



BAY ACADEMY

PRE-VISIT LESSONS

Aquarium of the Bay Self-Guided Tour
KINDERGARTEN – FIRST GRADE

Download all four parts from Bay Academy to enhance your students' educational experience:

- Pre-Visit Lessons**
- Chaperone Guide**
- On-Site Activities**
- Post-Visit Lessons**

OVERVIEW

GRADE LEVEL:

K-1

PREPARATION TIME:

20 minutes

ACTIVITY TIME:

40 minutes

LOCATION:

Suited to any open outdoor or indoor space

MATERIALS

- Water
- Salt
- Two medium-sized water containers (water bottles, pitchers, etc.)
- Small (approx. 5 oz) cups for tasting
- Shelter and Food tokens (Appendix A)



WHO LIVES IN THE BAY?

Intro to Estuaries: Pre-Visit Lesson Plan

ENDURING UNDERSTANDING

Students will understand that many animals live in the unique environment of the San Francisco Bay estuary.

LESSON OVERVIEW

Activity	Students will...	Students will learn...
Water Taste Test	Use their observations of water samples to identify whether water is fresh or salty	Some water is freshwater and some water is saltwater. An estuary is a body of water where freshwater and saltwater mix.
Animal Needs and the Bay	Participate in a game that models how estuaries provide animals the things they need to survive.	Estuaries provide animals the things they need to survive.
The San Francisco Bay as an Estuary	Discuss what they've done today and connect the activities to our local estuary.	The San Francisco Bay is an estuary.

SET UP

Activity One

1. Mix the salt into freshwater and put into one of the containers.
2. Fill the second container with regular freshwater.

Activity Two

1. Choose whether you would like to play V1(color) or V2(shapes) of the game. Note when choosing that the students must be able to distinguish different colors and/or shapes in order to play the game effectively.
2. Print 3-5 copies of the token sheet and laminate if desired.
3. Cut out all of the tokens.
4. You may choose to set up Activity Two before the class period, or you can set up the activity between the two activities.
4. When setting up this activity, there needs to be a central "habitat" area where students will collect tokens, as well as a small "safe area" large enough for all of the students to gather.
5. Lay out all of the tokens in the "activity area" so that all are face-up. Try to keep each habitat somewhat separate.

PROCEDURE WATER TASTE TEST

1. Explain to the students that they will be given two different cups of water to taste.

2. Tell the students that they are going to need to be scientists and try to figure out what is different between the two samples.
3. Have the students sit or stand in a line or circle to ease passing out materials.
4. Pass out all of the cups and then carefully pour each student a small sample of both freshwater and saltwater. Make sure to pour only a small amount, particularly of the salt water.
5. Ask the students to try each water sample and think about what is different.5. Once all of the students have tasted the water and observed that one sample is freshwater and the other saltwater, bring the class together again to debrief the activity.
6. Review where freshwater and saltwater are found.
 - + Freshwater is found in rivers, lakes, ponds, and creeks.
 - + Saltwater is found in the ocean.
7. Explain that there are also special places where these two kinds of water mix. These places are called estuaries.

PROCEDURE

ANIMAL NEEDS AND THE BAY

1. Describe that animals live in estuaries, the ocean, and freshwater places like rivers.
2. Explain that many animals that live in the ocean know how to find food and protect themselves right after they hatch.

3. Ask the students to think about how they are different than these kinds of animals.
4. Tell the students that they are going to get to pretend to be these baby animals and they are going to work hard to find all of the things they need to grow up in their area.
5. Brainstorm what animals need in order to survive and be sure to include:
 - + A place to hide/live
 - + Food
6. Show the students an example of the tokens and explain that some are food tokens and other are home tokens.
7. Explain that they will be put in three groups because they live in three different important areas: the ocean, the river, and the estuary.
8. Help the students understand what color/shape goes with each place, and check for understanding.
9. Split the students up into three equal sized groups and move to the game area.
4. Explain to students that they are going to be given 30 seconds to find their two tokens and return to the safe area.
5. After 30 seconds, have all of the students sit down where they are and separate students who completed the task from those that didn't.
6. All students who don't find their tokens, have the wrong tokens, or didn't follow directions will sit down in the safe area and cheer on their classmates.
7. Count the number of students in each group who made it past the first round and tally their numbers on the board.
7. All of the students who completed the first round will continue in the second round, where they will compete for the remaining tokens.
8. Continue to play the game until there are no more tokens. If time allows, play another round or two of the game, switching up the groups so they are looking for a different color/shape.
9. After the game has been finished, gather the students and have them reflect on the game, focusing on:
 - + Which group had the most people after the first round (estuary)
 - + Which group had the most tokens on the board (estuary)
6. Lead a discussion about how the estuary has more food and shelter than other nearby habitats, making it a good place for young animals to live, which is why those in the estuary group were able to continue more.

GAME PROCEDURE

1. If you did not place tokens during set up, have students close their eyes and place the tokens.
2. Make sure that the three groups are located near their token area and review the color/shape they are looking for.
3. Explain that in each round, every students needs to try to find (1) food and (1) home token that matches where they live (ocean, river, or estuary)

DISCUSSION

THE SAN FRANCISCO BAY AS AN ESTUARY

1. Conclude the lesson by connecting the estuary and its brackish water to the San Francisco Bay.
2. Explain that the Aquarium is our local estuary, and that just you talked about in the first activity - it is made of salt and freshwater.
3. Connect Activity Two to the San Francisco Bay by telling students that there are animals that live in the San Francisco Bay that need the same things they were looking for in their game.
4. Ask students if they have ever been in the Bay, and what kind of animals they thought lived there.
5. Explain that they will get to see some of the animals they talked about and others when they visit the Aquarium of the Bay on their field trip.

The brackish water—a mixture of freshwater and salt water—is a major reason that estuaries are such productive, diverse, and dynamic ecosystems. Many animals rely on estuaries for food, places to breed, and migration stopovers. Humans also rely on estuaries for food, recreation, and jobs. The San Francisco Bay Delta ecosystem is the largest estuary on the West Coast of the Americas, fed by the water flowing over about 40% of California's land mass.

FRESHWATER FLOWS

Freshwater flows are rainfall and snowmelt that run into surface streams and groundwater, downstream to major rivers, and eventually to the sea. For the San Francisco Bay, the Sacramento and San Joaquin rivers and their tributaries provide the freshwater flows into the Bay.

Freshwater helps create a healthy estuary through the transport of nutrients, sediment, and small organisms to and through the Bay. Freshwater flows are also essential corridors for migratory fish like salmon and other fish like sturgeon and striped bass. These animals must travel between the ocean and freshwater habitats to complete their lifecycle.

The amount of freshwater that comes into the San Francisco Bay has been dramatically affected by the alteration of flows. A combination of dams, groundwater

TEACHER BACKGROUND INFORMATION

ESTUARY

One of the reasons the San Francisco Bay can support its diverse wildlife is that it is an estuary. An estuary is a partially enclosed, coastal body of water where freshwater from rivers and streams mixes with salt water from the ocean.

FRESHWATER FLOWS CONT.

withdrawal from the Central Valley, water exports from the Delta for agribusiness, and for the needs of Southern California's growing population has led to a 50% reduction in freshwater flows into the Bay, with increasing frequency in the last several decades. The reduction of freshwater flows into the Bay has made it a less dynamic and less productive environment.

GLOSSARY

Brackish: Slightly salty. With a salinity between freshwater (0 ppt) and normal ocean water (35 ppt).

Estuary: A partially enclosed body of water where freshwater from land and saltwater from the ocean mix.

STANDARDS

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

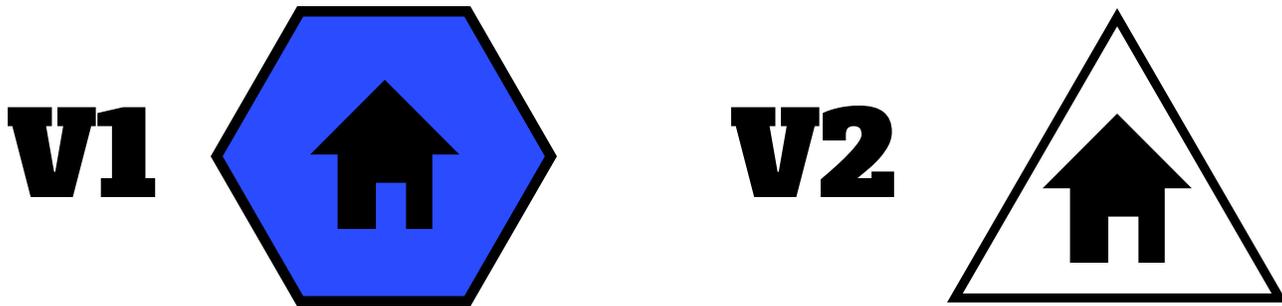
K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

APPENDIX A

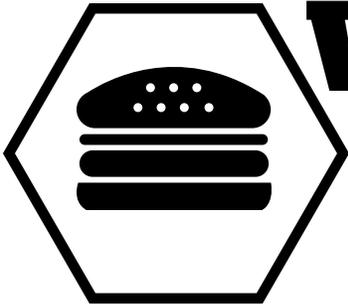
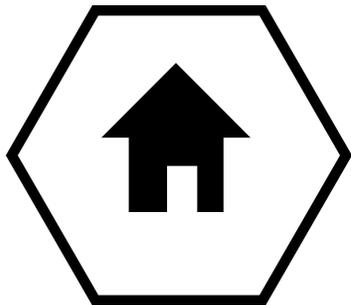
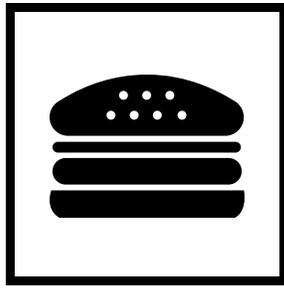
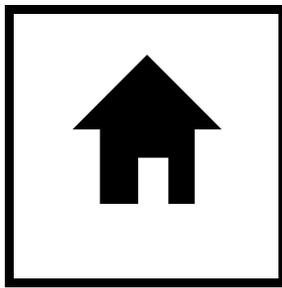
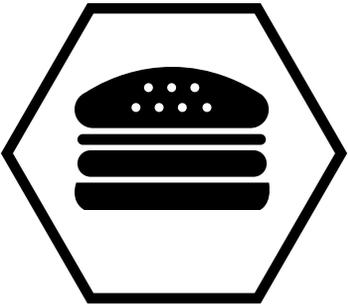
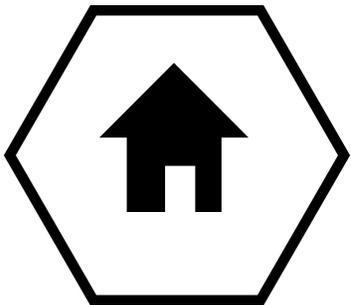
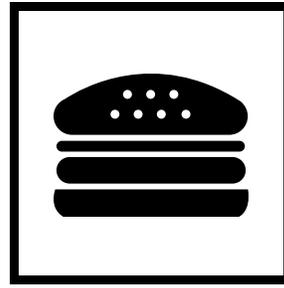
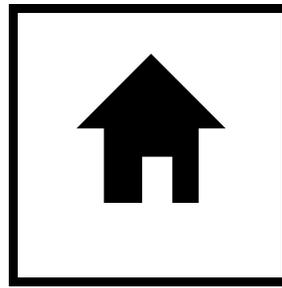
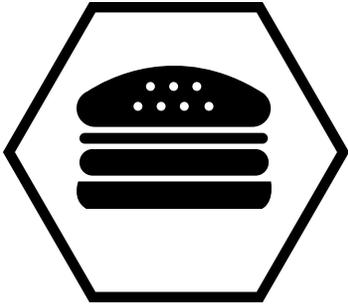
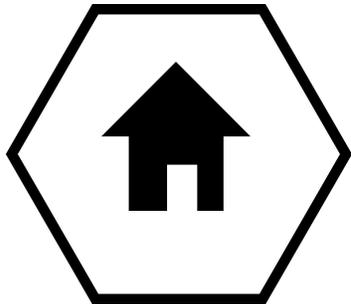
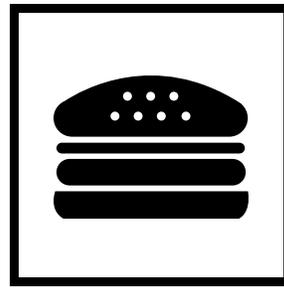
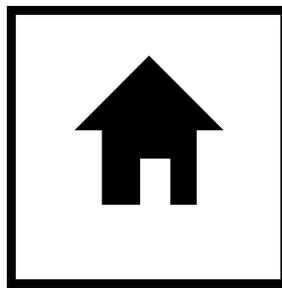
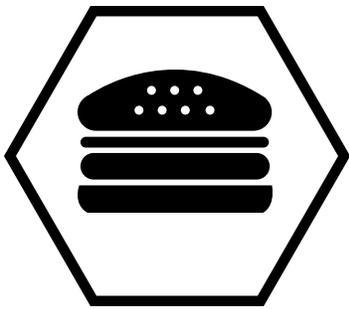
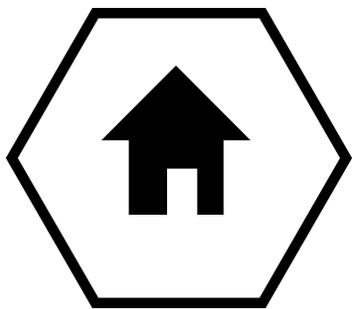
ANIMAL NEEDS AND THE BAY GAME TOKENS

This game simulates the process that many animals need to take in order to find resources to survive. The rules of the game may be changed in order to fit the needs of your class, however the game does need at least 50 tokens with some way to distinguish between Ocean Tokens, Estuary Tokens, and River Tokens. In Version 1, the color of the tokens signifies the area (Blue- ocean; Purple- estuary; Red- river). In Version 2, the shape of the tokens signifies the area (Triangle- ocean; Hexagon- estuary; Square- river). Each token has an icon indicating which resource it represents. The house represents the shelter an animal needs, and the burger represents food.

For example, the both tokens below are Ocean Home tokens:



We recommend that you laminate each sheet before cutting the tokens out to ensure that they tokens maintain their shape throughout each round, although this is not necessary. You may also use Version 2 to color your own tokens to fit the needs of your students. This game is a fun, informative way to explain complex processes in the environment, however it can be adjusted in many ways to fit many different classroom environments.



v2

