

Seasonal Leaf Changes/Differences Inquiry Project
Supplementary Learning Activity

Purpose

- To increase student awareness of changes/differences in/among leaves other than color and size
- To provide students with an opportunity to conduct an inquiry on the leaves in their local environment

Overview

Students will observe leaves looking for changes/differences that might be associated with particular seasons or environmental conditions and then work in groups to develop testable/researchable questions for their inquiry.

Time

Three to five class periods

Level

Beginning, Intermediate, Advanced

Key Concepts:

- Plants experience changes other than size and color
- Changes/differences are the result of a variety of factors including disease, insect damage, weather, etc.
- Sometimes these changes/differences can be associated with particular seasons
- Changes can be both temporal and/or spatial

Skills

- Observe
- Measure
- Collect data
- Analyze data
- Infer
- Graph

Materials

- Hand lenses (2 per group)
- Rulers (1 per group)
- Lighted microscopes
- Cm grid sheets (1 per group)
- Large clear packing tape (1 per group)

Procedure**Gear up**

- Ask students to get in small groups and brainstorm together and list:
 - Changes/differences they have observed in their local environment (for example, changes or differences in plants, animals, land, etc.)
 - Changes/damage they have observed on the leaves while doing phenology
 - Any inferences they have about what could have caused the change/damage

Explore

- (It is important to provide unstructured explore to give students the opportunity to develop good inquiry questions)

- Send students outside
- Have each person collect three leaves that have evidence of change/damage
- Challenge them to try to find leaves that appear to have changed or been damaged differently
- Back inside have each group pool their leaves and fill in the chart on page 4 together

Generalize

- Ask each group to share an important observation, inference and a question they had
- Put concept circle on board or chart with “Leaves” in the center (see Leaf Pigment Investigation, page 2)
- Draw spokes around the outside of the circle and have students supply observed change/damage (evidence)
- Next draw a line from each observed change for each possible (inferred) cause. Question students to elicit any missing variables that might need to be considered
- Next have students work in small groups to develop their inquiry questions.
- Remind students that Inquiry questions can be answered by any or all of the following procedures:
 - Hands-on investigation/experiment
 - Researching in books or on Internet
 - Consulting experts

Investigation/Inquiry

Have students work in groups or individually to:

- Refine their testable or researchable question
- Develop the procedure through which they will gather data
- Collect data
- Analyze their data to determine results
- Interpret the data to determine implications
- Communicate findings

Assessment

Rubric following

SAMPLE SCIENTIFIC INQUIRY SCORING RUBRIC

Criteria	Developing	Proficient	Exemplary
Developing Questions	Is unable to develop testable or researchable question	Develops questions that are testable or researchable depending on situation	Uses observations and scientific knowledge to develop testable and researchable questions
Designing Investigations	Is unable to develop a plan for a simple investigation to answer the question	Develops a plan for a simple investigation to answer the question with very little assistance	Plans a simple investigation to answer the question that includes orderly, safe and workable procedures
Conducting Investigations	Requires assistance to conduct simple investigation Data gathering is inconsistent, inaccurate or incomplete	Conducts investigations with some assistance from teacher Data appears mostly accurate and complete	Conducts investigations with little or no assistance from teacher Data appears is accurate and complete
Analyzing and Interpreting Data	Analysis and interpretation are not supported by the data collected	Analysis and interpretation of data are supported by the data	Analysis and interpretation of data are supported by the data collected New insights are provided
Communicating	Is unable to clearly communicate explanation of the investigation. Findings were unclear.	Clearly communicates explanation of the investigation. Findings are mostly clear	Clearly communicates explanation of investigation in a variety of ways (written, spoken, drawn). Findings are clear

Leaf Differences/Changes Record Sheet

Leaf number	Observations (Use four senses and measurement)	Inferences (Why do you suppose..?)	Predictions (What will happen if I ...?)	Questions that Come up during the Investigation