

Grade 7 Science

Unit 4: Matter Cycling and Photosynthesis

Driving question: Where does food come from, and where does it go next?

21 lessons (investigations and weekly readings) and a words quiz. Use this pack with the unit's **Teacher Guide**, **Student Procedure Guide**, **Student Work Pages** and **Science Literacy Student Reader** (download them once from the course) to teach the whole unit without the internet.

What is in this pack

- A plan for each lesson: the lesson question, how many class days it takes, the Teacher Guide pages to follow, and the student pages to print.
- For each weekly reading: the Student Reader pages, words to know and the exercise page.
- The words quiz, ready to print, with its key at the back.

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Lesson schedule

Each investigation lesson takes the number of class days shown (about 45 minutes a day). Do each reading over a week alongside the lessons. Tick each one off as you go.

	Lesson	Days	Student pages
☐	Reading: Science Literacy Preface: Put Yourself in This Scene	1 week	—
☐	Lesson 1: Where does this stuff come from?	3	4 to print
☐	Lesson 2: Do plants get their food molecules by taking them in?	2	4 to print
☐	Reading: Science Literacy Collection 1: Plants, Food, and Plants' Food	1 week	1 to print
☐	Lesson 3: What other inputs could be sources of food molecules for the plant?	1	1 to print
☐	Lesson 4: Are any parts that make up food molecules coming into the plant from above the surface?	2	3 to print
☐	Lesson 5: How are these gases getting into and out of leaves?	1	3 to print
☐	Lesson 6: How are all these things interacting together in this part of the plant?	2	3 to print
☐	Reading: Science Literacy Collection 2: Plants and Chemistry	1 week	1 to print
☐	Lesson 7: Why do plants need light?	1	4 to print
☐	Lesson 8: Where are plants getting food from?	2	2 to print
☐	Lesson 9: Where do the food molecules in the maple tree come from?	1	1 to print
☐	Lesson 10: Why don't plants die at night?	2	4 to print
☐	Reading: Science Literacy Collection 3: Our Changing Planet	1 week	1 to print
☐	Lesson 11: Why don't plants die when they can't make food?	3	2 to print
☐	Lesson 12: Where does the rest of our food come from?	3	1 to print

	Lesson	Days	Student pages
☐	Reading: Science Literacy Collection 4: Producers and Consumers	1 week	1 to print
☐	Lesson 13: What happens to food that doesn't get eaten?	2	3 to print
☐	Lesson 14: Where does food come from and where does it go next?	2	3 to print
☐	Reading: Science Literacy Collection 5: Connected Lives	1 week	1 to print
☐	Lesson 15: Where does food come from, and where does it go next?	2	2 to print
☐	Words quiz	—	—

Page numbers are PDF page numbers of each file, so they match what your PDF reader shows.

Reading: Science Literacy Preface: Put Yourself in This Scene

Words to know

- **phenomenon** — an observable occurrence
- **science literacy** — the ability to read, hear, and comprehend information about scientific topics and demonstrate understanding in discussion and through writing
- **social media** — websites and applications that allow users to participate in sharing content on the internet

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 29–32: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Preface: “Put Yourself in This Scene”: PDF pages 6–7. Look at the pictures and maps together.

Check for understanding

- Use one of today's words in a sentence of your own.

Lesson 1: Where does this stuff come from?

LESSON QUESTION

Where does this stuff come from?

Plan about **3 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 33–60: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 7–12
- What's in the foods we eat that come from plants? — Student Work Pages, PDF pages 7–8
- Reading: What do kids around the world eat for breakfast? — Student Work Pages, PDF pages 9–16
- How Plants Get Food Initial Model — Student Work Pages, PDF pages 17–18

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: Where does this stuff come from?

Lesson 2: Do plants get their food molecules by taking them in?

LESSON QUESTION

Do plants get their food molecules by taking them in?

Plan about **2 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 61-79: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 13-16
- Which food molecules are in the hydroponic plant food? — Student Work Pages, PDF pages 19-20
- Photos of Plants Growing in Class — Student Work Pages, PDF pages 21-22
- Self-Assessment for Classroom Discussions — Student Work Pages, PDF pages 23-24

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Do plants get their food molecules by taking them in?

Reading: Science Literacy Collection 1: Plants, Food, and Plants' Food

Words to know

- **carbohydrates** — naturally occurring compounds made C₆H₁₂O₆ up of carbon, hydrogen, and oxygen that play a crucial role in life processes
- **cardiovascular** — related to the heart and circulatory system
- **cellulose** — a chemical compound composed of many linked glucose units
- **cholesterol** — an organic compound, specifically a type of lipid, that is a natural component of animal cell membranes
- **cuticle** — the waxy coating on a plant's leaves or flowers that keeps in moisture and keeps out germs and insects polymer, n. a chain-like chemical structure of many units of identical or similar substances
- **evolution** — change in characteristics over an extended period of time
- **fat** — an oily or greasy substance that occurs naturally in living organisms
- **fructose** — simple sugar produced by many plants and found abundantly in fruit
- **fungi** — a group of organisms such as mushrooms, molds, and yeast that feed on organic matter and reproduce
- **glucose** — a simple sugar represented by the formula
- **gluten** — a structural protein naturally found in many grains
- **green algae** — a large grouping of photosynthetic organisms that live mostly in freshwater

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 80–86: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 1: “Plants, Food, and Plants' Food”: PDF pages 8–17. Look at the pictures and maps together.

Student pages to print

- Exercise Page 1 — Student Work Pages, PDF pages 67–68

Check for understanding

- Use one of today's words in a sentence of your own.

Lesson 3: What other inputs could be sources of food molecules for the plant?

LESSON QUESTION

What other inputs could be sources of food molecules for the plant?

Plan about **1 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 87–99: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 17–18

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
What other inputs could be sources of food molecules for the plant?

Lesson 4: Are any parts that make up food molecules coming into the plant from above the surface?

LESSON QUESTION

Are any parts that make up food molecules coming into the plant from above the surface?

Plan about **2 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 100–116: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 19–23
- Investigating Above the Surface Inputs — Student Work Pages, PDF pages 25–26
- Data from Leaves in the Light — Student Work Pages, PDF pages 27–30

For the teacher

- Teacher Reference — Teacher Guide, PDF pages 331–332
- Answer Key — Teacher Guide, PDF pages 333–338

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Are any parts that make up food molecules coming into the plant from above the surface?

Lesson 5: How are these gases getting into and out of leaves?

LESSON QUESTION

How are these gases getting into and out of leaves?

Plan about **1 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 117–130: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 24–27
- Leaf Observations — Student Work Pages, PDF pages 31–32
- Reading: Plant Cells — Student Work Pages, PDF pages 33–34

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
How are these gases getting into and out of leaves?

Lesson 6: How are all these things interacting together in this part of the plant?

LESSON QUESTION

How are all these things interacting together in this part of the plant?

Plan about **2 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 131–144: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 28–31
- Planning and Carrying out Investigations — Student Work Pages, PDF pages 35–36
- Making Sense of the Computer Simulation — Student Work Pages, PDF pages 37–38

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
How are all these things interacting together in this part of the plant?

Reading: Science Literacy Collection 2: Plants and Chemistry

Words to know

- **bacteria** — a large group of single-celled organisms that have cell walls but lack nuclei and organelles
- **cardiovascular** — related to the heart and circulatory system
- **cellular respiration** — the chemical process by which living cells convert glucose and oxygen to carbon dioxide and water, releasing energy
- **cellulose** — a chemical compound composed of many linked glucose units
- **conservation of matter** — the principle that the mass of matter involved in a chemical reaction remains constant before and after the reaction
- **cuticle** — the waxy coating on a plant's leaves or flowers that keeps in moisture and keeps out germs and insects
- **polymer**, n. a chain-like chemical structure of many units of identical or similar substances
- **decomposition** — the process of decay of once-living material
- **fat** — an oily or greasy substance that occurs naturally in living organisms
- **fructose** — simple sugar produced by many plants and found abundantly in fruit
- **glucose** — a simple sugar represented by the formula $C_6H_{12}O_6$
- **methane** — an odorless, flammable gas represented by the formula CH_4
- **monomer** — a molecule that can bond to other identical molecules to form a polymer

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 145–152: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 2: "Plants and Chemistry": PDF pages 18–27. Look at the pictures and maps together.

Student pages to print

- Exercise Page 2 — Student Work Pages, PDF pages 69–70

Check for understanding

- Use one of today's words in a sentence of your own.

Lesson 7: Why do plants need light?

LESSON QUESTION

Why do plants need light?

Plan about **1 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 153–167: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 32–33
- Reading: How do scientists measure energy in food? — Student Work Pages, PDF pages 39–40
- How many calories are in each input and output for plants making food? — Student Work Pages, PDF pages 41–42
- Obtaining Information from Scientific Text Checklist — Student Work Pages, PDF pages 43–44

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: Why do plants need light?

Lesson 8: Where are plants getting food from?

LESSON QUESTION

Where are plants getting food from?

Plan about **2 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 168–177: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 34–35
- Lesson 8: Gotta-Have-It Checklist — Student Work Pages, PDF pages 45–46

For the teacher

- Answer Key — Teacher Guide, PDF pages 339–343

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Where are plants getting food from?

Lesson 9: Where do the food molecules in the maple tree come from?

LESSON QUESTION

Where do the food molecules in the maple tree come from?

Plan about **1 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 178–186: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 36–37

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Where do the food molecules in the maple tree come from?

Lesson 10: Why don't plants die at night?

LESSON QUESTION

Why don't plants die at night?

Plan about **2 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 187–204: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 38–42
- Data Table for Leaves in the Dark — Student Work Pages, PDF pages 47–48
- Secondhand Data for Leaves in the Dark — Student Work Pages, PDF pages 49–52
- Communicating Information from Scientific Text Checklist — Student Work Pages, PDF pages 53–54

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Why don't plants die at night?

Reading: Science Literacy Collection 3: Our Changing Planet

Words to know

- **anoxic** — lacking oxygen
- **photosynthesis** — the chemical process by which organisms use energy from sunlight to convert carbon dioxide and water into glucose and oxygen
- **photosynthetic** — describing an organism that conducts photosynthesis
- **resin** — a sticky substance in plants, similar to sap, that aids the function of healing
- **sap** — the nutritious liquid that flows within a plant's conducting tissues
- **species** — a group of organisms that is identified by its ability to reproduce with each other and, in some cases, its distinct characteristics

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 205–211: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 3: "Our Changing Planet": PDF pages 28–37. Look at the pictures and maps together.

Student pages to print

- Exercise Page 3 — Student Work Pages, PDF pages 71–72

Check for understanding

- Use one of today's words in a sentence of your own.

Lesson 11: Why don't plants die when they can't make food?

LESSON QUESTION

Why don't plants die when they can't make food?

Plan about **3 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 212–232: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 43–46
- Beans and BTB Investigation Data Table — Student Work Pages, PDF pages 55–56

For the teacher

- Rubric — Teacher Guide, PDF page 344
- Answer Key 1 — Teacher Guide, PDF pages 345–349

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Why don't plants die when they can't make food?

Lesson 12: Where does the rest of our food come from?

LESSON QUESTION

Where does the rest of our food come from?

Plan about **3 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 233–255: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 47–51

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Where does the rest of our food come from?

Reading: Science Literacy Collection 4: Producers and Consumers

Words to know

- **bacteria** — a large group of single-celled organisms that have cell walls but lack nuclei and organelles
- **biomass** — the amount of matter in an organism or group by spores of organisms
- **carbohydrates** — naturally occurring compounds made C₆H₁₂O₆ up of carbon, hydrogen, and oxygen that play a crucial role in life processes
- **cellular respiration** — the chemical process by which living cells convert glucose and oxygen to carbon dioxide and water, releasing energy
- **fungi** — a group of organisms such as mushrooms, molds, and yeast that feed on organic matter and reproduce
- **glucose** — a simple sugar represented by the formula
- **photosynthesis** — the chemical process by which organisms use energy from sunlight to convert carbon dioxide and water into glucose and oxygen
- **photosynthetic** — describing an organism that conducts photosynthesis
- **phytoplankton** — microscopic photosynthetic organisms
- **plankton** — masses of minute animal and plant life that generally float passively in a body of water
- **primary productivity** — the rate at which energy is converted to food source biomass by photosynthesis
- **starch** — a polymeric carbohydrate consisting of numerous joined glucose units

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 256–262: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 4: “Producers and Consumers”: PDF pages 38–47. Look at the pictures and maps together.

Student pages to print

- Exercise Page 4 — Student Work Pages, PDF pages 73–74

Check for understanding

- Use one of today's words in a sentence of your own.

Lesson 13: What happens to food that doesn't get eaten?

LESSON QUESTION

What happens to food that doesn't get eaten?

Plan about **2 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 263–276: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 52–54
- What changes are happening around food that does not get eaten? — Student Work Pages, PDF pages 57–58
- Obtaining and Communicating Information from Scientific Text Checklist — Student Work Pages, PDF pages 59–60

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
What happens to food that doesn't get eaten?

Lesson 14: Where does food come from and where does it go next?

LESSON QUESTION

Where does food come from and where does it go next?

Plan about **2 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 277–290: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 55–57
- Lesson 14 Gotta-Have-It Checklist — Student Work Pages, PDF pages 61–62
- Self-Assessment — Student Work Pages, PDF pages 63–64

For the teacher

- Teacher Reference 1 — Teacher Guide, PDF pages 350–355

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Where does food come from and where does it go next?

Reading: Science Literacy Collection 5: Connected Lives

Words to know

- **bacteria** — a large group of single-celled organisms that have cell walls but lack nuclei and organelles
- **biomass** — the amount of matter in an organism or group by spores of organisms
- **carbon cycle** — the biochemical cycle through which carbon moves among living and nonliving materials in grain, n. a small, hard, dry seed harvested as a human or Earth's spheres animal food source
- **carbon footprint** — the amount of carbon compounds emitted resulting from the consumption of resources by a single person or group
- **carbon sink** — any feature that absorbs more carbon than it releases
- **cellulose** — a chemical compound composed of many linked glucose units
- **compost** — a mixture of decayed organic material used to fertilize plants
- **decomposition** — the process of decay of once-living material
- **glucose** — a simple sugar represented by the formula
- **invertebrate** — an animal without a backbone
- **methane** — an odorless, flammable gas represented by the formula CH₄
- **nutrient** — a substance that is chemically essential for life and growth

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 291–296: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 5: “Connected Lives”: PDF pages 48–56. Look at the pictures and maps together.

Student pages to print

- Exercise Page 5 — Student Work Pages, PDF pages 75–80

Check for understanding

- Use one of today's words in a sentence of your own.

Lesson 15: Where does food come from, and where does it go next?

LESSON QUESTION

Where does food come from, and where does it go next?

Plan about **2 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 297–303: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 58–114
- Reviewing Our Driving Question Board — Student Work Pages, PDF pages 65–66

For the teacher

- Rubric — Teacher Guide, PDF pages 356–379

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Where does food come from, and where does it go next?

WORDS QUIZ

Matter Cycling and Photosynthesis

Name: _____ Date: _____

Circle the letter of the best answer.

- 1.** Which word means “to produce offspring through the release of eggs”?
 - a) phytoplankton
 - b) spawn
 - c) cell wall
 - d) fungi
- 2.** Which word means “a polymeric carbohydrate consisting of numerous joined glucose units”?
 - a) starch
 - b) sucrose
 - c) fat
 - d) resin
- 3.** Which word means “an organelle in which respiration and energy production take place”?
 - a) predator
 - b) cellular respiration
 - c) biomass
 - d) mitochondrion
- 4.** Which word means “the biochemical cycle through which carbon moves among living and nonliving materials in grain, n. a small, hard, dry seed harvested as a human or Earth’s spheres animal food source”?
 - a) sap
 - b) gluten
 - c) phenomenon
 - d) carbon cycle
- 5.** Which word means “an animal without a backbone”?
 - a) social media
 - b) resin
 - c) invertebrate
 - d) scavenger
- 6.** Which word means “a molecule that can bond to other identical molecules to form a polymer”?
 - a) monomer
 - b) compost
 - c) photosynthetic
 - d) phytoplankton

- 7.** Which word means “the rate at which energy is converted to food source biomass by photosynthesis”?
- a) methane
 - b) monomer
 - c) primary productivity
 - d) vascular tissue
- 8.** Which word means “lacking oxygen”?
- a) methane
 - b) cellular respiration
 - c) prey
 - d) anoxic
- 9.** Which word means “a solid, inorganic chemical compound”?
- a) prey
 - b) photosynthetic
 - c) carbohydrates
 - d) mineral
- 10.** Which word means “masses of minute animal and plant life that generally float passively in a body of water”?
- a) vitamin
 - b) monomer
 - c) chloroplast
 - d) plankton
- 11.** Which word means “websites and applications that allow users to participate in sharing content on the internet”?
- a) bacteria
 - b) plankton
 - c) social media
 - d) chloroplast
- 12.** Which word means “the amount of matter in an organism or group by spores of organisms”?
- a) carbon footprint
 - b) biomass
 - c) starch
 - d) species

FOR THE TEACHER

Answers

Unit quiz key

1. b 2. a 3. d 4. d 5. c 6. a 7. c 8. d 9. d 10. d 11. c 12. b