5th Grade Science Lesson Plan: "What Do Plants Need to Survive?"

Essential Question:

- What do plants need to survive?

Standards:

NGSS (Next Generation Science Standards):

- **5-LS1-1:** Support an argument that plants get the materials they need for growth primarily from air and water.
- **Science and Engineering Practices (SEP):** Planning and carrying out investigations.

Common Core Standards:

- **CCSS.ELA-LITERACY.RI.5.4:** Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.
- **CCSS.ELA-LITERACY.W.5.2:** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- **CCSS.ELA-LITERACY.W.5.4:** Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
- **CA ELD Standard: Collaborative** (Grades 3–5)
    - **Objective:** Participate in discussions on the scientific method, plant experiments, and photosynthesis, using appropriate language for expressing ideas and supporting arguments.
    - **Support:** Encourage peer interaction with collaborative activities like Think-Pair-Share or small group discussions to process the results of the experiments.
- **CA ELD Standard: Interpretive** (Grades 3–5)
    - **Objective:** Interpret scientific texts (the article on photosynthesis) and visual information (the plant diagrams) to extract key ideas about plant survival.
    - **Support:** Use scaffolds such as visuals, labeled diagrams, bilingual glossaries, and simplified summaries to aid comprehension.
- **CA ELD Standard: Productive** (Grades 3–5)
    - **Objective:** Write an expository essay explaining what plants need to survive, following the structure of an informative text.
    - **Support:** Provide sentence starters and graphic organizers to help structure their writing (e.g., "Plants need ___ to survive because...").

Language Scaffolding and Support:

- **Visuals:** Use pictures of plants, diagrams of photosynthesis, and step-by-step guides during experiments.
- **Sentence Frames:** Provide language frames to help students with scientific discussions and writing tasks, such as:
    - "I observe that the plant is…"
    - "I think this happened because…"
    - "Photosynthesis is when..."
- **Vocabulary Support:** Use word walls, vocabulary cards, or word banks with translations in the students' home languages, if necessary.

Depth and Complexity Icons:

1. **Big Idea**
    - **Purpose:** Encourage students to identify the overarching concept or theme.
    - **Application:** Ask students to explore the big idea of interdependence between plants and their environment. Have them write or discuss why water, sunlight, and air are fundamental for plant survival, connecting it to broader ecological systems (e.g., the role of plants in producing oxygen for all life).
2. **Patterns**
    - **Purpose:** Focus on recurring elements or behaviors.
    - **Application:** Have students identify patterns in how plants grow based on the experiments. For example, they can analyze how the lack of water or sunlight affects plant health across different species or environments. Encourage them to look for patterns in their observations.
3. **Details**
    - **Purpose:** Encourage attention to specific components or facts.
    - **Application:** Focus on the specific structures of the plant (roots, leaves, stem) and how each part contributes to the plant's ability to survive. During the celery experiment, ask students to notice fine details, such as how water is absorbed into the leaves.
4. **Rules**
    - **Purpose:** Understand underlying principles or systems.
    - **Application:** Explore the rules or systems of photosynthesis, the process of water absorption, and plant growth. Discuss the scientific rules governing how plants convert sunlight into energy and how water moves through the plant system.
5. **Unanswered Questions**
    - **Purpose:** Encourage curiosity and the identification of gaps in knowledge.
    - **Application:** Prompt students to generate questions about what they still want to know. For example, "How do plants survive in extreme environments like deserts?" or "What other factors, beyond water, sunlight, and air, might affect plant growth?"

6. **Ethics**
    - **Purpose:** Analyze issues related to morality or fairness.
    - **Application:** Discuss ethical issues related to the environment, such as deforestation and its impact on plant life. Have students consider questions like, “What responsibility do humans have to protect plant ecosystems?”

GATE Strategies:

1. **Inquiry-Based Learning:**
    - Encourage students to develop their own experiments beyond what is taught in the lesson. For example, after the celery experiment, ask them, “What if we used different liquids instead of water? What results might you expect?”
2. **Differentiated Products:**
    - Allow students to choose how they represent their understanding of photosynthesis and plant survival. They might write a creative narrative from the perspective of a plant, create a comic strip, or design a digital infographic instead of the traditional diagram.
3. **Tiered Assignments:**
    - Offer more complex tasks for advanced learners, such as comparing photosynthesis in different plant species or environments. For example, ask, “How do desert plants, like cacti, differ from basil plants in terms of survival strategies?”
4. **Flexible Grouping:**
    - Use flexible groupings to differentiate learning tasks. For example, some students can focus on deepening their understanding of the scientific process, while others might investigate how environmental changes (e.g., climate change) impact plant life globally.

Universal Themes:

1. **Change:**
    - Explore the concept of change by looking at how plants respond to changes in their environment (lack of water, sunlight, soil). Have students reflect on how change affects all living things and how plants adapt or fail to adapt.
2. **Systems:**
    - Use the theme of systems to discuss how different parts of the plant (roots, stem, leaves) work together in a system to ensure survival. Relate this to larger systems, such as ecosystems and the Earth’s carbon cycle.
3. **Interdependence:**
    - Discuss how plants depend on their environment and how, in turn, animals and humans depend on plants. Highlight the interconnectedness of all living things

and how disrupting one part of the system (e.g., deforestation, pollution) can affect the rest.

Objectives:

- Students will use the scientific method to conduct two experiments testing what plants need to survive.
- Students will record observations and conclusions in their lab journals.
- Students will write a 5-paragraph expository essay explaining what plants need to survive.
- Students will learn about photosynthesis by reading an article and creating a labeled diagram.

Materials Needed:

- 4 potted basil plants (same size and health)
- Water
- Soil (optional for demonstration of a soil-less condition)
- Space near a window or artificial grow light
- 2 bunches of celery (with leaves)
- Red food coloring
- Clear cups
- Lab journals (for recording observations)
- Article about photosynthesis (provided by teacher)
- Doc cam or whiteboard for modeling
- Markers, pencils, and paper for drawing diagrams
- Writing materials for the essay (paper, pencil, or Google Classroom)

Day 1: Introduction and Experiment 1

1. Introduction (10 minutes):

- Pose the essential question: "What do plants need to survive?"
- Lead a class discussion to gather predictions (likely answers: water, sunlight, soil).
- Explain that they will test these predictions with an experiment.

2. Experiment 1 Setup (30 minutes):

- Introduce the **scientific method** (ask a question, form a hypothesis, conduct an experiment, record data, draw a conclusion).
- Show the 4 basil plants and explain how one will be deprived of sunlight, one of water, one of soil, and the last will remain a control.
    - **Control Plant:** Watered, kept in sunlight, and in soil.
    - **Plant 1:** Kept in the dark, still receives water and stays in soil.
    - **Plant 2:** Receives sunlight, but no water (optional: replace water with another liquid to test).
    - **Plant 3:** Kept in sunlight, watered, but removed from soil.
- Students record their hypothesis: What do they think will happen to each plant?

3. Observations & Lab Journals (20 minutes):

- Students record initial observations in their lab journals.
- Remind them to make daily observations for a week, noting any changes in the appearance of each plant.

Day 2: Experiment 2 – Celery and Food Coloring

1. Introduction (5 minutes):

- Introduce the concept of how plants absorb water through their stems.
- Pose the question: "How do plants get water to their leaves?"
- Explain that today's experiment will show how plants transport water.

2. Experiment 2 Setup (25 minutes):

- Each group receives 2 stalks of celery with leaves, two clear cups, and water.
- One cup will have plain water; the other will have water mixed with red food coloring.
- Students place one celery stalk in each cup and predict what will happen.
- Have students record their hypothesis and observations in their lab journals.

3. Reading on Photosynthesis (30 minutes):

- Distribute an article about photosynthesis.
- As students read, have them highlight key terms like "chlorophyll," "sunlight," "carbon dioxide," and "water."
- After reading, discuss how sunlight, water, and air help plants grow through photosynthesis.

Day 3: Observation and Photosynthesis Diagram

1. Review Experiment Results (15 minutes):

- Have students check the celery from **Experiment 2** and record the changes (e.g., leaves turning red as the colored water moves through the plant).
- Students should describe how the colored water moved through the celery, connecting it to how plants absorb water from the soil.
- Review any updates from **Experiment 1** (e.g., plants wilting without water, yellowing without sunlight).
- Ask students to record the changes in their lab journals and draw conclusions about what plants need to survive.

2. Photosynthesis Diagram (30 minutes):

- Use the doc cam to model a diagram of photosynthesis, starting with a sunflower.
- Label the parts of the plant (roots, stem, leaves, flowers) and illustrate the flow of water, carbon dioxide, and sunlight.
- Have students draw their own diagram, including labels like "sunlight," "carbon dioxide," "oxygen," and "chlorophyll."

Day 4: Writing the Expository Essay

1. Introduction to Essay Writing (15 minutes):

- Introduce the structure of a 5-paragraph expository/informative essay.
    - **Paragraph 1 (Introduction):** Introduce the topic—what plants need to survive.
    - **Paragraph 2-4 (Body):** Discuss the key factors (sunlight, water, air, soil) based on the experiments and research.
    - **Paragraph 5 (Conclusion):** Summarize what plants need and why it's important for their survival.

2. Writing the Essay (45 minutes):

- Students write their essays using the observations and conclusions they gathered from the experiments and the photosynthesis article.

- Provide support and guidance on structure, spelling, and grammar.
- Encourage students to refer to their lab journals and diagrams for specific examples.

Assessment:

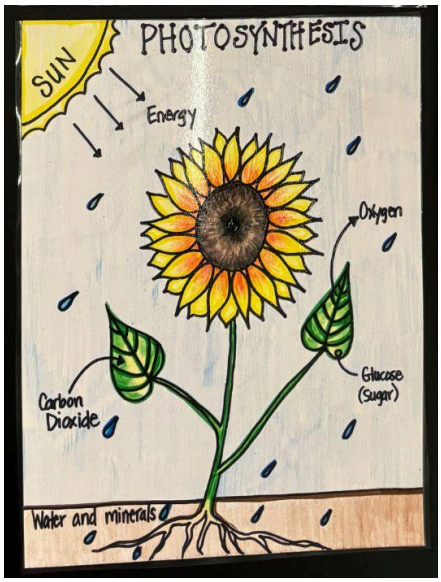
- Lab journals (observations, hypotheses, conclusions from both experiments).
- Completed photosynthesis diagram with labels.
- 5-paragraph expository essay (clarity, accuracy, and organization).
- Participation in discussions and experiments.

Extensions/Enrichment:

- Test different liquids in Experiment 1 (e.g., juice, soda) to see how plants respond.
- Explore different types of light sources (natural vs. artificial).
- Investigate what happens when plants are deprived of air by placing one under a glass dome.

This lesson plan integrates science and literacy, reinforcing the scientific method and key concepts about plant survival while enhancing students' writing skills through an expository essay.

Sample Diagram



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What Do Plants Need to Survive?

What do plants need to survive? Plants are living things that need specific resources to grow and thrive. Like humans and animals, plants depend on their environment to meet their basic needs. Without these essential elements, plants cannot survive. Through a series of experiments, we can see how water, sunlight, and air are crucial for plant growth.

To begin, one of the most important things that plants need is water. Water helps plants in many ways, such as transporting nutrients from the soil to the rest of the plant. In one of our experiments, we used celery stalks to see how water moves through a plant. When we added red food coloring to the water, we saw that the color traveled up the celery and into the leaves. This showed us how plants absorb water through their roots and use it to keep themselves alive. Without water, plants would dry out and die.

Likewise, sunlight is another essential resource for plants. Plants use sunlight to make their own food through a process called photosynthesis. In our basil plant experiment, one of the plants was kept in the dark to see what would happen without sunlight. After a few days, the plant started to wilt and turn yellow because it couldn't make the food it needed. Sunlight gives plants the energy to grow and produce oxygen, which is important for all living things.

In addition to water and sunlight, plants also need air, specifically carbon dioxide. Carbon dioxide is used during photosynthesis to help the plant create food. During our lesson, we learned that plants take in carbon dioxide from the air through tiny openings in their leaves.

Without carbon dioxide, the process of photosynthesis would not work, and the plant wouldn't be able to make food. This shows how important air is to plant survival.

In conclusion, plants need water, sunlight, and air to survive. These three elements work together to help plants grow, stay healthy, and produce oxygen. Through experiments and research, we have seen how plants rely on their environment to meet their basic needs. Understanding what plants need to survive helps us better appreciate the role they play in our world.