

# 7.4 Photosynthesis and Matter Cycling

Content Area: **Science**  
Course(s):  
Time Period: **Marking Period 3**  
Length: **6 weeks**  
Status: **Published**

## Course Pacing Guide

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Unit	Marking Period	Length
Chemical Reactions and Matter Transformation	1	6 weeks
Cells and Systems (2019 only)	1	6 weeks
Metabolic Reactions	2	6 weeks
Genetics (2019 only)	2,3	4 weeks
Evolution (2019 only)	3	4 weeks
Photosynthesis and Matter Cycling	4	8 weeks
Ecosystems	4	6 weeks

## Unit Overview

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This unit on photosynthesis and matter cycling starts out with students reflecting on what they ate for breakfast and which breakfast items may come from plants. Then students explore (and taste) a common breakfast food (maple syrup) and see according to the label that it is 100% from a tree. Students then see how some trees are tapped in the spring for their sap, and after the water is boiled off, what's left is syrup. Students get to taste maple sap coming directly from the trunks of trees and compare it to the maple syrup they tasted earlier.

Students argue that they know what will happen to the sugar they just consumed (it will get absorbed into the circulatory system and transported to all the cells of their body to be used for growth or fuel). Then the class recalls the things that they ate for breakfast that were completely from plants they ate and gather information from their nutrition labels. Students discover that foods from plants they ate not only have sugar but proteins and fats as well. This leads them to start talking about the questions: How are these plants getting these food molecules? Why do plants need food in the first place? Where does food come from?

## Enduring Understandings

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- Plants, green algae, and some bacteria convert light energy to chemical energy in the chemical reactions of photosynthesis.
- Plants need light energy, the green pigment chlorophyll, carbon dioxide and water as reactants and produce oxygen and biomolecules as products of the photosynthetic reactions.
- The chemical energy that is converted during photosynthesis is stored in the bonds of the biomolecules

produce

## Essential Questions

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- How do materials move through plants?
- How do plants perform photosynthesis?
- What is cellular respiration?
- What is the relationship between photosynthesis and cellular respiration?

## New Jersey Student Learning Standards (No CCS)

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SCI.HS-LS2-3	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
SCI.HS-LS1-6	Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

## Interdisciplinary Connections

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LA.WHST.6-8.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
MA.6.EE.C.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

## Technology Standards

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## **21st Century Themes/Careers**

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## **Instructional Strategies & Learning Activities**

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Throughout this unit, students will:

- \*Use a hydroponics system to investigate “food” sources for plants
- \* Data analysis of inputs and outputs (carbon dioxide and oxygen) and what those levels mean
- \* Examine plant tissue to observe the mechanism in which gas cycles through a plant
- \* Using light as a variable to test the energy input involved
- \* Use modeling to demonstrate the Law of Conservation of matter

## **Differentiated Instruction**

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Examples may include:

Inquiry/Problem-Based Learning

Learning preferences integration (visual, auditory, kinesthetic)

Sentence & Discussion Stems

Tiered Learning Targets

Meaningful Student Voice & Choice

Relationship-Building & Team-Building

Self-Directed Learning

LMS use

Student Data Inventories

Mastery Learning (feedback toward goal)

Grouping

Rubrics

Jigsaws

Assessment Design & Backwards Planning

Student Interest & Inventory Data

## **Formative Assessments**

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Include, but are not limited to:

- Initial models
- Driving Question Board
- Notebook checks
- Progress Trackers
- Scientists Circle discussions
- Peer Feedback rubrics

### **Summative Assessment**

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Scientific Explanation (Midpoint assessment)

Final Model and Explanation (Final unit assessment)

### **Benchmark Assessments**

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Fall/Winter LinkIt Assessments

### **Alternate Assessments**

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Modifications to assessments based on IEP/504; alternate assessments may include oral explanations, scaffolded templates, digital choice for final model representations

### **Resources & Technology**

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Adapted from OpenSciEd unit: Photosynthesis and Matter Cycling

### **BOE Approved Texts**

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McGraw Hill Education: iScience Series (Life Science)

## **Closure**

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Individual classes and lessons will end with a closure activity that reinforces what students figured out during class, and helps navigate toward next steps.

Closure activities may include:

- Scientists' Circle
- Post-it reflection
- Google form exit ticket
- Group performance reflection
- Science notebook jot

## **ELL**

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- Alternate Responses
- Extended Time
- Teacher Modeling
- Simplified Written and Verbal Instructions
- Frequent Breaks
- Google Translate

## **Special Education**

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Accommodations will be made in accordance with students' IEPs. The following list provides examples:

- Shorten assignments to focus on mastery of key concepts.
- Substitute alternatives for written assignments (clay models, posters, panoramas, collections, etc.)
- Keep workspaces clear of unrelated materials.
- Provide a computer for written work.

- Seat the student close to the teacher or a positive role model.
- Provide an unobstructed view of the chalkboard, teacher, movie screen, etc.
- Keep extra supplies of classroom materials (pencils, books) on hand.
- Maintain adequate space between desks.
- Give directions in small steps and in as few words as possible.
- Number and sequence the steps in a task.
- Have student repeat the directions for a task.
- Provide visual aids.
- Go over directions orally.
- Allow the student to complete an independent project as an alternative test.
- Show a model of the end product of directions (e.g., a completed math problem or finished quiz).
- Stand near the student when giving directions or presenting a lesson.
- Mark the correct answers rather than the incorrect ones.
- Use a pass-fail or an alternative grading system when the student is assessed on his or her own growth.

## 504

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Examples of accommodations in 504 plans include but are not limited to:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits

## **At Risk**

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Examples may include:

- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Assistance in maintaining uncluttered space
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
- Peer or scribe note-taking
- Use of manipulatives
- No penalty for spelling errors or sloppy handwriting
- Follow a routine/schedule
- Teach time management skills
- Verbal and visual cues regarding directions and staying on task
- Adjusted assignment timelines
- Visual daily schedule
- Immediate feedback
- Work-in-progress check
- Pace long-term projects
- Preview test procedures
- Film or video supplements in place of reading text
- Pass/no pass option
- Cue/model expected behavior
- Use de-escalation strategies
- Use peer supports and mentoring
- Have parent sign homework/behavior chart

## **Gifted and Talented**

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Examples may include:

- Offer choice
- Speak to Student Interests
- Allow G/T students to work together
- Tiered learning
- Focus on effort and practice
- Encourage risk taking