

Name _____

Date _____

Post Lab Quiz: Maple Syrup/Sap

History/General

- The monks at St. John's began making maple syrup in:
a. 1859 b. 1910 c. 1942 d. 1953
- Maple syrup is the oldest North American crop
a. false b. true
- Maple sap was made in Europe before the settlers arrived in America.
a. false b. true
- Hickory syrup is made the same way as maple syrup.
a. false b. true
- The country that is the largest producer of maple syrup is:
a. Canada b. Mexico c. New Zealand d. United States
- One important reason that Minnesota is NOT the top maple syrup-producing state is because:
a. Minnesotans recently learned how to make maple syrup
b. Minnesota winters are too cold for maple syrup production
c. Minnesota is on the edge of the growing range for sugar maple trees
d. Minnesota has a higher tax on maple syrup production than any other state.
e. The varieties of sugar maple trees that grow in Minnesota produce less sugar than trees in other states.
- A maple tree should only be tapped once every five years to prevent damage to the tree.
a. false b. true

Sap Chemistry

- The approximate concentration of sugar in maple sap is:
a. 0% b. 0.2% c. 1.0% d. 2% e. 20%
- The predominant sugar in sugar maple sap is:
a. fructose b. glucose c. raffinose d. malic acid e. sucrose
- Sucrose is an example of a:
a. disaccharide b. monosaccharide c. polysaccharide
- Sucrose is a(n) _____ sugar.
a. non-reducing b. reducing c. oxidative d. reductive
- The chemical name for table sugar is:
a. dextrose b. fructose c. glucose d. raffinose e. sucrose

13. Maple sap is a rich source of glucose.
a. false b. true
14. Malic acid, succinic acid, fumaric acid, and citric acid occur in trace amounts in maple sap. The one thing that these molecules have in common is that they all are:
a. monosaccharides
b. part of the Calvin cycle
c. intermediates in the Krebs's cycle
d. formed during photosynthesis

Sap Flow

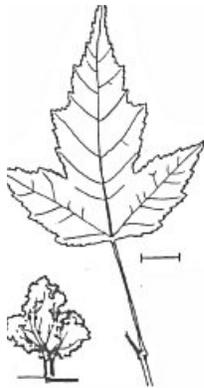
15. The spile is:
a. an instrument used to bore a hole in maple tree
b. a device used to measure sugar concentration in sap
c. the tube that directs maple sap from the tree into a collecting bucket
d. the name of the float that regulates the height of the sap in the evaporator
16. From a single tap, a syrup-maker can expect a yield of approximately _____ gallons of sap.
a. 1 b. 10 c. 40 d. 400
17. From a single tap, a syrup-maker can expect a yield of approximately _____ gallons of syrup.
a. 0.25 b. 1.0 c. 10 d. 40.0
18. The standard drill bit size for tapping maple trees is:
a. 5/32 b. 1/4 c. 7/16 d. 3/8
19. Maple sap drips out of the:
a. phloem b. xylem
20. The pressure in the stem of maple trees when sap is flowing is:
a. negative (under a tension)
b. less than atmospheric pressure
c. equal to atmospheric pressure
d. greater than atmospheric pressure
21. In which of the following conditions would you expect sap flow?
a. night temp - 20 F; day temp - 20 F
b. night temp - 20 F; day temp - 40 F
c. night temp - 40 F; day temp - 40 F
22. A cold night is required for sap flow in order to:
a. dissolve gases in the xylem to decrease the internal stem pressure
b. allow water to freeze inside hollow xylem cells and in intercellular spaces
c. absorb water from cells adjacent to the xylem and then ultimately from the roots
d. lock stem gases in ice bubbles
e. all of the above are required

23. Sap flow occurs when the temperature:
- remains above freezing for a day
 - remains above freezing for more than three days
 - remains below freezing for more than three days
 - is below freezing at night but above freezing during the day
24. The cause of maple sap flow is root pressure.
- false
 - true
25. Maple sap flow occurs:
- primarily at night
 - primarily during the day
 - equally during day and night
26. Root pressure is responsible for sap flow in:
- birch
 - hickory
 - maple
27. The main advantage of small diameter tap holes is that:
- it is easier to drill a smaller diameter hole
 - the tree seals up the hole more rapidly at the end of the syrup season
 - the rate of sap flow from a smaller hole is greater than from a larger one
 - the total amount of sap from the smaller hole is greater than from a larger hole
28. The unique feature about the wood of trees that produce sap in the spring is that they have:
- air-filled fiber cells & fluid-filled vessels
 - fluid-filled fiber cells & air-filled vessels
 - fiber and vessel cells that are both filled with fluid (water)
 - fiber and vessel cells that are both filled with air

Maple Tree Identification

29. Which of the following trees can NOT be tapped to produce sap in the spring?
- basswood
 - box elder
 - butternut
 - silver maple
 - red maple
30. Which of the following is a hard maple?
- box elder
 - butternut
 - red maple
 - silver maple
 - sugar maple
31. Maple syrup makers typically prefer to make syrup from "hard maples" rather than soft maples because:
- hard maples are more abundant than soft maples
 - the syrup made from a hard maple tastes better
 - hard maples are easier to drill a hole into the stem
 - hard maples are easier to identify in the winter than soft maples
 - hard maples have a higher sugar concentration than soft maples

32. Which of the following features is NOT TRUE for both hard AND soft maples
- belong in the genus *Acer*
 - have dense, heavy wood
 - produce sap when tapped in the spring
 - produce a helicopter-type seed/fruit
 - have leaves in pairs on the stems (opposite leaf arrangement)
33. The scientific name for a sugar maple is:
- Acer negundo*
 - Acer platanoides*
 - Acer rubrum*
 - Acer saccharum*
 - Acer saccharinum*
34. A sugar maple leaf is shown in figure:



A.



B.



C.



D.

35. Maple syrup makers must be able to recognize a sugar maple tree by its bark. The bark of a sugar maple tree is shown in Figure:



A.



B.



C.



D.



E.

Syrup Making

36. Assume the concentration of sugar in a sample of maple sap is 4%. How many gallons of sap are required to produce one gallon of syrup?

- a. 15.5 b. 21.5 c. 40 d. 86

37. Assume that a syrup-maker boils down 9,500 gallons of sap to make 380 gallons of syrup. What was the approximate sugar concentration in the sap?

- a. 1.5% b. 2.3% c. 3.4% d. 5.0% e. 40%

38. In 2005, the syrup makers collected 2770 gallons of sap and made 45 gallons of syrup. Why this a good syrup making year?

- a. Yes, because the sap/syrup ratio was less than 40.
b. No, because the sap/syrup ratio was greater than 40.
c. No, because the concentration of sugar in the sap was greater than 2%

39. Which of the following statements about sugar sand is NOT TRUE?
- Sugar sand has many important economic uses
 - Sugar sand must be filtered out of the final syrup
 - Sugar sand is comprised largely of calcium malate
 - Sugar sand is a precipitate that forms in the sap/syrup when it is heated
40. Assume that a syrup maker plans to make maple syrup. Before heading to the sugar shack the syrup maker boils some water on the kitchen stove and measures the boiling point and finds that it is 214 F. The syrup maker knows that the maple syrup will be finished when the temperature of the syrup reaches:
- 207 F
 - 212 F
 - 214 F
 - 221 F
 - not enough information is provided to answer this question
41. In which of the following months is it impossible to tap a maple tree in Minnesota to recover sap?
- April
 - January
 - June
 - November
42. On April 1, 2005 a news report on MPR reported that a glut of maple syrup on the world market has resulted in many maple trees not being tapped. And as a consequence, this has resulted in the buildup of large pressures in the stems of many of maple trees causing some of these trees to explode. This story:
- makes sense because large positive pressures develop in the stems of maple trees during sap season.
 - makes sense because diseased maple trees have weakened stems that would be unable to withstand the normal stem pressures
 - is bogus because the stem is too strong to explode
 - is bogus because a maple tree only develops stem pressure if it is tapped