# Lesson 3: Adaptations in Organisms

## Objective:

Students will construct their own water strider to determine the characteristics that help it live on top of the water.

How do water striders live on top of the water? In this investigation, students will determine what characteristics help the water strider live on top of the water. They will investigate the characteristics that keep the water strider from sinking into water, unlike many other living organisms. The water strider uses the surface water tension to “walk across” with their long legs spread out horizontally. This contrasts with other insects that have shorter legs that point downward and break the tension, causing them to sink. Water striders can easily move across the water to gather their prey and survive. Other insects sink and are unable to return to the surface.

## NGSS:

3-LS4.C. For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.

## Essential Questions:

1. How do adaptations help organisms to survive in different environmental conditions?

## Materials:

* Shallow rimmed plate
* Roll of thin copper wire
* Scissors
* Ruler with large print and braille
* Optional: Blue food coloring to add contrast to the water

## Lesson Sequence:

1. Ask students whether they have ever heard of an insect that can walk on water. [Answers vary depending on the experience of the students.]
2. Discuss with students how they think they could adapt an insect to walk on water. [Again, answers vary.]
3. Discuss the term “adaptations” with the students. Discuss with the students that some organisms survive well and some survive less well given different types of environments. Provide examples. [ex. Can a pig survive in the Arctic? Why not? What would a pig need to be able to survive in the Arctic?]
4. Tell students that they are going to create an insect that can adapt to the environment of water. Tell them that their job is to make a insect that can walk on water and live on top of the water and not sink.
5. Explain to students that their job is to use copper wire to create a new insect that will walk on water. Tell them that they are to tell you how long the legs of their insect will be. They can have legs that are between 1 inch and 8 inches. You will need to cut three pieces of wire of the specified length the students have given to you.
6. Once the students have the wire, have them twist the three wires at the center together in the middle so that all three wires are bound together and six legs are produced by the ends of the wire.
7. Now, have students spread out the three wires on each side. These are now the “legs” of their insect.
8. Have students curve the tip of their legs up to make tiny feet for the insect. Make sure it sits evenly on all six legs. Have students feel each leg that it is evenly sitting on their desks. This may require moving the legs farther apart. [You may want to give this hint to the students.]
9. Using your thumb and middle finger, grasp the point at which the wires come together (the insect’s body) and gently place the “insect” on the water. Does it float? If it sinks, try to move the legs out farther. If it still sinks, try a different measurement of wire. *Note*. To feel the floating, have students gently put their bugs on the water. Once gently placed, the surface tension will give some pushback. Students should be able to feel the floating happening. The sinking will happen immediately, and the students should feel that immediately and can check at the bottom of the water to determine whether it sank. In addition, blue food coloring can be added to the water for contrast for those with low vision. The plate can also be placed under a magnification device to watch for sinking or floating.
10. Once students have the right combination of length and stretch of legs, have students discuss in small groups their findings.
11. As a class, once all students have their insects floating, ask them what worked best. What adaptations did their insect have to make in order to float on the water?
12. Now, add a bit of weight to the body of the working insect. This can be in the form of small pieces of clay, paper, or tape wrapped around the body. What happened? Did it sink? [Adding weight sinks the insects.] What could you do to make it float better? [Spread out the legs more.] Try the experiment multiple times.
13. Discuss as a class what adaptations were made to the original insect to make it float. [Long legs that were spread apart.] What happened when the insect changed its body? [It sank.] What adaptation did you have to do to make it float again? [Removed some weight, changed the way the legs were spread, used different material to decorate.]
14. Talk about how the original insect is a model for the water strider and how they have adapted to living on water. How could other organisms adapt to their environments? How do you humans adapt to their environments?

Resource:

Science Buddies. (January 2, 2019). Make a water strider—STEM activity. YouTube. <https://www.youtube.com/watch?v=8h7UZ8pE_Q0>

*Note.* Lesson plan was adapted from “Water Striders: Survival Adaptations,” [https://www.sciencebuddies.org/teacher-resources/lesson-plans/water-strider-survival-adaptations - gc-howto](https://www.sciencebuddies.org/teacher-resources/lesson-plans/water-strider-survival-adaptations#gc-howto).