Making Maple Syrup in the Class

You don't need to have an evaporator to demonstrate how maple syrup is made and highlight the evaporation process. The simple process can be fun as well as educational. Remember, the magic formula is 40:1 (40 gallons of sap to produce 1 gallon of syrup).

MATERIALS: hot plate or stove
3.2 ounce jug of pure New Hampshire maple syrup
1 gallon jug of drinking water
1 measuring cup
1 eight quart pot to boil water
disposable wooden sticks or plastic spoons (3 per student)
several drops of vegetable oil or a teaspoon of butter

PROCEDURE:

1. remove approximately 3.2 ounces of water from the gallon jug.
2. Add 3.2 ounces of pure maple syrup to the water in the plastic jug (be as accurate as possible to maintain the 40:1 ratio). Shake the jug to thoroughly mix the water and syrup. You have now created "sap" with 2.1% sugar content.
3. Provide students with a tasting sample. Ask students to make observations on color, taste and smell. These observations can be compared to the syrup created after step 4.
4. The newly created "maple sap" should be placed into a container suitable for boiling, one that can hold at least two gallons to allow room for boiling. Make sure the container has been suitably cleaned. A smaller boiling container can be used if you continuously add more "sap" to the boiling pot from time to time. It is best to add only a small amount at a time so that the boiling is not interrupted. IMPORTANT: add a few drops of vegetable oil or a tiny dab of butter to the boiling sap to keep the foam down. Once the maple "sap" reaches a boil, it should be allowed to boil continuously until the quantity of solution is reduced to maple syrup having used almost all of the "sap" solution. The process of boiling away the water to produce maple syrup will take about 3 hours, so plan accordingly.

NOTE: set up the boiling station away from papers, wallpaper and other items which may be adversely effected by excessive steam. It should also be located in a safe spot where it can be monitored by an adult and away from students

NOTE: The point at which the "sap" becomes syrup can be determined by several methods. The easiest (less scientific) may be to measure where 3.2 ounces reaches in your boiling pot before you start. When the boiled liquid reaches that level, you most likely have syrup. Or, take a candy thermometer and stop boiling when the temperature reaches 7° above the boiling point. Be extra watchful as you near the point of syrup as it is easy to go too far and scorch the syrup.

5. Once again, provide students with a tasting sample so that they can make observations on color, taste and smell. Have them compare these observations to those made of the sap. What changed? Also, discuss what happened to the "sap" solution and why it changed into maple syrup.

(courtesy of Massachusetts Agriculture in the Classroom)

New Hampshire Agriculture in the Classroom

Contact us to:

- Find an online version of this guide with clickable links.
- Discuss curriculum materials
- Receive our monthly newsletter
- Learn about upcoming educator workshops
- School-to-Farm Field Trip information
- Borrow materials from our resource library

www.agclassroomn.org/nh email: nhaitc@nhfarmbureau.org

New Hampshire Agriculture in the Classroom

Annual Agricultural Literacy Program

2019 Educator Resource Guide

Dear Friends and Educators,

The mission of New Hampshire Agriculture in the Classroom is to help students increase their understanding and appreciation of the role that agriculture plays in their daily lives. We strive to achieve this through teacher workshops, school to farm field trips, a monthly newsletter and more.

As part of our efforts, we offer an Annual Literacy Program where we select an agriculturally accurate book, then encourage volunteers to visit schools throughout the state where they read the book and share related information with the students. Following the presentation, the book is donated to the school for continued enjoyment and learning. We also provide lesson ideas to help supplement the school visit. Teachers are encouraged to utilize these resources to round out the lessons with activities based in science, language arts, social studies, etc. Upon completion of the program, we ask that both teachers and volunteers complete a brief survey to evaluate our effectiveness. A hard copy is enclosed or you may complete it online at https://form.jotform.com/nhaitc/AgLit2019.

The book selected for the 2019 program is *Maple Syrup from the Sugarhouse* by Laurie Knowlton Lazzaro. This book follows Kelsey, her family and her friends as they collect sap and turn it into maple syrup. A heartwarming story infused with informative descriptions is a delight for the reader.

This year, we are thrilled to have support from Meadow View Sugarhouse, Hubbard Farms, Butternut Farm, Brookdale Fruit Farm, Northeast Earth Mechanics, and Spring Ledge Farm. Please visit their websites for additional information about their work.

We hope that you find this material useful and that your students enjoy learning about maple sugaring. If you are interested in integrating other agricultural topics or programs into your curriculum, please don't hesitate to contact us at (603) 224-1934, email nhaitc@nhfarmbureau.org or visit our website at www.agclassroom.org/nh.

Sincerely,

Debbi Cox
State Coordinator

Meadow View Sugar House — Your sweet neighbor — Union, NH

Spring Ledge Farm — New London, New Hampshire 03257

Hubbard — Your Choice, Our Commitment

EARTH — Northeast Earth Mechanics, Inc. — In memory of Tom Locke

Brookdale Fruit Farm — Hollis, NH

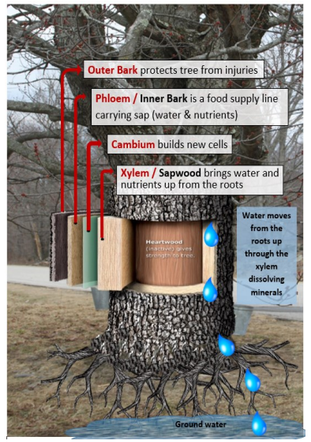
Butternut Farm — Farmington, NH

Maple Tidbits

- A sugar maple tree should be at least 10" in diameter before it is tapped (about 40 years old)
- Sap starts flowing in the tree when nighttime temperatures are below freezing and daytime temperatures are warmer in the
- A covered bucket is attached to the tap or spile to collect the sap
- Maple sap is roughly 2% sugar and 98% water.
- To tap a tree, a sugarmaker drills a 7/16" hole in the tree and inserts a tap or a spile
- It generally takes 40 gallons of sap to make one gallon of maple syrup
- One tap might provide 10 gallons of sap during the season
- If there are a lot of trees to be tapped, sugarmakers will attach plastic tubing to the tap instead of a bucket - sap is pulled out of the tree by gravity or a vacuum system and collected in a tank.
- The grade of syrup depends on when during the season the sap was collected and boiling conditions
- Sap is put into pans in an evaporator and heated over a wood fire to about 219° to remove the water
- Maple syrup is 67% sugar.
- The maple sugaring season runs for about 6 weeks in February and March

Tapping into Maple Tradition Curriculum

New Hampshire Agriculture in the Classroom has assembled a maple sugaring curriculum with lessons, activities and other resources for all kinds of K-12 classrooms. Find lessons, activities, resources, video and more. Learn about the Tucker Mountain Challenge classroom maple syrup contest and the maple equipment grant programs at https://www.agclassroom.org/nh/resources/maple.cfm. Check out some of the lessons below.



Tapping Into Maple Tradition: (grades 2-6) Oral and written communication, mathematical representation plus physical and conceptual models to describe and explain scientific concepts and ideas. Use inquiry strategies to investigate and understand the natural world. Younger students will learn to use the process approach to writing coherently and using appropriate conventions.

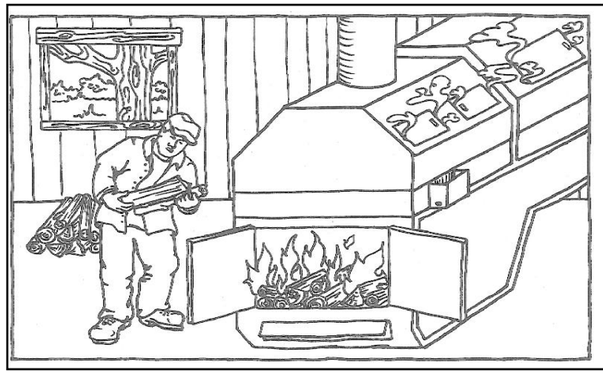
Pancakes (grades 1 - 2 or grades 3—5): Describe physical properties of materials and observe physical and chemical changes as they learn about the ingredients in pancakes and how maple syrup is harvested from trees.

Be A Sugar Maker: (grades K-2) Role-play the sugar making process with the option to expand into the water cycle. Tapping for sap is a wonderful accompaniment to this activity.

Looking Back, Thinking Forward (grades 3—6): Learn about the maple sugaring process - the equipment and its changes over time, climate, and technology. How has it changed through history and what might it look like in the future?

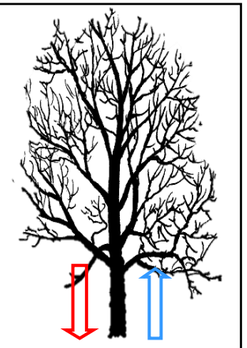
Maple Sugaring Sequence

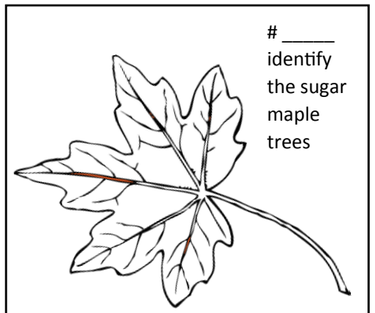
Next to each picture, write the number to show the order of steps for making maple syrup. Or, you can color the pictures, cut them out and then put them in the right order.



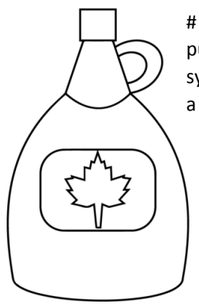
_____ boil the sap in an evaporator to create syrup

_____ the tree sap runs into buckets when the nights are below freezing and the days are warmer

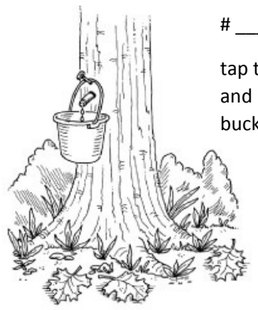




_____ identify the sugar maple trees



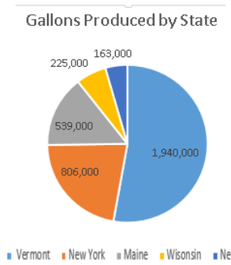
_____ put the syrup into a bottle

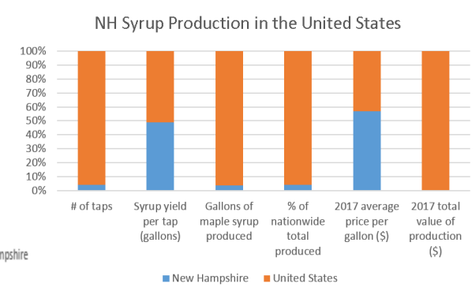


_____ tap the tree and hang a bucket

Graph Maple Sugaring in New Hampshire

Graphing is an essential skill for students. Why not make it more interesting by having students learn and practice with New Hampshire maple sugaring data? Use this data provided by the National Agricultural Statistic Service to create a variety of graphs. Also a great opportunity for working on percentages! Check out our samples for some ideas.





MAPLE PRODUCTION VALUE				
STATE	AVG PRICE PER GALLON		VALUE OF PRODUCTION	
	2016	2017	2016	2017
	(dollars)		(1,000 dollars)	
Connecticut	69.5	62.2	1,321	1,244
Indiana	50	50.2	600	602
Maine	30	33.7	20,250	23,893
Massachusetts	55.8	50.2	4,297	4,217
Michigan	44.8	51.2	4,032	5,632
Minnesota	65.7	66.6	920	932
New Hampshire	55.2	43.5	9,329	6,699
New York	44.3	39	31,320	29,640
Ohio	39.8	38.5	2,786	3,080
Pennsylvania	31.4	34.3	4,490	4,768
Vermont	30	27	59,700	53,460
West Virginia	48.4	36.7	290	330
Wisconsin	33.5	31.4	7,873	6,280
United States	35	35	147,208	140,777

Maple Syrup Taps, Yield, and Production – States and United States: 2016-2018

State	Number of taps			Yield per tap			Production		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
	(1,000 taps)	(1,000 taps)	(1,000 taps)	(gallons)	(gallons)	(gallons)	(1,000 gallons)	(1,000 gallons)	(1,000 gallons)
Connecticut	85	86	73	0.224	0.233	0.247	19	20	18
Indiana	60	62	70	0.200	0.194	0.257	12	12	18
Maine	1,860	1,890	1,870	0.363	0.375	0.288	675	709	539
Massachusetts	315	320	320	0.244	0.263	0.225	77	84	72
Michigan	400	440	455	0.225	0.250	0.275	90	110	125
Minnesota	76	77	65	0.184	0.182	0.200	14	14	13
New Hampshire	545	550	560	0.310	0.280	0.291	169	154	163
New York	2,515	2,650	2,730	0.281	0.287	0.295	707	760	806
Ohio	370	400	400	0.189	0.200	0.225	70	80	90
Pennsylvania	660	660	670	0.217	0.211	0.212	143	139	142
Vermont	4,850	5,410	5,670	0.410	0.366	0.342	1,990	1,980	1,940
West Virginia	51	61	66	0.118	0.148	0.121	6	9	8
Wisconsin	765	735	750	0.307	0.272	0.300	235	200	225
United States	12,552	13,341	13,699	0.335	0.320	0.304	4,207	4,271	4,159

Online Resources

New Hampshire Maple Producers Association: https://nhmapleproducers.com Locate a sugarhouse in your area, find information on Maple Month and more.

Tap My Trees: http://cdn.teachersource.com/downloads/lesson_pdf/TMT_Lesson_Plan.pdf offers a ist of classroom ideas

USDA National Agricultural Statistics Service Maple Data: //www.nass.usda.gov/Statistics_by_State/Maryland/Publications/News_Releases/2018/Maple%20Syrup%202018.pdf

Smartboard Presentation includes history, tree identification, tapping trees, nutrition and more https://www.dropbox.com/s/vratyaaef5nhe6e/All%20About%20Maple%20Smart%20Board%20Presentation.notebook

New York Agricultural in the Classroom offers photographic sequencing cards and activity at https://www.agclassroom.org/ny/programs/pdf/maple/maple_syrup.pdf or a Sugar Maple Days unit which includes tree ID, economics and more for 4th and 5th grades https://www.agclassroom.org/ny/resources/pdf/activities/sugar.pdf

The Canadian Homeschooler offers a variety of resources such as printables, activities and videos. https://thecanadianhomeschooler.com/maple-syrup/