Pond Pathways

Trace matter and energy through a pond.

5.9 "Create and use a model to explain the transfer of matter and energy between the environment and organisms within it."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline phrases that show matter moving, and circle phrases that show energy moving. Use your marks to help you make arrow models.

A Small Pond, Many Paths

1. At the edge of a pond, tiny duckweed plants float on the water. Sunlight reaches their green leaves. Duckweed takes in water through its roots and carbon dioxide dissolved in the pond water. Using sunlight, it makes sugars from these materials. The atoms in those sugars came from water and carbon dioxide, not from sunlight. Sunlight supplies energy, while water and carbon dioxide supply matter.

2. A pond snail nibbles duckweed. As it eats, some of the plant's matter becomes part of the snail's growing body. The snail also uses energy stored in the plant's sugar to move and stay alive. A small fish eats the snail and gains matter and stored energy. At each step, some energy spreads into the surroundings as heat, so less stored energy reaches the fish.

3. When duckweed, snails, or fish die, bacteria in the pond break down their remains. Matter from the remains enters the water as nutrients and carbon dioxide. Living duckweed can take in these materials again. Bacteria also use stored energy from the remains, and some energy spreads out as heat. Matter moves through the pond and its living things, but energy does not travel in a loop.

2 ANSWER WITH EVIDENCE

Use the passage

1. Write two labeled arrows showing how matter from the pond enters duckweed. Name the matter on each arrow.

2. Write an arrow chain showing how energy from sunlight can reach the fish. Where does some energy go before it reaches the fish?

3. A fish leaves a dead snail uneaten. Use an arrow chain to show how some of the snail's matter can return to living duckweed.

4. Should the energy arrows in a pond model form a loop like some matter arrows? Explain using two details from the passage.

3 YOUR TURN

Your own words

In the box, make an arrow model for a grassy yard with grass, a grasshopper, a robin, and fungi. Include sunlight, air, water, and soil; label arrows for matter and energy; then write two sentences explaining how their paths differ.

ANSWER KEY

Pond Pathways

GRADE 5 · 5.9

PART 1 · READ AND MARK

Underline phrases that show matter moving, and circle phrases that show energy moving. Use your marks to help you make arrow models. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Write two labeled arrows showing how matter from the pond enters duckweed. Name the matter on each arrow.	**Pond water → duckweed (water); pond water → duckweed (dissolved carbon dioxide).**
2	Write an arrow chain showing how energy from sunlight can reach the fish. Where does some energy go before it reaches the fish?	**Sunlight → duckweed → snail → fish. Some energy spreads into the surroundings as heat along the way.**
3	A fish leaves a dead snail uneaten. Use an arrow chain to show how some of the snail's matter can return to living duckweed.	**Dead snail → bacteria → nutrients and carbon dioxide in pond water → duckweed.**
4	Should the energy arrows in a pond model form a loop like some matter arrows? Explain using two details from the passage.	**No. Sunlight supplies energy to duckweed, and some energy spreads into the surroundings as heat. Matter from remains can return to the water and enter duckweed again.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Sunlight → grass (energy); air → grass (carbon dioxide, matter); soil → grass (water and minerals, matter); grass → grasshopper → robin (matter and stored energy); dead organisms → fungi → soil (matter); robin and fungi → surroundings (heat energy). Matter from dead organisms can return to the soil and enter grass again. Energy enters as sunlight and spreads into the surroundings as heat instead of looping back.

Accept different arrow layouts if they show where matter and energy enter organisms, move between organisms, and return to the environment. Energy should not be shown cycling back to the sun.