

James Farm Activity

This lesson is recommended for 4th grade but can be adapted to other grade levels. It is designed to correlate with curricular resource Structures of Life, Full Option Science Systems (FOSS).

Challenge:

Can you identify various structures of a horseshoe crab and explain how the structures help the horseshoe crab meet its needs, and protect itself in its environment?

Materials:

“Structures and Function” Handout, diagram of a horseshoe crab, pencil, clipboard, hand lens, copy of “Harry the Horseshoe Crab” by Suzanne Tate or “Crab Moon” by Ruth Horowitz and Kate Kiester.

Procedure for the teacher:

1. Prior to the trip, teacher should review the background information and read “Harry the Horseshoe Crab” or “Crab Moon” to the students.
2. Classes will meet at the pavilion.
3. Teacher will review the rules and the procedures for the day.
4. Students should be divided into small groups with at least one adult leader per group.
5. Students will follow the Red trail to the beach area.
6. Tell the students that they are to work in their small groups to find a horseshoe crab to study. Teacher can set boundaries for the search for the crabs. Depending on the time of year, students may only find small molts, dead crabs or crab parts. *Horseshoe crabs are picked-up by holding the sides of the shell, not the tail!*
7. They will make a drawing of the crab or use a printout of a crab and label the parts.
8. Labels should include the following: carapace, compound eye, simple eye, mouth, walking legs, book gills, telson.
9. Use the drawing to fill out the “**Structures and Functions**” chart.
10. After the data has been collected, students may gather on the beach or on the platform to discuss findings.

The teacher may want to use the following questions:

- How are the male and female crabs different? How are they alike?
- What structures are used for moving, either on land or in the water?
- What structures are used for protection?
- How does the crab get its food?

Extension:

1. Why are the horseshoe crabs important to the shorebirds?
2. Why should the horseshoe crabs be protected?
3. How are horseshoe crabs important to humans?

Structures and Functions

Challenge:

Can you identify various structures of a horseshoe crab and explain how the structures help the horseshoe crab meet its needs, and protect itself in its environment?

Function	Structure
How does the Horseshoe Crab breathe?	
How does the Horseshoe Crab move?	
How does the crab protect itself?	
How does the crab find food?	
What structure helps the crab flip over?	
How does the crab eat?	

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Horseshoe Crabs

Background information for the teacher

The Horseshoe Crab has survived for millions of years and is sometimes called a “living fossil.” It is not a crab but resembles a member of the arachnid family. The male and female crabs look similar except for size and legs. The male crab is much smaller and has as its first set of legs, a pair of what looks like boxing gloves, which it uses to hold on to the female crabs shell during spawning. The crab has an exoskeleton made of chitin which helps to protect it. This is called the carapace. The carapace is the color of the sand and helps the crab to blend in. On top of the carapace are two compound eyes. At the front of the carapace are simple eyes. There are also photoreceptors along the edge of the shell and along the telson. It has six sets of walking legs. The first set of legs on the male are the clasping legs. Behind the legs are the book gills. The gills remove oxygen from the water in order for the crab to breathe. As long as the gills are wet, the crabs can breath out of water for some time. In the middle of the sets of legs, is the mouth. Around the mouth are tiny bristles, which help to collect and grind up tiny worms and mollusks. The mouth works only when the crab is moving. The tail is called a telson. The telson is important to the crab because it uses it to flip itself over if it is stranded on the beach upside down. If left upside down it will die. The telson is also used in swimming.

Horseshoe Crabs spawn in late May to early June. The males come ashore and wait for a female. The females may have several males attach to her as she comes ashore. She lays eggs in clusters of about 4,000 eggs. She does this several times during the high tides. The eggs are tiny green circle and are found a few inches below the sand and sometimes along the high tide mark. These eggs are an important food source for migrating birds on their way from South America North.

Important Facts:

- Horseshoe Crabs are used for fertilizer and bait, which can contribute to population reduction.
- Scientists use Horseshoe Crab blood for testing medicines. This is not harmful to the Horseshoe Crab, but is very beneficial for humans.
- Students may see “hitchhikers” on the shell of the horseshoe crab. Sometimes the horseshoe crab shell will have slipper shells, mud snails, periwinkles, etc. attached.

- Horseshoe Crab eggs hatch in about 2 weeks. The crabs grow by molting. They molt 8-10 times in their first year. They molt for the last time at about 9-12 years old. Only then are they ready to spawn.
- Horseshoe Crabs live to be about 20+ years old.
- Horseshoe Crabs swim upside down.
- **Teachers should remind the students that the Horseshoe Crab is totally harmless and that they should never pick the crab up by its tail. Also, if they find a crab on the beach upside down, flip it over and put it back in the water.**

Horseshoe Crab

