

Vermont Evaporator Company Presents:

Curriculum for Little Kids, Big Kids and Biggest Kids!

For use with the Sapling Evaporator

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Evaporation Experiment

Background: Making maple syrup is easy and fun, and there's a lot to learn during the process. 'Sugar maple sap contains as much as 2% sugar, and it takes about 40 gallons of sap to make 1 gallon of syrup. If you tap another variety of maple, it can take even more. The process of making maple syrup provides opportunities to discuss a plethora of topics including: scientific observations, sugar content calculations, hydrometers, the evaporation process, tree identification, Native American history, and provides a tasty treat sure to please all students. Procedure:



- 1. Tap your trees and collect maple sap.
 - 1. For tree ID, check out the tree id infographic at the end of this packet as well as the blog post: Hobby Maple Syrup Makers: Time to Identify Your Trees. <u>https://vermontevaporator.com/2020/09/time-to-identify-your-trees/</u>
 - 2. For how to tap your trees, check out the infographic at the end of this packet as well as the blog post: DIY Maple Syrup: How to tap, <u>https://</u>vermontevaporator.com/2021/01/diy-maple-syrup-how-to-tap/
- 2. When you have collected a sufficient amount of sap, pass through cheese cloth or a pre-filter and pour at least 5 gallons of sap into the Sapling Evaporator Pan.
- 3. Start a fire in your Sapling Evaporator. Small pieces of soft wood get hotter quicker.
- 4. Once the sap starts boiling, simply keep fire going and talk with your students about what they see, smell, and taste, and how that differs between the three chambers of the Sapling Evaporator Pan. You can use the attached sheets to track your observations.
- 5. Ensure you replenish the sap in the pan by adding sap to the back of the pan, either with a Sapling Warming Pan, or a scoop full at a time. Make sure there is always 1-2 inches of sap in the pan at all times to prevent burning!
- 6. Continue to make observations throughout the day. You can pour off into a vessel for observation by the pour off valve, but be careful, it can get hot! And make sure to add more sap to the back.
- 7. Pour off sap when color gets dark, texture is almost syrup like, and temperature is close to 218° F. You can finish on a burner next to the evaporator, or even a kitchen inside. You can use any thermometer to track your syrup to 218° F.
- 8. When you are cleaning up for the day, be sure to remove the pan from the evaporator completely before pouring off the sap/syrup. If the pan is empty and still over a fire, it will burn the pan. By removing it first you ensure your Sapling pan will be around for another sugaring season!

For Biggest Kids



Maple Evaporator Worksheet

Name _____

- Date _____
- Weather _____
- Air temperature _____
- How are you feeling today?





Time	Temp	Color	Texture/ Viscosity	Sugar Content	Other Observations

Wood Calculations

Measure the amount of wood that you have been using in the first hour of boiling in square feet:

If your evaporation rate is 6 gallons per hour, how long will it take you to make 1 gallon of syrup?

If you intend to make a gallon of syrup, how much wood will you need?



Sugar Content Calculation

Volume of sap before evaporation begins _____

Volume of syrup after evaporation ends _____

Calculate the sugar content of your sap. Show your work below:

Evaporation Rate Calculation

Volume of sap before evaporation begins _____

Volume of syrup after evaporation ends _____

Time spent evaporating _____

Calculate the Evaporation Rate in gallons per hour. Show your work below:

<u>\$\$\$</u>

So now you know how long you have to boil sap to make 1 gallon of syrup, and how much wood it takes to make 1 gallon of syrup. If a cord of wood costs \$300 and a gallon of maple syrup sells for \$55, how many gallons of syrup would you have to sell to pay for the wood? (note: wood can only be sold in full cord volumes!)

If you wanted to get paid for your time, say \$10 per hour of boiling, how many gallons of syrup would you need to sell?

On average, syrup producers expect to get 10-20 gallons of sap per tap. If it is a good sugaring year, meaning lots of days above freezing and nights below freezing, and you get 20 gallons of sap per tree, how many taps would you have to place in the spring time to make the amount of syrup you calculated in the question above?





Draw arrows to indicate how the sap enters the pan, flows through the pan, and exits the pan.



Additional materials for Biggest Kids:

Infographics located at the end of the packet:

Maple Tree Identification Syrups of the World Sap/Cider to Syrup Maple four ways Maple producing states How to tap a tree Grades of maple Filtering and storing Cord of wood Continuous boil pan Baking with Maple Backyard Bingo



List of recommended books:

Young Adult Books:

Miracles on Maple Hill by Virginia Eggerson Sorenson Little House in the Big Woods by Laura Ingalls Wilder

Adult books:

The Maple Sugar Book by Helen & Scott Nearing Maple Sugarin' In Vermont: A Sweet History by Betty Ann Lockhart The Maple King by Matthew Thomas Amateur Sugar Maker by Noel Perrin

Cookbooks:

Maple: 100 Sweet and Savory Recipes Featuring Pure Maple Syrup by Katie Webster

Maple School Blog posts:

MAPLE SCHOOL: THE MATH OF TAPPING A MAPLE TREE

https://vermontevaporator.com/2020/04/maple-school-the-math-of-maple/

MAPLE SCHOOL: THE EARLY HISTORY OF MAPLE SYRUP

https://vermontevaporator.com/2020/04/the-early-history-of-maple-syrup/

MAPLE SCHOOL: MAPLE SYRUP STORY HOUR https://vermontevaporator.com/2020/04/maple-school-maple-syrup-story-hour/

MAPLE SCHOOL: WHY DOES SAP RUN? SCIENCE!

https://vermontevaporator.com/2020/04/maple-school-why-does-sap-run-science/

Additional resource for teachers:

Master's Project: Maple: A Sap to Syrup Guide, A Manual for Career and Technical Centers of Vermont by Lynn Michelle Wolfe https://scholarworks.uvm.edu/cgi/viewcontent.cgi?article=1022&context=rsmpp

Infographics









Maple Four Ways

Syrup



- Start with sap • Boil to 219° F
- Filter



Cream



- · Start with syrup
- · Do not stir
- · Boil to 235°F
- · Cool to 100°F
- Stir until lighter in color and the thickness of peanut butter (30+ minutes)

Candy



- · Start with syrup
- · Do not stir
- · Boil to 246°F
- · Cool for 5 minutes
- Stir until lighter and thicker (1-5 minutes)
- Pour into shallow pan(s) lined with lightly oiled parchment paper to 1" thick or so
- · Cool completely
- · Cut into cubes

Sugar



- · Start with syrup
- · Do not stir
- Boil to 257° -262°F
- Take off heat
- Stir vigorously as maple cools and crystals form (20+ minutes)
- Sift and grind any lumps with mortar and pestle or food processor















Replacing White Sugar with Maple in Baking

For each I cup of white sugar to be replaced:



