



Science Unit: *Aquatic Ecosystems*

Lesson 2: *Marine Organisms*

School year: 2006/2007

Developed for: Collingwood Neighbourhood Elementary School, Vancouver School District

Developed by: Catriona Gordon (scientist), Lisa Evans and Sean Hughes (teachers)

Grade level: Presented to grades K and 3; appropriate for grades K-7 with appropriate modifications.

Duration of lesson: 1 hour and 20 minutes

Notes: This lesson requires 1 adult per station for younger children.

Objectives

1. Learn about the diversity of local marine flora and fauna.
2. Learn about marine habitats.
3. Learn about the different intertidal zones and what lives in each zone, locally.
4. Learn about the adaptations that marine organisms in the intertidal zone use.
5. Gain experience making observations of different marine organisms.

Background Information

The beaches of southern B.C. are home to thousands of fascinating and diverse marine plants and animals. Beaches are shaped by the geography of the land, winds, currents, waves, underlying rock and tides. The tide rises and falls two times per day, and is caused by the gravitational pull of the sun and the moon, tugging on the oceans. As the tide is rising in one part of the world, it is falling in another part of the world. This constant ebb and flow of the sea, up and down a beach makes distinct habitat zones for seashore life. The intertidal region of a beach is the area that is underwater at high tide and exposed at low tide. This makes it a harsh environment characterized by constant wave action, intermittent dry and wet periods, and rapidly changing temperatures. Within the intertidal region are four distinct zones: the low tide zone (which is only exposed at low tides), the mid zone, the upper tide zone (which is exposed for much of the time and only covered with water at high tides) and finally the splash zone which is wetted occasionally with waves but is never fully submerged. Highly adapted marine plants and animals have evolved to survive in each of these distinct beach zones.

Vocabulary

Habitat: the place where a plant or animal lives (its home).

Adaptations: a trait (body part, behaviour, etc) that helps a plant or animal survive in its environment.

Invertebrates: animals without a backbone.

Tide: the daily rise and fall of sea level along a shore.

Intertidal Zone: area of shore between the highest and lowest tide levels.

Splash Zone: uppermost part of the beach, splashed by waves, but never covered by the sea.

Mollusks: a group of diverse animals with soft bodies, a mantle, and usually a protective shell (eg. Clams,



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oysters, squid, snails).

Bivalves: a subgroup of mollusks with a shell divided into two halves, hinged at one side (eg. Clams, oysters, mussels, scallops).

Gastropods: a subgroup of mollusks, usually with a single, spiraled shell (snails, limpets, whelks).

Crustaceans: a group of animals with jointed limbs, a hard outer skeleton and a pair of feelers (eg. Lobsters, crabs, shrimp, barnacles).

Algae: plants with no true roots, stems or leaves, living in water or moist environments (includes seaweeds).

Echinoderms: a group of animals with radial symmetry, tube feet and no head (seastars, sea urchins, sand dollars).

Gills: feathery structures in aquatic animals that absorb oxygen from sea or fresh water.

Filter feeding: a way that some marine animals get their food by straining tiny animals and particles from the water.

Materials

- Photographs and descriptions of each group of animals at each station
- Selection of seashells (oysters, clams, cockles, mussels, moon snails etc.).
- Plastic castanets
- Clancy Clam costume* (see at end of lesson for reference)
- 2 Plastic tubs for water
- Suction toys (found in a dollar store)
- Double sided tape
- Sandpaper
- Tongs (barbeque) inserted in cut-out oven mitts
- Barnacle model * (see at end of lesson for instructions)
- Plastic fish
- Seastar model (available from VSB Media Services: VO 04-05.0024874251
VO 25-05.0185133211)
- Cloth Seastar model with removable limb, using Velcro.
- Hermit crab model (available from VSB Media Services: VO 25-05.0195133222)
- Puppets of lobster, shark, sea jelly, octopus (Sea Life Kit available from VSB: VU 04-05.0024835212)
- Plasticene
- Coloured toothpicks (green, red and purple)
- Selection of seaweeds
- Houseplant
- Food items which contain seaweed derivatives (eg. Ice cream, salad dressing, chocolate milk, cottage cheese, candies all containing carageenan)
- Kelp chips, dulse, nori seaweed to sample
- Pictures/photos of the marine animals named below
- Felt poster and felt seashore animal cut-outs to show beach zones
- Magnifying glasses and/or dissecting scopes



In the School Gym/ Activity Room

Introductory Discussion

1. Review concepts from last lesson (SRP_Aquatic Ecosystems_Lesson 1_Exploring Marine Objects_2007 R.doc). Introduce concept of tides. Use a beach ball to show the moon's pull of the oceans, bulging water (high tide) on some parts of the ball while other parts of the beach ball are squished (low tides). Introduce concept of when one part of the world is experiencing a low tide, the other side of the world is experiencing a high tide. Turn the discussion to animals, particularly those that live at the seashore.
 - What do all animals need, including humans? A home/shelter (habitat), food, water, space, air.
 - What if you lived in the cold? Or in a hot place, wet or dry place? Introduce concept of adaptations. What about animals that live at the seashore? What kind of environment do they live in? What are their challenges? Getting bashed by waves, drying out, then getting rewetted, exposure to predators etc.
 - Make a list of seashore animals. Brainstorm about their adaptations (suction, they lie flat, body shapes, strong glue, or anchors, flexible bodies, suit of armor, ability to hide).
 - Use a poster/felt board to describe different beach zones, including splash zone, high tide zone, mid tide zone, and low tide zone. Discuss what seashore animals/plants live where? Use felt cut-out seashore animals for students to stick on board in appropriate zone.
2. Briefly describe the activities that will be done during the lesson. There will be 4-6 stations set up in the lunchroom, all with things from the seashore (see below). The stations will focus on animal/plant adaptations to the seashore environment: How these animals eat, how they move and how they protect themselves. Divide the class into 4-5 groups with one adult per group. For younger students, these station activities will need to be done over 2 lesson times.

Science Activity/Experiment

Station 1: Mollusks – Bivalves

These are soft-bodied animals, protected by a shell divided into two halves, with a hinge.

- Display selection of mixed-up bivalve shells: oysters, clams, scallops, cockles, mussels. Let students find matching pairs of shells.
- Clancy Clam costume – let students try on the costume. Talk about adaptations.
- Using the castanets in a tub of water, demonstrate how scallops swim, then let students try it out.

Station 2: Mollusks – Gastropods

These are animals with one large sucking foot and one shell.

- Display of snail shells: moon snail, limpets, whelks. If possible show clams with holes in the shell where a moon snail drilled a hole to eat the clam meat.
- Use suction toys to learn about how some gastropods hold on to protect themselves against predators and waves
- Use double-sided tape with sandpaper stuck on one side, students' finger on the other side, to let students 'scrape' algae/sushi. This is like a snail's radula or rough tongue.



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Station 3: Crustaceans

These are marine animals with jointed limbs, hard shells, and two pairs of feelers in front of their mouths. They include crabs, lobsters, shrimp, hermit crabs, barnacles.

- Use the barnacle model with large ostrich feathers for students to get inside and experience “filter feeding” and life as a barnacle.
- Use the crab tongs to try and catch a moving object (another student can move a plastic fish and try not to get “caught” by the crab).
- Walk like a crab.

Station 4: Echinoderms

Their name means spiny skin. These animals have radial symmetry based on a 5-pointed star and they can regenerate lost limbs or spines.

- Use the cloth seastar to observe how seastars can regenerate a lost limb.
- Make your own sea urchin with plasticene and coloured toothpicks.
- Learn about radial and bilateral symmetry.

Station 5: Seaweeds

These sea plants are supported by water, they have no true roots, stems or leaves, and often have bladders or air sacs to keep them close to the water’s surface and to sunlight.

- Place a variety of seaweeds in a tub of water and let students observe them.
- Using a houseplant for comparisons make observations about similarities and differences between sea and land plants.
- Taste a variety of seaweeds – dulse chips, kelp chips, nori seaweed.
- Place a variety of food items containing carageenan (a seaweed derivative) for students to observe, including ice cream, salad dressings, jelly candies, chocolate milk, etc.

Closure Discussion

Make a circle and ask students to talk about their experiences. What did they like best? What did they like least? Review what adaptations seashore animals and plants have to survive and thrive in their particular environments. What new things did they learn about plants and animals that live in the sea or seashore?

References

Canadian Wildlife Federation: www.wildeducation.org

WildBC: www.env.gov.bc.ca/hctf/wild.htm

“Clancy Clam Costume”. Monterey Bay Aquarium. 1996. Sea Searchers’ Handbook: Monterey Bay Aquarium. Roberts Rinehart Publishers. Boulder. Pp. 37-39.

Niesen, Thomas, M. 1997. Beachcomber’s Guide to Marine Life of the Pacific Northwest. Gulf Publishing Co. Houston. 160pp.

Haslam, Andrew and Barbara Taylor. 1997. Make it Work: Oceans. Two-Can Publishing Ltd. Southampton Oceanography Centre. 48pp.

Sheldon, Ian. 1998. Seashore of British Columbia. Lone Pine Publishing. Vancouver.

Harbo, Rick. 2003. Pacific Reef and Shore: A Photo Guide to Northwest Marine Life. Harbour Publishing. Madeira Park, B.C.



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MacQuitty, Miranda. 1997. Ocean: An Extraordinary Look From the Inside Out. Dorling Kindersley. London.

Swanson, Diane. 1997. The Central School Seashore Detectives. Nature Detectives- The Living World Science Series. Pacific Edge Publishing. Gabriola Island. B.C.

Extensions

Watch a seashore video such as Eco-Explorers: Seashore Wonders. Inside Edge Communications. Gabriola Island, B.C. (20 min.) or Animal Life in Action: Marine and Other Invertebrates. Schlessinger Science Library. 2000. (23 min. – for intermediate grades).

Make a tidal pool with a cake tin and gelatin in “How Dry I Am, How Wet I’ll Be” <http://www.epa.gov/safewater/kids/wsb/index.html#3-5>

Make marine seashore murals and riddles of marine organisms.

Make a 3-D kelp forest with marine animals and hang from the classroom ceiling

Make sushi.

* Barnacle Model: Make a large barnacle model using white cardboard. The barnacle should be large enough for students to get inside. Using ostrich feathers, students can wave them about while inside the barnacle to represent filter feeding.

Discuss various animals in animal kingdom.

Take a field study to the Vancouver Aquarium (see scavenger hunt for older students).

Do ocean art activities (ie. fish pictures with tissue paper, painted fish using paper plates, sea jellies with cellophane and tissue paper, octopus with construction paper.)

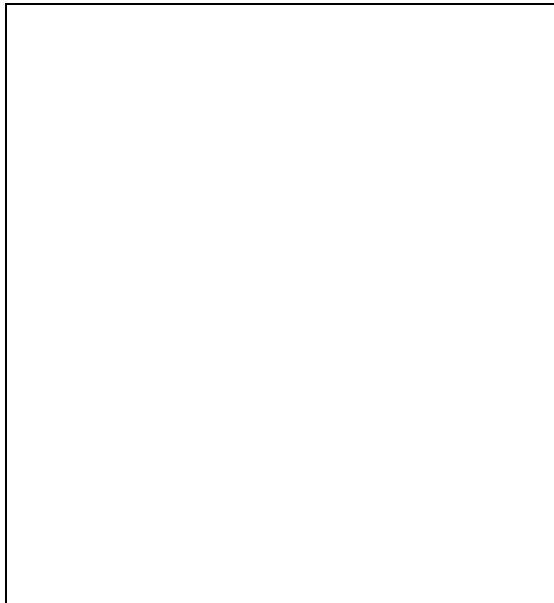
Sing song “Down in the Ocean” (sung to tune of “You Are My Sunshine”), and make pastel pictures of various marine animals:

Down in the ocean,	Down in the ocean,
The deep blue ocean,	The deep blue ocean,
Live many creatures of every size,	Live many creatures of every size,
Seastars and sea urchins,	Crabs, shrimp, and lobsters,
And also sand dollars,	Hermit crabs and barnacles,
Live together side by side!	Live together side by side!
“These are echinoderms!”	“These are crustaceans!”
Down in the ocean,	Down in the ocean,
The deep blue ocean,	The deep blue ocean,
Live many creatures of every size,	Live many creatures of every size,
There are moon snails,	Clams, mussels, scallops,
Octopus and limpets,	Cockles and oysters,
Live together side by side!	Live together side by side!
“These are gastropod mollusks!”	“These are bivalve mollusks!”

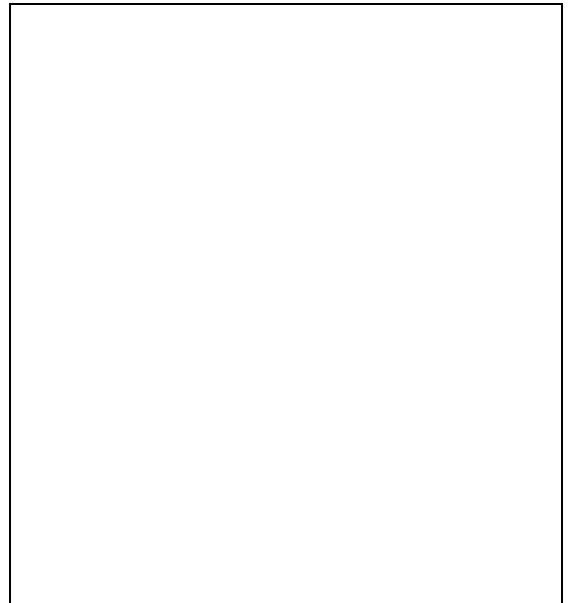
Marine Plants and Animals

Name of Scientist _____

1

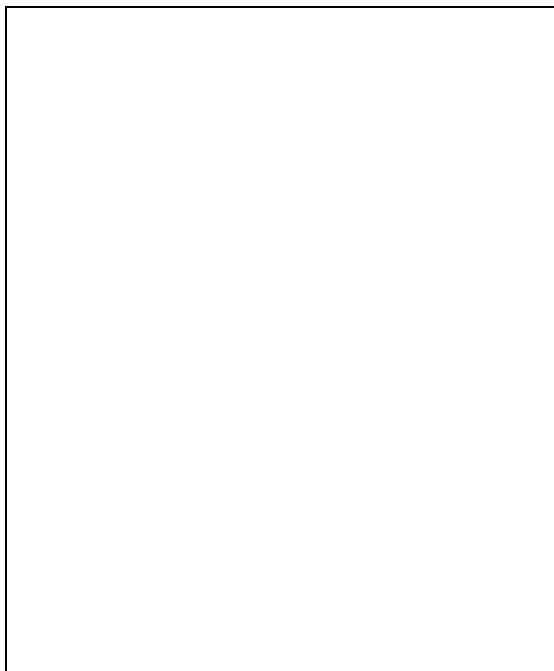


I am a clam.
How do I eat?

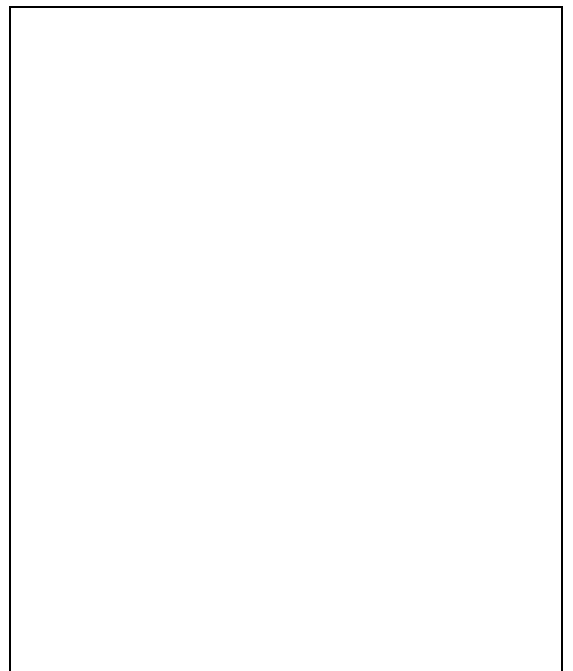


I am a scallop.
How do I swim?

2

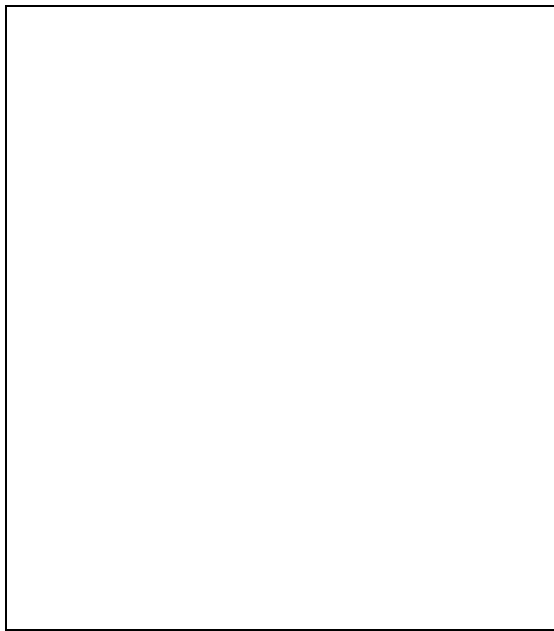


I am a snail.
How do I eat?

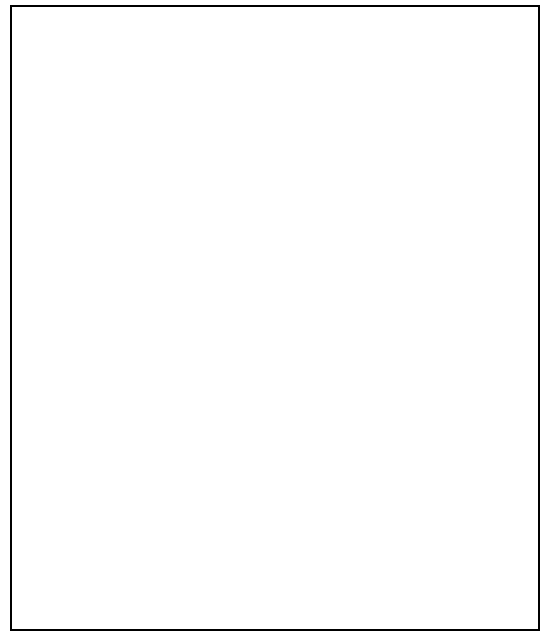


I am a limpet.
How do I hold on?

3

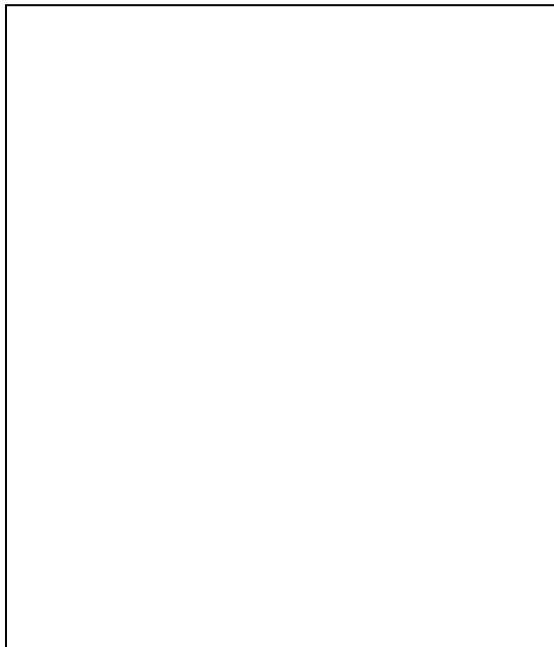


I am a barnacle.
How do I eat?

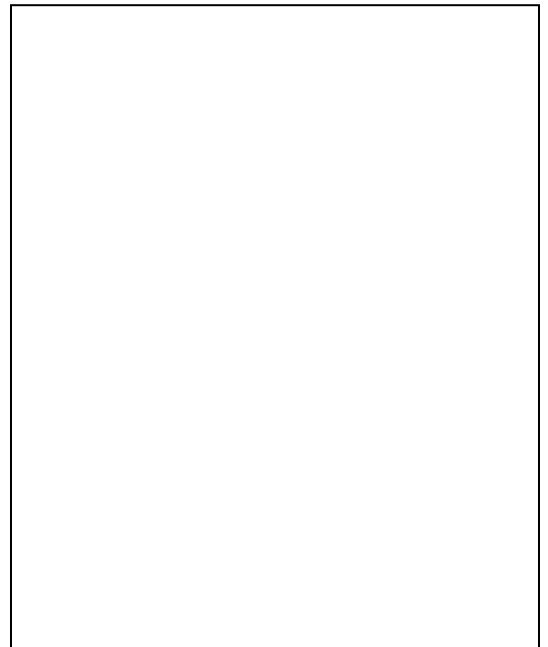


I am a crab.
How do I eat?

4

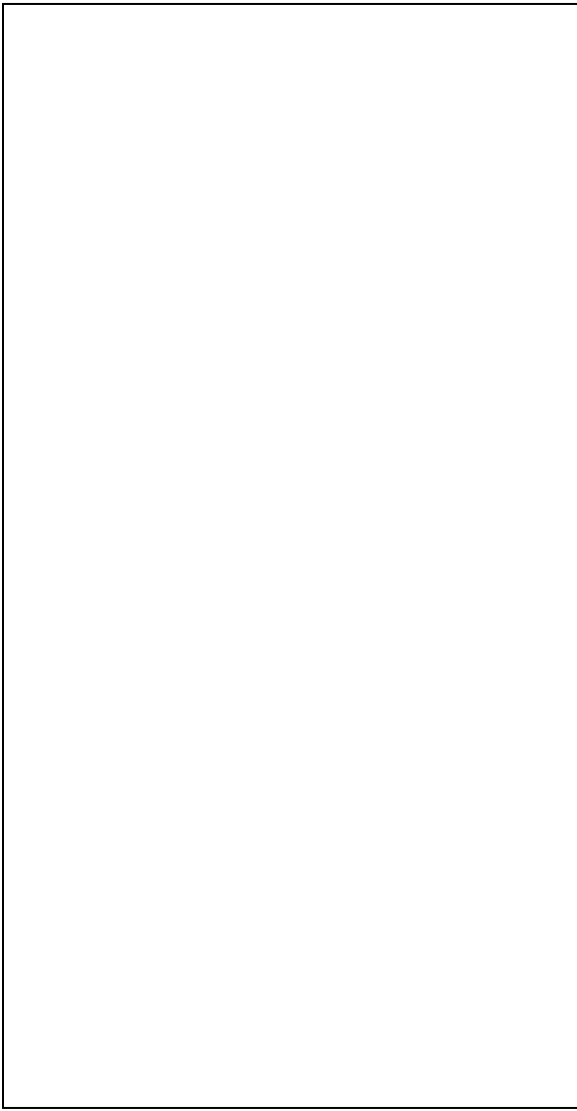


I am a sea urchin.
How do I stay safe?

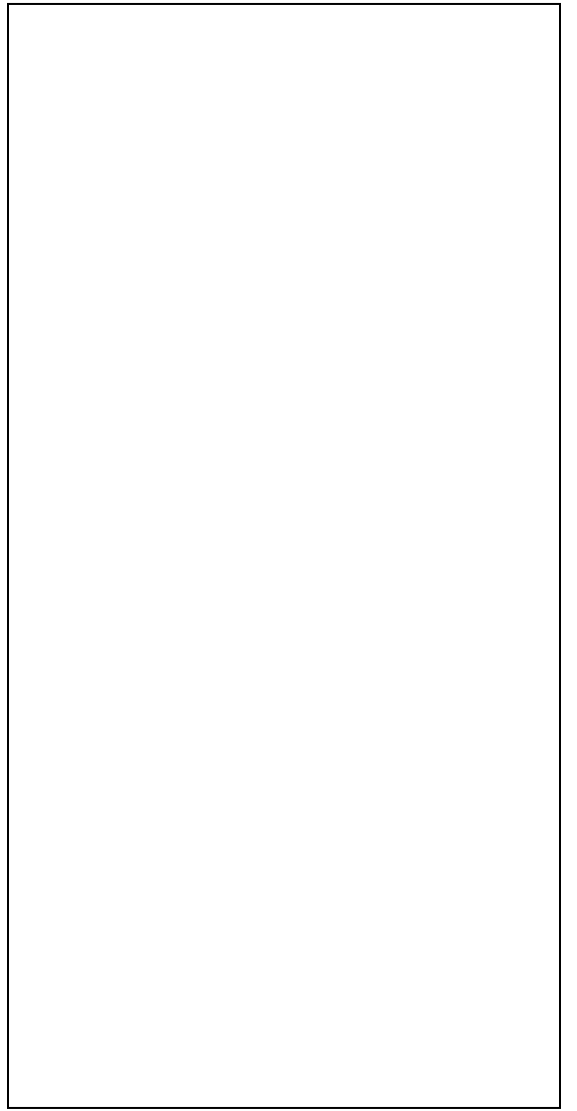


I am a seastar.
What happens if I lose a leg?

5



I am a seaweed.
Draw me and label me.



I am a land plant.
Draw me and label me.