Matter Models

7.5

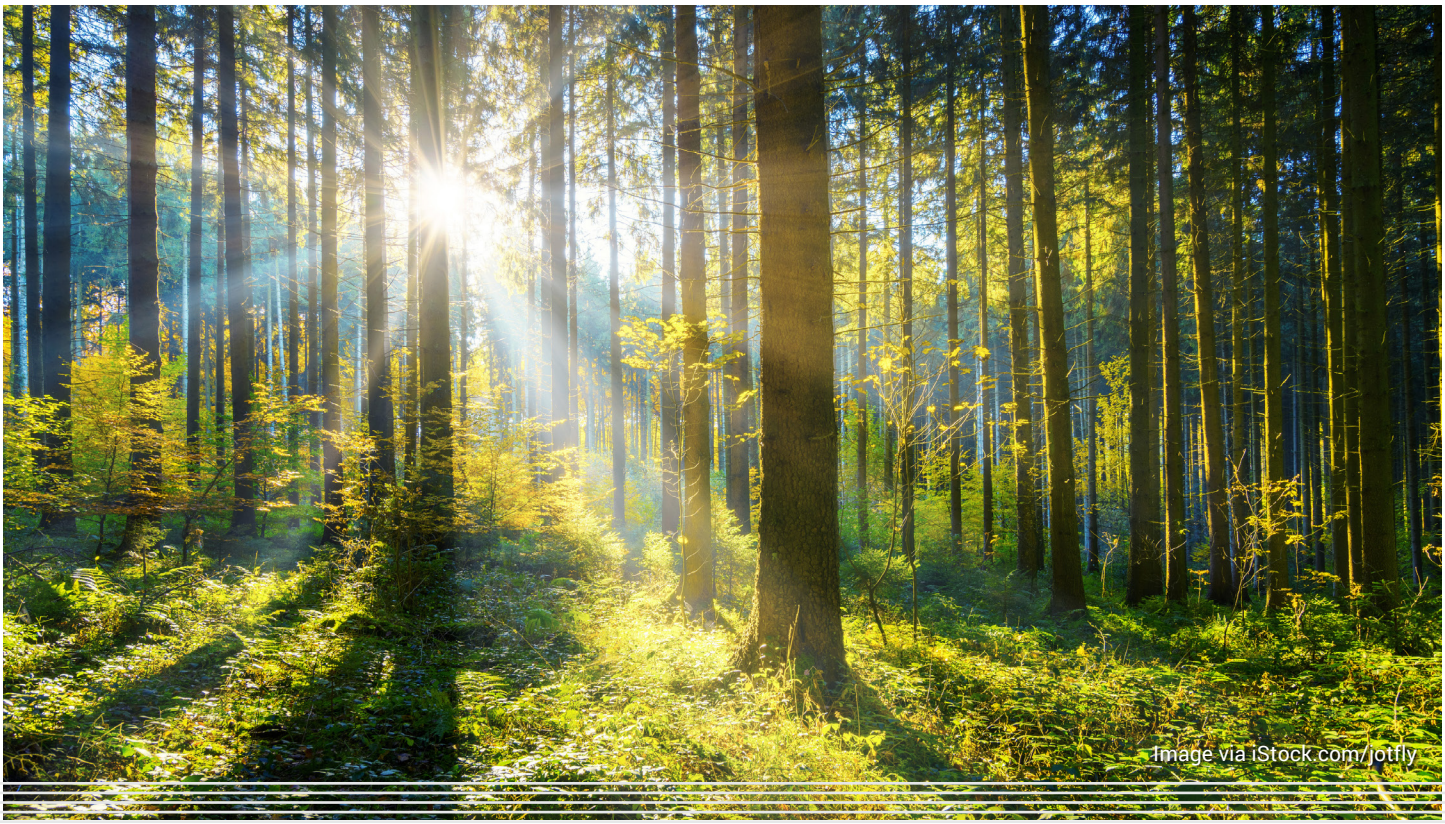


Image via iStock.com/jotfly

Anchoring Phenomenon

Tiny seedlings grow and transform into trees with a great quantity of matter.

Lesson Concept

Develop a model to explain how plants use the Sun's energy to recombine carbon dioxide and water into oxygen and carbon-based organic molecules, like sugar.

Investigative Phenomenon

When matter exits a plant, the molecules are in a different arrangement from when the matter entered.

Standards

Refer to Appendix 7.5 for NGSS, CCSS (ELA), and California ELD Standards.

A project of CA NGSS K–8 Early Implementation Initiative.

Storyline Link

In previous lessons, the students developed an understanding of inputs and outputs related to photosynthesis, including those not observable with the unaided eye. In this lesson, students will think about what is accumulated in the plant due to photosynthesis. Students use different-colored sticky notes to model the creation of glucose and cellulose through chemical processes. Students also extend their use of written models to the use of physical models to explain the photosynthesis process and the relationship between inputs, processes, and outputs at the atomic scale. Students continue to use concepts of systems and stability and change to think about how energy is used to rearrange matter at a very small scale, connecting changes at a small scale to the macro-scale observations of the overall phenomenon.

Throughout the lesson, a flag (▶) denotes formative assessment opportunities where you may change instruction in response to students' level of understanding and making sense of phenomena.

Time

120 minutes

Two 60-minute session

Materials

Whole Class

- ❑ Chart paper
- ❑ Markers

Group (Groups of 4)

- ❑ Sticky notes (assorted colors)
- ❑ 7.5.G1: Flowchart

Individual

- ❑ 7.5.H1: Photosynthesis Reading
- ❑ 7.5.H1a: Photosynthesis Reading Alternate Text
  - ❑ Overview of Cellular Respiration video (link in Photosynthesis Reading) https://www.khanacademy.org/science/biology/cellular-respiration-and-fermentation/overview-of-cellular-respiration-steps/v/overview-of-cellular-respiration
  - ❑ Lactic Acid Fermentation video (link in Photosynthesis Reading) https://www.khanacademy.org/science/biology/cellular-respiration-and-fermentation/variations-on-cellular-respiration/v/lactic-acid-fermentation
- ❑ Science notebook
- ❑ Baggies

- ❑ Sticky notes (assorted colors)
- ❑ Pieces of paper

Advance Preparation

1. Review **7.5.H1: Photosynthesis Reading** and **7.5.H1a: Photosynthesis Reading Alternate Text**.
2. Print one copy per student of **7.5.H1: Photosynthesis Reading** or **7.5.H1a: Photosynthesis Reading Alternate Text**
3. Print one copy per two students of **7.5.G1: Flow Chart** and have a copy ready to display to the class.
4. Assemble sticky notes and paper in baggies.

Procedure

Explore/Explain I (120 minutes)

Develop a model to explain how plants use the Sun's energy to recombine carbon dioxide and water into oxygen and carbon-based organic molecules, like sugar.

Review Previous Learnings

1. Ask students to use their science notebook to review the materials (matter) they have in their current model to represent the matter that allows a tree to grow and gain mass. Ask students to refer to the questions generated about trees and the matter they accumulate and consider if there are any new questions they want to add. Add new questions if necessary. This would also be a good time to review the previous class questions and identify those which have been answered and those which remain.

> **TEACHER NOTE**
>
> We are reaching the end of the unit. It is highly likely that there will be student questions left unanswered. It is important to acknowledge the questions that have been answered while recognizing that some questions have not. At this point in the lesson, it is appropriate to add questions that may not be resolved before the end of the unit. Post them and consider which ones might become options for individual student research or which ones might be connected to future units.

2. Tell the class that they will now consider their current models and reflect on how they might improve them. Remind students that they started with their initial model and have revised those models multiple times as they have gathered new information. Ask the class to consider the following questions:
   a. With what parts of their model are they satisfied?
   b. What parts of the model do they think could be improved?
   c. What information do they need to improve their models?
   d. What questions do they still have about how the plants are using energy to recombine matter?
3. Students should discuss these questions with a peer and then with their table groups before you conduct a whole-class discussion. This progression of sharing allows students time to develop their ideas and confidence in those ideas. English Learners will benefit from communicating ideas in varying types of interactions (peer-to-peer, small group, student-to-teacher, whole class). Ask students to consider if pursuing any of the questions on the class chart could be useful to improve their current models. Record student ideas on a chart. You may want to use multiple charts to separate their ideas about their models and energy and matter. Note: this should be a quick discussion for the purpose of linking their prior learnings to the next activity. Don't spend more than 15 minutes on this unless you want to extend the overall time of this lesson. However, if students are unclear about how their

model represents visible and invisible components in their model (Lesson 7.4: Investigating Gases) or how they represent the flow of matter through the system as a tree grows, pause to review concepts in each dimension before moving on in the lesson.

4. Ask students to record in their science notebook any ideas they want to remember from the class discussion.

Flowchart

5. Present **7.5.G1: Flowchart** and explain that this flowchart will help to answer questions related to the process that plants use to live and grow. The term photosynthesis is not necessary at this point unless students have already brought up the term during class discussions. Show students how the flowchart has areas to show the inputs and outputs of the process, as well as an area to indicate any accumulated materials. Remind students that they have used and developed models before. Ask students, "What do you remember about how they have used or developed models throughout the learning sequence? How have your models changed to improve their ability to describe the phenomenon? What aspects of your models have been useful?"
6. Distribute **7.5.G1: Flowchart** to each table group. Direct students to use the information gathered from their previous investigations to identify the inputs and outputs of the process. Students may need additional support locating information in their science notebooks. Students can work in groups and use sticky notes to flag information.
7. There is also a space for accumulation (things that are made but not released as waste). Tell students to write materials on sticky notes and to place each different material on its own sticky note. Instruct students to keep track of questions that come up and place those on sticky notes, too. Those can be placed on a corner of the chart. At this point in the learning sequence, students should know that carbon dioxide and water are inputs, matter is accumulated, and water and oxygen are outputs. These details were discussed in Lesson 7.3: Historical Investigations and Lesson 7.4: Investigating Gases.
8. Rotate around the room as groups discuss and create sticky notes with inputs and outputs. If students are struggling, remind them to look through their notes for useful evidence. Students can use previous models to identify inputs and outputs. If students have questions, encourage them to record those on sticky notes.
9. Once students have completed **7.5.G1: Flowchart**, create a class consensus chart on a board or document camera. Circulate from group to group and ask teams to share one sticky note from anywhere on their chart. As groups share, ask the class if they agree or disagree with the suggestion. Generate consensus around the inputs. Students may need support in separating material that plants need (sunlight) from those that contribute to new mass during growth (water and carbon dioxide). Sunlight is a required component, but it is energy and not matter. Ask students to consider how they might represent the "input" materials. How might you physically represent water? carbon dioxide? sunlight? Accept any student suggestions for a representation as long as there is a reasonable rationale behind it.

Explore

Modeling Matter Rearrangement

10. Refer to the student questions and review any that relate to matter being taken in by the plant, released by the plant, or rearranged within the plant. Explain to the students that they will now address these questions by focusing on the molecules that make up the input materials: water and carbon dioxide. Students can use previous models to identify inputs and outputs. If students have questions, encourage them to record those on sticky notes.

> **TEACHER NOTE**
>
> This next part of the lesson is designed to address common alternative conceptions related to matter and energy. Middle school students often fail to see material from the air (CO_2) as having enough mass to contribute to growth in plants. They also do not always understand that plants are chemical systems, converting matter taken in from the environment into food molecules. Manipulating the physical models is a strategy to help students understand what happens to the matter that is taken in by plants, how it is converted to new molecules, and how this increases the mass of the plant.

11. Distribute baggies filled with different-colored sticky notes or pieces of paper. Ask the class to discuss how they might represent the particles that make up the "input" materials.
12. Tell students that we are going to use the sticky notes to represent the atoms that can be joined (stuck together) to represent molecules. Tell students to work with the "atoms" to try and arrange molecules of carbon dioxide and water on the "inputs" side of their **7.5.G1: Flowchart**. Do not try to explain the bonding rules for atoms; simply facilitate students' understanding that water is an oxygen atom with two hydrogen atoms and carbon dioxide is made of one carbon atom and two oxygen atoms. The point is not to understand bonding in molecules but to represent the matter that creates water and carbon dioxide and to physically represent how they are arranged and rearranged during photosynthesis. Allow students to discuss how they want to represent the molecules with different colored paper or sticky notes. If students are unable to explain their representations, ask them to consider what they know about a water molecule and how they might represent those characteristics.
13. Once students have water and carbon dioxide molecules arranged using paper, tell students that plants take these materials, "break" them apart, and then rearrange them into new materials. Ask students to think about these questions: How are these materials are rearranged? Why does the plant rearrange the atoms in water and carbon dioxide? What are the implications for this rearranging of material? Ask students to discuss their ideas in their groups and record some possible ideas in their science notebook.
14. End the lesson by explaining to students that this unit is building on their previous lesson related to PS1 and extending their understanding of how Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. PS1.A.

TEACHER NOTE

This unit is intended to follow units related to PS1. It is expected that students enter this lesson with an understanding that Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. PS1.A.

Students can use this modeling strategy in later units when cellular respiration is discussed to build an understanding of how the two processes are related.

This is a good stopping place if you need to break the lesson into two days. Before proceeding to the next part, make sure students understand that the physical models of carbon dioxide and water represent the inputs of photosynthesis and connect these inputs to previous models of energy flow (in particular Lesson 7.3: Historical Investigations and Lesson 7.4: Investigating Gases) and evidence gathered through investigations (Lesson 7.3: Historical Investigations and Lesson 7.4: Investigating Gases). Students should also recognize that energy from sunlight is necessary for the matter to "break" apart. If these concepts are not clear to students, stop, and direct students to review their notes and previous models to clarify these ideas.

Reading to Enhance Explanations

15. Introduce **7.5.H1: Photosynthesis Reading** and tell students that this reading contains information about the process plants use to live and grow. For English Learners or below-grade-level readers, an alternate reading is provided (**7.5.H1a Photosynthesis Reading Alternate Text**) that has the same information presented through simpler text. Explain to students that they will use the reading to evaluate their current ideas in light of this new information. Distribute the reading and tell students to annotate the text by:
    a. circling information that is consistent with your current ideas
    b. highlighting information that is missing from your current ideas but can strengthen your ideas
    c. underlying information that is inconsistent with your ideas and brings up a question.

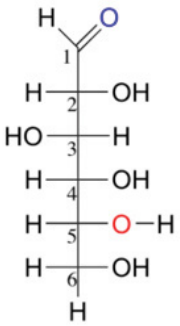
    Give students 10 minutes to read and annotate.
16. Once students have completed their annotations, tell them to discuss their annotations with their groups. Remind students of the group roles introduced in Lesson 7.4: Investigating Gas; however, students will not be presenting their ideas to the larger class. They may decide to have two students summarize. Direct students to start with the information from the reading that was consistent with their previous ideas. Tell students that each person in the group should share one "consistent" annotation at a time, rotating until all group members have shared this type of annotation. Next, students should share the information they found that could strengthen their current ideas, rotating around group members as they did before. Finally, students should share their questions about information that was inconsistent with the representations of "inputs" on the chart. As students share their annotations, check that students are citing specific textual evidence to support their analysis of what the text says. Allow time for the summarizer to review the important points of the conversation. Students should add or edit the molecules on the input side of **7.5.G1: Flowchart**.

17. Direct students to take their carbon dioxide and water molecules apart and try to create the "sugar" molecule described in the reading. Remind students that they can use additional sticky notes or paper to do so.

Image by WestEd

TEACHER NOTE

Students may need help finding the pattern of sugar. It is good to let students work through possible arrangements before providing suggestions, such as sugar has a carbon backbone, or providing a visual of a sugar molecule. Students should explore possible arrangements but avoid unproductive levels of frustration. Initially, students will make a simplified model of sugar. An example is provided below.



However, plants typically produce starch which links sugar molecules in chains.

18. As students work with their paper models, ask students to consider how the materials in the original CO_2 and water were rearranged. Facilitate small group discussions as you circulate around the room. How has the matter they started with changed? As matter has rearranged, what has happened to the original oxygen, hydrogen, and carbon atoms? How is energy involved in this process (beginning, middle, and end)? Students should use the crosscutting concept of Energy and Matter to make sense of how photosynthesis takes in matter and rearranges that matter without losing or gaining new matter in the process (it is conserved). Students should also consider how energy flows through the system as this process occurs.
19. Once students have created a sugar molecule, they should notice leftover "oxygen" atoms. Ask students why they think there are leftover oxygen atoms. Note: it is important that students recognize that the "extra" oxygen is simply leftover from the process. Emphasize that plants do not create oxygen; it is simply a byproduct of the process.
20. Ask students to repeat the process again with different amounts of inputs such as less water. How does this affect the outputs? What if there is more carbon dioxide inputted into the system? How are the outputs affected? Tell students to repeat the process with different amounts of inputs into the system to investigate how the outputs of matter are affected.

TEACHER NOTE

Students may have lingering alternative conceptions or fragile understandings at this point. The reading and the previous activities are intended to address lingering alternate conceptions like the confusion between energy and food, plants getting food from the environment rather than combining matter internally, and that CO_2 from the air is too small to become tangible matter. If students are still struggling with the notion that CO_2 is a gas AND has matter, you can show students dry ice and explain that dry ice is CO_2 as a solid. Students should use protective gloves when handling dry ice.

Explain

21. Ask students to consider the following questions in their groups.
    a. How do plants rearrange matter? What energy is used to do this?
    b. How do changes in the inputs of the system affect the processes and outputs?
    c. How does the rearrangement of matter at this small scale explain the observations of the seedling growing into a large tree?

    Summarizers should record the group's ideas on their charts after they have discussed and reviewed the summary. Encourage students to use evidence from their sticky note models and the reading to support their explanations. Circulate around the room and observe student discussions and explanations. You can ask questions such as "how do you know?" and "What evidence can you use to support that idea?" If students are using terminology like photosynthesis or glucose, ask students to define the terms to check that they fully comprehend what these terms mean in this context. Energy is needed for matter to be rearranged. If students have not considered this, ask them about the role of sunlight in the process: "Why do you think sunlight is necessary?" Allow students 15 minutes to work on their group explanations.

22. As students share their developing explanations with you while they work in their small groups, encourage students to clarify what evidence they are using to justify their ideas. Students should include evidence from their use of the physical models as well as the text. When students use the text in their justification, check that they are able to trace and evaluate the argument and specific claims in a text. Ask students to consider whether the reasoning is sound and if the evidence is relevant and sufficient to support their claim.

TEACHER NOTE

At this point, you should hear students connecting details from the sticky note models and the reading to the idea that plants take in CO_2 (and other materials) and rearrange the atoms to make sugars and oxygen. Students should also explain how this process requires energy from the Sun to create two types of new arrangements of matter: glucose for energy and cellulose for growth. Students should be able to apply these concepts to energy driving the flow of matter in and out of the system.

23. Conduct a whole-class discussion by having groups share their explanations. Once groups have shared, ask the class "What ideas were consistent across the explanations?" and record these ideas on a chart or whiteboard. Ask the students if there were any conflicting ideas. Discuss the conflicting ideas. In the discussion, ask students to consider what evidence was used to develop each explanation. Was it the same evidence? Different evidence? If it was the same evidence, did each group interpret the evidence in the same way? Continue to discuss until the class either has reached consensus or identified an area for further investigation.
24. Close this part of the lesson by providing students 5 minutes to record their own explanation of why plants rearrange matter in their own science notebook. Tell students that they can copy their group explanation into their science notebook if they are satisfied with that explanation, or they can modify that explanation with information from the class debrief. ▶ Science notebooks can be collected at the end of this lesson so you can assess students' understanding of each of the three dimensions from their individual explanations. It is not recommended that the student explanations be evaluated for a grade or score. This type of artifact will be produced in Lesson 7.6: Return to Seedling Growth Models. ▶ However, it is important to provide student feedback in the science notebooks. The rubric in Lesson 7.6: Return to Seedling Growth Models can be used as a guide for the type of feedback that should be provided to students. Similar to the feedback provided in Lesson 7.4: Investigating Gases, remind students that they should consider the feedback as suggestions for areas that were unclear to the reader (you) or not yet included. Tell them if something in the feedback is unclear, they should ask you for clarification.
25. In addition to providing feedback to individual students, the science notebooks should be reviewed to identify trends in student understanding before moving onto the end of the unit. If you find a significant number of students have not reached the expected goal in any of the three dimensions or not achieved an overall understanding of how plants add mass from the environment, this is a good time to pause and revisit previous activities or insert additional readings or activities.

TEACHER NOTE

Suggested resources for additional activities or videos:

- Modeling Photosynthesis and Cellular Respiration
  https://www.calacademy.org/educators/lesson-plans/modelling-photosynthesis-and-cellular-respiration
- Photosynthetic Floatation
  https://www.exploratorium.edu/snacks/photosynthetic-floatation
- Photosynthesis
  https://media.hhmi.org/biointeractive/click/photosynthesis/?_ga=2.43879269.1128105118.1549560377-1245758253.1535231461

Suggested sources for additional activities or readings for students above the target level

- Photosynthesis Colors
  https://www.calacademy.org/explore-science/photosynthesis-colors
- Leaf Filter
  https://www.exploratorium.edu/snacks/leaf-filter

Returning to Student Questions and Models

26. Review the charts created at the beginning of the lesson and ask students to review the questions. What questions have been answered? What questions remain? Tell students to review their current models and compare them to the explanation they just completed. Can they add or revise their model now? Does their model adequately explain how energy is used to rearrange matter? At this point, students should understand that trees use light to rearrange the molecules in water and carbon dioxide to create sugar for energy needs as well as cellulose that creates new mass in the tree.

TEACHER NOTE

Students should revise their model to accurately communicate how molecules of CO_2 and H_2O are taken in by trees and rearranged to create new material. The models should indicate that CO_2 and water molecules are broken apart and rearranged as sugar for energy or cellulose for growth. Photosynthesis should be identified as the process that plants use to convert matter on the model, and the model should indicate that oxygen is released during the process as well. The model should include some explanation that light/solar energy is required for this to happen and that the transfer of solar energy into food (chemical energy) drives the entire process of rearranging matter but that the energy is not lost, only rearranged.

References

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Khan Academy. *Overview of Cellular Respiration (Video)*. http://www.khanacademy.org/science/biology/cellular-respiration-and-fermentation/overview-of-cellular-respiration-steps/v/overview-of-cellular-respiration.

Khan Academy. *Lactic Acid Fermentation (Video)*. http://www.khanacademy.org/science/biology/cellular-respiration-and-fermentation/variations-on-cellular-respiration/v/lactic-acid-fermentation.

Toolbox Table of Contents

Flowchart

INPUT

OUTPUT

Photosynthesis Reading

Have you thanked a tree today? We all owe our lives to plants and other organisms that absorb light. All living things, including humans, need energy for growth, repair, and reproduction. However, most organisms are not able to use light energy directly for these energy needs. We need some way to change that light energy into chemical energy. Plants change light energy into chemical energy through a process called photosynthesis.

Photosynthesis is the process in which plants take sunlight energy and convert it into energy that can be stored as carbohydrates. This process provides the chemical energy that almost all species use. Glucose, an energy-rich sugar molecule, is the most essential carbohydrate molecule. This process is driven by light energy to build glucose molecules from water and carbon dioxide. A byproduct of this process is oxygen, some of which is released. These glucose molecules provide two important resources to organisms: immediate energy and material for growth.

- **Energy**. The glucose molecules provide fuel for cells. The chemical energy in glucose can be then used through processes like cellular respiration or fermentation and meet the cell's immediate energy needs. Starches are a group of molecules that connect many sugar molecules together and provide energy for later needs.
- **Growth**. Air is mostly composed of three gases: nitrogen, oxygen, and carbon dioxide. In order to get the carbon to grow, plants absorb carbon dioxide from the air.

Photosynthesis Reading (continued)

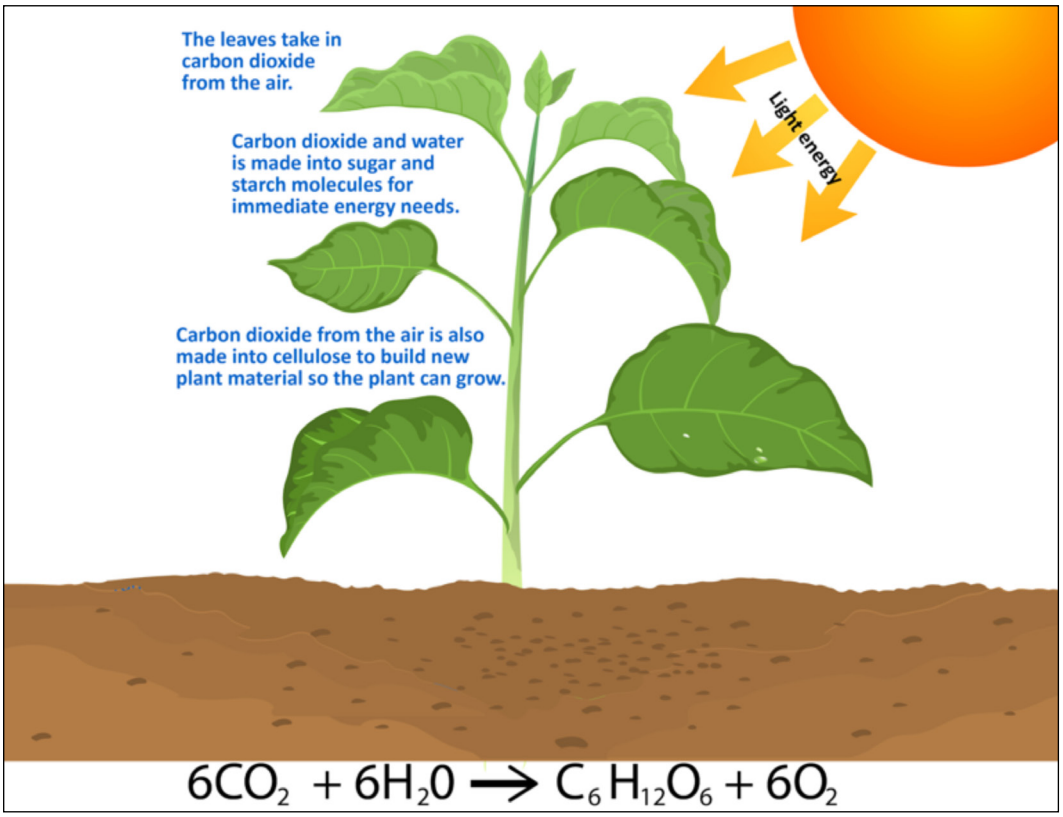

Image via iStock.com/mapichai modified by WestEd.

The carbon taken from the carbon dioxide in the air can be integrated into other organic molecules besides sugar. This carbon makes up most of the material that plants use to build new leaves, stems, and roots. The carbon that's used to make sugars during photosynthesis can be used to build other types of organic molecules that cells need. Cellulose is similar to starches. It is a molecule that is made from long strings of glucose molecules. In cellulose, long chains of glucose molecules are linked together as in starch, but the arrangement is different. This is why humans cannot digest cellulose, but we can digest starches.

Photosynthesis Reading Alternative Text

We are alive because plants and other organisms take in light. All organisms, including humans, need energy for growth, repair, and reproduction. However, most living organisms can't use light energy directly for their energy needs. We need some way to change that light into chemical energy. Plants change light energy into chemical energy through photosynthesis.

What is photosynthesis?

Photosynthesis is the way plants change sunlight energy into energy that is stored. It gives chemical energy for almost all types of living things. Glucose is an energy-rich sugar molecule. It is the most essential carbohydrate molecule. The process of photosynthesis is driven by light energy to make glucose molecules from water and carbon dioxide. Oxygen is let go as waste. The glucose molecules give living things two important resources: energy and material for growth.

- **Energy**. Energy. The glucose molecules give cells fuel. This chemical energy can be made through processes like cellular respiration or fermentation and used for the cell's immediate energy needs. Starches are a group of molecules that link many sugar molecules together. They give the plant energy for later.
- **Growth**. Air is mostly made of nitrogen, oxygen, and carbon dioxide. Plants take in carbon dioxide from the air.

Photosynthesis Reading Alternative Text (continued)

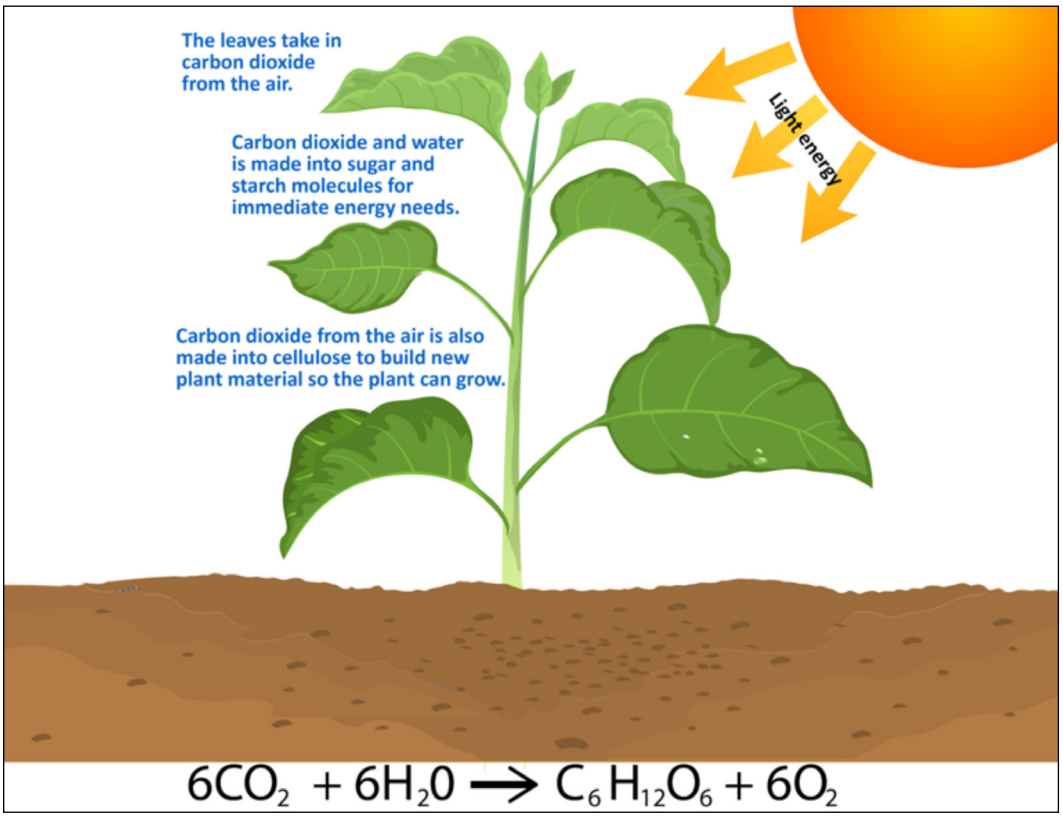

Image via iStock.com/mapichai modified by WestEd.

Carbon from the carbon dioxide in the air can be put into other molecules besides sugar. Carbon makes up most of the building blocks that plants use to build new leaves, stems, and roots. The carbon that is put into sugars during photosynthesis can be used to build other types of molecules cells need. Cellulose is a molecule. It is made from long strings of glucose molecules, as in a starch. In cellulose, the glucose molecules are put together in a different way than starch. Humans can digest starch. They cannot digest cellulose.

Appendix 7.5

Matter Models

Next Generation Science Standards (NGSS)

This lesson is building toward:

PERFORMANCE EXPECTATIONS (PE)	
MS-LS1-6	Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. [Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.] [*Assessment Boundary: Assessment does not include the biochemical mechanisms of photosynthesis.*]

NGSS Lead States. 2013. Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.

SCIENCE AND ENGINEERING PRACTICES (SEP)
Developing and Using Models
• Develop a model to describe unobservable mechanisms.
Obtaining, Evaluating and Communicating Information
• Critically read scientific texts adapted for classroom use to determine the central ideas and/or obtain scientific and/or technical information to describe patterns in and/or evidence about the natural and designed world(s).
Constructing Explanations and Designing Solutions
• Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem. (From Grade 3–5)

DISCIPLINARY CORE IDEAS (DCI)
LS1.C Organization for Matter and Energy Flow in Organisms
• Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use.
PS3.D Energy in Chemical Processes and Everyday Life
• The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon based organic molecules and release oxygen.

Appendix 7.5

CROSSCUTTING CONCEPTS (CCC)
Energy and Matter
• Matter is made of particles, Energy can be transferred in various ways and between objects. (From Grade 3–5) • Matter is conserved because atoms are conserved in physical and chemical processes. • Within a natural system, the transfer of energy drives the motion and/or cycling of matter.
Systems and System Models
• Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within a system. • Systems may interact with other systems; they may have sub-systems and be part of larger complex systems.

Common Core State Standards (CCSS)

CCSS READING
ELA-LITERACY.RST.6-8.1
Cite specific textual evidence to support analysis of science and technical texts.
ELA-LITERACY RI.7.8
Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims.

California English Language Development (ELD) Standards

CA ELD		
Part I 7.6 Reading/viewing closely		
EMERGING	EXPANDING	BRIDGING
P1.7.6a Explain ideas, phenomena, processes, and text relationships (e.g., compare/contrast, cause/effect, problem/solution) based on close reading of a variety of grade appropriate texts and viewing of multimedia with substantial support.	**P1.7.6a** Explain ideas, phenomena, processes, and text relationships (e.g., compare/contrast, cause/effect, problem/solution) based on close reading of a variety of grade level texts and viewing of multimedia with moderate support.	**P1.7.6a** Explain ideas, phenomena, processes, and text relationships (e.g., compare/contrast, cause/effect, problem/solution) based on close reading of a variety of grade level texts and viewing of multimedia with light support.