

ECHINOMORPHS

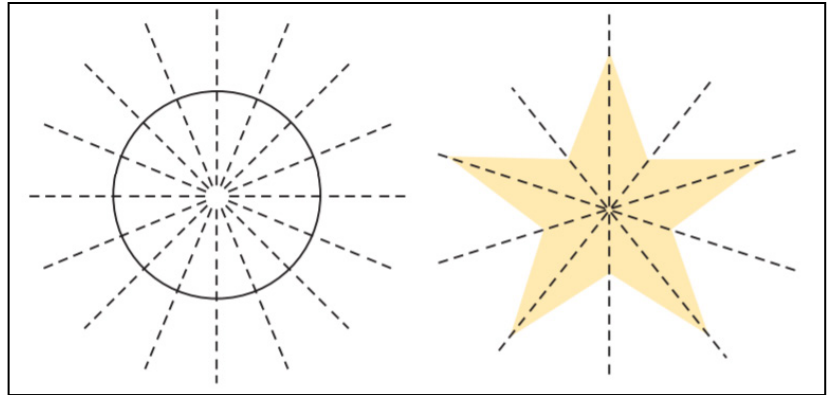
Adapted from the New England Aquarium and Bob DeWeese

Duration: 15-20 minutes

Group Size: 10-25 students

Ages: 5 and older (skills required: cutting with scissors)

Concepts/Skills Developed: Sea star anatomy, comparative anatomy (how different animals' bodies are similar or different), anatomy of a familiar animal that is very different from a human



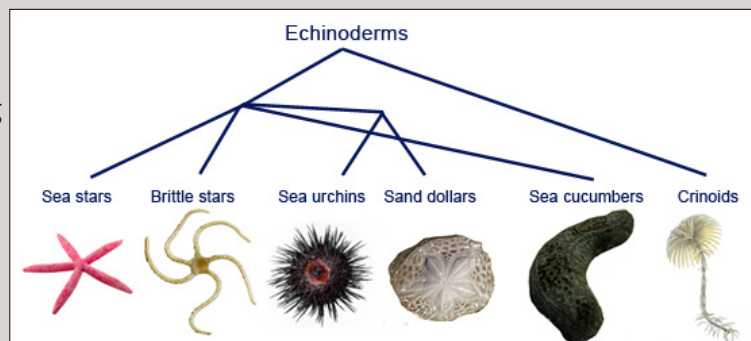
Via the New England Aquarium

Suggested Materials: Provide each student with a complete echinomorph template (one sheet with two echinomorph templates), scissors, and a stapler. Optional: Rubber bands and pencils for the sea cucumber.

Background Information: The family of animals known as echinoderms is a group of animals that includes sea stars, urchins, sand dollars, and sea cucumbers. Echinoderm means “spiny skin” and most of these animals are rough or spiny. They also share a type of symmetry called “radial symmetry,” which means that it can be folded along multiple lines. Think of a circle; no matter where you fold it through the center, the circle will be the same on each side. Most sea stars and other echinoderms have five lines of symmetry. This activity will show students how the body parts of these different types of echinoderms are similar by taking a sea star shape and folding it into the body plans for the other types.

Extensions

Younger students may not grasp the details of the science, but that's OK! Showing them the picture comparisons of the real animal and the paper model can help them have fun folding their paper into different animal shapes. These younger students may not exactly grasp that the different folds show that there is a common plan across all echinoderms, but you can still walk them through the folds and ask them what they notice about how each kind of animal is similar or different.



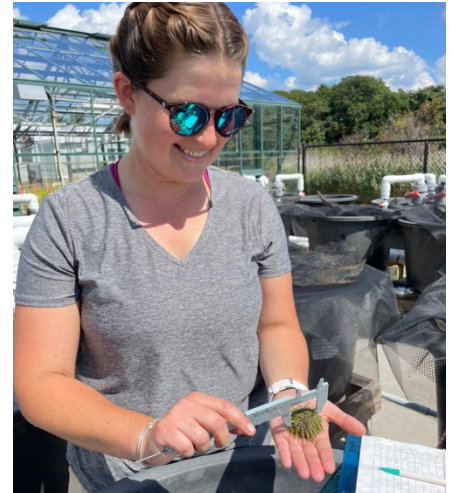
Via Marine Education Society of Australasia

MEET THE SCIENTISTS!

Researchers at the Northeastern University Marine Science Center study a wide variety of marine organisms, including echinoderms!

Nicole Peckham is a PhD student in the Kimbro Lab at Northeastern University's Marine Science Center. She studies green sea urchins and Jonah crabs, both found along the Atlantic coast of North America. Green sea urchins (*Strongylocentrotus droebachiensis*) are a type of echinoderms, a group of marine animals. The phylum name *echinoderm* comes from the Greek words for 'spiny skin.' The Jonah crab is a common predator of these green sea urchins.

Nicole worked with the green sea urchins in a tank farm, a grid of large tanks with seawater flowing in and out. These tanks allow scientists to observe many different marine organisms. Nicole's tanks had smaller enclosures within them that housed the Jonah crabs, to keep them separated from the urchins. The green sea urchins were outside of the smaller enclosure and could move around the tank. The tanks were also stocked with the urchins' favorite kinds of algae to snack on: *Saccharina latissimi* (common name: kelp) and *Codium fragile* (dead man's fingers).

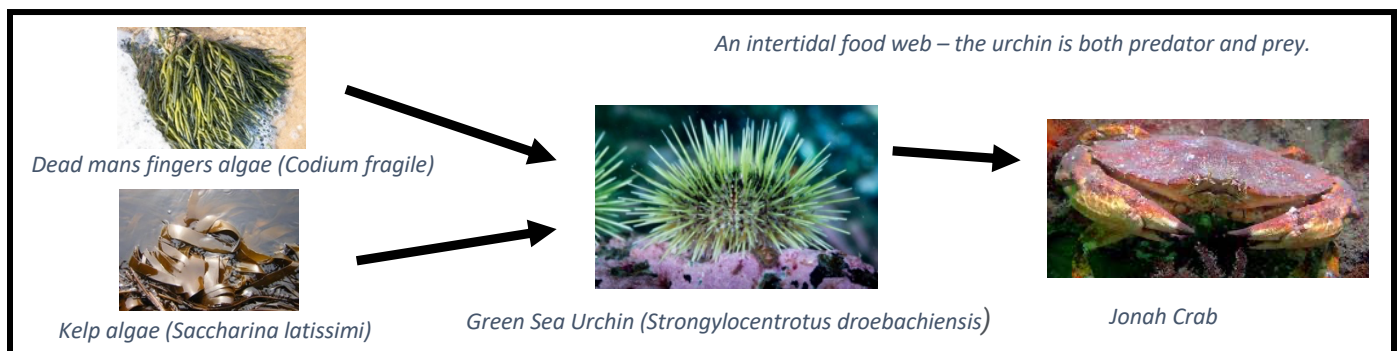


Nicole Peckham measuring an urchin.



The Marine Science Center Tank Farm.

Nicole and her team observed what impact the predator's presence might have on the urchins. Would the urchins' diets or feeding habits change? Would their movements change in the tanks? The tanks were monitored for intervals of several weeks so any changes in the urchins can be noted. Next, Nicole will analyze the data she collected, and produce reports to share with other scientists.



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Adapted from the New England Aquarium and Bob DeWeese

1

Make a star out of two pieces of paper

1. Cut out the two stars on the template page.
2. Lay them on top of each other.
3. Staple the two pieces together with one staple at the end of each point.

The circles represent tube feet, the sticky feet sea stars use to move. When you lay your star on a table, the tube feet should be on the bottom. A live sea star can tell if it is upside down and use its tube feet to turn over.

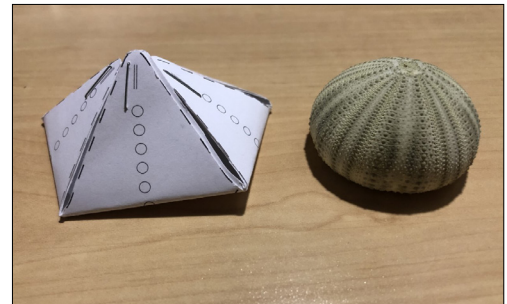


2

Make the star into an urchin

If you fold the arms of the star up and join them at the top, you've changed the star into a sea urchin.

Notice that the tube feet are on top now as well as on the bottom. If you ever have the chance to see a live urchin, you will see long tube feet "waving" all over the animal's body. The tube feet and five-part symmetry tells you the star and urchin are related, even though they may not appear similar at first glance.

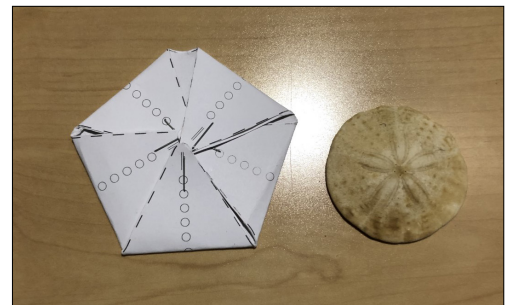


3

Flatten the urchin into a sand dollar

There's not much difference between a sea urchin and a sand dollar. Just squash your urchin to make it flat.

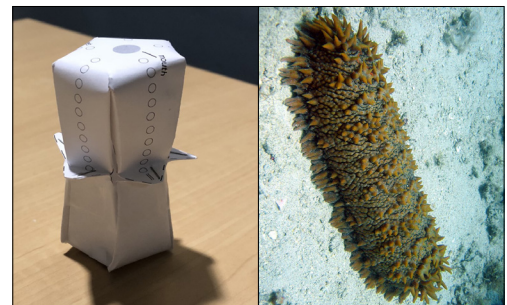
Sand dollars have spines too, but they are tiny and feel more like fur than spines. When you find the dried out skeleton or "test" of a sand dollar, you can see the five-part symmetry.



4

Making the cucumber is a stretch

Now you'll see why we made the sea star with two pieces of paper. If you pull the star apart, you'll change it into the sea cucumber. Optionally, you can use a pencil to draw tube feet on the other end and a rubber band to help the cucumber keep its shape.



Via Steven Purcell

