

Family Fun

Seaweed and Trees

Enduring Understanding: Seaweeds share some physiological characteristics with plants, but they have unique structures that allow them to survive in the marine environment.

Setup:

1. Labeled diagram of seaweed: http://www.mesa.edu.au/marine_algae/
2. Labeled diagram of tree: <https://www.kidzone.ws/plants/trees.htm>
3. Print “Seaweeds and Trees” information sheet.
4. Prepare art materials.
5. Draw a venn diagram comparing: “Seaweeds” and “Trees.”

Program outline:

Read “Seaweeds and Trees” information sheet aloud together.

- Take turns reading each paragraph. Be sure to explain any terms that they don’t understand.
- What is seaweed?
 - Seaweed is a plant-like organism that grows in water instead of on land.
 - Seaweed captures energy from the sun and converts it to food in a process called photosynthesis. It also makes oxygen.
 - Seaweed doesn’t have roots, stems, leaves or a trunk like a tree, but it has structures that resemble them.
- Seaweed parts
 - Take turns reading the different structures of the seaweed.
- Seaweed and trees
 - Take turns writing a comparison of seaweeds and trees on the table you created during setup. For example, in the “Seaweeds” circle you would write that seaweeds grow only in water. In the “Trees” circle you would write

Materials

- Diagram of seaweed online with labeled structures (blades, float, stipe, holdfast)
- Diagram of tree online with labeled structures (roots, trunk, branches, leaves)
- “Seaweeds and Trees” information sheet
- Blue construction paper
- Scissors, glue
- Coloring supplies
- Writing paper
- Pencils, markers, chalk (as needed)



program outline continued:

that trees grow only on land. In the overlap in the center you could write “photosynthesis.”

Compare and contrast seaweeds and trees

- Draw and label a picture of a tree and a picture of seaweed.
- If you have multiple kids in your family, divide into two groups and split the level 1 and level 2 questions in half. You can make it a contest to see who can answer the most! If you don't have enough people for that, go through the question and see how many questions you can answer using just your venn diagram and drawings. Then, check your answers using the “Seaweeds and Trees” information sheet.
 - Level 1 questions
 - o How is a seaweed holdfast different from the roots of a tree? Why?
 - o How is a seaweed stipe different from a tree trunk? Why?
 - o How are seaweed blades different from tree leaves? Why?
 - o What is the purpose of air bladders? Why don't trees have them?
 - o Do trees have mucus like seaweeds do? Why or why not?
 - o How are seaweeds similar to trees?
 - Level 2 questions
 - o What is the same or different in the environments in which seaweeds and trees grow?
 - o What are essential things that both trees and seaweeds need to survive?
 - o What do both seaweeds and trees provide for the environment and other organisms around them?
 - o What is the difference between how seaweeds get energy and how trees get energy?
 - o What would happen if all the trees in the world disappeared or died off? What would happen if all the seaweeds in the oceans disappeared? How might this impact other animals?
- If you are using this as a homeschool activity, you may choose to assign this as homework and ask your kids to write an answer to each question in complete sentences.



Background information:

Seaweeds are multicellular algae that are separated into three classifications: red, brown, and green. They are not actually plants, although they do share many characteristics with them. They are not grouped with true plants because they lack a specialized vascular system, roots, stems, leaves, and enclosed reproductive structures (flowers, cones, etc.). They do not need an internal conducting system because all parts of the seaweed are in constant contact with the surrounding water and are thus able to absorb nutrients and carbon dioxide. Terrestrial plants absorb nutrients and water from soil through their roots, and the nutrients and water are carried throughout the plant by specialized vascular tissue. Both plants and seaweeds get most of the materials they need for growth from carbon dioxide and photosynthesis.

Habitat

Seaweeds are typically found in the shallow, rocky intertidal zone, where they are able to photosynthesize. Sunlight is captured by chlorophyll and other light-absorbing pigments within their cells, which are responsible for the various colors of seaweeds. Photosynthesis is a biochemical process that uses water, carbon dioxide, and sunlight to produce sugars and oxygen. The sugars are used for food and the oxygen is released into the water. Just as vascular plants produce energy at the base of the terrestrial food web, seaweeds are the producers for the ocean food web. Seaweeds provide vital habitat and a major source of food for numerous invertebrates and fish. Some types of seaweed are also consumed by humans. We also use extracted compounds from seaweeds in many foods and products.

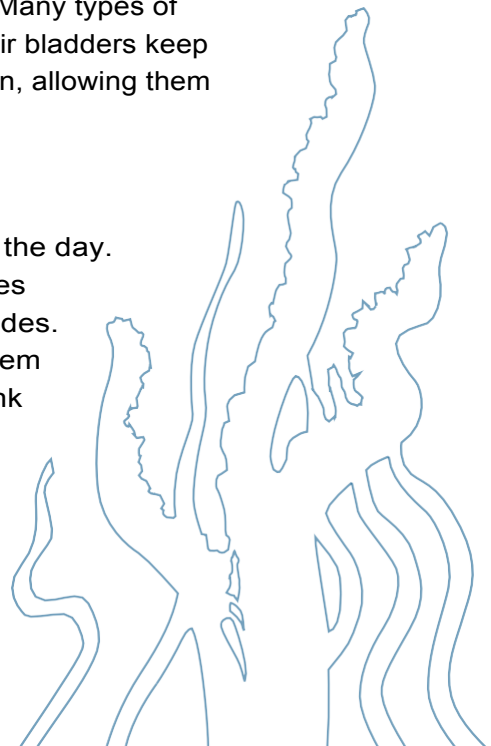
Physical Structures of Seaweeds

Rather than roots, seaweeds have holdfasts, which attach them to rocks or other substrates on the sea floor. In contrast to plant roots, holdfasts are not necessary for water and nutrient uptake. Instead, they act as an anchor to keep the seaweeds from floating away in the turbulent waves of the rocky intertidal or other habitats. The stipe is the seaweed stalk or stem. The stipe functions as the support structure for the rest of the plant. It can be stiff, flexible, filled with gas, very long, very short, or completely absent. The leaf-like structures of seaweeds are called blades. They function as the main surface for absorbing sunlight. The blades of some seaweeds hold the reproductive structures.

Some seaweeds have only one blade, while others have many. Many types of seaweed have air bladders, which are hollow, gas-filled floats. Air bladders keep the seaweeds buoyant so they float toward the surface in the sun, allowing them to maximize their ability to photosynthesize.

Other Adaptations

Seaweeds need to be submerged in water for at least part of the day. Many produce a slimy mucus layer that keeps their soft tissues from drying out when they're exposed to the sun during low tides. Most seaweeds are also flexible, an adaptation that allows them to bend in currents and waves. A stiff structure like a tree trunk would break easily in the marine environment.



glossary:

Algae: Any of numerous groups of photosynthetic aquatic organisms that range from single-celled forms to multicellular forms more than 100 feet long; distinguished from plants by the absence of true roots, stems, leaves, and vascular tissue

Blade: Flattened, leaf-like structure of seaweeds that contains photosynthetic pigment and sometimes reproductive structures

Gas Bladder: Hollow air-filled structure that floats

Holdfast: Stalked structure by which algae attach to a substrate

Organism: Individual living thing that can grow, reproduce, and react to stimuli

Photosynthesis: Process by which green plants, algae, and some other organisms use sunlight to synthesize food energy from carbon dioxide and water

Primary Producer: Organism in an ecosystem that converts light energy into organic matter

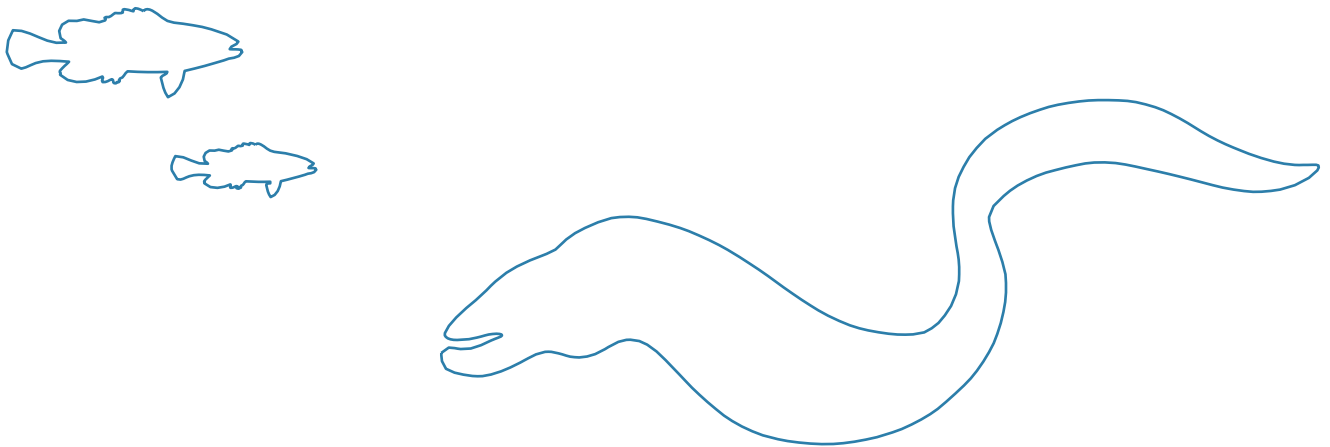
Rocky Intertidal Zone: Rocky shores at the edge of the ocean and land between high tide and low tide that support a tremendous amount of biodiversity

Seaweeds: Macroscopic, multicellular, benthic algae that grow beneath the high-tide mark

Stipe: Stalk or stem of seaweed

Thallus: Complete structure of seaweed, including holdfast, stipe, blades, and gas bladders

Vascular System: Plant tissue consisting of organized structures (such as ducts or vessels) that convey water, nutrients, and other materials through the plant



Name: _____

Date: _____

Seaweeds and Trees



Seaweeds grow in water. They have special **adaptations** that allow them to survive and thrive. They share some features with trees and other plants that grow on land, but they are not actually plants. Like trees, seaweeds are able to **photosynthesize**. They get energy from the sun and turn it into food. And like trees, they also make **oxygen**. Seaweeds do not have roots, stems, leaves, or trunks like trees do. They do have structures that resemble them.

The Parts of Seaweed

1. The **holdfast** of seaweeds looks like tree roots. But it does not take up nutrients the way roots do. The purpose of a holdfast is to fasten the seaweed to something, like rocks or boulders. It keeps the seaweed in one spot so it doesn't float away.
2. The **stipe** is the part of seaweed that connects the holdfast to the blades. It isn't hard and stiff like the trunk of a tree. The stipe is soft and flexible so it can move with the waves and currents of the water. If the stipe were stiff like a tree, the movement of the water would easily break the seaweed.
3. The **blades** of seaweeds are often long and flat. Sometimes they look like the leaves of a tree. Even though the seaweed stipe and blades can bend, they're also very strong so that water currents and waves don't break them apart.
4. The **gas bladders** of seaweeds float like a beach ball in a swimming pool. They keep the blades and stipe near the surface of the water. This helps the seaweeds grow up toward the sun, and makes it easier for them to photosynthesize.
5. The **thallus** is the body of seaweed, including holdfast, stipe, blades, and gas bladders. On the thallus is a slimy layer of mucus. This mucus keeps the seaweed from drying out during low tide, when it may be exposed to the air for several hours.

Seaweeds and Trees

Seaweeds grow only in water. Trees grow only on land. Trees usually can only photosynthesize through their leaves. Seaweeds can photosynthesize through any part of their thallus. Trees get most of the energy and materials they need to grow from the air and the sun. They also absorb, or take up, water and nutrients from the soil. Seaweeds do not rely on soil for nutrients. They grow only through photosynthesis and by absorbing nutrients from the water around them.

Both seaweeds and trees are primary producers. This is the group of organisms that make their own food through photosynthesis. They don't need to eat other plants or animals for energy, so they are at the very bottom of the food chain. Many animals eat them. Just like trees, seaweeds create important habitat for animals. Many animals rely on them for shelter, food, and protection from predators.

