Name: _____ Date: _____ Period: _____

Starfish (Sea Stars) Dissection

Student Objective: Students will be able to answer questions about starfish after reading information and dissecting a starfish.

TEKS Objectives:

- Demonstrate safe practices during laboratory including safe handling of preserved organisms. [1A]
- Describe how adaptations allow an organism to exist within an aquatic environment. [10B]

Common Name: Starfish (Sea Stars)
Scientific Name: *Asterias rubens*

Scientific Classification	
Kingdom:	**Animalia**
Phylum:	**Echinodermata**
Class:	**Asteroidea**
Order:	**Forcipulatida**
Family:	**Asteriidae**
Genus:	***Asterias***
Species:	***rubens***

Where do Starfish live?

Echinoderms are radially symmetrical animals that are only found in the sea (there are none on land or in fresh water). The common starfish is native to the Atlantic Ocean and the surrounding areas including the North Sea, Britain, France, Spain and Portugal, Florida, Gulf of Mexico and southwards along the coasts of Africa to Senegal. Echinoderms mean "spiny skin" in Greek. Many, but not all, echinoderms have spiny skin. There are over 6,000 species. Echinoderms usually have five appendages (arms or rays), but there are some exceptions. Many echinoderms have suckers on the ends of their feet that are used to capture and hold prey, and to hold onto rocks in a swift current.

What is Starfish's Symmetry?

Radial symmetry means that the body is a hub, like a bicycle wheel, and tentacles are spokes coming out of it (think of a sea star). As larvae, echinoderms are bilaterally symmetrical. As they mature into adults, they become radially symmetrical. Most adult echinoderms live on the bottom of the ocean floor.

How Do Starfish Move?

Each starfish has hundreds of tiny feet on the bottom of each ray. These are tube feet, or podia. These tiny feet can be filled with sea water. The vascular system of the starfish is also filled with sea water. By moving water from the vascular system into the tiny feet, the starfish can make a foot move by expanding it. This is how a starfish moves around. Muscles within the feet are used to retract them. Each ray of a starfish has a light sensitive organ called an eyespot. Though it cannot see nearly as well as we do, starfish can detect light and its general direction. They have some idea of where they are going.

Pre-Lab Questions:

1. In what phylum are starfish found?

2. What part of the ocean do starfish live (their habitat)?

3. What does echinoderm mean in Greek? Why is this a good name for this group?

4. Describe starfish symmetry as adults.

5. Explain how starfish move.

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Quick Vocabulary Check:

- **Aboral service**: the top side of a Starfish. Also known as the spiny side
- **Ambulacral groove**: contains the tube feet on the oral side and used to pry open the shells of bivalves
- **Ampulla**: moves water up and down the tube feet it is like a zipper.
- **Digestive Glands**: digest the food, absorbs nutrients
- **Eye Spot**: is located at the end of each ray. It helps the starfish to see.
- **Gonads**: makes sperm or eggs
- **Madreporite**: is a white round disc on the aboral surface. It lets the water into the water vascular system
- **Mouth**: is located on the oral surface
- **Oral service**: the bottom side of a Starfish. The mouth and tube feet are located here.
- **Radial Tubes**: takes water out to the arms from the ring canal
- **Rays**: each arm can regenerate (grow again) if the ring canal has not been damaged.
- **Ring Canal**: is circular canal in which filtered water enters through the madreporite and branches out into the radiated canals.
- **Stomach**: goes out of the body and gets the food and brings it back into the body.
- **Stone Canal**: This connects the ring canal to the madreporite.
- **Tube Feet**: moves the Starfish, grabs food and open clam shells.

Materials: Preserved starfish, dissecting pan, scissors, forceps, pointer, lab apron, gloves, safety glasses and lab assignment material.
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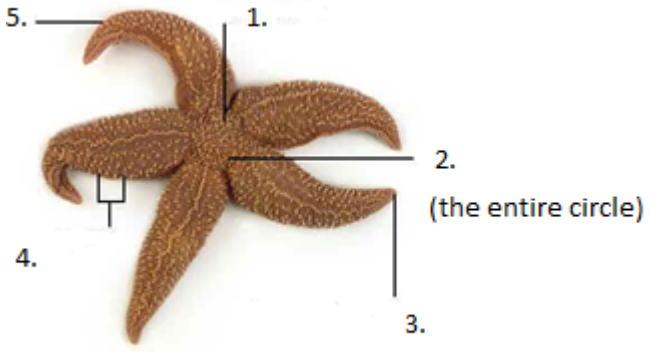
Procedure:

Aboral Surface:

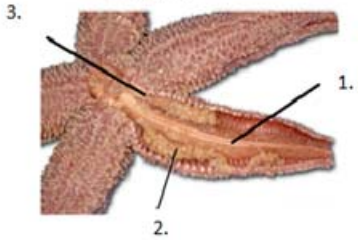
1. Place the starfish in the dissecting pan with its aboral (top) surface upward.
2. Observe the starfish and determine its symmetry.
3. Located the ring canal. This is the circle shape in the middle of the starfish.
4. Locate the small, round hard plate called the madreporite on top of the central disc. Water enters through this into the water vascular system.
5. Feel the upper surface of the starfish for spines. These spines protect the starfish and are part of their internal skeleton.
6. Look at the tip of each ray (arm) and find the eyespot which is at the end of each ray.
7. Label **Figure One**: Madreporite, Spines, Ray, eye spot, ring canal

Figure 1



8. Find a straight ray (arm) away from the Madreporite. You will dissect this arm. Each arm is the same so you do not have to cut each ray.
9. On the ray you picked to dissect, clip (cut) the eye spot off.
10. Take your scissors and put it gently into the tip of the ray.
11. Cut on the side of the ray and go up the ray until you get to the end of the ray. Do not cut too deep and do not enter the ring canal.
12. Cut the other side of the ray and remove the portion of ray you cut.
13. Once you remove the top part of the ray, you will see the digestive system. This helps break down the food the starfish eats. Remove the digestive system from the starfish. It is located throughout the entire ray around the radial tube.
14. Remove the gonads from the starfish. This is going to be located in the ray near the ring canal.
15. Notice the radial tubes. This is the tube that takes water out to the rays from the ring canal.
16. Label **Figure 2**: Digestive System, Gonads, Radial Tubes

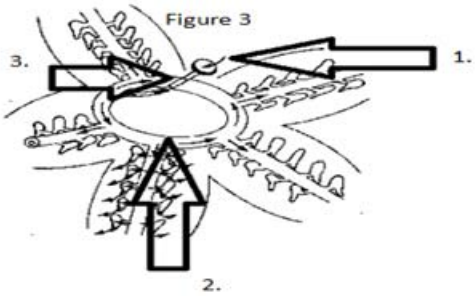
Figure 2



Stop and take a photo of your dissection. Upload it to padlet using your period's code.

17. Cut around the circle of the starfish (the entire circle). This is the ring canal. Do not cut it too deep. When you get to the madreporite, cut above it so you do not damage it.
18. Gently lift up the circle of the starfish (the part you just cut).
19. Remove the stomach. Be careful as it is a very thin membrane.
20. After removing the stomach, you should be able to see the stone canal. This connects the ring canal to the madreporite
21. Label **Figure 3**: Ring Canal, madreporite, stone canal.

Figure 3



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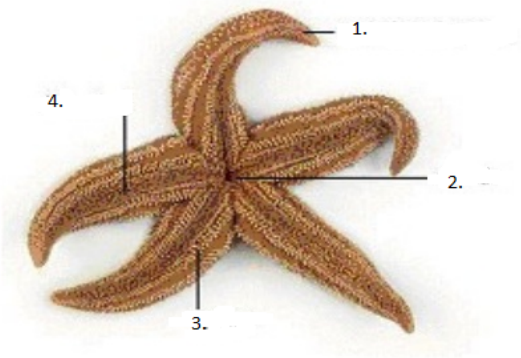
Oral service:

22. Turn the starfish over to its ventral or oral surface (underside).
23. Locate the mouth in the center of the central disc. Find the ring of oral spines surrounding the mouth.
24. Find the groove that extends down the underside of each ray. This is called the ambulacral groove. This contains the tube feet on the oral side and is used to pry open the shells of bivalves.
25. Feel the numerous, soft tube feet inside each groove. These are part of the water vascular system and aid in movement and feeding. It moves the starfish, grabs food and open clam shells.
26. Label Figure 4: Mouth, ambulacral groove, tube feet, spines.

Figure 4



Post Question:

1. Based on your expereince in the starfish dissection and information given in class, explain 2 ways the starfish adapts to its environment.