Unit Title: From Molecules to Organisms: Structures and Processes
Lesson Title: Plants are Alive!
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Grade Level: Kindergarten
Time Frame: - up to 18 days for best growth; not every day requires instructional time - 30 minutes for the first day - 30 minutes for the last day - 20 minutes for 5-6 days of observations in between -
Targeted Standard(s): NGSS K-LS1-1 Use *observations to describe patterns of what plants and animals (including humans) need to survive.* A.A D1 *Describe measurable attributes of objects, such as length or width. Describe several measurable attributes of a single object.* K.MD2 *Directly compare two objects with a measurable attribute in common, to see which object has "more of"/ "less of" the attribute and describe the difference.*
Short Description of Targeted Phenomenon: Take students outside to make observations of various plants around their campus, thinking about the question "What do plants need in order to survive and reproduce?" You can also have a seed sprouting ahead of time in order to facilitate the initial discussion.

Three Dimensions of NGSS
 	
Science & Engineering Practice/s (SEP):
Analyzing and Interpreting Data: Analyzing Data in k-2 builds on prior experiences and progresses to collecting, recording and sharing observations.
  ● Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.
Connection to Nature of Science: Scientific Knowledge is Based on Empirical Evidence
  ● Scientists look for patterns and order when making observations about the world.
 	
Crosscutting Concept/s (CCC): Patterns- Patterns in the natural and human designed world can be observed and used as evidence.

Disciplinary Core Idea/s (DCI): Organization for Matter and Energy Flow in Organisms- All animals need food in order to live and grow. They obtain their food from plants or other animals. Plants need water and light to live and grow.

Language Supports: Students must understand the following terms: *height, stem, leaves, prediction*

"Prediction" will be taught in lesson launch. Students will be given opportunity to practice identifying and using words height, stem, and leaves.

Materials Needed: 4 clear plastic cups or jars (if you can put them out of reach for safety) for planting, potting soil, mung bean seeds, two brown paper bags, water, chart paper, stacking math cubes, white paper, colored pencils, labels for plants (see Other Resources), worksheet with labeled cups (see Other Resources)

Objective(s): Students will be able to:
1. Make observations about plant growth (height, stems, leaves).
2. Compare observations and be able to determine under which circumstances plants are most successful.
3. Observe and understand that plants need soil, sun, and water to grow and survive.

How Math and Science concepts/skills/practices were integrated in this lesson:
In this lesson, students will be asked to integrate mathematical skills such as being able to identify, describe, and compare measurable attributes of objects (in this case plants). Students will learn that plants have survival needs like humans, and that they require food, water, and sun to prosper.

Possible Challenges /Misconceptions: Weather (cold, lack of sunlight) or classroom temperature (being too cold) can slow down plant growth.

Formative Assessment: On the whiteboard, draw a stick person and a tree in a t-chart. Ask students, "What do people, or humans, need to survive?", and make a list under the person. Then ask students, "What do you think plants need to survive?" and make a list under the tree.

Lesson Opening	
Teacher Actions	**Student Actions**
A. Tell students, "We are all scientists! Part of science and being a scientist is making a prediction, which is a fancy word for making a guess." Have students repeat the word prediction, and forward chain it to help with the pronunciation (e.g. "pre", "pre-dic", "pre-dic-tion").	A. Students practice saying *prediction.*
B. Hold a marker/pencil/pen up. Ask students, "Who can make a prediction about what will happen if I let go of this marker?"	B. Students predict that the marker will fall to the floor.

A. Model sentence, "X predicted that the marker will fall, and his/her friends agreed." Let go of the marker and when it falls to the floor, exclaim, "Amazing! See? You are scientists who can make predictions!"

B. Tell students, "We are going to make some predictions about plants."

Lesson Introduction	
Teacher Actions	**Student Actions**
A. Show students the 4 clear plastic cups, each filled 2/3 of the way with soil. Show students the seeds, and that you are placing one seed in each cup.	A. Students draw their predictions for each condition, making four different plants.
B. Explain that each seed will be treated differently. One plant will only get soil. One plant will only get soil and water. One plant will get soil and sun. One plant will get soil, sun, and water. Labels are in Other Resources section and can be taped on cups & bags.	B. Students discuss their predictions with peers, stating which plant will grow best, which one will grow the least.
C. Give students each a worksheet with labeled cups from Other Resources section. Tell students to write their name on their paper. Direct students to draw their predictions for each seed with pencil, working as a classroom one cup at a time. Be sure to tell students, "There is no wrong answer." If time allows, let students color in their drawings.	**Note from the Progressions (Appendix E):** Animals obtain food they need from plants or other animals. Plants need water and light.
D. Ask students to share their predictions at their tables. Prompt, "Scientists talk about their predictions with others. I want you to talk at your table about what you think will happen. Give students time to talk and circulate around the room to encourage listening and turn-taking skills, giving clarification as needed.	

Body of Lesson	
Teacher Actions	**Student Actions**
A. As growth is observed, chart the plant growth on paper, one paper per day of observations, folded into quarters so that there is one square per plant (see Other Resources).	A. Possible actions: - students count the number of roots observed on each plant

Select students to assist with different tasks on different days; for some tasks, table groups can work together to report out. Repeat for 5-6 days. * Have student helpers water plants C and D daily.	- students measure the height of the stem by using & counting stacking math cubes - students count the number of leaves on each plant - students count the number of beans on each plant

Lesson Closure	
Teacher Actions A. When there is enough data and growth, place the plants side-by-side. Return prediction drawings to students. Say, "Scientists always review their predictions to see what they have learned." Ask: *Which plant grew the most?* *Which plant grew the least?* *Did anyone predict that plant D would grow better than the other plants?* *Why did plant D grow so well?* *What happened to plant A?* *Did plant B or C grow better?*	**Student Actions** A. Students review their predictions, charted growth, and data. Students raise quiet hands and share their answers. Students observe that plant D grew best because it had soil, water, and sun.

Summative Assessment: Give each student a piece of white paper and crayons. Ask students to write their name at the top. Tell students to draw a picture of a lima bean plant. On the back, direct students to write a list (model on the board listed numbers 1-3) of three things plants need to survive. Suggest to students that if they need help spelling, that they can look around the room for the words they need.

Extensions:

Show video and teach song *The Needs of a Plant*: https://www.youtube.com/watch?v=dUBIQ1fTRzI
With students, brainstorm a list of things that need food, water, sun, and air to live.

Plant Labels

Plant A	**Plant B**
soil	Soil sun
Plant C	**Plant D**
soil water	soil sun water

Plant A	Plant B

Plant C	Plant D

Charts

Day 4

A	B
0 roots	2 roots

C	D
3 roots	5 roots

Day 10

A	B
no leaves	6 leaves / 8 cubes

C	D
6 leaves / 7 cubes	10 leaves / 10 cubes