

Plants and Animals

Lesson 5c: Food for Plants

Grade: Kindergarten	Length of lesson: 32 minutes	Placement of lesson in unit: 5c 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: What are different ways we can show how plants make their own food?
Main learning goal: Models and diagrams show how plants take in light, water, and air from their environment and make food inside their leaves that they can use to live and grow. Animals can't do this.		
Science content storyline: We've learned that plants take in light, water, and air from their environment and make food inside their leaves that they can use to live and grow. Animals can't do this. Today we explored two different models to help us think about what happens inside a plant leaf. Models are similar to and different from the real-life things they represent. We used a mixing-bowl analogy and a diagram to show how plants make their own food inside their leaves with the sunlight, air, and water they get from their environment.		
Ideal student response to the focus question: Both our mixing-bowl model and our diagram showed how plants get air, water, and sunlight from their environment and make food inside their leaves that they can use to live and grow.		

Preparation

Materials Needed

- Science notebooks
- Chart paper and markers
- Laser pointer or yardstick (for students to use as a pointer)
- A leafy, green plant or a collection of 5–10 leaves
- Magnifying lenses (1 per student from lesson 1)
- Large mixing bowl (ideally green)
- Flashlight
- Uninflated balloon (see note in Ahead of Time)
- Water bottle filled with water
- Sugar cubes
- Wire whisk or spoon
- **Optional:** sticky arrows (for students to add to plant diagram)

Ahead of Time

- Review section 5 in the content background document.
- Print a copy of the plant diagram from PowerPoint slide 9 to display on a document reader and mark up as students share their ideas about how plants get their food.
- Don't inflate the balloon until you demonstrate the mixing-bowl analogy. After inflating the balloon, pinch closed the opening (but don't tie it). When it's time to pour the air into the mixing bowl, unpinch the balloon to produce a dramatic whooshing sound. For a less dramatic alternative, fill a large zip-seal, plastic baggie with air ahead of time and zip it closed until you're ready to pour the air into the mixing bowl.
- **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. In particular, engage students in the activities associated with modeling photosynthesis. The concept of a formal model may be new to some students, so take time to explain what a model is and show them several examples that are similar to the ones they'll be using in the lesson. Allow students to handle the models to help them understand how they work. Identify vocabulary terms in the lesson plan to review with students in advance, including *model*, *diagram*, *sugar*, *flashlight*, and *mix together*. Post any new vocabulary terms and definitions on a word wall for easy reference. Also have students record these terms in their science notebooks and in their picture dictionary if they've made one.

Lesson 5c General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
3 min	Link to previous lessons: To review key ideas about plants from previous lessons, the teacher engages students in discussing pictures of different plants.	<ul style="list-style-type: none"> Plants take in light, water, and air from their environment and use these things to make their own food inside their leaves. Plants use the food they make to live and grow. Animals can't do this.
1 min	Lesson focus question: The teacher introduces the focus question, <i>What are different ways we can show how plants make their own food?</i>	
5 min	Setup for activity: The teacher introduces the concept of models and shows students different examples.	<ul style="list-style-type: none"> Scientists use models to help them think about how things work in the world around them. For example, scientists can use a model to show what happens inside a leaf. Models are similar to and different from the real-life things they represent.
12 min	Activity: The teacher engages students in using two different models—a mixing-bowl analogy and a plant diagram—to show how plants make their own food.	<ul style="list-style-type: none"> Scientists use models to help them understand and explain how things work in the world around them. For example, scientists use models to show what happens inside a leaf. Plants take in light, water, and air from their environment to make their own food inside their leaves, and they use this food to live and grow.
5 min	Follow-up to activity: The teacher reviews the focus question. Then students work in pairs to construct summary statements that explain what the two models show about plants.	<ul style="list-style-type: none"> We can use different models and diagrams to show how plants make their own food. Both of our models showed that plants take in light, air, and water from their environment and make their own food inside their leaves. Then they use this food to live and grow.
5 min	Synthesize/summarize today's lesson: Students share the summary statements they constructed to explain what the two models show about plants. Then they discuss which model made the most sense to them.	
1 min	Link to next lesson: The teacher announces that in the next lesson, students will become plant models and demonstrate in another way how plants make their own food.	

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
3 min	<p>Link to Previous Lessons</p> <p>Synopsis: To review key ideas about plants from previous lessons, the teacher engages students in discussing pictures of different plants.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> Plants take in light, water, and air from their environment and use these things to make their own food inside their leaves. Plants use the food they make to live and grow. Animals can't do this. 	<p>Link science ideas to other science ideas.</p> <p>Engage students in using and applying new science ideas in a variety of ways and contexts.</p> <p>Select content representations and models matched to the learning goal and engage students in their use.</p> <p>Engage students in communicating in scientific ways.</p> <p>Ask questions to probe</p>	<p>Show slides 1 and 2.</p> <p>Look at the picture on this slide. What different kinds of plants do you see? Let's see how many we can point to.</p> <p>NOTE TO TEACHER: <i>Call on students to come up one at a time and use a later pointer or yardstick to point to a plant they see on the slide. Have the class keep track of how many different plants students identify.</i></p> <p>Do all of these plants need food to live and grow?</p> <p>That's right! All living things need food to live and grow.</p> <p>How do plants get their food?</p> <p>NOTE TO TEACHER: <i>The anticipated student responses in column 5 are ideal. We included this additional lesson because we expect that students will still think that the light, air, and water plants take in from the environment are their food rather than the raw materials plants use to make energy-providing food in their leaves during photosynthesis. Students might also still think that soil is food for plants or that plants take in their food from the soil. Make sure to challenge these ideas by asking probe and challenge questions. Support students in understanding that plants use light, air, and water to make their own food, but these substances aren't food by themselves.</i></p>	<p>There's grass.</p> <p>There are trees.</p> <p>There are flowers.</p> <p>There are bushes.</p> <p>Yes.</p> <p>They make their own food.</p> <p>They use water, light, and air from their environment to make food.</p> <p>They make the food inside their leaves.</p>	<p>Tell me more about that.</p> <p>Can anyone add on to that?</p>

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			You did a great job summarizing what we've learned about plants so far!	own food.	
1 min	<p>Lesson Focus Question</p> <p>Synopsis: The teacher introduces the focus question, <i>What are different ways we can show how plants make their own food?</i></p>	Set the purpose with a <u>focus question</u> or goal statement.	<p>It's hard for scientists—and for us—to understand exactly how plants make food inside their leaves because we can't see what's going on in there. So today we're going to explore two different ways we can show how plants make food inside their leaves.</p> <p>Show slide 4.</p> <p>Our focus question for this lesson is <i>What are different ways we can show how plants make their own food?</i></p> <p>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 aloud.</p>		
5 min	<p>Setup for Activity</p> <p>Synopsis: The teacher introduces the concept of models and shows students different examples.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> Scientists use models to help them think about how things work in the world around them. For example, scientists can 	<p>Highlight key science ideas and focus question throughout.</p> <p>Make explicit links between science ideas and activities</p>	<p>Show slide 5.</p> <p>Scientists sometimes use models and diagrams to help them understand and explain how things work in the real world.</p> <p>That's what we're going to do today.</p> <p>Have you ever seen a model? What do you think a model is?</p> <p>ELL support: Give ELL students an opportunity to</p>	A model is like a toy.	

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	<p>use a model to show what happens inside a leaf. Models are similar to and different from the real-life things they represent.</p>	<p>before the activity.</p>	<p>look at the pictures during the lesson preview and practice describing what they think a model is. You could also ask students, “How would you use a model?”</p> <p>Show slide 6.</p> <p>The toys in these pictures are all models. The car is a model car, and the insects are model insects.</p> <p>What does this tell you about models?</p> <p>Right! The models in these pictures are like real cars and real insects, but they aren’t <i>exactly</i> like the real thing. They only represent things in real life.</p> <p>Some models are smaller than the real thing, like the toy cars, and some models are bigger than the real thing, like the toy insects.</p> <p>NOTE TO TEACHER: <i>If students observe that some models are smaller or larger than the real things they represent, you might use this opportunity to discuss in more detail what science models are and how</i></p>	<p>They’re not real.</p> <p>The model car is a lot smaller than a real car!</p> <p>The model insects are a lot bigger than real insects.</p>	

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		Highlight key science ideas and focus question throughout.	<p><i>scientists use them. Emphasize that models are not toys to play with; they help scientists figure out how things work in the real world.</i></p> <p>Show slide 7.</p> <p>It’s important to remember that scientists use models to help them figure out how things work in the real world. They don’t use models as toys! Keep that in mind as we use our models today!</p>		
12 min	<p>Activity</p> <p>Synopsis: The teacher engages students in using two different models—a mixing-bowl analogy and a plant diagram—to show how plants make their own food.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • Scientists use models to help them understand and explain how things work in the world around them. For example, scientists use models to show what happens inside a leaf. • Plants take in light, water, and air from their 	<p>Make explicit links between science ideas and activities during the activity.</p> <p>Select content representations and models matched to the learning goal and engage students in their use.</p> <p>Engage students in using and applying new</p>	<p>Next, we’re going to explore two different models of how plants make their own food. Each model will help us get a better idea of what is happening inside the leaves of all plants when they make their food!</p> <p>NOTE TO TEACHER: <i>Feel free to modify the following directions to best meet the needs of your students. You can also arrange the content in any order, such as presenting the plant diagram before the mixing-bowl analogy.</i></p> <p>Look at this plant [<i>or leaves</i>] I’m holding. Can we see this plant [<i>these leaves</i>] making food?</p> <p>NOTE TO TEACHER: <i>Show students the plant you brought to class or the leaves you collected.</i></p> <p>No. Even if we use a magnifying lens, we wouldn’t be able to see what’s going on inside the leaves of a plant.</p>	No!	

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	<p>environment to make their own food inside their leaves, and they use this food to live and grow.</p>	<p>science ideas in a variety of ways and contexts.</p>	<p>But we can use a special kind of model to show what happens when a plant makes food inside its leaves.</p> <p>Show slide 8.</p> <p>Mixing-Bowl Model</p> <p>We know that plants need water, air, and light from the Sun to make their food, so I have some water in this water bottle, some air in this balloon, and a flashlight to use for light.</p> <p>NOTE TO TEACHER: <i>Show students the water bottle, the inflated balloon, the flashlight, and the green mixing bowl. Make sure to inflate the balloon right before the activity.</i></p> <p>We're going to pretend or imagine that this green bowl is the leaf of a plant. Look at this bowl and these real leaves. Do they look the same?</p> <p>NOTE TO TEACHER: <i>Help students understand that even though the mixing bowl isn't a real leaf, they can still use it as a model to help them think about how real leaves make food for plants.</i></p> <p>That's right! The bowl doesn't look like a real leaf, but we can still use it as a model to help us understand how leaves make food for plants.</p> <p>Do you think we're really going to end up with food for plants in our bowl?</p>	<p>No.</p> <p>Because the bowl isn't a real leaf!</p> <p>No, because the</p>	<p>Why don't they look the same?</p>

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			<p>Now we need someone to be the Sun and shine this flashlight on the leaf.</p> <p>NOTE TO TEACHER: <i>Give a volunteer the flashlight and have him or her shine it into the mixing bowl.</i></p> <p>So does our leaf have all three things it needs to make food?</p> <p>When water, air, and sunlight come together in the leaf, the leaf does an amazing thing. It changes those three things into something totally new. Let's use this whisk [<i>or spoon</i>] to stir together all of our ingredients.</p> <p>While this change is happening, I want you to close your eyes. Don't peek now!</p> <p>NOTE TO TEACHER: <i>While students' eyes are closed, add the sugar cubes to the mixing bowl.</i></p> <p>Now open your eyes and see what happened! What did the water, air, and sunlight change into?</p> <p>Yes! When water, air, and sunlight mix together in the leaf, it makes food in the form of sugar.</p> <p>Do you think we would find sugar cubes if we could look inside this leaf?</p> <p>So the sugar cubes are only part of our model. They show that the leaf takes water, air, and sunlight from</p>	<p>Yes.</p> <p>Sugar cubes!</p> <p>No. They're too big!</p>	

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		Engage students in using content representations and models matched to the learning goal	<p>its environment and mixes them together to make sugar that the plant can use as food.</p> <p>What did we have to put into the leaf for it to make food for the plant?</p> <p>Turn and Talk (1 min): Share your ideas with an elbow partner and be prepared to share your answers with the class.</p> <p>Whole-class share-out: Who can tell me what we had to put into the leaf so it could make food for the plant?</p> <p>Yes! Leaves need light, water, and air to make food for the plant. The leaves change all three things into sugar, and the plant uses this sugar as its food!</p> <p>So our mixing-bowl model is one way we can show how plants make their own food. Let's explore another kind of model.</p> <p>Show slide 9.</p> <p>Plant Diagram</p> <p>Look at this picture, or diagram, of a plant. How can we add words and arrows to show what happens inside a leaf when a plant makes its own food?</p> <p>Do you remember the arrows in the book we read last time?</p>	Light, water, and air.	

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		and engage students in their use.	<p>What did the different kinds of arrows show us?</p> <p>Turn and Talk: Now I want you to talk with your elbow partner about this diagram. What words and arrows could we add to the diagram to show how plants make food inside their leaves? Work together to come up with some ideas to share with the class.</p> <p>ELL support: Have ELL students practice coming up with ideas during the lesson preview.</p>	<p>The blue arrows showed us where the water was going inside the plant.</p> <p>The water went from the soil into the roots of the plant and then up through the stem and into the leaves.</p> <p>The other arrows showed where the air and sunlight were going.</p> <p>The sunlight and the air went into the plant's leaves.</p>	<p>Where did the water go?</p> <p>And where did the air and sunlight go?</p>

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			<p>Whole-class share-out: Let’s hear your ideas. What words and arrows could we add to this diagram to show how plants make food inside their leaves?</p> <p>NOTE TO TEACHER: <i>Elicit a variety of ideas from students about words and arrows they could add to the diagram. Display a copy of the diagram on a document reader and add words and arrows to the diagram as students share their ideas. Or to engage students more fully in the activity, give them sticky arrows to place on the diagram and move around as they discuss their ideas.</i></p> <p>Show slide 10.</p> <p>Now let’s compare our diagram with the one on this slide.</p> <p>How are both diagrams the same?</p> <p>How are they different?</p>	<p>We need to show how the water goes from the roots up to the stem and then to the leaves.</p> <p>We need to draw arrows to show the air going into the leaves.</p> <p>We need to draw arrows to show the sunlight going into the leaves.</p> <p>We should draw sugar cubes inside the leaf to show the food it makes.</p>	
5 min	Follow-Up to Activity		Show slide 11.		

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	<p>Synopsis: The teacher reviews the focus question. Then students work in pairs to construct summary statements that explain what the two models show about plants.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • We can use different models and diagrams to show how plants make their own food. • Both of our models showed that plants take in light, air, and water from their environment and make their own food inside their leaves. Then they use this food to live and grow. 	<p>Highlight key science ideas and focus question throughout.</p> <p>Make explicit links between science ideas and activities after the activity.</p>	<p>Let's revisit our focus question: <i>What are different ways we can show how plants make their own food?</i></p> <p>To answer this question, let's think about what we did today.</p> <p>How many different ways or models did we use to show how plants make their own food?</p> <p>Who can describe the two models we used?</p> <p>Show slide 12.</p> <p>What did both of our models show about plants?</p> <p>Turn and Talk: Talk about this question with an elbow partner. Then work together to complete the sentence on the slide:</p> <p><i>Both models show that ...</i></p> <p>Be ready to share your sentences with the class.</p> <p>ELL support: During the lesson preview, give ELL students time to discuss the follow-up question and practice using the sentence starter so they understand what's expected of them and can participate more fully in the activity.</p>	<p>Two.</p> <p>We used a mixing bowl and a picture.</p>	
5 min	Synthesize/Summarize Today's Lesson	Engage students in	Let's hear the sentences you came up with to summarize what our models show.		

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	<p>Synopsis: Students share the summary statements they constructed to explain what the two models show about plants. Then they discuss which model made the most sense to them.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • We can use different models and diagrams to show how plants make their own food. • Both of our models showed that plants take in light, air, and water from their environment and make their own food inside their leaves. Then they use this food to live and grow. 	<p>making connections by synthesizing and summarizing key science ideas.</p> <p>Engage students in communicating in scientific ways.</p>	<p>As your classmates share their ideas, be good listeners and see if you can suggest ways they might make their sentences clearer or better.</p> <p>NOTE TO TEACHER: <i>Invite students to share their sentences one at a time. Record key ideas on chart paper and encourage students to give one another feedback.</i></p> <p>Show slide 13.</p> <p>Which of our two models made the most sense to you? Why?</p>	<p>Both models show that plants make their own food.</p> <p>Both models show that plants need food to live and grow.</p> <p>Both models show that plants need water, air, and sunlight to make their own food.</p> <p>Both models show plants getting water, sunlight, and air from their environment and mixing those things together in their leaves to make food they can use to live and grow.</p>	<p><i>Questions to ask during the discussion:</i></p> <ul style="list-style-type: none"> • Do you agree or disagree with this idea? • Do you have anything to add on? • Do you have any ideas for making this sentence clearer?

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			Which model did you like best and why?		
1 min	<p>Link to Next Lesson</p> <p>Synopsis: The teacher announces that in the next lesson, students will become plant models and demonstrate in another way how plants make their own food.</p>	Link science ideas to other science ideas.	<p>Show slide 14.</p> <p>So today we learned about models and how we can use different kinds of models to help us understand and explain how plants make their own food.</p> <p>The two models of plants that we used today were a mixing bowl and a diagram.</p> <p>We used the mixing-bowl model to show how plants take water, air, and light from their environment and mix them together inside their leaves to make food.</p> <p>In our plant diagram, we used arrows and words to show how plants get light, water, and air from their environment and use them to make food inside their leaves.</p> <p>Show slide 15.</p> <p>In our next lesson, we're going to show how plants make their food in another way. This time, we're going to be the plant models!</p>		