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DISCOVERING SAN FRANCISCO BAY ABOARD PEGASUS

DRAFT CURRICULUM

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Introduction

[Introduction needs to be rewritten, aligning it more to what actually will appear in the module]

This curriculum module introduces students to the discovery of San Francisco Bay by the early explorers. Students learn about various navigation techniques, including using the compass to take readings and plotting them on a map. Students are also exposed to modern-day issues that involve sailing in the San Francisco Bay. Through various readings and activities, students gain a solid understanding of sailing in history and in the present. In the final assessment activities, they are given an opportunity to use multiple intelligences to present what they learned from the curriculum.

In addition to the core activities, teachers can have students engage in other activities that relate to the main theme. For each section, there are extension activities that take the students beyond the main learning points and allow them to explore subthemes on their own. For example, in Part One, Discovery of the Unknown, students study about the first explorer to chart San Francisco Bay. As an extension activity, they can choose to read one of two literary excerpts about sailing and discovery that may further stimulate their interest in the topic.

Grade Level

This module is primarily for 4th through 6th grades. With slight modifications, however, the activities can be used for upper grade levels.

Standards

This module can be used to support national and California state standards for the teaching of history as well as English and language arts. Standards are from the following sources:

National History Standards

History–Social Science Content Standards , California State Board of Education

English–Language Arts Content Standards, California State Board of Education
National Council of Teachers of English

Depending on the class syllabus and timeline, teachers can use this module to supplement their classroom teaching on early explorers (e.g., Columbus, Drake, etc.).

Objectives

Knowledge

To learn about the historical and social/cultural importance of sailing

To learn about early explorers and their voyages of discovery

To learn about the native inhabitants of the Bay Area

To understand concepts such as orienteering

To learn about present-day issues involving sailing and the San Francisco Bay

Attitude

To appreciate the importance of sailing in world, U.S., and San Francisco-Bay Area history

To develop an understanding of the complexity of economic, environmental, and social issues that existed and continue to exist with sailing in the San Francisco Bay

Skill

To be able to explain the history of the San Francisco Bay and sailing around the bay

To use multiple intelligences to present newly-gained knowledge

To learn fundamental navigation techniques

To work effectively in small and large groups

To develop independent projects

Activities

[originally, I intended to create “procedural steps” here for the teachers; please modify these accordingly. Also, I have both required and supplementary activities together. Somehow, the teacher needs to understand that there is a set of activities that are required, but in addition, that there are supplementary/extension activities that they can pick and choose from]

Pre-trip Activities

Students engage in a short trivia quiz about sailing, and history and current events of San Francisco Bay (questions are culled from both this module and the Land School curriculum). [10-15 minutes]

Students read about the history of San Francisco Bay and create a class timeline that reflects major events in the Bay Area. They also read and discuss in class, excerpts from one or two literary works about sailing, written for their reading level. [this part may be taken out] [one night’s homework and one class period]

Students read and discuss excerpts from Ayala’s logbook, Father Vicente’s diary, and Ayala’s letter to the Viceroy of Spain. Students also read and discuss Miwok history, language, and literature. [either one night’s homework and one class period, or two class periods]

In the last part of the pre-trip curriculum students are given a brief lesson on the compass and mapping. Then, they are given a general map of their school and asked to take compass readings for certain places within the campus (e.g., school cafeteria, learning resource center/library, principal’s office, etc.). [one class period]

In the discussion about the compass and navigation, they will discuss the importance of “orienteering” in modern terms. For example, nowadays, some cars are equipped with navigation systems (modern-day compasses) —what is the significance of this? Also, in what situations would the students encounter the need to use orienteering techniques? (e.g., camping, hiking)

On-boat Activities

Students will pretend to be Ayala’s crew and work in groups to take compass readings during the sailing trip. Student representatives will also write entries into a logbook for later use in the classroom.

Post-trip Activities

Using a map of the San Francisco Bay, students will map out the readings that they took during the trip (readings from both in water and on land). [15-20 minutes]

In groups, students will create a log that documents what occurred on the sailing trip. This logbook will contain not only factual information (e.g., compass readings, weather/climate conditions), but also a recording of the students' feelings and thoughts during the trip through their writing and/or artwork.

Each group shares its logbook with the rest of the class. [half to one class period]

Assessment

The group logbook can be used for assessment purposes. In addition, teachers can use the following activities to evaluate students' understanding of the topics presented in this module:

Role-playing some scenarios (see handout)

Have students write a paragraph from each category/theme that begins,

Explorers and discovery voyages:

"The Miwoks were people who . . ."

"Ayala and his crew on the *San Carlos* were explorers who..."

They should include at least three qualities they have learned about the particular group of people.

Navigation:

"The sextant, astrolabe, and compass were used to..."

"Orienteering is important because..."

"Nowadays, people need navigation tools to..."

They should include at least three explanations.

Importance of the bay:

"The SF Bay was important because..."

"The SF Bay is important because..."

They should include at least three reasons.

Land vs. water

"I like being in the sea because..."

"I like being on land because..."

“I might/might not like living on water because...”

They should include at least three reasons.

Applying Pegasus experience to own life

“The Pegasus experience helped me to...”

“After sailing on the Pegasus, I am/feel...”

They should include at least three explanations.

Transparency #1: Trivia Quiz

When the boat crew says “Belay it!”, it means:

- “Hurry up!”
- “Go slow!”
- “Be quiet!”

The stern is the _____ of the boat.

- back
- front
- middle

When the boat crew is “tacking,” it means they are:

- Slowing down the boat.
- Changing the course by turning front of the boat.
- Changing the course by turning the back of the boat.

What does “raise the main” mean?

- Raise the main sail on the boat
- Check all the engine systems
- Start dinner

The galley on the boat is:

- The bathroom
- The kitchen
- The main cabin

A compass allows you to:

- See if you are going north, south, east, or west
- Read the latitude and longitude of a particular place
- Both

When is a compass particularly useful?

- When it is extremely foggy and you cannot see landmarks
- When you cannot see any land
- When you have no idea where you are
- All of the above

Which of the following tools were or are used to navigate on a boat?

- Sextant
- Abacus
- Pendulum

Up until the late 1700s, which Indian tribe lived in and around the San Francisco Bay?

- Navajo
- Hopi
- Miwok

Most of the native inhabitants of the San Francisco Bay disappeared due to:

Migration to Arizona and other states
Exposure to diseases brought by "white men" (explorers and settlers)
Lack of food

Which explorer(s) traveled to the San Francisco Bay?

Sir Francis Drake
Juan Manuel de Ayala
Juan Bautista de Anza
All of the above
None of the above

The first official map of the San Francisco Bay was completed in:

1775
1579
1861

In the 1800s, wooden sea vessels were used primarily for:

Entertainment/pleasure
Transportation of goods
Exploration

Today, they are used primarily for:

Entertainment/pleasure
Transportation of goods
Exploration

In the past, what was the main purpose of the Berkeley Pier?

It provided ferry service across the bay to San Francisco
It provided a vital fishing area for the community
It allowed for a good observation point for tourists

Today, what pressing concerns affect the Berkeley Pier?

There is too much foot traffic on the pier.
People who fish on the pier are seeing fish stock affected by water pollution.
It is slowly rotting away.
Both a and b
Both b and c

Transparency #2: Answer Key to Trivia Quiz

When the boat crew says “Belay it!”, it means:

“Hurry up!”

“Go slow!”

“Be quiet!”

The stern is the _____ of the boat.

back

front

middle

When the boat crew is “tacking,” it means they are:

Slowing down the boat.

Changing the course by turning front of the boat.

Changing the course by turning the back of the boat.

What does “raise the main” mean?

a) Raise the main sail on the boat

b) Check all the engine systems

c) Start dinner

The galley on the boat is:

The bathroom

The kitchen

The main cabin

A compass allows you to:

a) See if you are going north, south, east, or west

b) Read the latitude and longitude of a particular place

c) Both

When is a compass particularly useful?

a) When it is extremely foggy and you cannot see landmarks

b) When you cannot see any land

c) When you have no idea where you are

d) All of the above

Which of the following tools were or are used to navigate on a boat?

Sextant

Abacus

Pendulum

Up until the late 1700s, which Indian tribe lived in and around the San Francisco Bay?

Navajo

Hopi

Miwok

Most of the native inhabitants of the San Francisco Bay disappeared due to:

- a) Migration to Arizona and other states
- b) Exposure to diseases brought by “white men” (explorers and settlers)**
- c) Lack of food

Which explorer(s) traveled to the San Francisco Bay?

- a) Sir Francis Drake
- b) Juan Manuel de Ayala
- c) Juan Bautista de Anza
- d) All of the above**
- e) None of the above

The first official map of the San Francisco Bay was completed in:

- a) 1775**
- b) 1579
- c) 1861

In the 1800s, wooden sea vessels were used primarily for:

- a) Entertainment/pleasure
- b) Transportation of goods**
- c) Exploration

Today, they are used primarily for:

- a) Entertainment/pleasure**
- b) Transportation of goods
- c) Exploration

In the past, what was the main purpose of the Berkeley Pier?

- a) It provided ferry service across the bay to San Francisco**
- b) It provided a vital fishing area for the community
- c) It allowed for a good observation point for tourists

Today, what pressing concerns affect the Berkeley Pier?

- a) There is too much foot traffic on the pier.
- b) People who fish on the pier are seeing fish stock affected by water pollution.
- c) It is slowly rotting away.
- d) Both a and b
- e) Both b and c**

Handout #1: History of the San Francisco Bay

[my intent was to insert a brief description of discovery voyages by Drake and Ayala among other information]

Handout #2: Timeline Activity

Now that you know something about the history of the San Francisco Bay, think about how all the different events happened and when they occurred, and present the information on a class pictorial timeline.

Your teacher will put up a large piece of paper on the wall. On the paper, your teacher will draw a long vertical line that represents time. Each group will then add information to this timeline.

For each timeline entry, find a small photograph or draw a small picture that relates somehow to the information in the entry. For example, for the first compass that was invented in China, you can find a picture of a compass in a magazine or on the Internet. For Sir Francis Drake's arrival to San Francisco Bay, you can draw a picture of an explorer or a ship. Make sure that the picture is large enough for the class to see, but small enough to fit into the class timeline.

Follow the instructions below for your group:

Group #1: Up to 1700s

Your group will create the timeline up to the 1700s. The following information needs to be in your timeline:

First century AD: The compass is invented in China

????: [invention of wooden boat/ship/vessel]

1492: Christopher Columbus lands in the Americas

1579: Sir Francis Drake arrives in San Francisco Bay and claims land for England

[need something about Indians, more on explorers (vikings, Marco Polo), etc]

Group #2: 1700s-1800s

Your group will create the timeline from the 1700s through the 1800s. The following information needs to be in your timeline:

1775: Juan Manuel de Ayala and his crew (from Spain) arrive and create the first map of San Francisco Bay

1776: Juan Bautista de Anza (from Spain) come to the Presidio and map that area

1776: The United States declares independence from England

1850: California becomes the 31st state

1854: California's first lighthouse built on Alcatraz Island

1892: U.S. Quarantine Station opened on Angel Island (the station was a holding place for Asian immigrants who were coming to the United States to seek work opportunities)

Group #3: 1900s to the present

Your group will create the timeline for the 1900s to the present. The following information needs to be in your timeline:

19??: [something about buildup of military defense structures on Angel Island?]

1906: A major earthquake strikes Northern California

1914: World War I begins

1919: World War I officially ends with the signing of the Treaty of Versailles

1937: Golden Gate Bridge is officially opened to pedestrians and vehicles

1941: World War II begins with the United States declaring war on Japan

1945: World War II ends with Japanese surrender

1954: San Francisco International Airport opens

1962: Angel Island becomes a national park

Once all the groups have added to the class timeline, you will be able to see some of the main events that occurred in the world and in San Francisco Bay from the earliest times to the present.

Handout #3: Excerpts from Ayala's logbook, Father Vicente's diary, Ayala's letter to Viceroy of New Spain

[My intention was to have discussion questions after each excerpt or after all the excerpts that got students to think about what these people saw in the SF Bay. By reading these, students also have a chance to think ahead of time about what they might see or might want to look for during their own sailing trip near Angel Island.]

Ayala logbook

August 10. Nothing new. On the 11th the longboat was hoisted in for repairs.

August 12. The longboat was lowered and I set out in it to find a better anchoring ground for the ship. I was looking over the island that I called Angels Island (Isla de los Angeles), the largest one in this harbour, and making close search for an anchoring place that handily provided water and firewood. Although I found some good ones, I was inclined to go further and look over another island, and found it quite barren and rugged and with no shelter for a ship's boats. I named it Pelican Island because of the large number of pelicans that were there. Next I tried to reach the shore at the southwest of the entrance to the arm of the sea that extends to the southeast, in order to examine a cove, but neither wind nor current would let me do so. I returned aboard at half past 5 o'clock in the afternoon.

August 13. Today, at 8 o'clock in the morning, I weighed anchor to go to a cove that was a mile away from us, but as the incoming tide was flowing very strongly, I dropped anchor until 3 in the afternoon, when, again getting under weigh, I sought out an angle at the northwest part of Angel Island and dropped anchor in 9 fathoms at a pistol shot from the land, in the slack of the current and protected from all winds.

August 14. We put out another anchor and remained moored north-northeast and south-southwest. We struck the lower yards and the topmasts.

August 15. At 9 o'clock in the forenoon I ordered the longboat away with eight days' provisions, crew enough, and weapons, under command of the first sailing master. I directed him to continue exploring north-northeastward as far as he could take soundings.

Ayala's letter to the Viceroy of Spain

Most Excellent Sir

Sir: I have carried out the orders under which I embarked in the supply ship San Carlos, and have come in from my return voyage at this harbour of San Blas this 6th day of November after having been at the harbours of Monterey and San Francisco...

This is certainly a fine harbour: it presents on sight a beautiful fitness, and it has no lack of good drinking water and plenty of firewood and ballast.

Its climate, though cold, is altogether healthful and it is free from such troublesome daily fogs as there are at Monterey, since these scarcely come to its mouth and inside there are very clear days. To these many good things is added the best of all: the heathen all round this harbour are always so friendly and so docile that I had Indians aboard several times with great pleasure, and the crew as often visited them on land. In fact, from the first day to the last they were so constant in their behaviour that it behove me to make them presents of earrings, glass beads, and pilot bread, which last they learned to ask for in our language clearly.

Beyond question such amity was a great help to us, for it let us carry out with little fear the exploration with which I was charged....

Harbour of San Blas, the 9th of November, 1775.

Juan Manuel de Ayala

To His Excellency Antonio María Bucareli.

The Report of José de Cañizares, first sailing master of the San Carlos, to Captain Ayala

....A mile to the north-northeast of Angels Island is a bay that lies north-northwest and south-southeast. The points that make it are about two leagues apart and its depth into the land is about two and a half leagues. In its northwestern part are three small islets that form with the shore a narrow channel obstructed at its southwest end by a shoal. All round it is broken hill country with very little woodland, bay trees and live oaks here and there making up what there is. Inland, in the part that faces west-northwest, a forest can be seen that appears from a distance to be of pines. Midway of this bay is a rocky islet [Red Rock], high and bulky, with some underwater rocks at the northeast side. As the map shows, there is depth enough for anchoring if the ships have good cables as well as anchors; there would be great strain on them, since there is not less than a four-knot current...

To the east of this island, at a distance of two leagues, there is another, rough, craggy, and without shelter, which divides the entrance to the inlet into two channels through which the salt water comes in some dozen leagues. The width of the inlet is in places one, two, or three leagues. The fairway has no more than four fathoms depth. It has width enough, but a pistol shot away from it the depth is less than two fathoms. The furthest part of this bight, which faces east, makes with a curving point a pocket that at low tide is for the most part drained bare. Here are some stakes to which are fastened bunches of black feathers, handful of reeds, and small and spiral seashells. They gave me the idea, since they are in the midst of the waters, that they are fish traps...

Father Vicente Santa María's journal

...At 6 o'clock in the afternoon the sailing master set out again in the longboat to have a new look at the surroundings near by. As the Indians saw him turning landward they thought that, moved by their desires, we were of a mind to please them, and all of them came down to the shore's edge. At the same time, we saw that with the Indians who had left there were coming some others whose slow pace showed that they were carrying something heavy. The longboat took another direction, and when the Indians saw that it was not coming to them in spite of their urging us with shouts and signs of good will, they repeated their previous action, leaving at the shore's edge what they had brought to win our favour, and all of them went away; we had no sight of them again that evening.

The longboat returned to the ship, and in order to grace the occasion in person our captain went in it to see what the Indians had so generously left. Having reached the shore, he came upon a collection of things which, though to our notion crude, was of high value to those unfortunates, for otherwise they would not have chosen it as the best offering of their friendly generosity.

This was a basketful of pinole (who knows of what seed?), some bunches of strings of woven hair, some of flat strips of tule, rather like aprons (grass skirts), and a sort of hairnet for the head, made of their hair, in design and shape best described as like a horse's girth, though neater and decorated at intervals with very small white snailshells....it was decided that very early next morning the longboat should return the basket in which the Indians had given us their pinole, and in it trinkets made with bits of glass, earrings, and glass beads...

The time we were with them seemed to us short, but it was enjoyable, all the more when, upon my pronouncing the most sweet names of Jesus and Mary Most Holy, they repeated them clearly, a great satisfaction and pleasure to me and to my companions. We observed a singular thing about the gift of glass trinkets that we had presented to them: not knowing what to do with them, or what not to do, they had put them aside until we should demonstrate how they should be used; so they brought in their hands the earrings and glass beads we had given them and, reaching them out to us, made gestures with them as if asking us what they were for and how to use them. Then all of us began putting the earrings in their ears, at which they were much pleased, as they showed with faces full of joy...

It would be about 10 o'clock in the forenoon of the 23rd of August when, towards the point of the Isla de Santa Maria de los Angeles (Angel Island) near which we stayed, two reed boats were seen approaching, in which were five Indians. As soon as the captain was informed of this, he directed that signs be made inviting them aboard, to which they promptly responded by coming, which was what they wanted to do. Leaving their boats, they climbed aboard quite fearlessly. They were in great delight, marvelling at the structure of the ship, their eyes fixed most of all on the rigging. They wondered no less at the lambs, hens, and pigeons that were providently kept to meet our needs if someone on board should fall sick. But what captivated and pleased them was the sound of the ship's bell, which was purposely ordered to be struck so

we could see what effect it had on ears that had never heard it. It pleased the Indians so much that while they were on board they went up to it from time to time to sound it themselves. They brought us, as on other occasions, gifts of pinoles, and they even remembered men's names that we had made known to them earlier....Close on midday they took to their boats again, bidding farewell to us all and promising to be back on the morrow....

Group Task:

Look at the pictures below. These images show the first encounter between Indians and Sir Francis Drake's voyagers in the 16th century. Like the experiences of Ayala and his crew, Drake and his voyagers also met Indians who were mostly curious and just wanted to know more about the white man.

Picture 1: Sir Francis Drake arriving in San Francisco Bay



Picture 2: Engraving of Sir Francis Drake's first encounter with the Indians



Answer the following questions about the two images.
Describe the scenes. Based on what you see, what do you think the encounter was like?

How are the explorers depicted in these images? What about the Indians? What do you think the explorers are feeling and/or thinking? What do you think the Indians are feeling and/or thinking?

Task

Reflecting on what you read in the previous excerpts from Father Vicente, Ayala, and Canizares, draw a picture that illustrates their encounter with the Miwoks. You can draw the scene in one of these situations:

First glimpse of the Indians by the white men, in which the explorers are in the water on their longboat and approaching the shore. Meanwhile, the Indians are waiting by the shore.

A meeting at the Indian's house, where the native people have prepared gifts and food for the explorers. The explorers, in turn, have brought gifts for the Indians.

Explorers invite Indians onto their ship. This is the first time the Indians have set foot on such a ship.

Handout #4: Miwok History

According to archeologists, Coast Miwok, who lived predominantly in the area as far north as Bodega Bay and that included Marin County, chose to live in areas near water, such as oceans, bays, sloughs, lagoons, and streams.

Miwoks' main food staple was acorns, ground into flour with a mortar and pestle. This diet was supplemented with shellfish, fish, birds, rabbits, venison (deermeat), berries, nuts, and roots. These Indians were hunters, gatherers, and fishermen, and were peaceful people who did not engage in wars with other tribes. They made bows and arrows for hunting large animals such as bears and deer, nets for fishing, and basket traps for catching small birds such as quail. Miwok culture included activities such as basket-weaving, dances, and games. Typically, men were the hunters and leaders of the village while women prepared food and made baskets. Everyone had a job to do. For example, boys and girls helped gather wood and carry water. Boys also hunted for birds and small animals while girls helped the women with housekeeping chores. The Miwok lived in conical-shaped houses made of redwood and tule (a type of grass). Every family also had a similar but smaller structure to use as a storage place for acorns and other food items.

Each village had leaders (headmen and headwomen) as well as doctors (shamans). The Miwok doctors used ritualistic songs, prayers, ceremonies, and herbal concoctions to cure various illnesses. Miwoks participated in many rituals and ceremonies with each season. Special structures known as sweathouses and roundhouses were used for these events. They also enjoyed story telling, especially tales about deities and animals. Their In fact, they believed that the most important god, the Coyote spirit, created earth and men. Here is a legendary story from the Hookooeko Miwoks:

How O'-ye the Coyote Man Discovered His Wife

The world was made by O'-ye the Coyote-man. The earth was covered with water. The only thing that showed above the water was the very top of Oon'-nah-pi's (Sonoma Peak, about 40 miles north of San Francisco).

In the beginning O'-ye came on a raft from the west, from across the ocean. His raft was a mat of tules and split sticks; it was long and narrow. O'-ye landed on the top of Oon'-nah-pi's and threw his raft-mat out over the water—the long way north and south, the narrow way east and west; the middle rested on the rock on top of the peak. This was the beginning of the world and the world is still long and narrow like a mat—the long way north and south, the narrow way east and west.

When O'-ye was sitting alone on top of Oon'-nah-pi's and all the rest of the world was covered with water, he saw a feather floating toward him, blown by the wind from the west—the direction from which he himself had come. He asked the feather, "Who are you?"

The feather made no reply.

He then told the feather about his family and all his relatives. When he came to mention Wek'-wek, his grandson, the feather leaped up out of the water and said, "I am Wek'-wek, your grandson."

O'-ye the Coyote-man was glad, and they talked together.

Every day O'-ye noticed Ko-to'-lah the Frog-woman sitting near him. Every time he saw her he reached out his hand and tried to catch her, but she always jumped into the water and escaped.

After four days the water began to go down, leaving more land on top of the mountain, so that Ko-to'-lah had to make several leaps to reach the water. This gave O'-ye the advantage and he ran after her and caught her. When he had caught her he was surprised to find that she was his own wife from over the ocean. Then he was glad.

When the water went down and the land was dry O'-ye planted the buckeye and elderberry and oak trees, and all the other kinds of trees, and also bushes and grasses, all at the same time. But there were no people and he and Wek'-wek wanted people. Then O'-ye took a quantity of feathers of different kinds and packed them up to the top of Oon'-na'pi's and threw them up into the air and the wind carried them off and scattered them over all the country and they turned into people, and the next day there were people all over the land.

Miwok culture was bound by strong beliefs in the forces of nature (man's relationship with the natural environment, for example). Many of their stories talk about the "first people": with time, these first people were transformed into animals, trees, rocks, stars, and other objects. So, you can see why the Miwoks would place much importance and respect on these things.

The Miwoks who hunted on Angel Island were of the Hookooeko group of the Coast Miwok tribe. Miwoks traveled to Angel Island in tule reed boats (Spanish name for them: balsas). These boats typically carried four men (although some could carry as many as 10 people) with each using a double-bladed paddle and could go faster than a longboat. The Miwoks who regularly visited the island did not live on the island in any permanent fashion. Rather, they went there to hunt for deer, seals, sea lions, and sea otter. They also took advantage of the abundant supply of salmon and other fish/shellfish in the area. On the island, they could also find necessities such as herbal plants to use for their healing methods. They set up temporary hunting camps in the form of branches covered with tule in which to prepare for this task. They were the first "Californians" to meet English-speaking people (via Sir Francis Drake's voyage in 1579).

When the white man arrived, the Indians were exposed to what were then deadly diseases such as smallpox and measles. By 1804, there were only a little over 1,000 of them left, and just 25 years later, only 241 Indians remained. The last known full-blooded Miwok, Tom Smith, died in 1932.

Did you know that the city Novato got its name from Miwok language? The highest mountain in the SF Bay region, Mount Tamalpais is also a name from this language ("tamalpais" = coast mountain). Likewise, our largest water reservoir [is this the truth?] Hetch Hetchy, gets its interesting name from this

language (“hetch hetchy” = acorn valley or grass-seed valley). Here are some more commonly-used words from Miwok language:

[intent here was to have some type of activity that used these words in these languages; also, the Spanish equivalents are not yet in this table.]

Miwok (Coast)	Spanish	English
Kootca		House
Saka		Boat
Uumpa		Acorn
Kesuum-ala-kesuum		Deer
Meeye		Bird
Lota		Fish
Ooye		Coyote
Weea		Earth (world)
Hii		Sun
Puuluuluuk		Moon
Hitiis		Star
Hena, kiiwel		Wind
Hiiana		Day
Kawul		Night
Wukii		Fire
Kiik, liiwa		Water
Tcok		Stream
Paiyis		Mountain
Luupu		Rock
Alwas		Tree
Tuumai		Wood
Taiyis		Man
Kuuleeyis		Woman
Uunu		Mother
Apii		Father
henas		Boy
Kooya		Girl
Ooiiam-goo		Friend

Poo-toola-koo		White man
Toowiis		Good
Oomuu		Bad

Handout #5: Reading Excerpts

The following excerpts come from famous works of literature. The first one, from the *Island of the Blue Dolphins*, is about an Indian girl's experiences on an island and her people's encounter with the white man. The other, from Jack London's story *The Cruise of the 'Dazzler'*, is about a boy who's given up on school and has decided to try living and working on a boat. Choose one of the following to read, and be prepared to discuss the reading in your group.

Island of the Blue Dolphins (pp. 1-5)

[with an introductory paragraph]

I remember the day the Aleut ship came to our island. At first it seemed like a small shell afloat on the sea. Then it grew larger and was a gull with folded wings. At last in the rising sun it became what it really was—a red ship with two red sails.

My brother and I had gone to the head of a canyon that winds down to a little harbor which is called Coral Cove. We had gone to gather roots that grow there in the spring.

My brother Ramo was only a little boy half my age, which was twelve. He was small for one who had lived so many suns and moons, but quick as a cricket. Also foolish as a cricket when he was excited. For this reason and because I wanted him to help me gather roots and not go running off, I said nothing about the shell I saw or the gull with folded wings.

I went on digging in the brush with my pointed stick as though nothing at all were happening on the sea. Even when I knew for sure that the gull was a ship with two red sails.

But Ramo's eyes missed little in the world. They were black like a lizard's and very large and, like the eyes of a lizard, could sometimes look sleepy. This was the time when they saw the most. This was the way they looked now. They were half-closed, like those of a lizard lying on a rock about to flick out its tongue to catch a fly.

"The sea is smooth," Ramo said. "It is a flat stone without any scratches."

My brother liked to pretend that one thing was another.

"The sea is not a stone without scratches," I said. "It is water and no waves."

"To me it is a blue stone," he said. "And far away on the edge of it is a small cloud which sits on the stone."

"Clouds do not sit on stones,. On blue ones or black ones or any kind of stones."

"This one does."

"Not on the sea," I said. "Dolphins sit there, and gulls, and cormorants, and otter, and whales too, but not clouds."

"It is a whale, maybe."

Ramo was standing on one foot and then the other, watching the ship coming, which he did not know was a ship because he had never seen one. I had never seen one either, but I knew how they looked because I had been told.

"While you gaze at the sea," I said, "I dig roots. And it is I who will eat them and you who will not."

Ramo began to punch at the earth with his stick, but as the ship came closer, its sails showing red through the morning mist, he kept watching it, acting all the time as if he were not.

"Have you ever seen a red whale?" he asked.

"Yes," I said, though I never had.

"Those I have seen are gray."

"You are very young and have not seen everything that swims in the world."

Ramo picked up a root and was about to drop it into the basket. Suddenly his mouth opened wide and then closed again.

"A canoe!" he cried. "A great one, bigger than all of our canoes together. And red!"

A canoe or a ship, it did not matter to Ramo. In the very next breath he tossed the root in the air and was gone, crashing through the brush, shouting as he went.

I kept on gathering roots, but my hands trembled as I dug in the earth, for I was more excited than my brother. I knew that it was a ship there on the sea and not a big canoe, and that a ship could mean many things. I wanted to drop the stick and run too, but I went on digging roots because they were needed in the village.

By the time I filled the basket, the Aleut ship had sailed around the wide kelp bed that encloses our island and between the two rocks that guard Coral Cove. Word of its coming had already reached the village of Ghalas-at. Carrying their weapons, our men sped along the trail which winds down to the shore. Our men were gathering at the edge of the mesa.

I made my way through the heavy brush, and moving swiftly, down the ravine until I came to the sea cliffs. There I crouched on my hands and knees. Below me lay the cove. The tide was out and the sun shone on the white sand of the beach. Half the men from our village stood at the water's edge. The rest were concealed among the rocks at the foot of the trail, ready to attack the intruders should they prove unfriendly.

As I crouched there in the toyon bushes, trying not to fall over the cliff, trying to keep myself hidden and yet to see and hear what went on below me, a boat left the ship. Six men with long oars were rowing. Their faces were broad, and shining dark hair fell over their eyes. When they came closer I saw that they had bone ornaments thrust through their noses.

Behind them in the boat stood a tall man with a yellow beard. I had never seen a Russian before, but my father had told me about them, and I wondered, seeing the way he stood with his feet set apart and his fists on his hips and looked at the little harbor as though it already belonged to him, if he were one of those men from the north whom our people feared. I was certain of it when the boat slid in to the shore and he jumped out, shouting as he did so.

Discussion questions:

Why are the girl and her brother excited? What do they see in the ocean?

Why aren't they planning to greet the visitors with open arms?

[need to add more here]

The Cruise of the 'Dazzler' (pp. 72-77)

[with an introductory paragraph]

It was all Greek to Joe, except he knew that he was in some way the cause of the quarrel. In the end French Pete had his way, and the new-comers gave in after much grumbling. After they had drunk their coffee, all hands went on deck.

"Just stay in the cockpit and keep out of their way," 'Frisco Kid whispered to Joe. "I'll teach you about the ropes and everything when we ain't in a hurry."

Joe's heart went out to him in sudden gratitude, for the strange feeling came to him that of those on board, to 'Frisco Kid, and to 'Frisco Kid only, could he look for help in time of need. Already a dislike for French Pete was growing up within him. Why, he could not say; he just simply felt it.

A creaking of blocks for'ard, and the huge mainsail loomed above him in the night. Bill cast off the bowline, the Cockney followed with the stern, 'Frisco Kid gave her the jib as French Pete jammed up the tiller, and the Dazzler caught the breeze, heeling over for mid-channel. Joe heard talk of not putting up the side-lights, and of keeping a sharp lookout, though all he could comprehend was that some law of navigation was being violated.

The water-front lights of Oakland began to slip past. Soon the stretches of docks and the shadowy ships began to be broken by dim sweeps of marshland, and Jose knew that they were heading out for San Francisco Bay. The wind was blowing from the north in mild squalls, and the Dazzler cut noiselessly through the landlocked water.

"Where are we going?" Joe asked the Cockney, in an endeavour to be friendly and at the same time satisfy his curiosity.

"Oh, my pardner'ere, Bill, we're goin' to take a cargo from 'is factory," that worthy airily replied.

Joe thought he was rather a funny-looking individual to own a factory; but, conscious that even stranger things might be found in this new world he was entering, he said nothing. He had already exposed himself to 'Frisco Kid in the matter of his pronunciation of 'fo'c'sle', and he had no desire further to advertise his ignorance.

A little after that he was sent in to blow out the cabin lamp. The Dazzler tacked about and began to work in towards the north shore. Everybody kept silent, save for occasional whispered questions and answers which passed between Bill and the captain. Finally the sloop was run into the wind, and the jib and mainsail lowered cautiously.

"Short hawse," French Pete whispered to 'Frisco Kid, who went for'ard and dropped the anchor, paying out the slightest quantity of slack.

The Dazzler's skiff was brought alongside, as was also the small boat in which the two strangers had come aboard.

"See that that cub don't make a fuss," Bill commanded in an undertone, as he joined his partner in his own boat.

"Can you row?" 'Frisco Kid asked as they got into the other boat.

Joe nodded his head.

"Then take these oars, and don't make a racket."

'Frisco Kid took the second pair, while French Pete steered. Joe noticed that the oars were muffled with sennit, and that even the rowlock sockets

were protected with leather. It was impossible to make a noise except by a mis-stroke, and Joe had learned to row on Lake Merrit well enough to avoid that. They followed in the wake of the first boat, and glancing aside, he saw they were running the length of a pier which jutted out from the land. A couple of ships, with riding-lanterns burning brightly, were moored to it, but they kept just beyond the edge of the light. He stopped rowing at the whispered command of 'Frisco Kid. Then the boats grounded like ghosts on a tiny beach, and they clambered out.
[possibly add more to this excerpt]

Discussion questions:

Why does 'Frisco Kid tell Joe to stay in the cockpit and keep quiet?

Since this is Joe's first time on this kind of boat, how could he help the crew without getting in their way?

[need to add more here]

Handout #6: Navigation

Before people started discovering natural objects and inventing tools to use for navigation, they used methods like watching the sun, moon, and stars to navigate. For instance, a rising sun on the lefthand side of the ship meant that the vessel was sailing south. They also used weather conditions such as the direction and type of winds and currents, and habits of animals such as the migration of birds to guide them in their travels.

The first navigation “instrument” was the sounding line. This was a long line with knots that were used as distance marks. The line had a lead weight at the end that went into the water. Navigators used this tool to measure the depth of the sea. When they saw what touched the lead weight, they could tell where they were. Units of measure on a sounding line were called “fathoms.” [include anecdote about Mark Twain here???

A metal device called an astrolabe was used to measure the height of a star or other heavenly body. Not only did navigators on ships use it, but astronomers and astrologers also used the instrument for their pursuits. Astronomers needed it to find out when to plant crops while astrologers used it for their fortune-telling. Another instrument called a quadrant was also used to measure the height of a star or the sun above the horizon, and was usually made of wood. Since then, the sextant was invented; similar to an astrolabe, this is a tool that measures the angle of an object above sea level. Once the angle is known, it can be converted to a distance that can be plotted on a map. Along with a chronometer (that determines longitude), navigators used the sextant to determine their positions. Sextants are still used today.

The Compass

All these instruments of navigation took the backseat with the invention of the compass. The compass was the first instrument that allowed people to navigate in all conditions and situations. Day or night, bad weather, good weather, the compass worked accurately and efficiently for navigators on land, water, or in the air.

In ancient times (around first century B.C. or A.D.[one source says the former, other sources say the latter; need to verify]), the Chinese used something called a lodestone for a compass. The lodestone is magnetic, so when it was suspended in air, it would align itself along a north-south line. The Chinese used lodestone for other purposes as well. There is an interesting story about the gate of a particular palace. The gate was made of lodestone, so people who tried to enter the palace with hidden weapons were immediately detected and arrested.

After the Europeans refined the instrument, the compass became a very important tool for the Spanish and the Portuguese explorers. They used the compass, along with an astrolabe to measure the distance of stars and observations of the sky. It is said that Christopher Columbus mainly used his

compass and “dead reckoning” (knowing direction by methods such as locating natural landmarks) to navigate on his voyages.

Magnetism is what makes the compass work. Because the earth is covered by a magnetic field, anything that is magnetic, if it’s swinging freely, will “act” like a compass and align itself to north and south poles.

The compass needle points to magnetic north (vs. geographic north). Once you know where “north” is, you can find out the direction of anything by reading the compass degrees. For example, magnetic north is at 0 degrees, south is 180 degrees, east is 90 degrees, and west is at 270 degrees. Reading degrees depends on where you’re reading from. For instance, the degree readings you take from the front of the mountain will be different from those that you take from a position to the left of the mountain.

Modern-Day Navigation

Pilots and seamen still use instruments like the compass to navigate. Of course, the instruments they use now are much more sophisticated and technologically advanced than before. Such tools are also used by people who are doing recreational activities such as hiking, camping, and sailing.

Have you seen a car with a modernized navigation system? Some cars nowadays have a car navigation system that runs on information from satellites orbiting the earth. The system tries to figure out which route is best for you by constantly “watching” where your position and direction. You can just enter the name of the street and city you want to go to, and the system will give you step by step directions on how to get there. What kind of people would benefit most from such a system? Of course, travelers like the early explorers would appreciate this type of navigation tool. Salespeople, deliverymen, real estate agents, police, fire, ambulance drivers...people who need to get to an unfamiliar place as quickly as possible would find it really useful.

How to Use a Compass

There are different types of compasses. The easiest to use and most familiar is the magnetic compass. Follow these steps to read a magnetic compass: Point the arrow at your objective (for example, point it toward the mountain if that’s where you want to go). Then, turn the compass dial until the compass needle points to the N (north) symbol. By doing this you are orienting the compass to North. Next, note the degree reading just above the arrow. This is the “bearing” of your objective.

How to Plot a Position

When you plot the compass readings on a map or chart (a chart is a sailor's map), you can find out your position or your boat's position when you took the readings. This is called "laying off" the bearings on the map. There are different methods you can use, but the most commonly-used one is called the "cross bearing fix" or the "cocked hat" triangle. Here are the steps (you need a chart and a protractor):

Locate the first objective on the chart using the chart's compass rose. Mark the spot with an X or other symbol.

Draw a north-south line through the symbol. Put the center of the protractor over the symbol and mark from its rim the bearing.

Draw a line through the symbol and this mark.

Follow steps 1-3 for the other two objectives. You should have three lines that intersect. The intersection will probably not be a specific point, but rather a triangle.

Locate the middle point of the triangle. This is the position of your boat at which you took the compass readings.

Extension Activity

What different methods can be used to navigate? Do some research on your own about the following ways. You can use the library, the Internet, or even ask family members who may know about or have experience with these different methods.

Navigation by sun and/or stars

Navigation by weather conditions

Navigation by instruments such as the compass

Navigation by a car navigation system

Also, consider the following and how they are used in navigation:

Lighthouses

North Star (Big Dipper)

Tides

Migrant birds

Handout #7: Navigation Activity

In your groups, you will use a compass and a map to take readings of several places on your school campus. Then, you will plot these readings on your map.

Your teacher will give you a map of the school. Review the map to see the places that you are familiar with. For example, locate:

Your classroom
Principal's office
School cafeteria
Learning resource center/library

You will be given two places for which to take compass readings. In addition, you will be given two compass readings; you will need to find out what is situated at those particular readings (for these, start at the southernmost part of the school campus).

Group #1:

Principal's office
Playground (if your school has more than one, choose the one that your class uses the most)
40 degrees
180 degrees

Group #2:

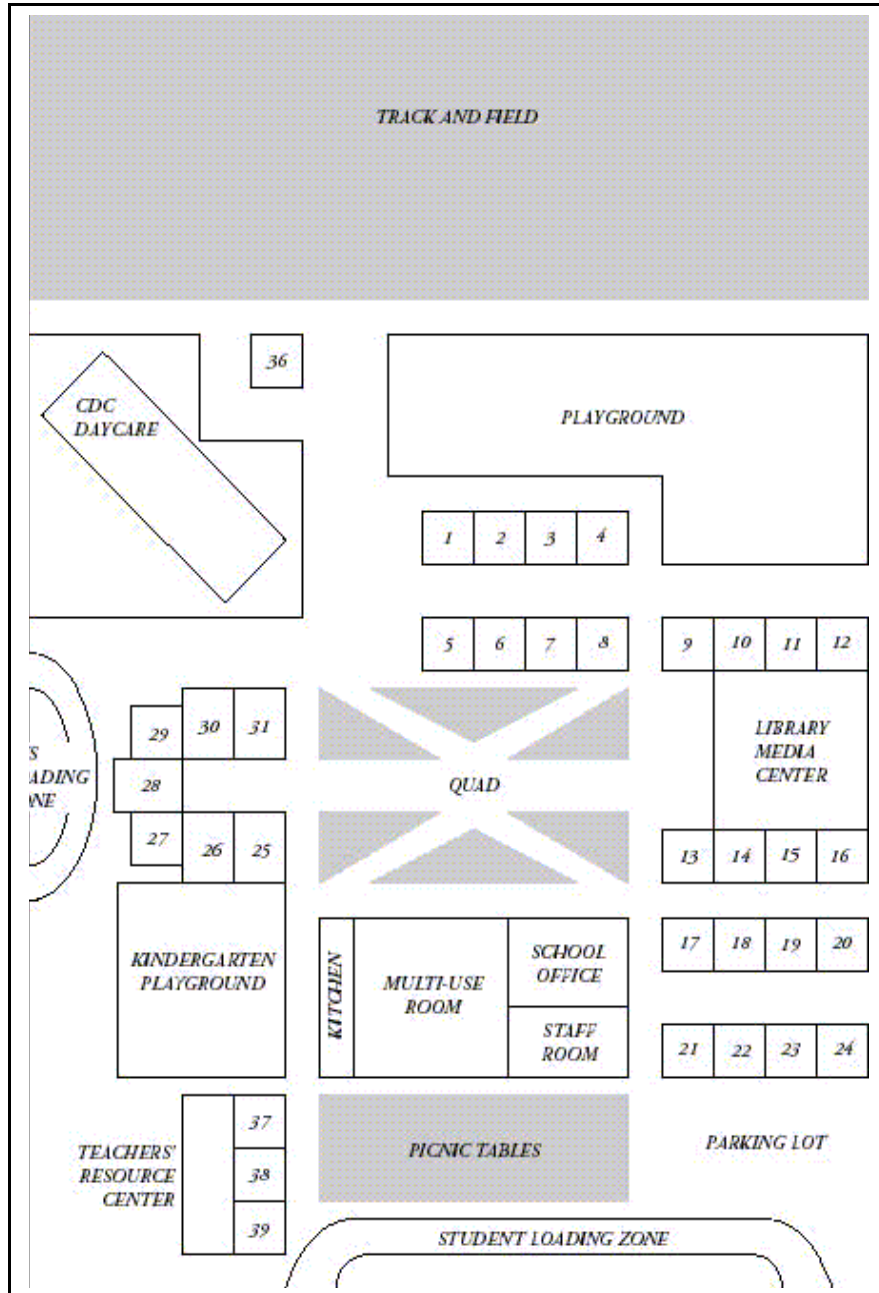
school cafeteria
garden/sports field
90 degrees
120 degrees

Group #3:

Learning resource center/library
School flagpole
50 degrees
270 degrees

Handout #8: School map

[either ask school to provide, have teachers sketch a map, or insert here a general map of a school; be sure the map has a simple compass rose on it]



Handout #9: Taking Compass Readings on the Pegasus

While on board the Pegasus, everyone on the boat will pretend to go back in time to 1775, when Captain Juan Manuel de Ayala arrived in San Francisco Bay to explore and chart new land for the King of Spain.

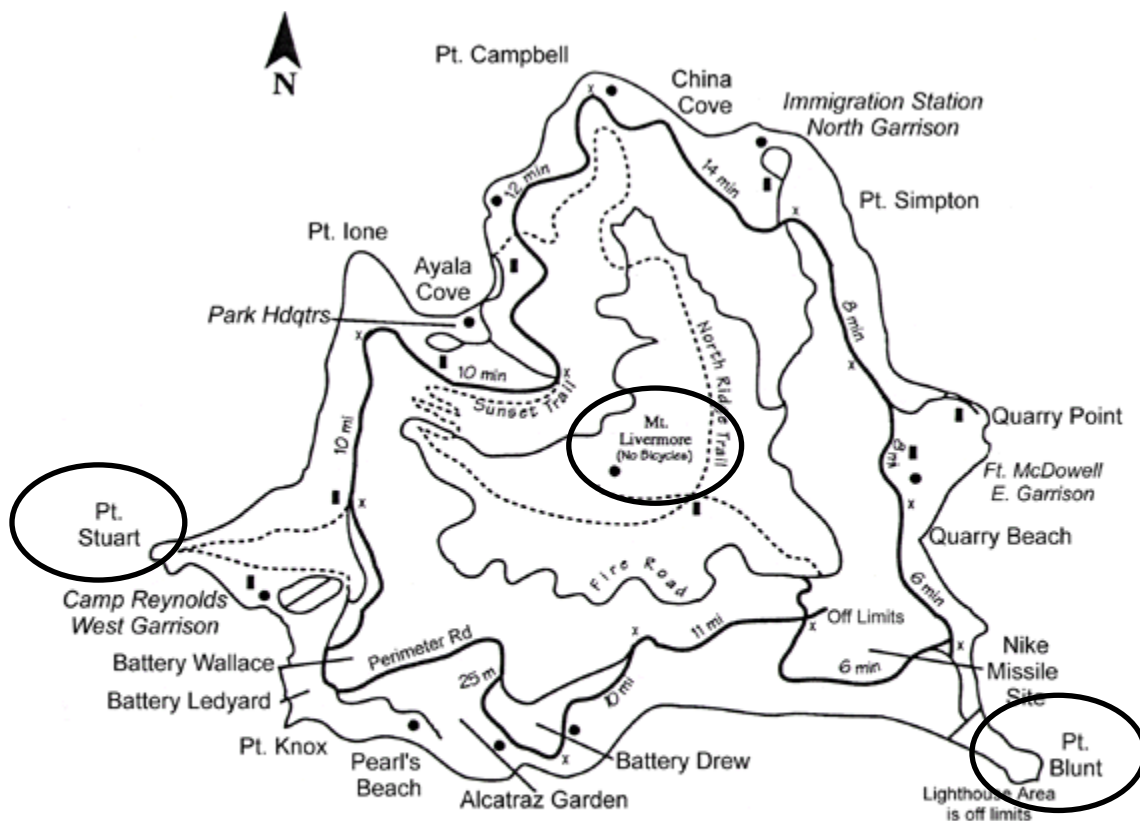
You and your classmates will be Ayala's crew members, in charge of taking compass readings to use in creating the first map of San Francisco Bay.

You will be responsible for the following readings:

Group #1: Point Blunt (southernmost tip of Angel Island)

Group #2: Mount Livermore (highest peak of Angel Island)

Group #3: Point Stuart (westernmost tip of Angel Island)



One representative from your group should write down the readings on waterproof paper that your teacher will give you.

Once you are back in your classroom, your teacher will give you a map of the San Francisco Bay on which you can plot the compass readings.

Handout #10: Reflecting on Your Pegasus Experience

While you were on the boat, you had a chance to experience life outside of familiar surroundings. Not only that, but perhaps this was the first time you have stayed off land for a length of time. Almost all of us have lived on land all our lives, and probably will continue to do so in the future. What is life like on water? How is it different from living on land? After your experience on a boat in water, is your relationship to land any different? If so, how is it different? What type of person would enjoy the sea life? What kind of personality or characteristics does such a person have?

On land, you're probably accustomed to being surrounded by mostly buildings, roads, cars, crowds of people. Of course there are things of nature such as trees, flowers, birds, etc. that you can see from your house or school or favorite park. What about when you're out in the water? What surrounds you? What catches your eye? What did you see while you were on the boat? Now that you're back on land, is there anything you notice around you that you didn't notice before? What about the water—looking at the ocean now, do you see anything that you didn't see before you went on the sailing trip?

[intention here was to add questions and a possible exercise on environmental concerns around the bay]

Think back to the experience aboard the Pegasus. If you have a hard time remembering all that you felt and saw, sit back and close your eyes for a few minutes. Try to remember everything you experienced in the water. Then, jot down the first few things that come to your mind under each of the following:

While I was sailing on the Pegasus,

I saw...

I heard...

I smelled...

I touched...

I tasted...

I felt...

Share your answers with your classmates. Are your experiences similar to those of the your classmates? If so, why do you think they are similar? Are they different? If so, why do you think they are different?

Self-Reflection Activity

This activity gives you a chance to express your feelings and thoughts about the sailing experience on the Pegasus.

You can choose any of the following ways to present these feelings and thoughts:

Journal entry

Letter to a family member or friend

Poem
Song (or lyrics to a song)
Reflection paper
Scrapbook entry
Sketch or painting

You can include writing, drawing, collecting pictures and/or photographs, or any combination of these processes.

In your writing and/or drawing, be sure to include your feelings and thoughts not only about the Pegasus experience but also about the “historical” tie-in to the experience. Is your experience on the Pegasus affected in any way by what you learned about early explorers to the San Francisco Bay? If so, how?

Recollect what you read about the Miwoks, and answer the questions below.
[This can only happen, of course, if the students actually did the supplementary reading on Miwoks and their history/culture]

How were the Miwoks attached to nature? What was their relationship to things of nature? Were plants and animals important to them? If so, how were they important? Did they live cooperatively in their natural environment? Did they do anything that affected their natural surroundings?

Imagine that you are a Miwok Indian who has been caught in a time warp and has landed in modern-day San Francisco Bay. After you get over your initial shock, you start to explore your surroundings. You start to compare this with the surroundings that you know and your people’s custom of living harmoniously with nature. You also think hard about what the natural landscape looked like when your people inhabited the area.

What are some of the most striking changes in the landscape?

Do you recognize any part of the bay now? Why or why not?

Are the changes good or bad? What are some of the good changes and why are they good? What are some of the bad ones and what makes them bad?

Would traveling on reed boats be possible now? Why or why not?

How do you feel about this modern-day land? What do you think about the modern-day bay?

In your travel back to your “time period,” what would you take with you to show to the other Indians? What would you tell them about your trip to the future?

Handout #11: Map of San Francisco Bay

[provide a very general map of the bay that does not have any labels or indicators on it except for Pacific Ocean; certain cities such as San Francisco, Berkeley, Oakland, Sausalito; and a simplified compass rose; a map similar to the one in the Land School curriculum]

Handout #12: Final Activity: Creating a Logbook

[this definitely needs to be explained better and in more detail]

You will create a logbook that includes:

Your feelings and thoughts about the sailing experience [this will come from the previous exercises in which you jot down your experiences through your “six senses,” the self-reflection activity, in addition to considerations about the environment]

A map/chart of the course your sailing trip took, including the compass readings you used in the previous exercise on navigation

Sketches/drawings that you made in a previous exercise or will make about either your experiences on the Pegasus, or about the historical experience you learned about in previous activities

Handout #13: Other Group Projects [this is one of the optional assessment activities]

You and your group members will create a project from the following scenarios. First, read about the scenarios. Then, discuss and plan what you will do for the project. Have each group member be in charge of some project task. Make sure that everyone in your group participates in the project.

After you are done with the project, you will have a chance to present it to the rest of the class.

Group #1 scenario:

As Father Vicente on Ayala's boat (who was in charge of writing down all his experiences on the boat and on shore), write a similar compilation of experiences, based on the excerpts you read before the trip and on your own experiences on the Pegasus; create a diary in which to enter all these recordings. [for presentation to class, have a group representative read excerpts from the diary]

Group #2 scenario:

Role play Ayala and/or his crew (explorers) and the native inhabitants of Angel Island (Native Americans: the Miwoks); write a script about and simulate a "Thanksgiving" feast that is occurring the night before the explorers are heading back to Spain with their newly-found knowledge about the land, the bay, and the people.

How do you feel at this last meeting?

What do you see?

What do you talk about? What do you say to one another?

[for presentation to class, have the group role play this event]

Group #3 scenario:

As Jose Canizares and his assistants, compose a final map of the area and a short guidebook that explains in writing and possible sketches the land/habitat, the bay, and the people (including their housing, boats, food, clothing, language, weapons). The map and guidebook are to be presented to the King of Spain. [for presentation to class, have two group representatives act as Ayala and the King, with Ayala doing a short presentation of these materials to the King]

Handout #14: Individual Writing Assignment [this is another optional assessment exercise]

Write one paragraph from each category/theme that begins,

Explorers and their voyages:

“The Miwoks were people who . . .”

“Ayala and his crew on the San Carlos were explorers who...”

You should include at least three qualities they have learned about the particular group of people.

Navigation:

“The sextant, astrolabe, and compass were used to...”

“Orienteering is important because...”

“Nowadays, people need navigation tools to...”

You should include at least three explanations.

Importance of the bay:

“The SF Bay was important because...”

“The SF Bay is important because...”

You should include at least three reasons.

Land vs. water

“I like being in the sea because...”

“I like being on land because...”

“I might/might not like living on water because...”

You should include at least three reasons.

Applying Pegasus experience to own life

“The Pegasus experience helped me to...”

“After sailing on the Pegasus, I am/feel...”

You should include at least three explanations.

Appendix A: Glossary

[this is not comprehensive]

Aft: toward the rear of the vessel

Amidships: the middle of the vessel

Astrolabe: an instrument used in ancient times to measure the height of celestial bodies above the horizon

Ballast: any heavy material such as lead, concrete, or stones placed low in a vessel to increase stability

Barometer: an instrument, often using a column of mercury, for measuring atmospheric pressure

Bearing dial: a navigational device used to determine the position of the sun and moon when the Pole Star was not visible; it was reputed to have been used by the Vikings

Bilge: the lowest part of a vessel's hull

Bow: the front of a vessel

Cartographer: a person who makes maps. Cartography is the science and practice of projecting by various methods an area of the Earth's surface on a flat plane, such as a sheet of paper

Chart: a map displaying various graphic representations; often, these are maps of waterways, used by mariners

Chronometer: a mechanical device for keeping time independent of ship's motion

Compass: an instrument whose magnetized metal needle aligns itself with the magnetic fields of the earth. Mariners use this information to navigate the vessel

Compass rose: a circle divided into 32 points for a total of 360 degrees and printed on a chart as a means of determining the course of a vessel

Cross-staff: an early 16th century instrument for measuring the altitude of a heavenly body.

Dead reckoning: Estimating location and speed using a variety of different methods including wind, waves, bird sightings, and current

Deck: floors on a vessel; each level is called a deck

Draft: the depth of water required to float a vessel

Hull: the outer body or shell of a vessel, floating partially in water and supporting the remainder of the vessel

Fore: the front part of a vessel

Foremast: the forwardmost mast on a vessel with three or more masts

Hand lead and line (also called sounding line): a means of finding the depth of water near the coasts; it consists of a rope, with length markings, attached to a lead weight; the depth of the water is equal to the length of line played out. The lower end of the weight is cupped and picks up material from

the sea floor. In studying the material, an experienced mariner can determine the location of the vessel

Keel: the backbone of a ship

Latitude: imaginary lines that run east to west on the surface of the earth. Latitude determines location north or south on the globe

Lodestone: a magnetized piece of iron ore than can impart its north-south properties to an iron needle, which in turn is used to make a compass; the Chinese in ancient times used the lodestone for navigation and other purposes

Longitude: imaginary lines that run north to south on the surface of the earth. The prime meridian is 0 degrees. Each 15 degrees of longitude equals one hour of time

Mainmast: the second mast on vessels with two or more masts

Mast: a vertical pole usually made of wood or metal that supports the sails

Masthead: the top of a lower mast to which a topmast is attached

Meridian: a great circle passing through the poles and denoted in degrees of longitude east and west of Greenwich, England

Mizzenmast: the third mast on vessels with three or more masts

North star (Pole Star): a star at the end of the handle of the Little Dipper and almost at the north celestial pole. Also called Polaris

Pilot: a person who navigates a vessel. Historically, another name for a navigator (different from a master or captain). Today, a pilot navigates a vessel in specific bodies of water

Planks: the timbers forming the outermost covering of the hull

Poop: a partial deck above the main deck, toward the rear of the vessel

Port: the left side of a vessel; the side of the vessel that is traditionally pulled up to the dock

Quadrant: a simple instrument for determining the altitude of heavenly bodies. It is a quarter circle and like a protractor, measures the degrees of an angle

Rib: the frames or timbers of a vessel that rise from the keel to form the shape of the hull

Rudder: a device mounted near the stern of a vessel to control direction

Sail: an assemblage of cloth cut to various sizes and shapes, designed to catch the wind and use its force to propel a vessel

Sand glass: a device for measuring time aboard a ship and used before the development of the chronometer

Sextant: An instrument used for...

Square rigged: square or rectangular sails on two or more masts

Starboard: the right side of a vessel

Stern: the back of a vessel

Appendix B: References

Books

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[These are contingent upon what you decide to do with this module and which pieces you might use; for the ones that I did use to write what I have so far, I will try to get them to you in the next month or so]