

# Understanding the Bay.

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## Instructions for Teachers Before the Museum Visit

Use Part 1 of the lesson to familiarize students with some facts about the Bay and also to introduce vocabulary related to the Bay. Make copies for your students. Introduce the information supporting and assisting students as necessary. Students do not need to memorize the facts or vocabulary. They can use this information as they do the second part of the lesson.

Once students have finished with the information from Part 1, make copies and have them complete Part 2. This page is for students to use *before* they go to the museum and *at the* museum. Students are to answer the questions to the best of their abilities. They can provide their best guess for parts they are not sure about. Some of the answers can be found on the activity for Part 1. Encourage students to use the information and vocabulary to assist them as they answer the questions. Correct answers to all of the questions can be found in the exhibition (and will be provided for you on this teacher page).

## Museum Visit

Students will take their answers from Part 2 to the museum. Lead your class into the *Below* section of the exhibition. Their task is to find as many answers as they can from the exhibition at the museum. Once students find information in the exhibition they can:

- Go to the next question if they answered correctly.
- Add information if they find more information to add to their answers.
- Write correct answers for questions they missed or did not complete.

**Make sure students use only pencils for work done at the museum.**

## After the Visit

Allow time for students to share their impressions and ideas from the museum. Have students share answers to the questions. You can do this as a whole class activity or have them work in smaller groups.

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**Answers to the Student Worksheet Questions:**

1. In most places the water is very shallow—just 12 feet on average—but beneath the Golden Gate Bridge it plunges to 350 feet.
2. The currents, wind, and tides make the waters move.
3. People filled in parts of the Bay to develop for other uses, diverted water from rivers so it doesn't flow into the Bay, and also built walls that prevented tides from flooding onto land that was developed (with houses and other developments). All of these things resulted in the Bay being smaller today than it was before Americans arrived in the 1800's.
4. Basically it was created to save and restore the Bay. It was established by the U. S. Congress to transfer 20,000 acres of salt ponds to federal ownership and to manage this land in partnership with Leslie Salt (now Cargill).
5. Baylands are the wetlands, marshes, and other lands of the Bay.
6. Twice a day
7. The salt water comes from the Pacific Ocean.
8. The fresh water comes from rain and river run-off (for those rivers that have not been diverted).
9. Answers will vary...

Answers do not have to be as complete as some of these are. You can share the complete answers for their information, after hearing what they recorded at the exhibition.

**Other Activities:**

- Incorporate the vocabulary from the lesson into your spelling activities.
- Have students (individually or in groups) draw pictures using the information they have learned, or have the whole class work on a mural that incorporates the information.
- Have students write articles and/or stories that focus on the Bay and how important it is to keep the Bay and its regions natural and free from harm.

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## Information for students—Part 1, Learning New Vocabulary

Read this information about the bay and learn new vocabulary that you can use later in the lesson. You will also see this information at the museum.

- A **bay** is where the water forms an inlet (“arm”) into the land.
- The San Francisco Bay is actually an **estuary**—a place where cold salt water from the ocean mixes with warmer fresh water from rivers.
- **Tides** are the slow, daily movement of ocean water towards or away from land. They cause the level of the water to rise and fall and are influenced by forces of nature such as the movement of the earth and moon.
- **Tidal flats** are exposed (uncovered) by the low tides of the bay. They are filled with life: marine worms, small clams, and crustaceans (crabs and other shelled animals) that provide food for more than one million birds each year.
- **Mudflats** (flat muddy areas) and **marshes** (muddy places where tall grasses grow) are exposed when the tide is low and covered by water when the tide causes the water to rise.
- By the 1960’s, Californians had filled (added dirt and rocks to get rid of the mud) and **diked** (built dams and walls to control the flow—movement—of the water) most of the **wetlands** of the Bay (places where we find mudflats and marshes).
- In 1969, laws were passed to stop people from filling the bay’s wetlands and since then **refuge** (protection from further harm or danger) projects have protected 30,000 acres (a land measurement) in the South Bay, and another 14,000 acres at other places around the Bay.
- Marshes absorb (hold) water and decrease (make smaller) the size of waves during high tides so they reduce the need for people to build protective **seawalls** (stone, brick, or concrete “walls” to keep water from flooding onto land).

## Information for students—Part 2, Finding Out What We Know About the Bay

Answer the questions below. You may not know the answers. It is fine to guess or give your best try. Part 1 of this lesson may help with some of the questions. Use it as you answer the questions. Please answer all of the questions, it is okay if your answers are not correct. You will be able to find all of the correct answers when you go to the museum.

Questions to answer	Answers <i>before</i> the visit to the museum	Answers from the exhibit <i>at the Museum</i>
1. How deep do you think the water in the Bay is?		
2. Why do you think the water moves in the ocean and the Bay?		
3. What happened to make the size of the Bay smaller today than it was before 1800?		
4. What do you think the San Francisco Bay National Wild Life Refuge does for the Bay?		
5. What do you think “Baylands” are?		
6. How many times each day do you think tides come and go at the Bay?		
7. Where do you think the salt water in the estuary comes from?		
8. Where do you think the fresh water in the estuary comes from?		
9. Why do you think it is important to protect the Bay and its natural form?		