Plants and Animals
Lesson 3b: Investigating What Plants Need

Grade: Kindergarten	**Length of lesson:** 42–45 minutes	**Placement of lesson in unit:** 3b of 6 lessons on plants and animals
Unit central question: Do plants and animals need the same things to live and grow? Explain your thinking.		**Lesson focus question:** How can experiments help us find out whether plants need light to live and grow?
Main learning goal: Designing an experiment to find out whether plants need light to live and grow involves asking a question, designing an experiment, making predictions and observations, and gathering evidence.		
Science content storyline: To find out whether plants have the same or different needs as animals, we're conducting experiments to test some of our ideas about what plants need. In the last lesson, we studied a science experiment that provided evidence that plants need air to live and grow. Today we designed an experiment to help us figure out whether plants need light to live and grow. Then we made predictions based on our experiences with plants, set up the experiment, and developed a plan for making observations and collecting evidence to help us answer our question. Now we'll observe our plants and write down our observations to keep track of what happens during the experiment. The evidence we collect will help us figure out whether plants need light to live and grow.		
Ideal student response to the focus question: As scientists, we can set up experiments to investigate the needs of plants, like growing plants with and without light. By observing our plants over time, we can gather and record evidence to help us figure out if our ideas and predictions are correct. Then we can answer our question, "Do plants need light?"		

Preparation

Materials Needed
- Science notebooks
- Chart paper and markers
- Crayons (1 set per pair containing 2 shades of green, tan, brown, and yellow)
- **Optional:** magnifying lenses (1 per student)
- Circle map from lesson 3a (Our Beginning Ideas: What Do Plants Need to Live and Grow?)

Student Handouts and Teacher Masters
- **Optional:** 3.1 Observations Worksheet: Light Experiment (1 per student for each observation day; 5 per student for the entire two-week period)
- 3.2 Light Labels (Teacher Master) (1 page of Avery labels, 1" × 2 5/8")
- 3.3 No Light Labels (Teacher Master) (1 page of Avery labels, 1" × 2 5/8")
- 3.4 Directions for Starting the Radish or Bean Seeds (Teacher Master)

Ahead of Time
- Care for the seeds you planted two weeks before lesson 3a. (See handout 3.4, Directions for Starting the Radish or Bean Seeds.) Find a *very dark* location for the plants that will be grown with no light.
- Review section 4 in the content background document, focusing on what plants need.
- Review the circle map from lesson 3a (Our Beginning Ideas: What Do Plants Need to Live and Grow?).
- Decide how to best pair up students for the experiment and whether to have students record their plant observations using Option 1, 2, or 3. (See activity follow-up for a description of each option.)
- Plan the schedule for the observation period. Pairs will observe their plants approximately every three or four days for two weeks. During this observation period, you can teach the optional lessons on soil (lessons 3d.1 and 3d.2) in addition to lesson 3c. After this two-week period, move on to lesson 4.
- **ELL support:** Meet with ELL students in advance and introduce them to the lesson content, structure, materials, and activities so they know what's expected of them and can participate more fully in the lesson. Explain the logic involved in designing the science experiment and emphasize that only one need of plants (light) is being tested. Identify vocabulary terms in the lesson plan to review with students in advance, including *experiment*, *prediction/predict*, *evidence*, and the verb *record*. Post any new vocabulary terms and definitions on a word wall. Also have students record these terms in their science notebooks and in their picture dictionary if they've made one.

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Lesson 3b General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
2 min	**Link to previous lesson:** The teacher engages students in summarizing the results of the science experiment from the previous lesson and their conclusion that plants need air to live and grow.	• To live and grow, plants need air just like animals do.
2 min	**Lesson focus question:** The teacher reviews the unit central question and revisits students' initial ideas about what plants need to live and grow. Then the teacher introduces the focus question, *How can experiments help us find out whether plants need light to live and grow?*	
8 min	**Setup for activity:** The teacher elicits ideas from students about whether plants need light to live and grow and challenges students to communicate their ideas and reasoning in scientific ways.	• Scientists communicate in scientific ways by sharing their ideas, supporting their ideas with observations or evidence, and giving reasons for agreeing or disagreeing with each other.
12 min	**Activity:** Students come up with ideas for designing an experiment that will help them figure out whether plants need light to live and grow. After agreeing on a plan, students set up their experiment.	• A good experiment enables scientists to collect observable evidence and compare different conditions to help answer a question.
12–15 min	**Follow-up to activity:** The teacher reviews the key question the experiment will help students answer. Then students predict what will happen to the plants with and without light, and they record their initial observations of the plants.	• Recording observations helps scientists keep track of and organize their evidence.
4 min	**Synthesize/summarize today's lesson:** The teacher reviews the focus question. Then students summarize the experiment they designed to find out whether plants need light to live and grow. Afterward, students connect their work to what scientists do.	• Collecting and recording evidence from observations is important when conducting an investigation. • Our experiment will help us figure out whether plants need light to live and grow.
2 min	**Link to next lesson:** The teacher announces that in the next lesson, students will set up another experiment to see whether plants need water to live and grow.	

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Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
2 min	**Link to Previous Lesson** **Synopsis:** The teacher engages students in summarizing the results of the science experiment from the previous lesson and their conclusion that plants need air to live and grow. **Main science idea(s):** • To live and grow, plants need air just like animals do.	Link science ideas to other science ideas.	**Show slides 1 and 2.** In our last lesson, we learned about an experiment a scientist conducted to find out what plants need to live and grow. What question was the scientist trying to answer? What did the scientist do with the plants in her experiment? When the experiment started, did both plants look the same? What did both plants get during the experiment? Who can describe what the plants looked like two weeks later? Based on the results of this science experiment, what did we decide?	Do plants need air? She let one plant have air and put one plant in a container without any air. Yes, they were both green and stood up straight. They both got light and water. The plant with air was green and straight, but the plant without air was brown, and the leaves were hanging down. We decided that	

		Summarize key science ideas.	So the evidence we collected from this experiment helped us figure out that plants need air to live and grow just like animals.	plants need air to live and grow! The plant without air turned brown and wilted, but the plant with air stayed green and stood up straight.	What evidence did we find?
2 min	**Lesson Focus Question** **Synopsis:** The teacher reviews the unit central question and revisits students' initial ideas about what plants need to live and grow. Then the teacher introduces the focus question, *How can experiments help us find out whether plants need light to live and grow?*		**Show slide 3.** Who remembers the big question we're trying to answer in this unit? Let's read it together: *Do plants and animals need the same things to live and grow? Explain your thinking.* **NOTE TO TEACHER:** *Point to the words on the board as you read the unit central question aloud together.* Last time, we listed on a circle map our beginning ideas about what plants might need to live and grow. Let's look at the ideas we came up with. **NOTE TO TEACHER:** *Display the circle map from lesson 3a ("Our Beginning Ideas: What Do Plants Need to Live and Grow?") and make sure that everyone can see it.* Based on the results of our first investigation, we know that plants need air to live and grow, so let's put a check mark next to that idea on our circle map.		

		Set the purpose with a <u>focus question</u> or goal statement.	What other ideas on our map could we investigate to find out what plants need to live and grow? Today we're going to investigate whether plants need light. **Show slide 4.** Our focus question is *How can experiments help us find out whether plants need light to live and grow?* **NOTE TO TEACHER:** *Write the focus question on the board for students to refer to throughout the lesson and draw a box around it. Point to each word as you repeat the question.*	Whether plants need plant food. We could find out whether plants need water. We could test to see if plants really need light.	
8 min	**Setup for Activity** **Synopsis:** The teacher elicits ideas from students about whether plants need light to live and grow and challenges students to communicate their ideas and reasoning in scientific ways. **Main science idea(s):**	Make explicit links between science ideas and activities **before** the activity. Ask questions to elicit student	**Show slide 5.** Do you think that plants need light to live and grow? Why or why not? When you share your ideas, start with the words "My idea is …" or "I think that …." As your classmates share, listen carefully like a scientist would and think about whether you agree or disagree with their ideas.	I think that plants need light to live and grow because they always turn toward the light, so they must need it.	Does anyone have a different

	• Scientists communicate in scientific ways by sharing their ideas, supporting their ideas with observations or evidence, and giving reasons for agreeing or disagreeing with each other.	ideas and predictions. Engage students in communicating in scientific ways.	When you share your comments, say, "I agree with that because …" or "I disagree with that because …." **NOTE TO TEACHER:** *Point to the sentence starters on the CSW poster (My idea is …, I think that …, I agree …, I disagree …) as you read them aloud to the class. As students share their ideas and reasons, record them on chart paper.* **ELL support:** During the lesson preview, give ELL students an opportunity to practice communicating in scientific ways and using the sentence starters on the CSW poster. This will enable them to participate more fully in the lesson. They might also find it helpful to engage in a Think-Pair-Share before sharing their ideas with the class. Today we're going to set up our own experiment and collect evidence that will help us figure out whether plants need light to live and grow. **Show slide 6.** Who remembers the symbol on our Communicating in Scientific Ways poster that reminds us of the word *evidence*?	I think that plants don't need light. Because as long as they have water and air, I think they'll stay alive and grow. I think plants only need sunlight, not light like in our classroom. I agree. Sunlight is different from the lights on the ceiling.	idea? Why do you think that plants don't need light? Who else has an idea about whether plants need light or not? Does anyone agree or disagree? That's an interesting idea. Maybe we can test it in an experiment.

			Who can tell us what evidence is? **Show slide 7.** Right! Evidence is something that helps us answer a question or explain how something works in the world around us. It also helps us figure out whether our ideas are right. Who can give us an example of evidence from our plant investigation last time? What happened to the plant with air and the plant without air? What did we observe?	A magnifying glass. It's a clue that helps scientists answer a question or explain how something works. The plant with no air turned brown, but the plant with air stayed green.	
12 min	**Activity** **Synopsis:** Students come up with ideas for designing an experiment that will help them figure out whether plants need light to live and grow. After agreeing on a plan, students set up their experiment. **Main science idea(s):** • A good experiment		**Show slide 8.** To find out whether plants need light to live and grow, we're going to observe two plants like last time. In a minute, I'm going to have you pair up with a partner. Then I'll give each pair two cups that contain young plants. Be careful not to knock the cups over. And don't pick up the cups or touch the plants or pull on them. Just *observe* the plants. Why do you think we shouldn't touch or pull on		

	enables scientists to collect observable evidence and compare different conditions to help answer a question.		the plants? Why do you think we shouldn't pick up the cups? That's right! So it's a good idea to leave the plants sitting on the table and just look at them. **NOTE TO TEACHER:** *Have students pair up with an elbow partner. Then give each pair two plants and have students spend a few minutes observing them.* **Observation time.** **Show slide 9.**	Because we might break them or kill them. Because we might drop them, and the dirt could spill out.	
		Make explicit links between science ideas and activities **during** the activity. Ask questions to elicit student ideas and predictions. Ask questions to probe student ideas and predictions.	**Turn and Talk:** Now I want you and your partner to talk about how we could plan an experiment to find out whether plants need light. What could we do that would help us answer the question, "Do plants need light?" I'll give you 2 minutes to come up with some ideas to share with the class. **Whole-class discussion:** What ideas did you come up with? What kind of experiment could we conduct to find out whether plants need light? **NOTE TO TEACHER:** *Elicit a variety of ideas from students and record them on chart paper.* Do you think we should water both plants?	We could put one plant in the light and one plant in a dark cupboard and see what happens. Yes. They should both get water.	

					Why do you think that both plants should get water?
			Should we make sure that both plants have air? So what is the only thing that will be different for these two plants? **NOTE TO TEACHER:** *Help the class reach a consensus on a simple plan for an experiment and record the plan on a new sheet of chart paper. At the top of the page, write the title, "Do Plants Need Light?" and emphasize that this is the question they'll try to answer in this investigation.* Now that we've talked about our ideas and agreed on a plan for our experiment, I'm going to write our plan on a new sheet of chart paper. For this investigation, we're going to act like	Because we're testing whether plants need light. Everything else should be the same, like when the scientist tested whether plants needed air. Both of those plants had water and light. Yes, they should both get air because we already know that plants need air. We don't need to test that idea again! One of the plants will get light, and the other one won't get any light.	

			scientists and collect evidence to help us answer the question, "Do plants need light?" **NOTE TO TEACHER:** *Leave the cups sitting on the table as you give each pair of students Light and No Light labels from handouts 3.2 (Light Labels) and 3.3 (No Light Labels). Each pair should receive one Light label and one No Light label.* **Show slide 10.** Next, let's set up our experiment. I'm going to give you two labels to put on your cups. One label says "LIGHT," and the other says "NO LIGHT." Put the Light label on one of your cups, and the No Light label on the other cup. Then write your name *[or initials]* on both cups.		
12–15 min	**Follow-Up to Activity** **Synopsis:** The teacher reviews the key question the experiment will help students answer. Then students predict what will happen to the plants with and without light, and they record their initial observations of the plants. **Main science idea(s):** • Recording observations helps scientists keep track of and organize their evidence.	Make explicit links between science ideas and activities **after** the activity.	What question are we investigating for this experiment? What question are we trying to answer? **NOTE TO TEACHER:** *Go around the room and make sure each pair of students can state the question they're investigating.* That's right! For this investigation, we're going to act like scientists and collect evidence to help us answer the question, "Do plants need light?" To find out if plants need light, we're going to place one plant in light and one plant in no light. What do you think will happen to the two plants by the end of our experiment? Let's make some predictions like scientists do.	Do plants need light?	

			First, who can tell me what a prediction is?	A prediction is what you think will happen. It's a guess.	
		Summarize key science ideas.	Yes, a prediction is what you think will happen. When you make a prediction, you give a reason for what you think will happen, so a prediction isn't a guess. **Show slide 11.**		
		Ask questions to elicit student ideas and predictions.	Now let's make some predictions. What do you think will happen to our plants by the end of our experiment and why? Begin your answer with the words *I predict that ….* What do you predict will happen to the plants that have light?	I predict that the plants with light will be healthy.	How will you know these plants are healthy? How could you tell?
			ELL support: Give ELL students an opportunity to practice making predictions during the lesson preview. It might also be helpful to have them engage in a Think-Pair-Share for this prediction activity during the lesson.	The plants will be green and strong.	What else might you see if the plants are healthy?
			What do you predict will happen to the plants with no light?	The plants will stand up straight. I think that the plants with no light will die.	How will you know they're dying? What will they look like?

				They'll look brown and droopy.	
			NOTE TO TEACHER: *If time is running short or students are losing focus, end the discussion here and skip to the synthesize/summarize activity. Then have students observe their plants and record their first observations in the next lesson.* Over the next two weeks, you and your partner will watch what happens to your plants and write down your observations. Why do you think it's important to write down our observations?	To be good scientists. So we have a good experiment. So we can prove our answers. It's our evidence!	
		Highlight key science ideas and focus question throughout.	**Show slide 12.** Yes! To be good scientists, we need to write down our observations so we can answer our questions accurately and see if our predictions are correct or if we need to change our ideas. If we don't write down our observations, we might remember things wrong and come up with the wrong answers for our question. Writing down or recording their observations helps scientists keep track of their evidence. Like detectives, they're very careful to write things down and keep their evidence safe. If they don't,		

			they won't be able to prove their ideas are correct. If they lose their evidence, they can't use it to prove their case in court. Like scientists, we'll need to write down what we see several times during our experiment so that we can compare our observations at the beginning of the experiment with our observations at the middle and the end. **ELL support:** Make sure to introduce the word *record* to ELL students in advance and have them write this word and its definition in their science notebooks and picture dictionary if they made one. Also post the term on a word wall for easy reference. So every few days during our experiment, you and your partner will observe your plants and then record your observations using pictures and words. These observations will become your evidence. **NOTE TO TEACHER:** *Students should observe their plants and record their observations approximately every three or four days for two weeks. After the two-week observation period, students should have clear evidence that the plants in the dark are changing color (from green to pale or brown) and wilting.* Let's make our first observations right now! **NOTE TO TEACHER:** *Have pairs observe both of their plants carefully for a few minutes. Then direct students to record their observations using the method you selected in advance (Option 1, 2, or 3). We recommend using Option 1, if possible.*		

Option 1 (preferred, if time allows): In their science notebooks, have students create a chart like the one below. Create a model on chart paper for them to copy. Then have students draw and label the plants in their science notebooks based on their observations.

Do Plants Need Light? Our Observations: Day 1	
Plants with Light	**Plants with No Light**
Students draw and label their plants here.	*Students draw and label their plants here.*

Option 2: Give each student a copy of handout 3.1 (Observations Worksheet: Light Experiment). Students will observe their plants every three or four days for two weeks, so you'll need to give them a new worksheet to fill out for each observation. On a document reader or Smart Board, show students how to complete the first data page. Feel free to modify the process to best suit your students' needs.

Option 3: Have students take photographs of both plants on each observation day and then print the pictures and paste them into their science notebooks. Then have students write down their observations. This option will give you more time to support students in writing down their observations.

<table>
<tr>
<td></td>
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<td></td>
<td>NOTE TO TEACHER: While students are recording their observations, create a tree map to keep track of students' observations and evidence throughout the experiment. (See model below.) Students will use the class evidence chart in lesson 4a to help them decide whether plants need light to live and grow. Make sure to update this chart throughout the observation period.

<table>
<tr><th colspan="2">Do Plants Need Light?
Our Evidence</th></tr>
<tr><th>Plants with Light</th><th>Plants with No Light</th></tr>
<tr><td>Record student observations and evidence here.</td><td>Record student observations and evidence here.</td></tr>
</table>

Whole-class share-out: Now let's talk about your beginning observations and record our evidence on a class evidence chart.</td>
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<td>4 min</td>
<td>Synthesize/Summarize Today's Lesson

Synopsis: The teacher reviews the focus question. Then students summarize the experiment they designed to find out whether plants need light to live and grow. Afterward, students connect their work to what scientists do.

Main science idea(s):
• Collecting and</td>
<td>Highlight key science ideas and focus question throughout.

Engage students in making connections by synthesizing and summarizing</td>
<td>Show slide 13.

Today's focus question is How can experiments help us find out whether plants need light to live and grow?

So who can tell me why we're doing this experiment?

And what question are we trying to answer?

How will our experiment help us answer this question?</td>
<td>To find out whether plants need light.

Do plants need light to live and grow?</td>
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</table>

	recording evidence from observations is important when conducting an investigation. • Our experiment will help us figure out whether plants need light to live and grow.	key science ideas.	**ELL support:** Give ELL students an opportunity to practice answering these questions during the lesson preview. It might also be helpful to have them engage in a Think-Pair-Share for this summarizing activity during the lesson. How did we act like scientists today? What did we do that scientists do when they're trying to figure out how something works? **NOTE TO TEACHER:** *If students get stuck, encourage them to look at the symbols on the Communicating in Scientific Ways poster*.	Our experiment will help us get evidence about what happens to the plants. We can compare what happens to the two plants. The experiment will show what happens to the plants with light and without light. We planned an experiment. We made predictions about our plants. We made observations and recorded them. We collected evidence. We talked about our ideas. We agreed and disagreed and told each other why.	

2 min	**Link to Next Lesson** **Synopsis:** The teacher announces that in the next lesson, students will set up another experiment to see whether plants need water to live and grow.	Link science ideas to other science ideas.	**Show slide 14.** Now that you've looked at your plants and recorded your beginning observations, we'll place half of the plants in the light and half of the plants in a dark place where they won't get any light. We'll leave our plants in these places until the next time we observe them. Each day, I'll give all of the plants the same amount of water, and every few days, you'll look at your plants and record your observations. In our next lesson, we'll set up another experiment to find out whether plants need water to live and grow. How do you think we can do that? You have some good ideas! We'll talk more about our ideas next time.	We can give some plants water and leave some plants without water.	