Where Autotrophs Live

Match aquatic autotrophs to their habitats and energy sources

MAQ.5.2 "List and describe common autotrophs that may be found in particular aquatic ecosystems, including prokaryotes (e.g., Cyanobacteria and Archaebacteria), protists (e.g., diatoms, dinoflagellates, green algae, kelp, sargassum, and red algae)..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the first mention of each autotroph, circle a habitat clue for it, and label it P for prokaryote, R for protist, or L for plant. Use your marks to compare where these organisms live.

From River Mouth to Rocky Shore

1. At the mouth of a river, fresh water meets seawater. Sunlit, shallow water can support cyanobacteria, tiny prokaryotes that use light to make food. Diatoms, single-celled protists with glasslike shells, also photosynthesize in this water. Some dinoflagellates, protists that swim with whiplike structures, make food from sunlight too. In darker mud below, certain archaea are autotrophs without sunlight. These prokaryotes gain energy by oxidizing ammonia and use carbon dioxide to build organic matter. A cloudy tide may limit light near the bottom, but it does not stop those ammonia-oxidizing archaea from obtaining chemical energy.

2. Along a cool, rocky shore, kelp, a large brown alga grouped here with protists, anchors to rock and forms underwater forests. Smaller red algae also cling to rock; their pigments let them photosynthesize where less light reaches. Farther offshore in warmer Atlantic water, floating sargassum, another brown alga, forms rafts that shelter animals. Each alga needs sunlight, but kelp grows from the seafloor while sargassum floats at the surface. In the open water around both, diatoms and some dinoflagellates drift as plankton. These examples show why a coast and nearby open sea can host different autotrophs.

3. Return to the sheltered shallows. Cord grasses root in salty marsh soil flooded by tides, with blades that rise above the water. Reeds often grow at the fresher edge of an estuary, where their roots hold muddy banks. Seagrasses are flowering plants rooted in submerged sand or mud; they need clear, shallow coastal water so light reaches their leaves. In warm tropical estuaries, mangrove trees grow along tidal shores, with roots that tolerate salty, waterlogged soil. Unlike drifting plankton, these plants stay rooted in place. Together, their stems and roots provide habitat while their leaves use sunlight to produce food.

2 ANSWER WITH EVIDENCE

Use the passage

1. Cyanobacteria and certain archaea are both prokaryotes in the estuary. Where does each live, and how does each get energy?

2. Which two kinds of protists can drift as plankton in open water? Describe how each can make food.

3. Compare where kelp, red algae, and sargassum live. Include one detail about how each stays in its habitat.

4. Choose two plants from the passage that live in different coastal habitats. Name each habitat and describe how each plant grows there.

3 YOUR TURN

Your own words

Plan a three-stop survey of dark estuary mud, a cool rocky shore, and a tropical tidal shore. In 4 to 5 sentences, name one autotroph at each stop, identify its group, and explain how it gets energy there.

ANSWER KEY

Where Autotrophs Live

HIGH SCHOOL · MAQ.5.2

PART 1 · READ AND MARK

Underline the first mention of each autotroph, circle a habitat clue for it, and label it P for prokaryote, R for protist, or L for plant. Use your marks to compare where these organisms live. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Cyanobacteria and certain archaea are both prokaryotes in the estuary. Where does each live, and how does each get energy?	**Cyanobacteria live in sunlit, shallow water and use light for energy. Certain archaea live in darker mud and gain energy by oxidizing ammonia.**
2	Which two kinds of protists can drift as plankton in open water? Describe how each can make food.	**Diatoms and some dinoflagellates drift as plankton. Diatoms photosynthesize, and some dinoflagellates make food from sunlight.**
3	Compare where kelp, red algae, and sargassum live. Include one detail about how each stays in its habitat.	**Kelp anchors to rock on cool, rocky shores. Red algae cling to rock there, including where less light reaches. Sargassum floats at the surface in warmer offshore Atlantic water.**
4	Choose two plants from the passage that live in different coastal habitats. Name each habitat and describe how each plant grows there.	**For example, cord grasses root in salty marsh soil flooded by tides, while seagrasses root in submerged sand or mud in clear, shallow coastal water.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

In dark estuary mud, ammonia-oxidizing archaea are prokaryotes that gain energy by oxidizing ammonia. On a cool rocky shore, kelp is grouped with protists and uses sunlight to make food. At a tropical tidal shore, mangroves are plants that photosynthesize in their leaves. The dark mud supports an autotroph that uses chemical energy, while the two shore sites support autotrophs that use light.

Accept any two passage-supported plants for question 4 if their habitats and growth descriptions are accurate. For the survey, accept red algae in place of kelp at the rocky shore; the mud stop should name ammonia-oxidizing archaea.