Life Reshapes Earth

Trace how evolutionary changes affected air, rock, and soil.

ESS.3.7 "Cite evidence and develop logical arguments to identify the cause-and-effect relationships of the evolutionary milestones (e.g., photosynthesis and the atmosphere, the evolution of multicellular animals, the development of shells..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline evolutionary changes, circle their effects on Earth's systems, and number three connected events in one cause-and-effect chain.

When Life Changed the Planet

1. Long before forests existed, photosynthetic microbes lived in the oceans. They used sunlight to make food and released oxygen as waste. At first, much of that oxygen reacted with dissolved iron. Later, oxygen built up in the atmosphere, as indicated by ancient red rocks containing oxidized iron. More atmospheric oxygen supported organisms that use it to release energy from food. It also helped form an ozone layer that reduced harmful ultraviolet radiation at Earth's surface. One biological innovation had changed both air and living conditions.

2. Much later, multicellular animals became common in the seas. Specialized cells allowed bodies to move, feed, and sense their surroundings in new ways. Some animal groups evolved hard shells made of minerals from seawater. Shells could protect soft bodies from predators, while predators evolved ways to break or bypass them. Fossil shells record this shift in ocean life. After shelled organisms died, their remains sometimes accumulated on the seafloor and eventually became sedimentary rock, linking evolution to Earth's rocky surface.

3. Life also transformed dry land. As land plants evolved roots, they helped break down rock and trapped loose particles, contributing to soil formation. Plants took in carbon dioxide for photosynthesis, stored some carbon in their tissues and soils, and altered the flow of carbon between air, land, and living things. As land plants spread, animals found food and shelter there. Some animals spread plant spores or seeds; others returned nutrients to soil through waste and decay. These linked changes reshaped terrestrial habitats.

2 ANSWER WITH EVIDENCE

Use the passage

1. What evidence suggests that photosynthetic microbes changed the atmosphere? Explain the link.

2. How did multicellularity change what animals could do, and how could shells then change interactions between animals?

3. How did the evolution of shells affect Earth's rocky surface after shelled animals died?

4. How could plants and animals together change soil on land? Cite one action by each.

3 YOUR TURN

Your own words

Which evolutionary change in the passage had the broadest effects on Earth's systems? Make a claim, cite two passage details about effects on different systems, and explain why they support your choice.

Life Reshapes Earth

PART 1 · READ AND MARK

Underline evolutionary changes, circle their effects on Earth's systems, and number three connected events in one cause-and-effect chain. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What evidence suggests that photosynthetic microbes changed the atmosphere? Explain the link.	**Ancient red rocks contain oxidized iron, which indicates that oxygen built up in the atmosphere after photosynthetic microbes released it.**
2	How did multicellularity change what animals could do, and how could shells then change interactions between animals?	**Specialized cells helped animals move, feed, and sense their surroundings. Shells protected some animals, while predators developed ways to break or bypass them.**
3	How did the evolution of shells affect Earth's rocky surface after shelled animals died?	**Their remains sometimes accumulated on the seafloor and eventually became sedimentary rock.**
4	How could plants and animals together change soil on land? Cite one action by each.	**Plant roots helped break down rock and trap particles. Animals returned nutrients to soil through waste and decay.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Photosynthesis by ocean microbes had the broadest effects on Earth's systems. Ancient red rocks containing oxidized iron indicate that oxygen accumulated in the atmosphere after microbes released it. That oxygen supported organisms that use it for energy, changing conditions for life. It also helped form an ozone layer that reduced ultraviolet radiation at Earth's surface. Unlike shells, which affected ocean interactions and sediments, photosynthesis changed both the air and conditions at the surface.

Accept any milestone if the claim is supported by two accurate passage details about different systems and a logical explanation of their significance.