



## TEACHER GUIDE

# PHOTOSYNTHESIS AND CELLULAR RESPIRATION GRADES 6-8

### COMMON MISCONCEPTIONS

- **Only animals use cellular respiration.**  
Plants use both photosynthesis and cellular respiration. Photosynthesis occurs in the presence of light and takes place in the leaves. When there is no light or when plants, such as trees, lose their leaves, they go through the process of cellular respiration to use their stored energy to stay alive.
- **Algae is a plant.**  
Algae is often referred to as a plant; however, it is not a plant, but is a part of the kingdom Protista. Algae is mostly found in aquatic environments, contains chloroplast, and is able to photosynthesize. Seaweeds, such as kelp, are also algae.
- **Only plants photosynthesize.**  
Plants go through the process of photosynthesis; however, so do algae and some bacteria. Cyanobacteria, often called *blue-green algae*, are bacteria that can photosynthesize and are found in aquatic environments. Cyanobacteria do not have chloroplast like plants and algae.

### PHOTOSYNTHESIS

Photosynthesis is a process that plants and other organisms use to make what they need to grow and survive. This process combines carbon dioxide and water, using energy from the Sun to start a chemical reaction that produces sugar and oxygen.

### CELLULAR RESPIRATION

Cellular respiration is a process in which an organism uses stored energy. When there is not an immediate energy source, such as food for animals or sunlight for plants, organisms use what they have stored. This chemical process has several steps and breaks down stored energy (glucose and fat) into energy that the organism needs to survive.

## PHYTOPLANKTON

The term *phytoplankton* is used to refer to all photosynthetic microorganisms found in aquatic environments. Phytoplankton is a broad category that includes both algae and cyanobacteria, as well as other microorganisms that photosynthesize such as dinoflagellate and diatoms.

## TEACHER TIPS

Many students come to middle school having heard the term *photosynthesis*; however, they do not understand what it is or how it works. Allow students to come to some of these understandings as they work through the activity. Giving students the time and space needed to add to their understanding on their own gives students a deeper connection to the content and allows them to commit these ideas to memory. Once these ideas are concrete, adding abstract ideas, like how gas is used by plants in a chemical reaction, becomes easier for students to figure out and explain.

## ABOUT THIS LESSON

**This lesson was created by the National Science Teaching Association (NSTA) to pair with the Generation Genius video and support NGSS.**

**They have requested we provide the following background with this lesson:**

*The Next Generation Science Standards (NGSS)* are the national standards on how students learn science, and they are based on contemporary research presented in *A Framework for K–12 Science Education (the Framework)*. The shift in science teaching and learning required by the Framework is summarized in this infographic: [A New Vision for Science Education](#).

At the start of each Generation Genius lesson, students are presented with a phenomenon, then they try to explain it. Students will notice they have gaps in their knowledge and ask questions, which motivates them to build ownership of science ideas they need in order to explain how or why the phenomenon occurred. The way students build ownership of science and engineering ideas is through active engagement in the science and engineering practices (SEPs). This process of sensemaking, or doing science to figure out how the world works, is one of the major shifts the *Framework* encourages.

To engage in the SEPs, students should be part of a learning community that allows them to share their ideas, evaluate competing ideas, give and receive critiques, and reach consensus. Students can start by sharing ideas with a partner, then with a small group, and finally, with the whole class. This strategy creates opportunities for all students to be heard, build confidence, and have something to contribute to whole-class discussions. Each Generation Genius lesson provides conversational supports to facilitate such productive student discussions to contribute to sensemaking.

Excited to continue your shift toward the new vision for science education? Check out the [Generation Genius Teacher Guide](#) page on the NSTA website for resources and strategies to engage every student in your classroom in **doing** science.



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A non-profit dedicated to raising academic standards and graduation requirements.*