

Overview:

Students create edible leaves and compare them to real leaves.

Objectives:

The student will identify and describe the parts and functions of a tree leaf.

Targeted Alaska Grade Level Expectations:

Science

- [7] SC2.1 The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by describing the basic structure and function of plant and animal cells.
- [7] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

Materials:

- Shallow square or rectangular glass pan (one for every eight students)
- Green gelatin (one 6 oz. package per glass pan)
- Clear gelatin (two envelopes per glass pan)
- Apples, bananas, green grapes, melons (preferably two kinds that can be cut into long strips and then split lengthwise)
- Water
- Paring knives
- Spoons
- Mixing bowl
- Stove
- Refrigerator or freezer
- Green food coloring (optional)
- Whipped cream (optional)
- STUDENT INFORMATION SHEET: "Leaf Mold Directions"
- STUDENT WORKSHEET: "Leaves"
- STUDENT INFORMATION SHEET: "Forest Facts"

Activity Procedure:

Allow for four 30-60-minute intervals while gelatin sets.

Collect the food ingredients and utensils. Ask for food contributions. Locate a refrigerator or freezer for fast setting of the gelatin.

Day 1:

1. Draw a diagram of a leaf on the board. Review its parts with the class. Complete the "Leaves" worksheet.
2. Divide students into groups of eight. Give each group a copy of the leaf mold directions.
3. Each group should slice apples (**stomata**) through the core and layer them on the bottom of the glass pan in pairs. Each pair of apple slices should form a pattern like an "O."
4. Prepare the green gelatin according to the package directions. Add a few drops of green food-color (optional). Pour a layer (**epidermis**) just to cover the apples. Keep the remaining gelatin covered at room temperature. Chill the apple/gelatin layer until the gelatin is firm (one hour – or less in a freezer – to overnight).

MAKE A TASTY LEAF

INSTRUCTIONS

5. Prepare the clear gelatin. Hold at room temperature.
6. Cut two kinds of melons into strips. Cut strips in half lengthwise and stack one from each melon on top of the other (**xylem and phloem**). The combined strips should be no higher than 1/2 inch. Lay them in a row (**vein**) on the middle of the green gelatin.
7. Cut the bananas (**spongy layer**) into pieces about 1/2 -inch thick and loosely cover the rest of the gelatin, leaving spaces.
8. Pour half of the clear gelatin (**mesophyll**) over the banana and melon. Cool until the clear layer is firm.

Day 2:

1. Arrange the green grapes (palisade layer) in tight rows on the firmed clear layer. Pour the last half of the clear gelatin (**mesophyll**) over the grapes.
2. When the clear/grape layer is firm, pour the last green gelatin layer (**epidermis**) on and cool until firm.
3. Optional: Spread whip cream (**cuticle**) over the top.
4. Before cutting into the leaf mold, ask students if they can figure out what each layer represents. Discuss the layers and their functions.
5. Discuss the concept that plants are the **producers** of food, not only for themselves, but for most of the animal world. We are **consumers**. What other creatures are consumers?

Extension Ideas:

1. Substitute vegetables for the fruits.
2. Combine the tree pizza (previous activity) and leaf mold for a single plant feast.

Evaluation:

Students sketch and label cross-sections of a tree leaf.

Credits:

This lesson adapted with permission from Alaska Department of Fish and Wildlife's *Alaska's Forests and Wildlife* curriculum, 2001.

Original lesson adapted with permission of National Wildlife Federation, *Trees are Terrific!* (Ranger Rick's NatureScope), 1992.

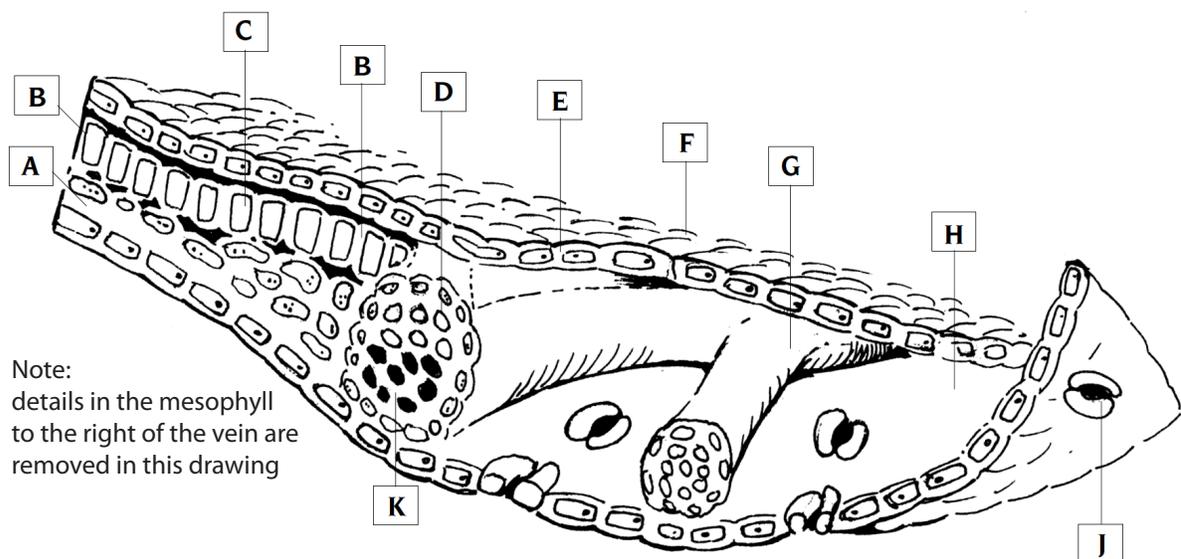
Directions:

1. Slice apples through the core and layer them on the bottom of the glass pan in pairs. Each pair of apple slices should form a pattern that looks like an "O."
2. Prepare the green gelatin according to the package directions. Add a few drops of green food color (optional). Pour a layer just to cover the apples. Keep the remaining gelatin covered at room temperature. Chill the apple/gelatin layer until the gelatin is firm (one hour – or less in a freezer – to overnight).
3. Prepare the clear gelatin. Hold at room temperature.
4. Cut two kinds of melons into strips. Cut strips in half lengthwise and stack one from each melon on top of the other. The combined strips should be no higher than 1 /2 inch. Lay them in a row on the middle of the green gelatin.
5. Cut the bananas into pieces about 1 /2-inch thick, and loosely cover the rest of the gelatin leaving spaces.
6. Pour 1 /2 of the clear gelatin over the banana and melon. Cool until the clear layer is firm.
7. Arrange the green grapes in tight rows on the firmed clear layer. Pour the remaining clear gelatin over the grapes.
8. When the clear/grape layer is firm, pour on the last green gelatin layer, and cool until firm.
9. **Optional:** Spread whipped cream over the top

NAME: _____
LEAVES

Write the following words on the appropriate lines: **chlorophyll, chloroplasts, cuticle, epidermis, mesophyll, palisade, phloem, photosynthesis, spongy, stomata, vein, xylem**. Then write the letter identifying the correct part of the leaf in the box at the beginning of each statement.

1. _____ is the process of making food from light, carbon dioxide, and water.
2. The pigments that absorb light energy and produce the green color of plants are called _____.
3. The outer waxy layer of the leaf is the _____.
4. The _____ carries the "food" manufactured in the leaf to other parts of the tree.
5. The "skin" of the leaf is also known as the _____.
6. The _____ of the leaf is also known as the _____.
7. The middle area of the leaf where light, water, and gas exchanges happen is called the _____.
8. The _____ layer is where light is absorbed in photosynthesis.
9. _____ are the thin-walled cylindrical cells in the palisade layer that contain chlorophyll.
10. _____ cells carry water and dissolved minerals in the leaves.
11. _____ are small pores on the underside of the tree's leaves that open to absorb carbon dioxide
12. The _____ layer is where most gas exchanges occur in the leaf.



TREE LEAVES

Leaves are the food factories of trees. Leaves capture light energy from the sun and gases from the atmosphere. They combine those with water pumped from the roots to make the sugars the tree uses for food. This process of making food is called **photosynthesis**. Skinny spruce needles and broad cottonwood leaves all work as food factories.

Look at a Cross-Section

A cross-section of a leaf shows several layers of cells that are organized in three systems: (1) protective, (2) food producing, and (3) transporting.

1. Protective

A protective “skin” covers the entire leaf. It has two layers: the **epidermis** and the **cuticle**. The cuticle is a waxy layer that is usually thickest in plants growing in windy or hot, dry regions. The skin lets in light, but blocks the movement of water and gases.

Little “mouths” or **stomata** in the skin on the under-side of the leaf open and close to let in carbon dioxide, release oxygen, and control the loss of water. A single leaf has many thousands of these little mouths. In most plants, the stomata open in the day for gas exchange during photosynthesis and close at night to prevent water loss.

2. Food Producing

The producing system of a leaf, the **mesophyll**, has several layers. The **palisade layer** has thin-walled cylindrical cells called **chloroplasts**. These closepacked cells contain **chlorophyll**, the pigment that absorbs light energy in photosynthesis.

Beneath the palisade is the **spongy layer** which has loose-packed, irregularly shaped cells that form large air spaces. Most gas exchange – oxygen (O_2) and carbon dioxide (CO_2) – occurs in this area.

3. Transporting

Veins transport materials to and from the leaf. The veins are tubes divided into the **xylem** and the **phloem**. The xylem carries water and minerals *up* from the roots. The phloem transports food produced by the leaf *down* to the rest of the tree

