

Food Webs

Lesson 1b: Food

Grade 5	Length of lesson: 46 minutes	Placement of lesson in unit: 1b of 7 two-part lessons on food webs
Unit central question: How do living things depend on one another to get the food (matter and energy) they need to live and grow?		Lesson focus questions: Do living things take in (“eat”) materials that are not food? What is your evidence?
Main learning goal: Food provides matter and energy for all living things.		
Science content storyline: Scientists define <i>food</i> as “matter (building materials) that contains energy living things can use to live and grow, to heal wounds, and to keep all their parts working.” Water, carbon dioxide (Seltzer water), plant fertilizer, salt, and vitamins aren’t food by this definition. They provide matter that living things take into their bodies, and this matter helps them. But these materials don’t provide energy that living things can use to live and grow. Therefore, they are not food by the scientific definition. On the other hand, orange juice, sugar, and mints are matter that contains food energy measured in Calories. Therefore, they are food by the scientific definition.		
Ideal student response to the focus questions and synthesize/summarize task: Food contains matter and energy that living things need to live and grow, to heal wounds, and to keep all their parts working. Materials like water, vitamins, plant food, and Seltzer water (carbon dioxide) help keep living things healthy, but they aren’t food because they don’t provide energy that living things can use to live and grow.		

Preparation

<p>Materials Needed</p> <ul style="list-style-type: none"> • Science notebooks • Containers with nutrition labels of the following for each group of students (or provide handouts showing only the labels): <ol style="list-style-type: none"> 1. Orange juice with nutrition label 2. Sugar packet/package with nutrition label 3. Water bottle with nutrition label 4. Vitamins bottle (Note: Make sure the vitamins do not contain sugar/Calories) 5. Plant fertilizer with ingredients list (Even better if the bottle/box says “plant food.”) 6. Seltzer or sparkling water with no Calories (Put a label on the bottle with these words: Carbon-dioxide bubbles in water.) 7. Salt 8. Mints with nutrition label showing that it has Calories 9. Optional: 2–3 additional food/drink containers with nutrition labels • <i>Optional:</i> Glue and scissors to trim the Food versus Not Food handout so that pages 1 and 2 can be pasted into students’ science notebooks • <i>Optional:</i> chart paper, markers <p>Student Handouts</p> <ul style="list-style-type: none"> • 1.2 Food versus Not Food (1 per student) 	<p>Ahead of Time</p> <ul style="list-style-type: none"> • Review the Food Webs Content Background Document: section 1.2, Is Food Considered Matter or Energy or Both?, and section 1.3, How Are Nutrients Different from Food? • Review the PowerPoint slides and modify them as you wish. • Several days prior to teaching this lesson, collect all the necessary food and beverage containers OR make copies of labels to use as handouts. You might request that students bring in empty food, beverage, vitamin, and plant-food containers from home and/or ask your colleagues to do the same. • If you want to add 2–3 materials to be tested beyond the 8 listed under Materials Needed, write the names of these materials in the table on PowerPoint slides 5, 8, and 9. • Review the PowerPoint slides or Smart Board images and modify them as you wish. • From lesson 1a, select 2–3 samples of student writing on the question, <i>Is chewing gum food by the scientific definition? Explain your thinking.</i> Select samples that have both strengths and weaknesses. These will be shared with the class at the beginning of this lesson. • Organize a set of nutrition materials on a tray for each group of students.
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Lesson 1b General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
5 min	Link to previous lesson: Students share their writing from the previous lesson about whether chewing gum is food.	<ul style="list-style-type: none"> Scientists define <i>food</i> as “matter (building materials) that contains energy living things can use to live and grow, to heal wounds, and to keep all their parts working.”
2 min	Lesson focus questions: The teacher introduces the focus questions, <i>Do living things take in (“eat”) materials that are not food? What is your evidence?</i>	
8 min	Setup for activity: Students predict whether certain materials are food for living things.	<ul style="list-style-type: none"> Scientists define <i>food</i> as “matter (building materials) that contains energy living things can use to live and grow, to heal wounds, and to keep all their parts working.”
15 min	Activity: Working in small groups, students examine nutrition labels to gather information that will help them decide whether certain materials are or are not food by the scientific definition.	<ul style="list-style-type: none"> Food for living things provides <i>both</i> matter and energy. Energy in food is measured in Calories (Cal). Matter in food has mass and is measured in grams (g).
10 min	Follow-up to activity: Students answer the analysis questions and then compare their responses with a partner. Following this activity is a class discussion of conclusions.	<ul style="list-style-type: none"> To be defined as food, substances must provide both matter (mass) and energy (Calories). By the scientific definition of <i>food</i>, water, vitamins, fertilizers, minerals, Seltzer water (carbon dioxide), and salt are not food. They’re matter, but they don’t provide energy for living things. Our evidence is that they have no Calories, which is a measure of food energy.
5 min	Synthesize/summarize today’s lesson: Students write about and/or discuss the focus questions, <i>Do living things take in (“eat”) materials that are not food? What is your evidence?</i>	<ul style="list-style-type: none"> To be defined as food, substances must provide both matter <i>and</i> energy for living things to live and grow. By this definition, water, plant food, vitamins, Seltzer water (carbon dioxide), and salt are not food because they have no Calories (they can’t provide energy that living things can use to live and grow).
1 min	Link to next lesson: The teacher links science ideas to the next lesson.	


Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
5 min	<p>Link to Previous Lesson</p> <p>Synopsis: Students share their writing from the previous lesson about whether chewing gum is food.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • Scientists define <i>food</i> as “matter (building materials) that contains energy living things can use to live and grow, to heal wounds, and to keep all their parts working.” 	Make explicit links between science ideas and activities	<p>Show slides 1 and 2.</p> <p>NOTE TO TEACHER: <i>Using the document viewer, show two or three student work samples from the previous lesson. Select samples that have both strengths and weaknesses. Decide whether you’ll present the work or have each of the students who did the writing share their own work.</i></p> <p><i>Encourage the class to ask clarification questions, suggest corrections or additions, and agree or disagree.</i></p> <p>Goal: <i>Make sure that students are using the scientific definition of food appropriately.</i></p> <p>Show slide 3.</p> <p>This is the definition of <i>food</i> we’ll be using in these lessons. Remember that the big question we’re trying to answer in these lessons is <i>How do living things depend on one another to get the food (matter and energy) they need to live and grow?</i> [Point to where this question is posted in the classroom.]</p>		
2 min	<p>Lesson Focus Questions</p> <p>Synopsis: The teacher introduces the focus questions, <i>Do living things take in (“eat”) materials that are not food? What is your evidence?</i></p>	Set the purpose with a <u>focus question</u> or goal statement.	<p>Show slide 4.</p> <p>Today we’re going to use the scientific definition of <i>food</i> to answer these focus questions: <i>Do living things take in (“eat”) materials that are not food? What is your evidence?</i></p> <p>Write these questions in your science notebooks and draw a box around them.</p>		

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			<p>NOTE TO TEACHER: <i>Post the focus questions where students can refer to them throughout the lesson.</i></p> <p>We know all living things need food, but is everything they take into their bodies food? That’s what we’re going to investigate.</p>		
8 min	<p>Setup for Activity</p> <p>Synopsis: Students predict whether certain materials are food for living things.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • Scientists define <i>food</i> as “matter (building materials) that contains energy living things can use to live and grow, to heal wounds, and to keep all their parts working.” 	<p>Make explicit links between science ideas and activities before the activity.</p> <p>Ask questions to elicit student ideas and predictions.</p>	<p>NOTE TO TEACHER: <i>Distribute handout 1.2 Food versus Not Food.</i></p> <p>Show slide 5.</p> <p>First we’re going to make some predictions. Look at the list of materials on page 1 of the handout and put a check mark beside each one to indicate whether you think it IS food or IS NOT food for living things. Be ready to share the reasons for your choices.</p> <p>Individual prediction time.</p> <p>Whole-class discussion: Think about our focus questions, <i>Do living things take in (“eat”) materials that are not food? What is your evidence?</i></p> <p>Do you think anything on this list is not food? What is your reason for that conclusion? Listen to see if you agree or disagree with the suggested ideas.</p> <p>NOTE TO TEACHER: <i>Have several students share their reasoning. Notice whether students agree or disagree about which materials are food. Don’t correct their ideas at this time, but</i></p>	<p>I think orange juice and water aren’t food because they’re drinks.</p> <p>Because you chew food but not water.</p>	<p>What is your reason for saying that drinks aren’t food?</p>

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			<p><i>suggest that you'll get answers today by exploring a scientific definition of food.</i></p>	<p>I disagree, because you can't live without water, so I think it's food.</p> <p>I disagree, too, because I think orange juice and water give you energy like in our scientific definition. So I think they're both food.</p> <p>I think salt isn't food, because it's a spice. I don't think it gives you any energy.</p> <p>I think mints aren't food; they're just for your breath.</p>	<p>Can you link that to the scientific definition of <i>food</i>?</p>
15 min	<p>Activity</p> <p>Synopsis: Working in small groups, students examine nutrition labels to gather information that will help them decide whether certain materials are or are not food by the scientific definition.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • Food for living things provides both matter 		<p>NOTE TO TEACHER: <i>Create working groups of three or four students. Distribute the containers (or the handout containing nutrition labels) to each group. Remind students how they examined the chewing-gum nutrition labels in the previous lesson. If you think it is necessary, work through the orange-juice example together.</i></p> <p>In this activity, you and your teammates will use nutrition labels to find out which substances are or are not food for living things based on the scientific definition.</p>		

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	<p>and energy.</p> <ul style="list-style-type: none"> • Energy in food is measured in Calories (Cal). • Matter in food has mass and is measured in grams (g). 	<p>Make explicit links between science ideas and activities during the activity.</p> <p>Engage students in analyzing and interpreting data and observations.</p>	<p>Show slide 6.</p> <p>Let’s read the introduction to the investigation on page 2 of your handout before your group completes the chart.</p> <p>Using the data on the nutrition labels, you’ll see what you can find out about orange juice, water, and other materials. Are they food or not food by the scientific definition?</p> <p>Record your ideas on the data chart. When you’re finished, raise your hand so I can check your work. Then answer analysis questions on page 3 of the handout. Write your responses in your science notebooks using complete sentences.</p> <p>Small-group work time.</p> <p>NOTE TO TEACHER: <i>Allow small groups to work on their own, but circulate among the groups to help them interpret the nutrition labels, if necessary. They’ll need help interpreting the plant-food label. They should notice, for example, that no Calories are listed on this label.</i></p> <p>ELL support: As students are working together, encourage them to share their ideas with one another in their small groups.</p> <p><i>Check students’ charts as they finish, and probe for understanding by asking questions like “Why did you decide that orange juice is food?” or</i></p>	<p><i>[Students don’t share their ideas at this time.]</i></p>	

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			“Why did you decide that water is not food?”		
10 min	<p>Follow-Up to Activity</p> <p>Synopsis: Students answer the analysis questions and then compare their responses with a partner. Following this activity is a class discussion of conclusions.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> To be defined as food, substances must provide both matter (mass) and energy (Calories). By the scientific definition of <i>food</i>, water, vitamins, fertilizers, minerals, Seltzer water (carbon dioxide), and salt are not food. They’re matter, but they don’t provide energy for living things. Our evidence is that they have no Calories, which is a measure of food energy. 	Make explicit links between science ideas and activities after the activity.	<p>Show slide 7.</p> <p>Now look at the analysis questions on page 3 of your handout.</p> <p>NOTE TO TEACHER: <i>If time is running short, have students work in pairs on this task (skip the individual work time).</i></p> <p>Individuals: Work independently to answer the four analysis questions on the handout. Write your answers in complete sentences using the sentence starters provided.</p> <p>Individual work time.</p> <p>Turn and Talk: Turn to a partner and discuss your answers. Do you agree? Disagree? Make changes if you want to.</p> <p>Show slide 8.</p> <p>Whole-class discussion: Which of these materials are food? Explain why you think so.</p> <p>NOTE TO TEACHER: <i>Ask challenge questions that push students to connect their ideas with the scientific definition of food.</i></p> <p>ELL support: Ask challenge questions for all responses.</p> <p>Show slide 9.</p>	Orange juice, sugar, and mints have both matter (in grams) and energy (in Calories), so they’re food.	<p><i>If unexpected responses arise, ask challenge questions:</i></p> <p>What is your evidence for that?</p> <p>Tell me how the scientific definition matches your idea.</p> <p>How do you know</p>

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			<p>Which items are not food by the scientific definition, and why?</p> <p> STOP AND THINK</p> <p><i>Listen to students' ideas. What's visible about student thinking? Are they using the scientific definition of food appropriately? What's still confusing for them?</i></p> <p>NOTE TO TEACHER: <i>If some students insist that water (or other nonfood substances, such as vitamins) is food, keep directing them back to the scientific definition of food. To be classified as food, a substance must provide both matter and energy.</i></p>	<p>Water, plant food, vitamins, Seltzer water (carbon dioxide), and salt don't contain energy (Calories), so they aren't food by the scientific definition.</p> <p>I think water is food because we can't live without it.</p> <p>Fertilizers and water aren't food for us, but I think they're food for plants.</p>	<p>water can give you energy (Calories)?</p> <p>What did you learn from examining the water nutrition label?</p> <p>Are you saying that plants don't need food energy (Calories)?</p>
5 min	<p>Synthesize/Summarize Today's Lesson</p> <p>Synopsis: Students write about and/or discuss the focus questions, <i>Do living things take in ("eat") materials that are not food? What is your evidence?</i></p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> To be defined as food, substances must provide both matter 	<p>Highlight key science ideas and focus question throughout.</p> <p>Engage students in making connections by</p>	<p>Show slide 10.</p> <p>Today we addressed the focus questions, <i>Do living things take in ("eat") materials that are not food? What is your evidence?</i></p> <p>Individuals: Now I want you to use what you know about the scientific definition of <i>food</i> to answer these questions in your notebooks. Make sure to provide evidence. Give your best answer and write in complete sentences.</p> <p>NOTE TO TEACHER: <i>Students don't have to use the exact wording of the scientific definition, but their ideas should reflect an understanding</i></p>		<p><i>Challenge questions:</i></p> <p>What is the scientific definition of <i>food</i>?</p> <p>What is your reasoning?</p>

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	<p><i>and</i> energy for living things to live and grow. By this definition, water, plant food, vitamins, Seltzer water (carbon dioxide), and salt are not food because they have no Calories (they can't provide energy that living things can use to live and grow).</p>	<p>synthesizing and summarizing key science ideas.</p>	<p><i>of the ideas.</i></p> <p><i>If time is running short, skip the individual writing.</i></p> <p>Individual writing time.</p> <p>Turn and Talk. Discuss your answers to the focus questions with a partner and make sure to provide evidence.</p> <p>Whole-class share-out. How did you answer these questions? Let's hear your ideas, and make sure to back up your answers with evidence.</p>		<p>How do you know?</p>
<p>1 min</p>	<p>Link to Next Lesson</p> <p>Synopsis: The teacher links science ideas to the next lesson.</p>	<p>Link science ideas to other science ideas.</p>	<p>Show slide 11.</p> <p>Tomorrow we'll think about how plants get the food—the matter and energy—they need to live and grow. We'll also explore the question, <i>What is food for plants?</i></p>		