reactions Role playing	30 min - multi day
#4 Maple Nation on the Move: Maple Forests & Climate Change	6 - 8	Science: climate change Geography: mapping habitats	1 - 2 hours
#5 Winter Tree ID & All About Sap - Let's be a tree	3 - 8	Science: observation, classification	35 min

INTRODUCTION**(10 MINUTES)****ALL GRADES****TRUE OR FALSE?**

Begin with a fun interactive true or false activity. When a statement is true, students will stand up. When they believe a statement is false, they will sit down.

- Maple trees all over the world are tapped for maple sugaring
 - **FALSE!** Maple sugaring is restricted to a unique bioregion in the Northeastern US and Canada called the Maple Nation
- Quebec produces about 20% of the world's maple syrup
 - **FALSE!** The Canadian province of Quebec produces over a whopping %70 of the world's maple syrup.
- Vermont is the largest producer of maple syrup in the United States
 - **TRUE!** That's something to be proud of!
- It takes up to 10 quarts of sap to produce one quart of maple syrup
 - **FALSE!** It takes 40 quarts of sap to produce one quart of maple syrup
- Other trees besides sugar maples can be tapped, including red maple, silver maple, and birch.
 - **TRUE!** Though other tree sap tend to have a lower sugar content
- All grades of syrup have the same sugar content.
 - **TRUE!** Maple syrup that is produced earlier is lighter in color, and gets progressively darker, as well as tastes more robust, as the season goes on, but the sugar content remains constant.





ACTIVITY #1

ALL GRADES

MAPLE FIELD TRIP TOOLKIT

There is no better way to teach students about maple sugaring than by showing them a real operation in action. The following offers some suggestions for how to connect with your local sugarmakers, as well as some educational activities to supplement your field trip to the sugarbush.

Preparation

1. Connect with a local sugarmaker in your community
 - a. Look for a community partner who is interested in engaging in an interactive experience with your students.
 - b. A quick internet search of operations in your area should result in some phone numbers to call. You might even find a sugarbush to visit by asking around your school-- many people have connections to maple sugarmakers in Vermont!
2. Establish a method of transportation
 - a. Connect with school administration about getting a bus.
 - b. Talk through parking options with the sugarmaker.
3. Identify a safety plan
 - a. Talk to the farmer in advance about any potential hazards on the farm, such as large equipment, and agree on rules to share with the students. (Don't forget to ask the farmer about bathroom facilities, too!)

Procedure

1. Have a plan with plenty of activities
 - a. The depth of learning that happens on a farm visit depends on how students spend their time there
 - b. Find lots of activity plans in the Maple section of this Farm Field Trip Guide:
http://www.vermontharvestofthemonth.org/uploads/2/8/9/6/28966099/farmfieldtripguide_2017.pdf





ACTIVITY #2

(20 MINUTES)

3 - 5

THE LESSON STORY OF GLUSKABE AND MAPLE SYRUP

In this lesson, students will explore concepts around sustainability through the Abenaki lesson story of Gluskabe and how maple syrup became available to humans.

Key Themes:

Sustainable, Oral Tradition, Lesson Story, Moderation

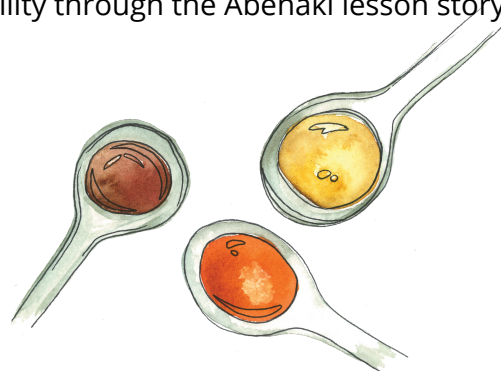
Materials:

Story of Gluskabe and how maple syrup became available to humans (Recorded by Indigenous New Hampshire Collaborative Collective. Story told by Paul Pouliot of the Cowasuck Band of Pennacook-Abenaki)

<https://indigenousoh.com/2018/11/23/indigenousoh-101-maple-syrup/#more-129>

Procedure

1. Introduce the lesson by asking students what they know about maple trees, maple sugaring, and maple syrup
2. Explain that maple sugaring has been taking place in this region for a very long time and was first practiced by Indigenous peoples. The Abenaki people have a lesson story of how humans came to enjoy and appreciate the natural gift of maple syrup
3. Tell students that you will listen to the story of Gluskabe and how maple syrup became available to humans. Abenaki people have passed down stories through speech from one generation to the next, since time immemorial.
4. After listening to the audio story, prompt discussion with these questions:
 - a. What is the main problem in this story? What happened to create that problem?
 - b. What happened to the people when they had such easy access to maple syrup? How did this affect nature, the community and the people?
 - c. What did Gluskabe do when he discovered the people and the land in this condition?





(Activity #2 continued)

d. What's the difference between a need and a want?

- When we have too much of a good thing, it can be bad for our bodies and our environment
- Can you think of other examples where overconsuming is harmful?

Moderation: only taking what you need

Fairness: Sharing resources and care across time and space to meet the needs of all living things now and in the future.

Real Life Connection:

- Give the students the responsibility of distributing the snack so that every person gets what they need.
- Guiding questions: What does each person need? What does the group need? How much is enough? Where did this snack come from? What went into producing it?



ACTIVITY #3

K - 2

BE A SUGARMAKER

Objectives

- Children role-play the maple sugaring process as they become sugar makers.
- Children experiment with taplines, funnels, and water.

Setup

Set up an area in the classroom as a sugar bush and sugar house. Hang paper trees on the walls of your room, attach "buckets" made of empty rolled oats boxes covered in foil. Fill buckets with corks or packing peanuts so children can "collect sap" and take it to be boiled in the evaporator pan. Set up the sugarhouse with the evaporator pan, a basket with wood scraps, fire gloves, and empty match box. Place "tools" in the evaporator pan such as a spatula to use as a sheeting tool, a slotted spoon to get any bugs out of the sap, and a wooden ruler to make sure there is always 2 inches of sap in the pan so it won't burn.





(Activity #3 continued)

Suggested Materials:

- firewood
- empty match box
- simulated “fire” (for example, crumpled up red and orange tissue paper)
- heavy gloves: the pan and arch get very hot!
- buckets: to catch the finished syrup as it is poured off the pan
- ladles: used to test whether the sap is “sheeting.”
- ruler: there needs to be 1 ½ to 2 inches of sap in the evaporating pan or it will burn.
- slotted spoon: used to remove foam that naturally occurs during the boiling process. It will also remove any bugs that have snuck into the sap!
- thermometer (pretend, or broken is fine), to test whether sap has become syrup. Sap turns into syrup when its temperature reaches 219°F.
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- a tall plastic cup and stick to represent the hydrometer.
- empty syrup containers
- hammers
- tree taps
- “Sugaring Tools Cards” (see Appendix, p.239 in [Cultivating Joy and Wonder](#))
- a cardboard box approx. 4 ft. x 3 ft. x 4 in., to make an evaporator pan. Cover the box in aluminum foil or paint it silver. To make the evaporator pan more authentic, cut the flaps off the box before covering with foil, and use the two longer flaps as dividers in the pan.
- a cardboard box approx. 4 ft. x 3 ft. x 3 ft. to make the fire arch. Paint the box black and cut a door in the front. Place your evaporator pan on top of the fire arch
- corks, packing peanuts, or some other material to represent sap. It won’t flow like liquid sap, but children love collecting and “pouring” these sap substitutes.
- tree stump drilled with holes, extra taps, small buckets, kid-sized hammers

**Find further instruction on page
145 of [Cultivating Joy and Wonder](#)**

https://shelburnefarms.org/sites/default/files/cultivatingjoywonder_all_smaller.pdf





ACTIVITY #4

6 - 8

Maple Nation on the Move: Maple Forests & Climate Change

Part 1: What is Maple Nation?

1. WATCH the video [What is Maple Nation?](#) narrated by Dr. Robin Wall Kimmerer about the Voices from Maple Nation Summit: Indigenous Women's Climate Summit.
2. Discussion:
 - What and where is the bioregion called Maple Nation?
 - What impacts of climate change are the women of Maple Nation observing?
 - What strategies and tools for adaptation were mentioned?

RESEARCH: What are the ideal conditions for sugar maple trees to thrive and maple syrup production?

1. In small groups– Research to gather facts.
2. Create a poster of what you already know and what you find out about maple sugaring.
3. Share out your findings!

Resources to get started:

- Maple Hardiness Zones Map: <http://www.maple-trees.com/pages/maple-tree-growing-zones.php>
- How Warm Weather Affects Sap Collection in Maple Trees, Wisconsin Public Radio: <https://www.wpr.org/how-warm-weather-affects-sap-collectionmapletrees#:~:text=Early%20warm%20weather%20and%20the,and%20nighttime%20temps%20be low%20freezing.>
- Maple Mini Manual: https://www.uvm.edu/sites/default/files/media/Maple_Mini_Manual.pdf





(Activity #4 continued)

Part 2: How are sugarmakers adapting to climate change?

WATCH: Maple Sugaring and Climate Change from Shelburne Farms

<https://vimeo.com/534595555/9e716ef85b>

DISCUSS: How are sugarmakers adapting to climate change?

PART 3: How do you think Maple Nation is adapting to climate change?

Listen & Read: Introduction and Listen to Sugar Maple

<https://emergencemagazine.org/feature/they-carry-us-with-them/>

Explore: Offer the students these resources to construct a response to the guiding question.

- Interactive Map: Climate in 2050: <https://therevelator.org/interactive-map-climate-2050/>
- Askik: Maple Sugar Northeast: <http://www.aksik.org/node/3574>

Map it: If we only looked at the factor of temperature in sugar maple health and in climate change, where will the new maple nation migrate to in the future? Add 3-5 suggestions to your visual about what we, as citizens of the Maple Nation can do to tend to the changing bioregion?

ACTIVITY #5 (Part 1)

15 min

3-8

Be a Winter Tree Sleuth: Identify Sugar Maple Trees in Winter

Materials:

- 7-8 twigs each from three trees (enough so that you have one for each student) – Sugar maple, Red maple, Ash, Cottonwood. Tell the students the 4 species but NOT which ones are which yet.

Directions:

1. Give each student a different twig.
2. Lead a discussion about maple trees - *Let's pretend you are a maple sugar farmer - and you're about to head out and tap some trees to get the sap. How can you tell what's a maple tree? The leaves right? Everyone knows what a maple leaf looks like. But, what time of year is sugaring season? Are there leaves at this time of year? So, how do we, as maple sugar farmers know which tree is a maple? We're going to find out! Today, you are going to learn how to be tree sleuths and identify 4 common trees in winter using clues, and find out which one is our sugar maple.*



(Activity #5 Part 1 continued)

3. Teach them vocab by showing them on their twig, and writing it on the board: *Look at your twig: see the part at the end of the branch, that's the bud. Do you see other buds? See the little mark underneath the bud, that's last year's bud, called the leaf scar. And the rest is called the branch.*

Bud - Small bump on the side or end of a branch that will develop into leaves and/or flowers

Leaf Scar - The mark left on the stem after the leaf falls off.

Branch - The woody part of a tree or shrub, usually coming off the main stem

4. Find your twig team! Give time for students to walk around and find their group of people who all have the same twig. Once each group is formed, ask them for one or two things that they noticed on their twig.

5. Find the Sugar Maple: Now that we have our groups, let's try and guess what trees we have.

Give them 3 clues (on the board)

- Sugar maples have opposite branches (unlike the cottonwood)
- Sugar maples have brown buds (unlike the red maple)
- Sugar maples have leaf scars that go all the way around the branch – (unlike the ash)

What group thinks they have the sugar maple and why? *It's ok if we're wrong, this is about learning!*

Reflection: *Were there any other differences you noticed besides the clues? What other trees are these? What else could this skill of identifying trees be good for?*





ACTIVITY #5 (Part 2)

20 min

3 - 8

Materials: tree cookie (the bigger the better, so everyone can see, or bring multiple small ones to pass around. Twigs (from the last lesson)

1. Introduction and discussion: Have students take their twig again and hold it up. *Let's still pretend we are maple sugar farmers. We know now what a maple tree in late winter looks like. How do we know where to place our taps, so we can get sap and make our maple syrup? Let's look at our twig and learn what's inside: Look at the cut section of the twig, and scratch the bark off with your fingernail - what do you see? How many layers are there? We see brown wood in the middle, then a thin green layer (this is the living part!) and bark on the outside (protection, etc). Where do you think the sap is located? We're going to learn all about the inside of trees by playing a game where we become the tree and see how sap flows.*

2. Become a Tree (Adapted from Shelburne Farms Project Seasons Educator Resource.)

- Show students a tree cookie, ask the students to look at the center, guess what it's called. This is heartwood.
- Pick out 3 students to be heartwood and say "I'm strong, I hold up the tree, I'm heartwood!" Have them stand shoulder to shoulder in a small circle facing outwards.
- Sapwood - Show them the lighter wood that surrounds the heartwood, ask them to guess what it's called.
- Pick out 4 students and have them repeat: "sap going up, sap going down, sap going up, sap going down" Have them stand in a circle outside the first circle holding hands.
- Cambium - Ask them what the thin layer between the bark and the sapwood is. What does it do? Pick out 5 students and have them repeat: "I make new wood, I make new bark, I make new wood, I make new bark" Have this group stand outside the previous circle
- Bark - What does the bark do? Protection! Also, a thin layer inside the outer bark also transports food up and down the tree. Pick 6 students and have them repeat: "Food going up, food going down" then raise their hands over their heads and grow!



(Activity #5 Part 2 continued)

- Review and practice each groups role.
- As the grand finale, have the whole tree perform together. Have the heartwood begin and let each successive layer join until every group is performing in unison.
- If time, add temperature: when below freezing, the sapwood and cambium stop singing, then go above freezing again, and add them back in. (Also, the bark may just growl would be more appropriate)

3. Reflection: Now we know how to ID maple trees, and we know how the sap flows in a tree, so we can tap them. But we also know a lot of how trees work on the inside.

4. Pop Quiz!

- What part of the tree are alive and which are dead - heartwood, sapwood, cambium, bark?
All four? None?

Answer: *It's only the cambium that is alive! All the rest is inert!*

- Knowing that only the cambium is alive - does it hurt a tree to put a tap in it?

Answer: *Yes, but not very much. And as long as we don't put too many taps in a tree, it won't affect its health, and sugarmakers have a system for determining how many taps each tree can use based on the size of the tree.*

- What's much worse is girdling (cutting a circle around the bark) a tree, which will kill it, even if the wound is only down to the cambium - why is that based on what we know?

Answer: *Because cambium is the only living part, and it is just beneath the bark*

- What's something else you noticed today or learned about trees?

