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Plants Alive

Christy D. McGee

INTRODUCTION TO THE UNIT

Overview of Unit

This plant unit emphasizes the importance of allowing students to discover scientific concepts and principles through hands-on exploration. In science, it is important to emphasize the concept of thinking like scientists. In this unit, students conduct experiments, create hypotheses, and record results just as scientists do in their laboratories. To encourage students to think like scientists, they wear lab coats and carry clipboards to record their observations of plants under a variety of circumstances.

In each of the lessons, students explore the basic concepts of living and nonliving things, seed germination, plant requirements for living, plant growth, seed dispersal, and plant parts. This unit culminates with a plant fair, allowing students to demonstrate what they learned throughout the unit. They create displays for each lesson that include a demonstration and a poster explaining their research. For the display, they also create a small, room-size plastic "bubble" (Resource 1.15) that serves as a greenhouse. The students fill the greenhouse with a variety of plants that they have categorized.

The purpose of this unit is to teach children how to think like scientists. Students explore the world of seeds and plants, and keep a detailed record of their findings and observations in their science notebooks. Learning how to use technical writing allows them to understand that they write for many purposes and that writing styles change to support these purposes. Students are exposed to a variety of science skills including observation, inference, measurement, communication, description, prediction, experimental techniques, and research design.

In this unit, students explore plant life through the use of the Parallel Curriculum Model (PCM). The Core Curriculum is dominant in that students work with key concepts and principles of science. Students also learn the importance of investigations in science. Keeping a precise account of the protocol used during their experiments teaches them the fundamentals of science inquiry. Posing questions and conducting experiments are essentials in the field of science. This unit is also closely aligned to the state standards of Kentucky. Those standards were developed using the national science standards as their model.

Because science and math are closely correlated, the Curriculum of Practice is also of key interest. Science and math both depend on systematic procedures and precise language to examine the world around us. Students use mathematical concepts when they use measurement to describe the growth of their plants and when they precisely measure the soil and water used when planting.

Language arts is another strong component in this unit. Scientific writing is technical in nature. Throughout the unit students are required to write about their observations, inferences, and predictions, recognizing that technical writing requires clear, concise, and detailed descriptions of events and observations.

The Curriculum of Practice is central in any investigative science unit. Students in this unit conduct experiments, record and follow protocol, learn the importance of a control in an experiment, and write down precise descriptions of observations. These activities emphasize that science is about doing, and the practice parallel is key to learning the scientific concepts and principles that practicing professionals use in a study of plants.

The Curriculum of Identity is also set forth in this unit, assisting students in finding their place in the world. Change, growth, and the importance of systems are central to understanding themselves and the world in which they live. In this unit, students begin to make the connection that the plant system is similar to their own system, in that growth and change are a part of all living things.

Guiding Questions for the Parallels

Core Curriculum

1. How do seeds differ in size, shape, color, and texture?
2. What are the various ways that seeds are dispersed?
3. What do plants need to grow?
4. What is the function of the parts of the plants?
5. How does a seed turn into a plant?
6. Can seeds sprout without soil?
7. What's inside fruit?
8. How are vegetables and fruits different?

Curriculum of Practice

1. What do we know about plants?
2. How do scientists do their work?

3. How does experimental design work?
4. Why do scientists have to be so precise when recording their findings?

Curriculum of Connections

1. Can writing solidify scientific understanding?
2. What role does mathematics play in the study of plants?
3. How does reading assist scientists in their work?

Curriculum of Identity

1. What are the effects of people traveling to different places?
2. Do people share some of the same needs as plants?
3. What characteristics do living things share?

Background for the Unit

The lessons in this unit assume that primary-aged children know very little technical information about seeds and plants. The use of the KWL (know, want to know, learned) as an introductory activity allows the teacher to assess student knowledge and understanding. It also allows the teacher to group students by readiness levels so that students who are budding horticulturists can move at a quicker pace than those who know very little about the plant world.

This unit is based on national and state standards for children at the primary level. It provides introductory activities that require students to explore the concept of living and nonliving matter, seeds, germination, plant growth, seed dispersal, seed classification, and, finally, the processes of organizing and delivering a plant fair for parents and other students at school.

A critical component of this unit is the classroom community. Students should be used to working together cooperatively to solve problems. Students should also be empowered in their classroom to be in control of their learning environment and themselves. Empowered students flourish in an inquiry-based classroom, and inquiry-based science demands that students explore the materials they work with and make decisions about how to use those materials. Students subsequently are responsible, focused, and intent in exploring the lessons.

CONTENT FRAMEWORK

Organizing Concepts

Macroconcepts

M1: Cycles

M2: Systems

M3: Change

Discipline-Specific Concepts

C1: Patterns

C2: Production

C3: Survival

Principles

1. Things in the environment are classified as living, nonliving, and once living.
2. Living things differ from nonliving things.
3. Organisms are classified into groups by using various characteristics (e.g., body coverings, body structures).
4. Plants grow from seeds and need water, soil, air, and nutrients to grow.
5. Seeds differ in size, shape, color, and texture and are dispersed in a variety of ways.
6. Each plant or animal has observable structures that serve different functions in growth, survival, and reproduction.
7. The details of a life cycle are different for different organisms. Observations of different life cycles are made in order to identify patterns and recognize similarities and differences.

National Science Education Standards

Content Standard A

As a result of activities in Grades K–4, all students should develop

1. Abilities necessary to do scientific inquiry
2. Understanding about scientific inquiry

Content Standard C

As a result of activities in Grades K–4, all students should develop understanding of

1. The characteristics of organisms
2. Life cycles of organisms
3. Organisms and environments

Kentucky State Standards

Key to Standards

Each content standard is preceded by a code. The code begins with SC for science followed by a grade-level designation and then a three-digit number that indicates subdomain, organizer, and sequential standard, respectively. The codes are deciphered in the first set of standards. The codes used for the rest of the standards are listed as follows.

Grade-Level Codes	Subdomain	Organizer
EP = End of primary	1 = Physical science	1 = Structure and transformation of matter
04 = Fourth grade	2 = Earth/space science	2 = Motion and forces
05 = Fifth grade	3 = Biological science	3 = Earth and the universe
06 = Sixth grade	4 = Unifying concepts	4 = Unity and diversity
07 = Seventh grade		5 = Biological change
08 = Eighth grade		6 = Energy transformations

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
SC-P-UD-U-1 (Science-Primary-Unity & Diversity-Understanding-1st Standard) Students will understand that most living things need water, food, and air while nonliving things can continue to exist without any requirements.	**SC-P-UD-S-1 (Science-Primary-Unity & Diversity-Skills-1st Standard)** Students will describe the basic needs of organisms and explain how these survival needs can be met only in certain environments. **SC-P-UD-S-7** Students will ask questions that can be investigated, plan and conduct "fair tests," and communicate (e.g., write, draw, speak, use multimedia) findings to others.	**SC-EP-3.4.1 (Science-End of Primary-Biology-Unity & Diversity-1st Standard)** Students will explain the basic needs of organisms. For example, organisms have basic needs. Animals need air, water, and food; plants need air, water, nutrients, and light. Organisms can survive only in environments in which their needs can be met. **DOK 2** **SC-EP-3.4.2** Students will understand that things in the environment are classified as living, nonliving, and once living. For example, living things differ from nonliving things. Organisms are classified into groups by using various characteristics (e.g., body coverings, body structures).
SC-P-UD-U-2 Students will understand that plants and animals have features that help them live in different environments.	**SC-P-UD-S-1** Students will describe the basic needs of organisms and explain how these survival needs can be met only in certain environments. **SC-P-UD-S-2** Students will identify the characteristics that define a habitat.	**SC-EP-3.4.3** Students will describe the basic structures and related functions of plants and animals that contribute to growth, reproduction, and survival. For example, each plant or animal has observable structures that serve different functions in growth, survival, and reproduction. Humans have

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Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
	SC-P-UD-S-3 Students will investigate adaptations that enable animals and plants to grow, reproduce and survive (e.g., movements, body coverings, method of reproduction). **SC-P-UD-S-4** Students will analyze structures of plants and animals to make inferences about the types of environments for which they are suited. **SC-P-UD-S-7** Students will ask questions that can be investigated, plan and conduct "fair tests," and communicate (e.g., write, draw, speak, use multimedia) findings to others.	distinct body structures for walking, holding, seeing, and talking. These observable structures are explored to sort, classify, compare, and describe organisms.
SC-P-UD-U-3 Students will understand that the offspring of living things are very much like their parents, but not exactly alike.	**SC-P-UD-S-5** Students will use scientific tools (e.g., hand lens/magnifier, metric rule, balance) to observe, make comparisons of organisms, and to classify organisms using one or more of their external characteristics (e.g., body coverings, body structures).	**SC-EP-3.4.4** Students will describe a variety of plant and animal life cycles to understand patterns of the growth, development, reproduction, and death of an organism. For example, plants and animals have life cycles that include the beginning of life, growth and development, reproduction, and death. The details of a life cycle are different for different organisms. Observations of different life cycles are made in order to identify patterns and recognize similarities and differences.
SC-P-UD-U-5 Students will understand that organisms may not be able to survive if some of their parts are missing.	**SC-P-UD-S-3** Students will investigate adaptations that enable animals and plants to grow, reproduce, and survive (e.g., movements, body coverings, method of reproduction). **SC-P-UD-S-4** Students will analyze structures of plants and animals to make inferences about the types of environments for which they are suited. **SC-P-UD-S-7** Students will ask questions that can be investigated, plan and conduct "fair tests," and communicate (e.g., write, draw, speak, use multimedia) findings to others.	

UNIT ASSESSMENTS

Preassessment	Classification activity and KWL chart
Formative Assessments	Science journal entries (in 1-inch binders so lab reports can be added) Lab reports for each of the experiments conducted Observation checklists Discussion checklists
Summative Assessments	Plant fair and science notebooks
Self-Assessments	Daily checklist on group work Overall assessment of each summative assessment
Unit Assessment by Students	Completion of *W* and *L* on KWL chart

UNIT SEQUENCE AND TEACHER REFLECTION

LESSON 1.1: WHAT DO WE KNOW ABOUT PLANTS?

Length: One 45–50-minute session

Unit Sequence	Reflection
Principles • Plants grow from seeds and need water, soil, air, and nutrients to grow. • Seeds differ in size, shape, color, and texture and are dispersed in a variety of ways. • Each plant or animal has observable structures that serve different functions in growth, survival, and reproduction.	KWL helps the teacher assess what students already know about plants. Putting the students' initials by their contributions serves as a checklist for a preassessment.
Skills Communication, prediction, and inference	
Guiding Questions • What do we know about plants? • How do scientists do their work?	Developing two KWLs—one that explores student knowledge of plants and one that explores their understanding of how scientists work—sets the stage for this unit of study.

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Unit Sequence	Reflection
Materials Needed • Paper and pencils • White "lab coats" and clipboards for each student	*Author's note:* I go to thrift stores and buy men's white dress shirts to serve as lab coats. I write each child's name on the shirt above the pocket in permanent marker. The students love wearing their lab coats and using clipboards to hold their lab reports.
Introduction The teacher explains KWL if students have not used this organizer before.	
Teaching Strategies and Learning Experiences The teacher introduces this unit by talking about the work of scientists, noting the importance of lab protocol, accuracy, and details. Students brainstorm what they know and what they want to know about plants. This can be a whole-class activity or students can work in teams and make one KWL chart per group. Students record this activity using the KWL chart with the *K* and *W* columns completed for their science notebooks.	For lab coats, the teacher can request that students bring an old, white dress shirt from home. (Extras can be purchased at Goodwill stores for a minimal amount of money.) With help, students then print their names over the left pockets in fabric pen. Students also have an individual clipboard to hold their lab reports. Donning the lab coat and using a clipboard adds to the seriousness of their work and helps to eliminate behavior problems. The teacher can empower students by allowing them to run the brainstorming session while the teacher scribes. The team's KWL serves as a preassessment and allows for a variety of grouping practices. For example, the teacher can group students by readiness level or interest. An excellent resource for the KWL strategy is an article found at www.accessmylibrary.com/coms2/summary_0286–92503_ITM. The article describes using this reading strategy in a content area.
Closure Students complete a lab sheet for their science notebooks that states three things they already knew and three things they still want to know about plants.	

LESSON 1.2: IS IT ALIVE?

Length: Two 45–50-minute sessions

Unit Sequence	Reflection
Concepts • Systems • Cycles • Change	

Unit Sequence	Reflection
Principles • Things in the environment are classified as living, nonliving, and once living. • Living things differ from nonliving things.	
Skills Observation, description, communication, and prediction	
Standards *KY State Standards* SC-P-UD-U-1 *NSES Standards* C1	
Guiding Question What characteristics do living things share?	Allowing the students to discover the different types of classification systems allows the teacher to assess the depth of student understanding and creativity.
Materials Needed Rocks, buttons, soil, sand, empty seashells, and plant life (flowers or a small container of plants) Leaves, animals (meal worms, ants, or flies), and a variety of manmade objects	
Introduction Each group has a variety of animate and inanimate objects. Through observation and classification, students think about the differences. By creating four to six stations in the room where students can compare and contrast these objects, the teacher allows students to discover the purpose of this lesson. Objects include inanimate ones such as rocks, soil, sand, and seashells (empty), and animate ones such as growing grass, leaves, animals, and insects.	By observing the students during this activity, the teacher gains insight into the children's knowledge of classification and identifies which students are already able to distinguish between living and nonliving things.
Teaching Strategies and Learning Experiences In this opening lesson using discovery learning, students "mess around" with materials that promote their thinking and understanding of what it means to be alive. An important scientific process is the ability to classify.	Jerome Bruner introduced the discovery method of learning. He encouraged teachers to allow children to discover scientific concepts by using the science processes to learn them. In this lesson, students use the science processes of observation and classification to make predictions about the characteristics of the things they observe.

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<table>
<tr><th>Unit Sequence</th><th>Reflection</th></tr>
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Observation/Classification

The teacher guides students through the following steps:

• Ask the students to observe the selection of objects and record them on their lab report. They are to complete their work on this part of the lesson individually.
• Once this step is accomplished, have the students work together in groups of four (arranged by readiness levels) to discuss the various ways they made their classifications.
• Instruct students to compile their various categories into one list that they prioritize by the number of times they use each classification scheme.

Class Discussion

The students share their ideas with the whole class. If they have not made the connection of inanimate and animate objects, the teacher can assist them in doing so by asking,

What makes the animals, insects, and plants different from the other things you observed?

Students then complete a lab report (Resource 1.1).
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Teachers can differentiate this lesson by providing the students with lab reports that vary in depth and the number of steps required to complete them.

Author's note: I have provided one type of report, but teachers should differentiate these reports by student readiness level and need.

The teacher provides each group with six to eight objects to classify. The lab report (Resource 1.1) serves as a formative assessment for student understanding of the classification of objects as living or nonliving.
Students' lists should generate that the plants and animals (this includes the insects) differ from the other objects they observe.
Websites with worksheets for living and nonliving things may be found at www.teachervision.fen.com/childrens-science-activities/printable/31997.html.
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Closure

Students respond to the following question in their science journals:

What do the living things need in order to survive?

An extension for this activity can be a schoolyard walk with students continuing to explore the concept of living and nonliving things. Students note what they see in their science journals and then think-pair-share on commonalities of the plants and animals around them.
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It is important not to rush this part of the lesson. Students need to know that what they put in their science notebook is important. Scientists keep detailed notes of their work and since the students are scientists, they must do the same thing. This entry will solidify what the students know about the needs of living things. Most students will be able to describe those needs in their journals after their observation and classification of the objects. Students who have more difficulty writing can draw what those needs are or the teacher can provide them with a more definitive worksheet that includes more opportunities to think about those classifications.
The schoolyard walk is a day-two activity for this concept. The amount of time needed to teach the concept of living and nonliving characteristics varies with the age and readiness levels of the students involved.
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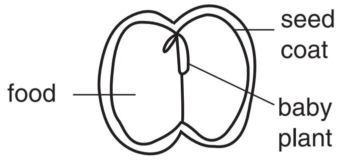
LESSON 1.3: WHAT'S IN A SEED?

Length: Two 45–60-minute sessions

Unit Sequence	Reflection
Concepts • Growth • Change • Systems	
Principle Each plant or animal has observable structures that serve different functions in growth, survival, and reproduction.	
Skills Conducting an experiment, measuring, informative writing, and research techniques	
Standards *KY State Standards* SC-P-UD-U-1, SC-P-UD-S-1, and SC-EP-3.4.1; SC-P-UD-U-2, SC-P-UD-S-1, and SC-EP-3.4.3; SC-P-UD-U-4, SC-P-UD-S-5, and SC-EP-3.4.4 *NSES Standards* A1, A2, C1, C2	
Guiding Question What is inside a seed?	
Materials Needed • Lima bean seeds soaked overnight • A toothpick to help pry the seed open • Lab report • Handheld microscope or magnifying glass	
Introductory Activity After reminding the students that they are scientists in search of answers about plant life, the teacher holds up a lima bean seed and prompts, *What do you think is inside this seed? Once you have taken some time to answer that question, draw what you think you would find in the seed.*	This activity makes students think about the inside of a seed. By encouraging them to think like scientists, the teacher motivates them to take their work on this unit more seriously.
Teaching Strategies and Learning Experiences Students work in cooperative groups, heterogeneous or differentiated by readiness level.	

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Unit Sequence	**Reflection**

The teacher guides students through the following steps:
• Model how to open the seed, stressing the need for handling it gently.
• Ask the students to look for separate parts of the seed that they can see.
• Withhold the names of the parts until the students have time to observe what they see.
• During the observation time (10 minutes), check with each group, using probing questions to assist student understanding.
• At the end of the observation time, ask the students to discuss what they found within their group.
• Ask the group recorder to list the group findings.
• Follow this protocol:
  ○ *Provide at least one handheld microscope for each group of students.*
  ○ *Pass out lima beans that have been soaked overnight.*
  ○ *Instruct students to open the seed with their thumbnail or carefully use a toothpick.*
• Tell students to describe the inside of the seed and write those descriptions in their science notebooks, using the following prompts:
  ○ *What do you notice about your seed?*
  ○ *How does the inside feel?*
  ○ *Is there a smell? How would you describe it?*
  ○ *Does it look like the picture you just drew of a seed?*
• Ask students to draw a second picture of what they now see in their seeds.
• On the board, draw a diagram of the open seed (these are easily found on the Internet).
  ○ *Label the three parts: seed coat (outside protective tissue), cotyledon (food supply), and plant embryo.*
	Seeds come in a variety of shapes and sizes, but they all share three things: (1) seed cover or coat, (2) plant embryo, and (3) food supply. The seed coat protects the seed. In lima beans and other plants, the seed food comes in the form of two seed leaves or cotyledons. Other seeds, such as corn and rice, have a single cotyledon. The baby plant has embryonic leaves and a root.
	Useful resources found on the Internet include a lesson plan and diagram of bean and corn seed found at www.herbsociety.org/fhc/fseeds2.php.
	Other helpful resources are *How a Seed Grows (Let's-Read-and-Find . . . Science 1)* by Helene J. Jordan and Loretta Krupinski and *From Seed to Plant (Rookie Read-About Science)* by Allan Fowler.

Closure Students complete a lab report (Resource 1.2). Students review the questions provided in the teacher strategies and learning experiences section and respond in their science notebooks. On the second day of the activity, students examine a variety of seeds (corn, pea, mustard, grass, sunflower, etc.) and make predictions about the type of plant it is and how large it will grow (and add these predictions to the science notebook). Students research the other seeds so they can see if their predictions are correct. They can also explain the different lengths of germination.	The teacher ensures that students have the parts labeled correctly and reteaches if they have not labeled the parts correctly. It is important for students to understand the importance of their work and to be as detailed and precise as possible. Their research findings go into their science notebooks and are used as a reference when they make predictions about growth rate in subsequent lessons in this unit. As with the previous lesson, this takes more than one day to complete.

LESSON 1.4: WHAT DO SEEDS NEED TO GROW?

Length: One 45–50-minute session

<table>
<tr><th>Unit Sequence</th><th>Reflection</th></tr>
<tr><td>Concepts
Cycles
Change
Systems</td><td></td></tr>
<tr><td>Principles

Plants grow from seeds and need water, soil, air, and nutrients to grow.</td><td></td></tr>
<tr><td>Skills

Measurement, prediction, and communication</td><td>Students precisely measure the appropriate amount of soil for their container and add a measured amount of water.</td></tr>
<tr><td>Guiding Questions
How does a seed turn into a plant?
Can seeds sprout without soil?</td><td>Students understand that when a seed germinates it sprouts.</td></tr>
<tr><td>Materials Needed
A small bag of lima bean seeds soaked overnight
Grass seed
A variety of seeds to plant (alfalfa seeds, sunflower seeds, millet, buckwheat, etc.)
Clear plastic 8 to 12 ounce cups (two per child) to serve as containers
One egg carton per group
Potting soil: ¾ cup for each student’s cup and approximately 2 cups of soil for each egg carton planter
Water: ½ cup of water per clear plastic container, and ¾ cup of water for the egg carton planter
Measuring cylinders
Brown paper towels (the ones most schools supply work best)
1-quart ziplock bag for each student</td><td>Students make a natural connection to math by measuring the soil and water.</td></tr>
<tr><td>Standards

KY State Standards

SC-P-UD-U-1, SC-P-UD-S-1, and SC-EP-3.4.1; SC-P-UD-U-2, SC-P-UD-S-1, and SC-EP-3.4.3; SC-P-UD-U-4, SC-P-UD-S-5, and SC-EP-3.4.4

NSES Standards

A1, A2, C1, C2</td><td></td></tr>
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<tr><th>Unit Sequence</th><th>Reflection</th></tr>
<tr><td>Introductory Activity
The teacher asks students,
Do you remember when we looked at the inside of a lima bean seed? What did we find?
After students answer the question, the teacher focuses on the baby plant and introduces the word germinate. Students should infer how they think the seed will become a plant. They can discuss this in their small groups and write down their inferences in their science notebooks.</td><td>This is a review for the students.</td></tr>
<tr><td>Teaching Strategies and Learning Experiences
Working in small groups, the teacher prompts students to complete the following tasks:
• Plant two containers of lima bean seeds per group.
• Plant a variety of seeds in an egg carton.
o Once the seeds are planted, label them by placing three of the seeds on a piece of tape and placing the tape over the area where you planted that type of seed. Repeat this for each of the two remaining areas.
• Plant a bean seed and an alfalfa seed in ziplock bags to observe how the seeds begin to germinate.
o Predict which seed you think will sprout first (the one in the bag or the one in the soil).
o Record your predictions in your science notebooks.
The teacher gives students precise directions as to the amount of soil and water used in their experiments (Resource 1.3). They record all of their protocol in their science notebooks.
The teacher specifies planting in the egg carton, containers, and ziplock bags as follows:
• Place three different types of seeds in the egg carton (four sections per seed).
o Place about 2 centimeters of soil in each section.
o Place the seeds over each area.
o Cover with soil.
o Water to moisten soil and keep soil moist throughout the experiment.
o To identify the new plants, place three of each type of seed used on a piece of tape and place it on the lid of the egg carton above the same type of planted seeds in the egg carton. Do this with each type of seed.
• In the containers (plastic cups), plant two bean plants per group.
o Measure ¾ cup of potting soil and put it in the container.</td><td>This activity empowers students to take charge of their learning environment. Each group has the following jobs: lead scientist, materials handler, assistant materials handler, and recorder. Well-organized materials for the handlers assist in this activity. Task cards with the directions clearly and simply stated are also helpful. Additionally, it is important for students to realize that there isn't one right way to do something. Mistakes are an important part of a scientist's work. In fully assuming the role of scientists, students focus on their experiments and really act like scientists.
By making predictions about the time it will take their seeds to germinate, students begin to see the need for predictions based on evidence. It is illogical to think that the seed may take months to germinate. By discussing with the students ways scientists make hypotheses, the teacher allows them to see the need to base their predictions on prior knowledge and research. By reflecting on what they see in the spring when plants begin to germinate and grow, students make more accurate predictions.
Author's note: I use the strategy of thinking out loud to let them hear how I reason through problems so they have something on which to model their thinking.
The following books are excellent resources: From Seed to Sunflower and How It Works: The World of Plant Life by Gerald Legg; What Is a Plant? The Science of Living Things, Introducing Living Things by Bobbie Kalman; and All About Plants by Lisa V. Matthews.</td></tr>
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Unit Sequence	Reflection
o *Place the unopened presoaked bean seed in a ½-inch hole.* o *Cover gently with dirt—don't pack it.* o *Use a graduated cylinder to measure and pour 1/3 cup of water into the container.* o *Place it in a warm sunny area.* o *Water as necessary.* • In the ziplock bags, plant seeds as follows: o *Fold the paper towel so there is a pocket for the seed to sit in.* o *Poke a hole in the bottom of the fold with a pencil.* o *Wet the paper towel so it is saturated, but not dripping.* o *Place the seed in the fold.* o *Zip the bag leaving a 1-inch opening at the top and hang it where it will get sunlight.* Upon completion of the planting, students predict the number of days it will take for their plants to germinate and record their predictions in their science notebooks (Resource 1.4).	
Closure Students share their predictions with others in their group, explaining why they chose the number of days they did for each seed. They record their explanations in their science notebooks along with their predictions. The teacher asks, *What other things grow and change?* As a follow-up, students can bring in pictures of a pet growing up, themselves as they grow, and so on. This discussion emphasizes the connection between students' own growth cycles and those of plants.	This reinforces the concept of accuracy in the scientific world. It is important to offer students a choice regarding the charts they use. Some students will be able to create their own chart, while others will need templates to follow.

LESSON 1.5: OBSERVING GERMINATING PLANTS

Daily Observation and Notation of Growth: 10 minutes

Length: One 45–50-minute session

Unit Sequence	Reflection
Concepts • Growth • Systems	

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Unit Sequence	Reflection
Principles • Plants grow from seeds and need water, soil, air, and nutrients to grow. • The details of a life cycle are different for different organisms. Observations of different life cycles are made in order to identify patterns and recognize similarities and differences.	
Skills Investigative inquiry	
Guiding Questions • What do plants need to grow? • How does experimental design work? • How do scientists do their work? • Do people share some of the same needs as plants? • What role does mathematics play in the study of plants?	
Materials Needed • Six of the bean plants previously planted by the students to serve as a control • Plastic pellets or packing pellets • A dark place to keep the plants	
Standards SC-P-UD-U-1, SC-P-UD-S-1, and SC-EP-3.4.1; SC-P-UD-U-2, SC-P-UD-S-1, and SC-EP-3.4.3; SC-P-UD-U-4, SC-P-UD-S-5, and SC-EP-3.4.4	
Introductory Activity The teacher asks students, *How are your plants doing? Why do you think they are growing so well?* A discussion follows explaining that to find out the needs of plants, scientists conduct experiments that test the conditions in which the plants live. In scientific terms, these requirements are known as *variables.* In order to test a variable, the conditions must remain exactly the same for everything else that affects the plant. The teacher then asks students, *What would happen if we changed some of the conditions in which the plants are growing? What conditions could we change? How do you think we could test these conditions?*	During this discussion, students review the growth of their plants. By discussing what conditions the plants are growing under, they are encouraged to think about what the plant needs to grow. Once they have named some of the conditions, the discussion about what to change gleans that light, water, soil, and nutrients have helped them grow. Students brainstorm ways they might test the variables guiding them to reasonable tests.

Unit Sequence	Reflection
Teaching Strategies and Learning Experiences In groups arranged by readiness levels, students use brainstorming and inquiry-based learning. The teacher brainstorms with students about what conditions to change for their plants. (Students should mention light, water, and soil.) The students conduct the following experiments: 1. Two groups place one of their plants in a dark place. 2. Two groups withhold water from one of their plants. 3. Two groups repot one of their plants in plastic pellets. 4. All groups ensure that every other condition remains exactly the same. 5. The remaining plants serve as the control group and continue to receive light and water. 6. Students predict what they think will happen to each of the plants. 7. Students observe their plants daily and note any changes taking place in their science notebooks. Students complete lab reports (Resources 1.5 through 1.8) over the test period.	It is important to make sure the students understand that all other variables remain constant during this experiment. For example, the plant placed in the dark should continue to be watered and the plant receiving no water should continue to receive sunlight. This activity takes at least two weeks of observations. When the plants begin to change, the teacher leads a discussion about what they found and what they can infer from their findings. Students should also infer that soil provides more than a medium in which to anchor plants; it also provides nutrients to the plants. Students record their thoughts in their science notebooks by drawing what they see happening to each of the experimental plants and inferring why they think the plant reacts as it does.

LESSON 1.6: PLANT PARTS!

Daily Observation: 10 minutes

Length: Three 45–50-minute sessions

Unit Sequence	Reflection
Concepts • Systems • Cycles	
Principle Each plant or animal has observable structures that serve different functions in growth, survival, and reproduction.	Not all plants have stems, leaves, or roots, but students can explore this later or it can be an independent project for a student who excels in plant study.
Skills Observation, classification, and measurement	
Guiding Questions • What is the function of the parts of the plants? • What characteristics do living things share?	

(Continued)

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Unit Sequence	Reflection
Materials Needed • Twelve different healthy potted plants • Books about plants for students to use for research • Websites for students to visit to learn more about plants • Handheld microscopes or magnifying glasses for each pair of students	It is essential to use a plant that has easily distinguishable leaves and stems. Handheld microscopes can be expensive. By procuring six handhelds (one for each group), students each have the opportunity to use one. The less expensive magnifying glass allows for each student to continue observing their plant while others use the handhelds.
Standards SC-P-UD-U-1, SC-P-UD-S-1, and SC-EP-3.4.1; SC-P-UD-U-2, SC-P-UD-S-1, and SC-EP-3.4.3; SC-P-UD-U-4, SC-P-UD-S-5, and SC-EP-3.4.4	
Introductory Activity The teacher displays the twelve different plants for the students to observe, explaining that they will be paired and given one of the types of plants to thoroughly examine. Discussion focuses on what the students should be looking for during their examination. Students record what they will look for in their science notebooks.	Students describe what they see and mention the stem, leaves, soil, container, and so on.
Teaching Strategies and Learning Experiences Students learn about the parts of plants through discovery learning and a jigsaw activity. The teacher gives each pair of students a healthy potted plant, asking them to observe what they see and to make sure they use the points they recorded in their science notebooks. After an appropriate amount of time, the teacher invites the students to share what they notice about the plants. If no one mentions roots, the teacher asks, *Is there more to the plant than what you see?* The teacher then shows students how to remove their potted plants from the containers and gently shake off the soil to allow examination of the roots of the plant using a handheld microscope or magnifying glass.	It helps if the soil surrounding the plants is semidry, and to remind the students to treat the plants as gently as possible because they are going to replant them to see if they will continue to grow after being disturbed. Once the roots are exposed, it is helpful to spray them lightly with water so they do not dry out. Some of the plants may not survive this examination, which can lead to a discussion about the need to carefully transplant plants. With a reminder, students gently remove the plants from the containers and observe the root system, the stem, and the leaves of the plant. They use handheld microscopes to examine the plant parts and note what they see in their science notebooks. After examining the plant, they gently replant it and give it sufficient water. In their science notebooks, students draw the parts of the plants and label them. Some good resources include the University of Illinois Extension, www.urbanext.uiuc.edu/gpe/case1/c1facts2a.html and the Enchanted Learning website, www.enchantedlearning.com/subjects/plants/label/plantsimple/.

Unit Sequence	Reflection
Closure Students repot the plant and complete their drawings (Resource 1.9). They also record reflections about the activity in their science notebooks. **Day 2 and Day 3 Activity** In the jigsaw activity, the teacher divides the class into groups of four. One person from each group becomes an expert on one plant part (stem, leaf, root, and flower). After researching, the student returns to the group and explains each plant part's function. The students then complete their research log.	Depending on the age of the students and their readiness levels, this part of the lesson can be as easy or as complex as the teacher sees fit. A variety of plant reference books varying in complexity provide helpful resources for the students. If computers are available, students can use the Internet resources provided here. A simple search of the Internet also reveals many additional student-friendly resources for teachers.

LESSON 1.7: THE NEEDS OF EVERY LIVING THING

Length: One 45–50-minute session

Unit Sequence	Reflection
Concepts • Growth • Systems	
Principles • Plants grow from seeds and need water, soil, air, and nutrients to grow. • The details of a life cycle are different for different organisms. Observations of different life cycles are made in order to identify patterns and recognize similarities and differences.	
Skill Investigative inquiry	
Guiding Questions • What do plants need to grow? • How does experimental design work? • How do scientists do their work? • Do people share some of the same needs as plants? • What role does mathematics play in the study of plants?	

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Unit Sequence	Reflection
Materials Needed • Six of the bean plants previously planted by the students to serve as a control • Plastic pellets or packing pellets • A dark place to keep the plants	
Standards SC-P-UD-U-1, SC-P-UD-S-1, and SC-EP-3.4.1; SC-P-UD-U-2, SC-P-UD-S-1, and SC-EP-3.4.3; SC-P-UD-U-4, SC-P-UD-S-5, and SC-EP-3.4.4	
Introductory Activity The teacher asks students, *How are your plants doing? Why do you think they are growing so well?* A discussion follows explaining that to find out the needs of plants, scientists conduct experiments that test the conditions in which the plants live. In scientific terms, these requirements are known as *variables.* In order to test a variable, the conditions must remain exactly the same for everything else that affects the plant. The teacher then asks, *What would happen if we changed some of the conditions in which the plants are growing? What conditions could we change? How do you think we could test these conditions?*	During this discussion, students review the growth of their plants. By asking what conditions the plants are growing under, the teacher encourages them to think about what the plant needs to grow. Once they have named some of the conditions, the discussion about what to change gleans that light, water, soil, and nutrients have helped them grow. Students brainstorm ways they might test the variables guiding them to reasonable tests.
Teaching Strategies and Learning Experiences In groups arranged by readiness levels, students use brainstorming and inquiry-based learning. The teacher brainstorms with students about what conditions they want to change for their plants. (Students should mention light, water, and soil.) The students then conduct the following experiments: 1. Two groups place one of their plants in a dark place. 2. Two groups withhold water from one of their plants. 3. Two groups repot one of their plants in plastic pellets. 4. All groups ensure that every other condition remains exactly the same.	It is important to make sure the students understand that all other variables remain constant during this experiment. For example, the plant placed in the dark should continue to be watered and the plant receiving no water should continue to receive sunlight. This activity takes at least two weeks of observations. When the plants begin to change, the teacher leads a discussion about what they found and what they can infer from their findings. Students should also infer that soil provided more than a medium in which to anchor plants; it also provides nutrients to the plants. Students record their thoughts in their science notebooks by drawing what they see happening to each of

Unit Sequence	Reflection
5. The remaining plants serve as the control group and continue to receive light and water. 6. Students predict what they think will happen to each of the plants. 7. Students observe their plants daily and note any changes taking place in their science notebooks. Students complete lab reports (Resource 1.10) over the test period.	the experimental plants and inferring why they think the plant reacts as it does.

LESSON 1.8: THE ADVENTURES OF A SEED

Length: Two 45–50-minute sessions

Unit Sequence	Reflection
Concepts • Change • Systems • Cycles	
Principle Seeds differ in size, shape, color, and texture and are dispersed in a variety of ways.	
Skills Investigative inquiry, classification, and observation	
Guiding Questions • Why do seeds need to disperse? • What are the effects of people traveling to different places?	

Materials Needed
• Seeds that disperse by wind
  ○ *Helicopters (maple, ash, sycamore)*
  ○ *Parachutes (dandelions, milkweed, cottonwood)*
• Seeds that disperse by water
  ○ *Boats (coconut, walnut, water lily, milkweed, pussy willow)*
	This unit is best done in early spring or late fall when seeds are dispersing. It is important to tell students to be mindful that flowering plants should not be disturbed, and also to caution students not to strip a plant of all of its seeds.

(Continued)

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Unit Sequence	Reflection

• Seeds that disperse by explosion
  ○ *Bombs (pea, bean, lupine, gorse)*
• Seeds that disperse by animals
  ○ *Tummy express (blackberry, cherry, apple, acorn, elderberry)*
  ○ *Hitchhikers (cocklebur, tick seed, burdock)*
• A wooly mitten, scarf, or sock for each group
• Velcro
• Paper bag for each student	

Standards SC-P-UD-U-1, SC-P-UD-S-1, and SC-EP-3.4.1; SC-P-UD-U-2, SC-P-UD-S-1, and SC-EP-3.4.3; SC-P-UD-U-4, SC-P-UD-S-5, and SC-EP-3.4.4	
Introductory Activity The class walks outside, preferably through a weedy area. As the children walk, the teacher asks them to look for dandelions and other types of plants in the area that have several examples within the area but aren't close together, asking, *How did the dandelions spread from one area to another?* Students then gather as many types of seeds that they can find.	This activity is tailored to the area around the school. It is important to use an area where there are examples of a variety of plants that represent seed dispersal.
Teaching Strategies and Learning Experiences When students return to the classroom, they carefully remove the seeds from the bags they used for collection. They then begin to hypothesize as to how the seeds they collected might travel. Passing out cherries and blackberries for students to examine, the teacher asks, *When animals eat these fruits, do they spit out the seed? If not, what might happen?* Students then conduct a simple experiment to test their seeds by gently blowing on them to see if they stick to a woolen object or if they float.	Students complete a lab report (Resource 1.11) classifying the seeds under each of the main headings listed under the materials section. Students sanitize their hands before handling the edible seeds. Some helpful resources include *Tiny Seeds* by Eric Carle; *How Seeds Travel* by Cynthia Overbeck, Shabo Hani, and Cynthia Bix; and the websites www.countrysideinfo.co.uk/seed_dispersl/competit.htm and http://theseedsite.co.uk/dispersal.html.
Closure Students complete a lab report (Resource 1.11) **Day 2** Students compare and contrast how movement to different places relates to seed travel.	Connecting literature and writing with science is powerful. Students learn informational writing when compiling their science notebooks, but it is also important to note that scientific information can be the basis for creative writing.

LESSON 1.9: WHAT'S INSIDE OUR FRUIT?

Length: Two to three 45–50-minute sessions

Unit Sequence	Reflection
Concepts • Growth • Cycles • Systems	
Principles Seeds differ in size, shape, color, and texture and are dispersed in a variety of ways.	
Skills Investigative inquiry, observation, and communication	
Guiding Questions • What is inside a fruit? • Can writing solidify scientific understanding?	Writing about what they know helps students remember key facts and understandings if they enjoy what they are writing about. The concept of thinking like a scientist reinforces student understanding and the need to be specific concerning details and observations.
Materials Needed • Fruits (pears, oranges, apples, bananas, tomatoes, cucumbers, grapefruit, peanuts, avocados, pea and bean pods, etc.) • Handheld microscopes • Lab report	
Introductory Activity The teacher holds up several types of fruits and asks, *What are these? How do you know?* Once students have established that all of the examples are fruits, the teacher explains that they are going to try and discover what makes each of the examples a fruit.	A fruit contains seeds; so technically, anything with seeds is a fruit including peas, beans, peppers, cucumbers, avocados, peanuts, and so forth. Fruits come from the flowers of plants. Vegetables are the roots, tubers, or stems of plants and do not contain seeds; examples include radishes, carrots, lettuce, celery, potatoes, and sweet potatoes.
Standards SC-P-UD-U-1, SC-P-UD-S-1, and SC-EP-3.4.1; SC-P-UD-U-2, SC-P-UD-S-1, and SC-EP-3.4.3; SC-P-UD-U-4, SC-P-UD-S-5, and SC-EP-3.4.4	
Teaching Strategies and Learning Experiences Each pair of students receives three types of fruits, halved. Each group is then paired with another who has three different types of fruit so that each group has six different types of fruit. Their task is to observe	This activity is especially enjoyable for students because they get to eat and try the different types of fruit they examine. Students sanitize their hands and desks before and after completing this activity.

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Unit Sequence	Reflection
their examples and discover what makes each of them a fruit.	Interesting resources are *It's a Fruit, It's a Vegetable, It's a Pumpkin* by Allan Fowler and *Fruits and Vegetables* by Susan Derkazarian.
Closure Students complete a lab report (Resource 1.12). In addition, the teacher assigns one the following (Resource 1.13): 1. Write a newspaper article explaining that fruits contain seeds, which include several food items people mistakenly refer to as vegetables. 2. Take the role of a fruit that is normally called a vegetable and share how you think it might feel being misnamed. 3. Set up a vegetable and fruit market that correctly categorizes the items and advertise your fruits and vegetables.	These three activities can be differentiated by using Sternberg's intelligence preferences (analytical, creative, and practical).

LESSON 1.10: WHAT DO WE KNOW ABOUT PLANTS? REVISITED

Length: One 45–50-minute session

Unit Sequence	Reflection
Concepts • Systems • Growth • Change	
Principles • Things in the environment are classified as living, nonliving, and once living. • Living things differ from nonliving things. • Organisms are classified into groups by using various characteristics (e.g., body coverings and body structures). • Plants grow from seeds and need water, soil, air, and nutrients to grow. • Seeds differ in size, shape, color, and texture and are dispersed in a variety of ways. • Each plant or animal has observable structures that serve different functions in growth, survival, and reproduction.	
Skills Summarizing and drawing conclusions	

Unit Sequence	Reflection
Guiding Questions • Is what we thought we knew different from what we know now? • Did we learn what we wanted to learn? • What key ideas did we learn about plants?	Students discuss what they have learned during the plant unit. *Author's note:* My students always enjoyed filling out the *L* column in the KWL charts.
Materials Needed • Original KWL chart • Marker	
Standards SC-P-UD-U-1, SC-P-UD-S-1, and SC-EP-3.4.1; SC-P-UD-U-2, SC-P-UD-S-1, SC-EP-3.4.3; SC-P-UD-U-4, SC-P-UD-S-5, and SC-EP-3.4.4	
Introductory Activity The teacher reintroduces the students to the KWL chart they worked on at the beginning of this unit, asking why they think this strategy might have been important to use in the unit.	When using the KWL strategy, it is important to remember to complete the *L* portion at the end of the unit. This portion becomes an assessment tool for the students to evaluate not only what they learned, but also whether or not they learned what they wanted to learn in the *W* section. This assists students in pulling together what they learned throughout the unit. It is also an excellent record for them of their accomplishments.
Teaching Strategies and Learning Experiences Students are grouped in pairs or in their original KWL groups. Groups complete the *L* column, using their science notebooks and correcting any misunderstandings they might have listed in the *K* column.	Students review their notebooks to be sure that all of their lab reports and observations have been included. The teacher reviews with students the rubric (Resource 1.14) so that all students know what the teacher will look for when reviewing their work. If students have not had much experience with rubrics, the teacher might conduct a discussion to show how they are used to provide students feedback.
Closure Students post their charts and use them during the plant fair to show visitors what they learned throughout the unit.	

CONCLUSION: PLANT FAIR

This is the concluding event for the unit on plants. Students prepare an exhibit to share, with their parents and other students in the building, what they have learned about plants in an all-day plant fair. Students prepare invitations for their parents and every class in their school. They develop a schedule for classroom visits that is completed by the classroom teachers. Each class is invited for a 15 to 30 minute session with an opportunity to visit each display.

Each experiment is displayed with a poster explaining what the students did and what happened. Students demonstrate the following: planting techniques, the importance of proper care, how to transplant a plant from one container to another, seeds found in fruits and vegetables, how seeds disperse, plant parts, and the use of a control for experiments. Students also create a greenhouse by building an inflatable structure with 25-milliliter plastic sheets that inflate using a 20-inch box fan (Resource 1.15).

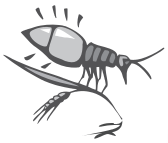
Students create a guide to the tour using notes from their science notebooks. Each visitor receives a copy of the guide, condensed to two pages front and back. This is a student-directed project, so creating work teams to plan each section works well. Since parents are invited, they can also serve as volunteers. Students rotate the positions of tour guides and experts throughout the day.

Author's note: I used the language arts block of my day to work on this plant unit because it requires the students to use their skills in reading and writing. I have also done this activity with other units and it is a huge hit with classroom teachers and students.

Plants Alive!

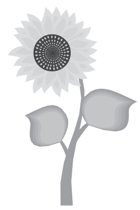
My Science Notebook

RESOURCE 1.1: LESSON 2 LAB REPORT



Living or Nonliving

	Living	Nonliving
I can move.		
I take up space.		
I breathe.		
I can be touched.		
I grow.		
I change.		
I need food and water.		
I reproduce.		
I have weight.		



Draw a picture of a non-living thing.

Draw a picture of a living thing.

RESOURCE 1.2: LESSON 3 LAB REPORT

Seed Dissection

In the box below predict what you think is inside a seed. Draw a picture of what you think you might find inside the seed.

I think a seed contains ____

____

____

and looks like this.

In the box below, draw a picture of what you saw inside your seed.

My seed looked like this!

Did your pictures look alike? Why or why not? ____

____

____

RESOURCE 1.3: LESSON 4 LAB REPORT

My Plant Grows Up!

Draw a picture of your lima bean and alfalfa seed each day you observe it. Write the date by the day.

Lima Bean Seed

Day 1 ________ Day 2 ________ Day 3 ________ Day 4 ________ Day 5 ________

Day 6 ________ Day 7 ________ Day 8 ________ Day 9 ________ Day 10 ______

Alfalfa Seed

Day 1 ________ Day 2 ________ Day 3 ________ Day 4 ________ Day 5 ________

Day 6 ________ Day 7 ________ Day 8 ________ Day 9 ________ Day 10 ______

RESOURCE 1.4: LESSON 4 LAB REPORT

My Baggie Garden

Scientists make careful notes of how they conduct experiments. This is called a *protocol.* Create your own protocol on how to make a baggie garden.

What materials do you need?

What steps did you take to make your garden?

RESOURCE 1.5: LESSON 5 LAB REPORT

My Plant Grows Up!

Check your potted plant every other day after your seed germinates. Draw what you see. Using a ruler, measure the height of your plant and record it on your lab report. Make sure to include the date. On the back of your paper, describe your plant on each of your observation days.

Height: ________ in.

Day 1 ________________

Height: ________ in.

Day 3 ________________

Height: ________ in.

Day 5 ________________

Height: ________ in.

Day 7 ________________

Height: ________ in.

Day 9 ________________

Height: ________ in.

Day 11 ________________

Height: ________ in.

Day 13 ________________

Height: ________ in.

Day 15 ________________

Height: ________ in.

Day 17 ________________

RESOURCE 1.6: LESSON 5 LAB REPORT

Writing About My Potted Plant

Describe what you see on each day that you observe your plant.

Day 1

Day 2

Day 3

Day 4

RESOURCE 1.7: LESSON 5 LAB REPORT

Egg Carton Observations

In what order did your seeds germinate?

1. ______________________________

2. ______________________________

3. ______________________________

When your plants grow bigger, transplant one of each kind to a bigger container. How long do you think it will take for the one that germinated first to be ready to transplant?

Draw a picture of each of your plants.

RESOURCE 1.8: LESSON 5 LAB REPORT

Graphing My Plants' Growth

Scientists keep accurate data. List the plants in your group and choose a color to represent each one. Carefully measure each daily and graph your results. Each square = ½ inch growth.

15														
14														
13														
12														
11														
10														
9														
8														
7														
6														
5														
4														
3														
2														
1														

Plant ______________________________ ☐

Plant ______________________________ ☐

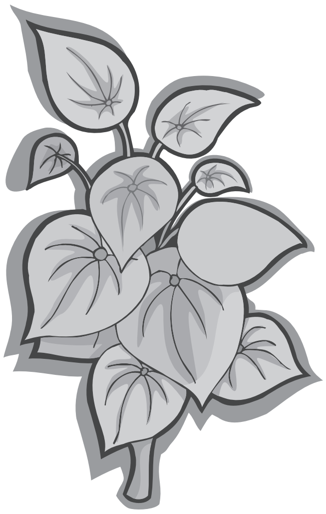
Plant ______________________________ ☐

Plant ______________________________ ☐

Plant ______________________________ ☐

RESOURCE 1.9: LESSON 6 LAB REPORT

Plant Parts: Labeling the Parts of a Plant



After observing your plant, draw what you saw and label the parts.

RESOURCE 1.10: LESSON 7 LAB REPORT

Experimenting With the Basic Needs of Plants

My prediction for the experimental plants:

No soil	No light	No water

Draw what happened to each plant after one week.

No soil	No light	No water

RESOURCE 1.11: LESSON 8 LAB REPORT

The Adventures of a Seed

Glue each type of seed you found on the schoolyard walk in the space below. Underneath the seed, label it as a helicopter, parachute, boat, bomb, or tummy express.

RESOURCE 1.12: LESSON 9 LAB REPORT

What's Inside Fruit?

I explored these fruits (draw a picture of the inside of each). What did they have in common?

Check your partner pair's fruit drawing. What did they have in common?

RESOURCE 1.13: LESSON 9 LAB REPORT

Connecting Writing to Science

Use the following writing prompts to encourage students to solidify their conceptual understanding of fruits in a literary venue.

Sternberg's Analytical Intelligence

- ☐ Write a newspaper article explaining that fruits contain seeds, which include several food items people refer to as vegetables.

Sternberg's Practical Intelligence

- ☐ Set up a vegetable and fruit market that correctly categorizes the items and advertise your fruits and vegetables.

Sternberg's Creative Intelligence

- ☐ Take the role of a fruit that is normally called a vegetable and share how you feel being misnamed.

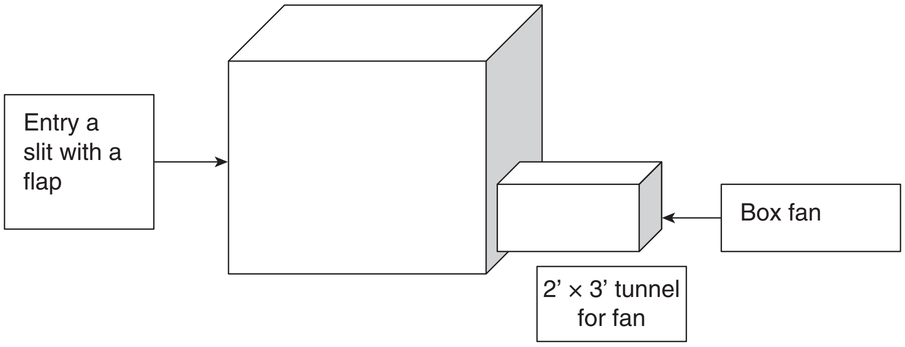
RESOURCE 1.14: RUBRIC FOR SCIENCE NOTEBOOK

Criteria	Developing	Proficient	Exemplary
Organization	Some work is missing or it is in disorder.	All work is complete. Entries are orderly.	All work is complete and extra work is evident. Entries are in excellent order.
Science Understanding	Some areas show a grasp of the science concepts and principles while some entries are inaccurate or unclear.	Entries are accurate and clear. A basic understanding of the principles and concepts is evident.	Entries are accurate and clear and contain additional information revealing an in-depth understanding of the concepts and principles.
Creativity	There is some evidence of creativity throughout the notebook.	Creativity is shown in some areas of the notebook while others remain basic.	Creativity is shown throughout the notebook.

RESOURCE 1.15: CREATING A PLASTIC BUBBLE GREENHOUSE

Using a plastic inflated bubble as a classroom "greenhouse" is a great project that emphasizes cooperation and mathematical skills to create. The "greenhouse" becomes a focal point for the plant fair.

The greenhouse is created using at least 6-milliliter-thick translucent plastic and duct tape; it is inflated by a 20-inch box fan.



At least a 10′ × 10′ cube (using a 10′ × 10′ structure) is recommended.

Materials Needed

70 feet of 6-milliliter clear plastic, 10 feet wide

A large roll of duct tape

20-inch box fan

Benches or tables for plants

Author's note: Students in my first-to-third-grade multiage class did all of the measuring, cutting, and taping.

1. Cut six 10′ × 10′ pieces of plastic.
2. Tape the pieces together to form a cube.
3. Cut a hole for the tunnel for the fan.
4. Tape the tunnel together and attach to the main cube.
5. Tape the fan to the tunnel so that it blows inward.
6. Cut a slit for an entry and tape a 2.5-foot strip over it to serve as a door.

The advantage of this bubble for the classroom is that it can be used for many activities. It can be converted to a planetarium when studying space, a rainforest when studying habitats, and also used as a book nook for students' reading.