Plants and Animals
Lesson 3c: Investigating What Plants Need

Grade: Kindergarten	**Length of lesson:** 40 minutes	**Placement of lesson in unit:** 3c 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 water to live and grow?
Main learning goal: Designing an experiment to find out whether plants need water 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. First, we studied a science experiment that provided evidence that plants need air to live and grow. Then we designed an experiment to help us figure out whether plants need light to live and grow. 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. Today we designed an experiment to answer the question, "Do plants need water?" We made predictions and set up our experiment. Now we'll observe what happens and write down our observations to keep track of what happens. Then we'll use the evidence we collect to figure out whether plants need water to live and grow.		
Ideal student response to the focus question: As scientists, we can set up experiments to investigate the needs of plants. Today we set up a new experiment to find out whether plants need water to live and grow. Then we made predictions about what will happen to the plants. Some plants in our experiment will get water, and some won't. All of our seeds will get air and light. Now we'll observe our plants and write down our observations to keep track of what happens. The evidence we collect will help us figure out whether plants need water to live and grow so we know if our predictions are right.		

Preparation

Materials Needed
- Science notebooks
- Chart paper and markers
- Craft sticks (to cross over top of No Water cups)
- Circle map from lesson 3a ("Our Beginning Ideas")
- **Optional:** magnifying lenses (1 per student)
- Crayons (green, tan, brown, yellow) (from lesson 3b)

Student Handouts and Teacher Masters
- **Optional:** 3.5 Observations Worksheet: Water Experiment (1 per student for each observation day; 5 per student for the entire two-week period)
- 3.6 Water Labels (Teacher Master) (1 page of Avery labels, 1" × 2 5/8")
- 3.7 No Water Labels (Teacher Master) (1 page of Avery labels, 1" × 2 5/8")
- 3.8 Directions for Starting the Radish or Bean Seeds (Teacher Master)

Ahead of Time
- Care for the plants you started two weeks before lesson 3a (see handout 3.8, Directions for Starting the Radish or Bean Seeds). Make sure you have enough plants for today's experiment (water/no water) and the experiment in lesson 3d (soil/no soil). Each pair of students will need two plants. If you don't have enough, plant more seeds.
- Review section 4 in the content background document, focusing on what plants need.
- 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). After this two-week period, continue with 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.

Lesson 3c General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
2 min	**Link to previous lesson:** The teacher revisits the experiment students set up in the previous lesson to find out whether plants need light to live and grow. Then students share their initial observations.	• A good experiment enables scientists to collect observable evidence and compare different conditions to help answer a question. • We already know that plants need air to live and grow, and we're collecting evidence to find out whether plants need light.
2 min	**Lesson focus question:** The teacher revisits key findings from the first experiment on whether plants need air. Then the teacher introduces a new focus question: *How can experiments help us find out whether plants need water to grow and live?*	
8 min	**Setup for activity:** The teacher elicits ideas from students about whether plants need water 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 an experiment that will test whether plants need water to live and grow. After agreeing on a plan, students set up their experiments.	• A good experiment enables scientists to collect observable evidence and compare different conditions to help answer a question.
10 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 water, and they record their initial observations of the plants.	• Recording observations helps scientists keep track of and organize their evidence.
5 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 water 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 find out whether plants need water to live and grow.
1 min	**Link to next lesson:** The teacher announces that in the following lessons, students will observe their plants and collect evidence to answer their questions for light and water experiments.	

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2 min	**Link to Previous Lesson** **Synopsis:** The teacher revisits the experiment students set up in the previous lesson to find out whether plants need light to live and grow. Then students share their initial observations. **Main science idea(s):** • A good experiment enables scientists to collect observable evidence and compare different conditions to help answer a question. • We already know that plants need air to live and grow, and we're collecting evidence to find out whether plants need light.	Link science ideas to other science ideas. Ask questions to elicit student ideas and predictions. Ask questions to probe student ideas and predictions. Ask questions to challenge student thinking.	**Show slides 1 and 2.** In the last lesson, we set up our own experiment to answer a question about what plants need. What are we doing in this experiment? What question are we trying to answer? What is happening with your plants so far? What did you and your partner observe last time? Does the plant with no light look any different from the plant with light? **NOTE TO TEACHER:** *Students' responses will depend on how many days have passed since you set up the light experiment and how many observations students have made.* **ELL support:** It may be helpful for ELL students to share their observations in a Think-Pair-Share.	One plant gets light, and one plant gets no light. Do plants need light? Nothing is happening yet. Our plants don't look any different. Maybe because the plant in the dark doesn't need light. Because it still looks the same as the plant in the light.	Why do you think the plants don't look any different yet? Why do you think that?

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			So we'll keep observing the plants with and without light and see what happens next!	I think it hasn't been long enough yet to see whether plants need light or not. Because maybe plants in the dark have light stored up inside them, so they're still living. We can leave the plants where they are for a longer time and see if anything changes. Yes!	What do others think? Why do you think that? That's a very interesting idea. How can we find out? So you think that changes might not happen right away in an experiment?
2 min	**Lesson Focus Question** **Synopsis:** The teacher revisits key findings from the first experiment on	Engage students in analyzing and interpreting data	**Show slide 3.** In our first investigation, a scientist set up an experiment to answer the question, "Do plants need air?" What did we find out?	We found out that	

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	whether plants need air. Then the teacher introduces a new focus question: *How can experiments help us find out whether plants need water to grow and live?*	and observations.	That's right! So we know that air is one thing that plants need. We also set up our own experiment to find out whether plants need light, and we'll be observing our plants over the next two weeks to see if our predictions are correct. Now let's look at our circle map of ideas about what plants need to live and grow. **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.* We put a check mark next to air because we've already tested that idea and know that plants need air. And we can put a check mark next to light because we're investigating that idea now.	plants do need air. The plant without air turned brown and droopy, but the plant with air was green and stood up straight.	What evidence did we observe?

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			What other ideas on the map could we investigate?	We could investigate whether plants need plant food. Maybe we could test to see if plants need dirt. We could see whether plants need water.	
		Set the purpose with a <u>focus question</u> or goal statement.	So today we're going to investigate whether plants need water to live and grow. **Show slide 4.** The focus question we'll think about is *How can experiments help us find out whether plants need water 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.*		

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8 min	**Setup for Activity** **Synopsis:** The teacher elicits ideas from students about whether plants need water to live and grow and challenges students to communicate their ideas and reasoning in scientific ways. **Main science idea(s):** • 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.	Make explicit links between science ideas and activities **before** the activity. Engage students in communicating in scientific ways. Ask question to elicit student ideas and predictions. Ask questions to probe student ideas and predictions.	**Show slide 5.** Do you think that plants need water to grow and live? 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. 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.	I think plants need water. Because we have a garden at home, and we give our plants water. If we don't, they'll die. I agree, because when my mom forgets to water her plants, they look bad. They get brown and dried up. I think water is like food for plants. I think water is like the plant's blood.	Why do you think that plants need water? Does anyone agree or disagree that plants need water? What do you mean when you say they "look bad"? Does anyone disagree or want to add on?

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				Because when you cut a plant, sap comes out, and that's like when we get a cut and blood comes out.	How is water like blood? That's an interesting idea. Maybe we can test it in an experiment.
			Today we're going to set up an experiment to find out whether plants need water to live and grow.		
12 min	**Activity** **Synopsis:** Students come up with ideas for an experiment that will test whether plants need water to live and grow. After agreeing on a plan, students set up their experiments. **Main science idea(s):** • A good experiment enables scientists to collect observable	Make explicit links between science and activities **during** the activity. Summarize key science ideas. Ask questions to	The evidence we collect over the next two weeks will help us answer the question, "Do plants need water?" Who remembers what evidence is? That's right! And what symbol on our Communicating in Scientific Ways poster reminds us of this word? **Show slide 6.** **Turn and Talk:** So how could we plan an	It's a clue that helps us answer a question or explain how something works. A magnifying glass.	

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	evidence and compare different conditions to help answer a question.	elicit student ideas and predictions. Ask questions to probe student ideas and predictions.	experiment to find out whether plants need light? Pair up with your partner and come up with some ideas to share with the class. **NOTE TO TEACHER:** *Give pairs 2 minutes to discuss their ideas.* **Whole-class discussion:** What ideas did you come up with? What kind of experiment could we conduct to find out whether plants need water? **NOTE TO TEACHER:** *Elicit a variety of ideas from students and record them on chart paper.*	We could water one plant and not water the other plant. Because we could compare the plants and see if the one without water stays healthy and grows or dies. They'll be green and get tall.	Why do you think that would help us find out whether plants need water? What do you think we'll see if the plants stay healthy and grow? What do you think we'll see if the plants aren't

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					healthy and growing?
			What should we make sure to give both plants?	They'll turn brown, and they might bend over. We should give both plants light and air.	Why should we give both plants light and air?
			So what is the only difference between 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 Water?" and emphasize that this is the question they'll try to answer in this investigation.*	Because we're only testing to see whether plants need water. We already know they need air to live, and our other experiment is testing to see if they need water. One has water and one doesn't.	

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			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 scientists and collect evidence to help us answer the question, "Do plants need water?" **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. Also give each pair two craft sticks to place over the top of the cup labeled No Water as a reminder that this plant shouldn't be watered. Show students how to make an* X *with their sticks.* **Show slide 7.** Next, let's set up our experiment. I'm going to give you two labels to put on your cups. One label says "WATER," and the other says "NO WATER." Put the Water label on one of your cups, and the No Water label on the other cup. Then write your name *[or initials]* on both cups. I'm also going to give you two craft sticks. Make an *X* with your sticks like this and then place them on top of the cup with the No Water label.		

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			The crossed sticks will remind us not to give this plant any water.		
10 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 water, 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. Ask questions to elicit student ideas and predictions.	Now that we've set up our experiment, who can tell me what question we're trying to answer for this investigation? **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 water?" To find out if plants need water, we're going to keep watering one plant and stop watering the other plant. We already know that scientists make predictions when they conduct experiments. **Show slide 8.** What do you think will happen to your two plants by the end of our experiment? When you share your prediction, start with the words *I predict that ….* What do you predict will happen to the plants that get water?	Do plants need water? I predict that the	

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			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. What do you predict will happen to the plants with no water?	plants that get water will stay green and healthy and grow tall. The plants will be green and strong. They'll stand up straight. I predict that the plants with no water will dry up and turn brown and die. They'll look brown and droopy. Because I saw plants at home turn brown when we forgot to water them.	How will you know the plants are healthy? How could you tell? What else might you see if the plants are healthy? How will you know they're dying? What will they look like? What makes you think that? Any other ideas?

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				I think that plants can't live without water just like we can't live without blood. Water is like blood for plants!	Any other predictions?
				I predict that the plant with water will live and grow best.	Why do you think so?
				Because water is food for plants.	
			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 a good scientist.	
				So we can prove our	

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		Summarize key science ideas.	**Show slide 9.** Yes, to be good scientists, we need to write down our observations. That will help us keep track of our evidence so we can answer our question accurately. 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. 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 without water are changing color (turning brown) and wilting.*	answers. To keep track of our evidence!	

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<tr><td></td><td></td><td></td><td>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.

<table><tr><th colspan="2">Do Plants Need Water?
Our Observations: Day 1</th></tr><tr><th>Plants with Water</th><th>Plants with No Water</th></tr><tr><td>Students draw and label their plants here.</td><td>Students draw and label their plants here.</td></tr></table>
Option 2: Give each student a copy of handout 3.5 (Observations Worksheet: Water 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</td><td></td><td></td></tr>
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<tr><td></td><td></td><td></td><td>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.

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 4b to help them decide whether plants need water to live and grow. Make sure to update this chart throughout the observation period.

<table><tr><th colspan="2">Do Plants Need Water?
Our Evidence</th></tr><tr><th>Plants with Water</th><th>Plants with No Water</th></tr><tr><td>Record student observations and evidence here.</td><td>Record student observations and evidence here.</td></tr></table></td><td></td><td></td></tr>
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			Whole-class share-out: Now let's talk about your beginning observations and record our evidence on a class evidence chart.		
5 min	**Synthesize/Summarize Today's Lesson** **Synopsis:** Students summarize the experiment they designed to find out whether plants need water to live and grow. Then they connect their work to what scientists do. **Main science idea(s):** • Collecting and recording evidence from observations is important when conducting an investigation. • Our experiment will help us find out whether plants need water to live and grow.	Highlight key science ideas and focus question throughout. Engage students in making connections by synthesizing and summarizing key science ideas.	**Show slide 10.** Today's focus question is How *can experiments help us find out whether plants need water to live and grow?* So why are we doing this experiment? And what question are we trying to answer? How will our experiment help us answer this question? **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.	To find out if plants need water. Do plants need water to live and grow? It 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 when one plant gets water and the other one doesn't.	

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			How did we act like scientists today? What did we do that scientists do when they're trying to answer a question or explain how something works? **NOTE TO TEACHER:** *If students get stuck, encourage them to look at the symbols on the Communicating in Scientific Ways poster*.	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.	
1 min	**Link to Next Lesson** **Synopsis:** The teacher announces that in the following lessons, students will observe their plants and collect evidence to answer their	Link science ideas to other science ideas.	**Show slide 11.** Now that you've looked at your plants and recorded your beginning observations, we'll leave the plants where they are until the next time we observe them.		

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	questions for light and water experiments.		Each day over the next two weeks, I'll water only the plants with the Water label and leave the plants with the No Water label alone. I'll also keep watering the plants in our light experiment. Every few days, you and your partner will look at your plants for both experiments and record your observations. Then in a couple of weeks, we'll look at all of our evidence and find out whether plants need light and water to live and grow.		