# DIVE BENEATH THE SURFACE

## Lesson 1: Introduction to Marine Adaptation

**4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.**
[Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
|---|---|---|
| **Engaging in Argument from Evidence.**<br>• Construct an argument with evidence, data, and/or a model. (4-LS1-1) | **LS1.A: Structure and Function.**<br>• Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.(4-LS1-1) | **Systems and System Models.**<br>• A system can be described in terms of its components and their interactions. (4-LS1-1) |

## Objective:

Students will understand that different marine organisms have specific adaptations/forms that allow them to move and function in differing marine environments.

# Materials

- Plastic Vase (any clear container will do)
- Water
- Bottle Cap
- Ping pong balls
- 1 lb. Weight
- Sponges
- Cork
- Data Worksheets

*The 5 items used for the sink or swim activity are suggestions but can be substituted based on supplies available.

# Engage

## Introduction:

## 10 minutes

Introduction of adaptations for movements in a variety of environments.

Lesson will begin with a whole class discussion mediated by the teacher and guided by student responses. This conversation is designed to understand students' prior knowledge and get students thinking about what an adaptation is.

Beginning with animals that students are familiar with asks questions about the structures they use to move. Allow time for students to share ideas with an elbow partner before beginning whole class discussion. Questions may include:

- How does a human walk? What do they use to help them walk?
- How does a bird fly? What about a bird allows them to fly?
- How does a dog/cat walk? How is this different from how humans walk?
- How does a fish move? Can a fish swim on land?
- Can you think of any other way animals move?

After students have finished discussing with a partner give the opportunity for the partner pairs to share what they discussed with the class. On a white board or poster, record the different structures the students describe. This recorded list will establish examples of different structures that serve the function of movement.

# Explore

## Activity:

### 25 Minuites

During this activity students will be working in groups of 3-5.

Students will be testing a variety of objects and recording data about these objects and the rate and manor in which they sink (some may float). Through observations of how the composition of a variety of objects effects the way in which they sink or float, the students will begin exploring the concept that marine organisms will "swim" differently depending on the structures that make them up.

Supplies for this activity (1 per group):

- Plastic Vase/Tub (filled ¾ with water)
- Weight
- Ping-Pong Ball
- Bottle Cap
- Dry Sponge
- Wet Sponge
- Sink or Swim Worksheets
- Assignment badges for each group position

## Procedure:

1. Divide students into groups.
2. Give students description of the "Sink or Swim" activity.
    a. Within groups the students will begin by recording data of each object that will be dropped based on measurements and observations. Students should also make predictions about what they believe will happen when an object is dropped into the water.
    b. Students will then begin dropping each object one at a time into the vase of water. Observation about how the object sinks and the time it takes to sink should be recorded as well. If an item floats that should be indicated as well.
    c. Once each item is dropped and observations are recorded students will determine whether their predictions matched reality and why they think this happened.
    d. Groups will use any remaining time they have to answer some of the follow-up questions to extend their thinking.
    e. Once the classroom is in order and materials are returned, transition into a whole class discussion of what was observed.

## Student Jobs:

**Once students are organized in groups and a description of the activity is given, each student will be given a specific task to responsible for within their group. In groups with less than 4 students, a student may oversee more than one task. Likewise, if a group has more that 4 students, 2 students can share a job.**

Materials Master: This student will be responsible for retrieving necessary supplies, organizing workspace, and returning supplies at the end of the activity.

Super Scribe: This student will be recording all the data on the worksheet that they will then share with the other members of the group. Data includes dimensions of objects and the time it takes an object to sink.
Dr. Dropper: This student will drop the objects into the water in a calm manner, being careful not to splash the water out of the vase.
Water Warrior: This student will be responsible for keeping the splash zone under control and drying up any pesky puddles. In addition to managing the overflow of H2O, this student will be asked to dispose of the water outside on a plant or tree.

# Expand

## Follow-up Discussion and Conclusion of Lesson 1:

### 10 Minutes

In a whole class discussion ask for student responses based on what the observed during the "Sink or Swim" activity. The focus of discussion should be on the differences in the composition of the objects and how this affected the way it sank.

- Did all the objects sink?
- Did some sink faster than others?
- What was different about the objects that sank versus the ones that floated?
- Could anything be changed to make an object that sank float? Or an object that floated sink?

## Introduce Key Terms

Once students have demonstrated an understanding that the differences in the composition of the objects affected how they moved in water introduce the academic terms that will be used throughout the lessons to describe these differences. When introducing terms be sure to also use information discussed in the opening activity about animal movement as well.

**Adaptation:** A change in a plant or animal that allows it to live and survive in a particular place or situation.
**Structure:** The way that something is built, arranged, or organized. The *structure* of a plant. (ex. Wings on a bird)
**Function:** The special purpose or activity for which a thing exists or is used. The *function* of the heart is to pump blood through the body. (ex. The function of wings on a bird are to allow the bird to fly)

## End Lesson with Dive Beneath the Surface Introduction Video:

## "Introducing DBS to Your Classroom"

https://calpolydbs.wixsite.com/divebeneath/videos