Grade: 4th
Title: Tree Cookies
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Student Learning Objective(s):
- The students will examine the life cycle of a tree.
- The students will examine the cross section of trees.
- The students will use the cross sections of the trees, called tree cookies, and infer how old the tree is based on their prior knowledge about the rings on the tree cookies.
- The students will use the cross section to infer what types of environmental conditions the tree has encountered.
- The student will identify and explain the significance of a tree’s annual rings.
- The student will recognize and define the importance of the bark, cambium, and the heartwood of a tree.

LA GLE’s
Grade: 4th #: (SI-E-A1): Pose questions that can be answered by using students’ own observations, scientific knowledge, and testable scientific investigations.
Grade: 4th #: (SI-E-A2): Use observations to design and conduct simple investigations or experiments to answer testable questions.
Grade: 4th #: (SI –E-A2): Predict and anticipate possible outcomes.
Grade: 4th #: (LS –E-B2): Classify examples of plants and animals based on a variety of criteria
Grade: 4th #: (SI –E-A4): Select and use developmentally appropriate equipment and tools (e.g., magnifying lenses, microscopes, graduated cylinders) and units of measurement to observe and collect data

Materials needed:
- Cross sections from trees (“Tree Cookies”)
- Pencils
- “Reading Tree Cookies” hand out
1. **Engage:**

   **Science Process Skills** Indicate which science process skills students will develop in this part of the lesson.
   - Observation
   - Classification
   - Communication
   - Measurement
   - Estimation
   - Prediction
   - Inference
   - Identifying Variables
   - Controlling Variables
   - Defining Operationally
   - Forming Hypotheses
   - Experimenting
   - Graphing
   - Modeling

   1. The teacher will ask the students to think of ways that they could tell the age of a tree.
   2. The teacher will ask the students if there are ways to know how fast or how slow tree growth occurs.
   3. The teacher will ask the students to think of things that might affect the growth of a tree.
   4. The teacher will ask the students how they think the life span of a tree compares to their own life span.
   5. The teacher will ask the students to use their prior knowledge of trees to infer the significance of the bark on a tree, the cambium, and the heartwood.

   **Note:**
   The bark (protects tree), cambium (helps tree make new bark), and the heartwood (supports tree on the inside).

2. **Explore:**

   **Science Process Skills** Indicate which science process skills students will develop in this part of the lesson.
   - Observation
   - Classification
   - Communication
   - Measurement
   - Estimation
   - Prediction
   - Inference
   - Identifying Variables
   - Controlling Variables
   - Defining Operationally
   - Forming Hypotheses
   - Experimenting
   - Graphing
   - Modeling

   1. The teacher will distribute “tree cookies,” also known as cross sections, to each student.
   2. The teacher will instruct the students to observe the physical characteristics of their tree cookies.
   3. The students will estimate the age of the tree from their particular tree cookie.
   4. The students will share their thoughts and ideas on how they estimated the age of the tree using the cross section.
   5. The students will discuss the various characteristics of their tree cookies in groups.
   6. The teacher will ask the students to think about the different rings on their tree cookies and what they mean.
   7. The teacher will instruct the students to observe whether the growth rings on their tree cookies are well spaced or closer together and infer what that might mean about the tree.
   8. The teacher will then ask the students to compare the lifespan of a person to the lifespan of a tree.
   9. The students will work in pairs to determine the age of their tree cookie as well as if any other environmental factors might have affected the tree.
   10. The students will carefully count the number of rings on their tree cookies to determine the age of their tree. The students will record their answers in their learning logs.
   11. The teacher will instruct the students to count either only the light rings, or only the dark rings as each represent a different growing season that occur in the same year.
   12. After counting the number of rings on their tree cookies, the students will subtract that number from the current year to find the year that the tree the cookie came from started growing.
   13. The teacher will then ask the students to find the growth ring for the year that they were born.
   14. The teacher will then ask the students if their tree cookie has a dark band that extend part way around the trunk from both sides indicating a fire scar.
   15. The students will count the number of fire scars their tree cookies has and determine the years that these fires occurred.

3. **Explain:**

   Outline the line of questioning you will use to assist students in understanding the concept. List at least 5 good questions and identify the question category (Gallagher & Aschner) in which your question falls (see text, Figure 7.6).
1. By using a cross section of a tree, called a tree cookie, how can you determine the age of that tree?
   By counting either only the number of light colored rings or only the number of dark colored rings that are on the cross section of the tree.
2. What are three major things that can affect the growth of a tree?
   Fire, insect infestation and drought
3. Rings that are well spaced from one another on a cross section indicate what?
   Wide rings indicate years of vigorous growth
4. What causes this?
   The well space rings represent a season of abundant water, sunlight, nutrients, and space.
5. Rings that are narrower on a cross section indicate what?
   Narrower rings indicate years of slower growth, and may represent a season of inadequate water, sunlight, nutrients, or space.
6. What are the three parts of a tree and what does each part do for the tree?
   The bark (protects tree), cambium (helps tree make new bark), and the heartwood (supports tree on the inside).

4. Expand:
Science Process Skills
   Indicate which science process skills students will develop in this part of the lesson.
   □ Observation □ Classification □ Communication □ Measurement □ Estimation □ Prediction □ Inference
   □ Identifying Variables □ Controlling Variables □ Defining Operationally □ Forming Hypotheses
   □ Experimenting □ Graphing □ Modeling

   As an expanded for this lesson, students could make their own family tree using a tree cookie.
   1. Obtain a cross section of wood at least 2 inches in diameter, preferably from a tree that is at least 40 years old.
   2. Starting from this year’s growth, count back the rings and label the ring that grew the year you were born. (Use a small label and glue.)
   3. Do this for other members of your family, too. Draw your own family ring history here:

5. Evaluate:
What exactly will you do, or what evidence/data will you collect, to ascertain whether the students can achieve the objectives you listed at the top of this lesson?

The teacher will evaluate the student’s knowledge and understanding of the lesson by filling out the “Reading Tree Cookies” chart that is handed out at the end of the lesson. The teacher will ask the students to recall what they just learned about using a tree cookie to identify a trees age, and complete the chart.
Additional Notes to supplement lesson:

- Each year, trees that grow in temperate regions (non-tropical) create a layer of wood around the circumference of the trunk and branches.
- Light-colored rings in the wood are called spring wood and are a result of rapid tree growth during the spring time.
- Darker-colored more narrow rings in the wood are called summer wood and are a result of slower tree growth during the hot, dry summer.
- One layer of light-colored spring wood along with one layer of darker summer wood marks the passage of a year in the tree’s life.
- Wide rings indicate years of vigorous growth, and may represent a season of abundant water, sunlight, nutrients, and space.
- Narrower rings indicate years of slower growth, and may represent a season of inadequate water, sunlight, nutrients, or space.
- Narrow and wide rings on the same tree could have been caused by intermittent years of drought, insect damage, construction damage or other disturbance.
- Trees record injuries in the form of scars. Scars on tree rings may come from fire, insects, or damage from machines like lawnmowers, earth movers, or vehicles.

Brain Compatible Learning Strategies Used in This Lesson:

- Brainstorming/Discussion
- Drawing and Artwork
- Field Trips
- Games
- Graphic Organizers
- Humor
- Manipulatives, Experiments, Labs, Models
- Metaphors, Analogies, and Similes
- Mnemonic Devices
- Movement
- Music, Rhythm, Rhyme, and Rap
- Project/Problem-Based Instruction
- Reciprocal Teaching, Cooperative Learning
- Role Plays, Drama, Pantomimes
- Storytelling
- Technology (student use)
- Visualization/Guided Imagery
- Visuals
- Writing/Journals

Lesson Source: