

Pond Energy Paths

Trace how photosynthesis and cellular respiration support a food web.

LS.4 "The student will investigate and understand that there are chemical processes of energy transfer which are important for life. Key ideas include photosynthesis is the foundation of virtually all food webs..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each sentence that explains an energy change in photosynthesis or cellular respiration, or names materials used or made in either process. Write P beside photosynthesis sentences and R beside respiration sentences to identify how these processes support life.

Energy at the Pond

- ① On a sunny pond, algae use photosynthesis to capture light energy. Inside their cells, chlorophyll helps use carbon dioxide and water to make glucose, a sugar that stores chemical energy. Oxygen is released as a product. The algae use some glucose, but small animals also eat the algae. When a snail eats algae, chemical energy in the glucose can move into the snail. This makes algae producers and an important starting point for the pond food web.
- ② Food webs branch because consumers may eat different foods, yet nearly all of the web depends directly or indirectly on photosynthetic producers. A frog may gain chemical energy by eating an insect that ate algae. A heron may gain some of that energy by eating the frog. At every step, organisms use cellular respiration. In this process, cells use glucose and oxygen to release usable energy for life processes. Carbon dioxide and water are produced. Energy is also released as heat, so less chemical energy is available at the next feeding level.
- ③ Photosynthesis and respiration are linked, but they do not occur in the same way. Photosynthesis stores light energy as chemical energy in glucose, using carbon dioxide and water and releasing oxygen. Cellular respiration releases energy from glucose, using oxygen and producing carbon dioxide and water. Plants perform both processes. During daylight, a leaf can photosynthesize while its cells also respire. Animals cannot make glucose by photosynthesis, so they obtain glucose by eating plants or other animals. Both processes keep organisms supplied with materials and usable energy.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 Why are algae an important starting point for the pond food web?

2 Trace one path of energy from sunlight to the heron. Include the organisms in order.

3 Compare photosynthesis and cellular respiration. What materials does each process use, and what does each produce?

4 Why is less chemical energy available at the next feeding level?

3 YOUR TURN _____ Your own words

On the first line, create a four-organism food chain that begins with a photosynthetic producer. Then write exactly three sentences explaining how energy enters the chain, moves to a consumer, and is released by cellular respiration.

PART 1 • READ AND MARK

Underline each sentence that explains an energy change in photosynthesis or cellular respiration, or names materials used or made in either process. Write P beside photosynthesis sentences and R beside respiration sentences to identify how these processes support life. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Why are algae an important starting point for the pond food web?	Algae use photosynthesis to make glucose that stores chemical energy. Animals eat algae, so that energy can enter the food web.
2	Trace one path of energy from sunlight to the heron. Include the organisms in order.	Light energy is captured by algae and stored in glucose. An insect eats algae, a frog eats the insect, and a heron eats the frog.
3	Compare photosynthesis and cellular respiration. What materials does each process use, and what does each produce?	Photosynthesis uses carbon dioxide and water to make glucose and release oxygen. Cellular respiration uses glucose and oxygen and produces carbon dioxide and water while releasing usable energy.
4	Why is less chemical energy available at the next feeding level?	Organisms release some energy as heat during cellular respiration, so less chemical energy remains to move to the next level.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Grass → rabbit → snake → hawk Grass uses photosynthesis to store light energy in glucose. The rabbit gets chemical energy by eating grass, and energy can continue to the snake and hawk when they eat. Each organism uses cellular respiration, which uses glucose and oxygen and releases usable energy, carbon dioxide, water, and heat.

Accept any accurate four-organism chain that begins with a photosynthetic producer and uses realistic feeding relationships. The three sentences should correctly connect photosynthesis to stored chemical energy and cellular respiration to usable energy release.