



# Shipwreck Center

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**History, Science and Language Arts**  
**Grade Levels 3-5**

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# CAPE COD'S LEGENDARY SHIPWRECK

Did you know there's a *real* pirate ship buried right off Cape Cod's coastline? Yes, it's true! The vessel is called *The Whydah Gally* and her adventure is not a myth. The former London slave ship was captured by the Pirate Prince, "Black Sam" Bellamy, and his crew over three hundred years ago. Then on the night of April 26, 1717, the *Whydah* wrecked on the Cape Cod coastline during a powerful storm.

Centuries later, thanks to advances in science and technology, as well as in-depth historical research, the shipwreck was discovered in the summer of 1984. To this day, artifacts from the *Whydah* are still being unearthed by divers and archaeologists. Get ready to learn the fascinating story of an actual Caribbean pirate ship and her discovery centuries later!

## MISSION STATEMENT

This unit plan has been designed to use the true story of *The Whydah Gally* to teach upper-elementary school students skills and standards in history, science, and language arts. While each lesson plan can function independently, as a multi-lesson exercise the entire unit illustrates how multiple academic disciplines can work together.

During these lessons, students explore local history and bits of related folklore through a reading comprehension and oral narration exercise. Straightforward physics and chemistry experiments demonstrate how a scientific understanding of natural processes helps uncover and conserve the past. Activities in geography, demographics, and economics illustrate the larger forces that impacted and influenced the central characters of the *Whydah's* chronicle.

The creators of these lessons hope that the use of the *Whydah's* history and artifacts will remind students that these exercises—both ours and theirs—are not fruitless or trivial endeavors, but honest efforts to reveal, understand and sustain the legacy of ordinary people, who lived extraordinary lives.

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## UNIT OVERVIEW

This unit plan has been designed around your visit (or virtual visit) to the Whydah Pirate Museum, with the history and language arts lessons taking place *prior* to the class trip and the science lesson taking place *after* the trip.

The first three lessons are designed to give students historical background. Exploring the museum after completion of these lessons will reinforce and expand upon the concepts and standards they learned in the classroom.

The first lesson in the unit begins with a biographical narrative of three individuals from colonial Cape Cod whose interwoven fates took them on a voyage throughout the Western Hemisphere. Although the narrative is based on authentic history, the lesson activity is grounded in language arts and focuses on phonetics, vocabulary, and reading comprehension.

The next lesson takes students to the West Indies where they will examine the political and economic conditions that shaped the 18<sup>th</sup> century world—not to mention created the conditions for the "Golden Age of Piracy." The two exercises demonstrate how European colonialism and globalization altered the people, languages, and economics of the Caribbean in ways that can still be seen today.

Students will then return to Cape Cod and analyze the 1717 map of cartographer Cyprian Southack, who led the governor's unsuccessful salvage effort of the *Whydah* over three centuries ago. The map-based activity gives students the opportunity to practice location and geography skills, while also underscoring a map's role as part of the historical record.

After these lessons, students will be prepared for a trip (or virtual trip) to the museum. While this unit plan does not contain a specific lesson for the museum visit, our staff can provide teachers with a number of different activities upon request. **We recommend that you contact our educators prior to your visit so we can tailor the experience to best accommodate your needs and objectives.**

The remaining lesson plan works best after your class trip. Touring the museum's laboratory will provide students with context for the final lesson activities, which explore the science and technology used to locate and salvage artifacts.

This science lesson shows students how density affects the arrangement of objects on the seafloor, the natural processes that protect artifacts (i.e. the formation of "concretions") and how archaeologists recover, excavate, and preserve these relics.

## LESSON ONE: BLACK SAM AND THE WHYDAH

### DURATION

40 - 50 minutes

### OVERVIEW

Students will practice discerning the fiction from the facts by examining the lives of three legendary, yet very real, Cape Cod historical figures. By reading aloud the story of these characters in the form of a classic oral narration, students will learn the story of common sailor and eventual pirate captain, Samuel Bellamy, as well as his love, Maria Hallett, and his partner and financier, Paulsgrave Williams.

### SKILLS AND LEARNING STANDARDS

The following language arts reading standards are addressed:

- 3-RI-1.** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- 3-RI-2.** Determine the main idea of a text; recount the key details and explain how they support the main idea.
- 3-RI-3.** Describe the relationship between a series of historical events, scientific ideas or concepts, mathematical ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect
- 4-RI-5.** Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.
- 4 & 5-RF-3.** Know and apply grade-level phonics and word analysis skills in decoding words.
  - A.** Use combined knowledge of all letter-sound correspondences, syllabication patterns, and morphology (e.g., roots and affixes) to read accurately unfamiliar multisyllabic words in context and out of context
  - 4-RF-4.** Read with sufficient accuracy and fluency to support comprehension.
    - A.** Read grade-level text with purpose and understanding.
    - B.** Read grade-level prose and poetry orally with accuracy, appropriate rate, and expression on successive readings.
    - C.** Use context to confirm or self-correct word recognition and understanding, rereading as necessary.

**5-RI-5.** Describe how an author uses one or more structures (e.g., chronology, comparison, cause/effect, problem/solution) of events, to present information in a text.

The following history and social science concepts, skills, and learning standards are addressed:

**3-CS-1.** Explain the meaning of time periods or dates in historical narratives (decade, century, 1600s, 1776) and use them correctly in speaking and writing. (H)

**5-CS-1.** Identify different ways of dating historical narratives (17th century, seventeenth century, 1600s, colonial period). (H)

**5-CS-2.** Interpret timelines of events studied. (H)

**LS-3.7.** After reading a biography of a person from Massachusetts in one of the following categories, summarize the person's life and achievements. (H, C)

## ESSENTIAL QUESTIONS

How can personal motivations impact an individual's decisions and actions? How can global or societal circumstances impact an individual's decisions and actions?

## OBJECTIVES

By the conclusion of the lesson students will be able to:

- Define time frame terminology such as *decade*, *century*, *1700s*.
- Construct timelines.
- Discuss the biographies and local folklore of Cape Cod figures Samuel Bellamy, Maria Hallett and Paulsgrave Williams.
- Differentiate between fact and fiction.

## MATERIALS

1. Short story, "The True Story of Black Sam and the Whydah" (provided in **Unit Materials** package).
2. Pen or pencil and notebook or lined paper

## METHODS

Students will read "The True Story of Black Sam and the Whydah" aloud as a group, with a different student narrating each paragraph. Students will answer "true or false" questions and construct a general timeline at the completion of the reading.

## LESSON BACKGROUND

The story of Sam Bellamy, Maria Hallett and Paulsgrave Williams has survived as an oral tradition for over three hundred years. Some students may even be familiar with the folk legends or ghost stories of the "Witch of Wellfleet" or "Black Bellamy." While obviously prone to exaggeration and superstition, these tales—passed down from generation to generation—have helped keep the story alive and around long enough to be analyzed by researchers and scholars.

The lesson material, "The True Story of Black Sam and the Whydah," gives an accurate account of these Cape Cod figures, but aims to tell the story in a similar fashion to the oral tales and campfire stories that have circulated around Cape Cod for hundreds of years.

## LESSON

### Warm-up

To get students thinking about local history teachers can ask students to share their own ancestral or community folklore. Did their grandparents or relatives ever share stories about the past? Do they know any local legends? Do they believe these tales to be true?

### Activity

Teachers will distribute copies of the reading material, "**The True Story of Black Sam and the Whydah**" (**Material A**) to each class member.

To demonstrate an effective oral narrative, teachers will read the first paragraph or two of the short story, emphasizing a gradual pace, pauses at punctuation and clear annunciation. After an adequate example, students will volunteer to each read a paragraph apiece. The narrator will read the current passage aloud while the rest of the class listens or reads along silently.

After the passage, students will examine whether the statement is "true or false," based on the reading. If the statement is "false" students should rewrite it to be accurate.

When the class has completed the story, students will construct a timeline using the dates from the story. After writing down all the dates, students can then add important events to the timeline.

### Wrap-up

After students have completed their timeline, they will compare how the order of events in their chronological timeline differs from the order of events in the narrative they just read. The class can discuss why authors or speakers tell stories (even true ones) in an order of events different from when they actually happened.

## **LESSON TWO: The Caribbean, a Crossroads for Eighteenth Century Commerce**

### DURATION

60 - 90 minutes

### OVERVIEW

Students will analyze the goods and resources that made up the transatlantic trade. Students will also study how merchants, sailors, and slaves were at the heart of global commerce.

### SKILLS AND LEARNING STANDARDS

The following history and social studies concepts, skills, and learning standards are addressed:

**3-CS-10.** Define barter, give examples of bartering and explain how money makes it easier for people to get things they want. (E)

**4-CS-7.** Give examples of limited and unlimited resources and explain how scarcity compels people and communities to make choices about goods and services, giving up some things to get other things. (E)

**4-CS-8.** Give examples of how the interaction of buyers and sellers influences the prices of goods and services in markets. (E)

**LS-4.11.** Describe the climate, major physical features, and major natural resources in each region. (G)

**LS-5.11.** Explain the importance of maritime commerce in the development of the economy of colonial Massachusetts, using historical societies and museums as needed. (H, E)

**LS-5.12.** Explain the causes of the establishment of slavery in North America. Describe the harsh conditions of the Middle Passage and slave life, and the responses of slaves to their condition. Describe the life of free African Americans in the colonies. (H, G, E, C)

### ESSENTIAL QUESTIONS

Were the goods being produced by slave plantations necessary for human survival?

## OBJECTIVES

By the conclusion of the lesson students will be able to:

- Identify Cape Cod's maritime industries and explain how they connected to a global economy.
- Illustrate the flow of goods involved in the "Triangular Trade."
- Indicate which forces changed the demographics of the Caribbean; explain how these forces changed the demographics.

## MATERIALS

1. Unlabeled map of the Caribbean (provided in **Unit Materials** package).
2. Note cards or prop

## METHODS

Students will fill in their own maps to provide an overview of the shifting populations, language, and political powers of the colonial Caribbean. A group exercise will demonstrate how large forces impacted the everyday lives of individuals in particular groups.

## LESSON BACKGROUND

While Sam Bellamy's swashbuckling adventure through the Caribbean has roots in his personal experience (his background as a sailor, his relationship with Maria Hallett), it was also shaped by much larger forces. The circumstances that spawned the Golden Age of Piracy can be traced all the way back to Columbus's first voyage across the Atlantic.

The waves of piracy which characterized the 17<sup>th</sup> and early 18<sup>th</sup> century were not random, isolated phenomena. Far reaching social, political, and economic forces created the environment in which disenfranchised classes turned to piracy. To properly understand the "Golden Age of Piracy," students must also understand the broader world in which it took place. The rise and continuation of colonialism, mercantilism, the slave-trade and rivalries between European powers, among other factors, contributed far more to the raising of the skull and crossbones, than the moral shortcomings of a few individuals.

## LESSON A

### Warm-up

Teachers should begin the activity with a discussion about Maritime industries on Cape Cod. During the 17<sup>th</sup> and 18<sup>th</sup> century, fisherman, whalers, ship builders and merchant sailors were the main economic lifeblood of Cape Cod.

Before the invention of trains, airplanes, and the internet, it was the ocean that first connected humans to their peers all around the world. The 18<sup>th</sup> century is often called the "Age of Trade." While most Cape Codders in the 18<sup>th</sup> century barely traveled more than a few miles from their home, those involved in maritime trade might travel thousands of miles in a single year.

Sailors visited bustling ports throughout the Atlantic. Many of these major ports were located in the Caribbean, which could be reached from Cape Cod in a matter of weeks or months depending on the winds and weather. The Caribbean, also referred to as the "West Indies," was a major hub and economic powerhouse during the "Age of Sail." As European empires were constantly vying for new territory, the Caribbean changed dramatically in a relatively short time.

The first activity demonstrates how the arrival and subsequent colonization by Europeans drastically altered the demographics of the Caribbean.

### Activity:

Teachers pass out individual copies of **Material A**—a blank map of the Caribbean. With the aid of a globe, static map, or interactive map (Google maps, for example) teachers will guide the class to placing key ports on the map. Students will then write down the names of these ports in the first column of the table.

Teachers are free to choose their own locations, but the sample exercise uses the following ports:  
1. Havana 2. Port Royal 3. Nassau 4. Vera Cruz 5. Port-au-Prince.

Next the teacher will guide the class to identifying the various indigenous peoples who lived in the Caribbean before the arrival of Europeans. Students will circle the Bahamas, where the Lucayans lived, the Greater Antilles islands, where the Taíno/Chiboney lived, and the middle portion of the Yucatan where the Aztecs lived.

In the table, students will write down the indigenous populations they would have encountered in 1492—the year of Columbus's first expedition. If the class is following the sample locations, the

second column should read as follows: 1. Taíno/Chiboney 2. Taíno/Chiboney 3. Lucayan 4. Aztec 5. Taíno/Chiboney.

The teacher will guide students forward into history by discussing the arrival of the Europeans. First, students will color in the vast Spanish territory along the Spanish main, as well as the island of Cuba and the eastern half of Hispaniola (modern day Dominican Republic). Next, students will choose a different color and color in the British territories of Jamaica and the Bahamas. Finally, students will choose a third color and fill in the western half of Hispaniola (modern day Haiti) for France.

After coloring is complete, students will write down in the third column the colonial territory and flag they would have encountered in 1717—the year of the Whydah's capture. If following the sample exercise, the table should read as follows: 1. Spanish 2. British 3. Jolly Roger\* 4. Spanish 5. French. Note that Nassau in the Bahamas had no colonial government in 1717 and functioned as a "pirate republic" from 1714-1718.

Finally, teachers will guide their students into the present day and discuss how these territories eventually became independent. In the last column, students will write down the modern name of each nation, the year it achieved independence and the language students would encounter today. If using the sample locations, the final column should read: 1. Cuba (1902), Spanish 2. Jamaica (1962), English 3. Commonwealth of the Bahamas (1973), English 4. Mexico (1821), Spanish 5. Haiti (1804), French/ Haitian Creole.

#### Wrap-up:

Examining their newly created map, students will see that the arrival of European explorers impacted the make-up of the Caribbean significantly. But why did the major European powers start claiming territory in the West Indies? What incentive did countries like Spain, England, and France have for establishing colonies on the other side of the Atlantic? Discussing these questions will set the stage and tie in directly with **Activity B**.

## LESSON B

#### Warm-up

The wrap-up from the previous activity will also serve as the warm-up for the second activity.

### Activity B:

Teachers will rearrange the physical space of the classroom into three stations, which represent the three regions of triangle trade—Europe, western Africa, and the Caribbean. Alternatively, for distance education, teachers can use a bulletin board, refrigerator magnets, etc. with labeled note cards to keep track of student locations.

Students will be divided into six or seven groups: 1. *Merchants/ShipOwners* 2. *Sailors* (one student among this group may be appointed *Captain*) 3. *Manufacturers* 4. *West African Kings* 5. *Captives from Africa's Interior* 6. *Sugar Plantation Owners* 7. *Native American Captives*. Classes can have multiple ships, captains and crews. Each student will be given a note card to designate goods or pay they receive along each stage of the journey. Props can also be used in place of note cards.

Each group will be sent to their respective starting location. Groups 1-3 will begin in Europe, groups 4-5 will begin in West Africa and groups 6 -7 will begin in the Caribbean. *Merchants/ship owners* will purchase manufactured goods and *manufacturers* will receive profit. The *captain(s)* will sail for Africa with manufactured goods along with the *sailors*.

They will arrive in West Africa to trade and barter. *African kings* will receive the manufactured goods. *Captains* may receive valuables like gold, ivory and jewelry. *Sailors* and captives receive nothing and depart for Caribbean.

After arriving in the Caribbean, *plantation owners* will buy slaves and sell sugar. *African and indigenous captives* receive nothing and remain in the Caribbean. The *captain(s)* receive sugar and/or profit from the sale of slaves. *Sailors* receive nothing and depart for Europe.

After arriving in Europe, *merchants/ship owners* will receive large profits from the sale of sugar and the acquisition of any valuables from Africa. *Sailors* will receive a few pounds in wages. *Captains* will receive 20x what *sailors* receive.

The cycle will repeat once or twice more. In the final cycle, Teachers may play the role of a pirate captain and capture a merchant ship on its return to Europe.

### Wrap up:

At the end of the exercise, students will either write or talk about their experience as one of the group types. Compare and contrast the lifestyle of merchants, sailors, and captives. Teachers may also want to recount the story of the *Whydah's* capture by Sam Bellamy's crew as it will segue into **Lesson Three**.

## **LESSON THREE: CAPTAIN SOUTHACK'S MAP, 1717**

### **DURATION**

45 - 60 minutes

### **OVERVIEW**

Students will analyze Cyprian Southack's map of eastern Massachusetts and identify familiar locations and geographical features.

### **SKILLS AND LEARNING STANDARDS**

The following concepts, skills, and learning standards are addressed:

**3-CS-5.** Describe the difference between a contemporary map of their city or town and the map of their city or town in the 18th, 19th, or early 20th century. (H, G)

**4-CS-1.** Use map and globe skills to determine absolute locations (latitude and longitude) of places studied. (G)

**4-CS-2.** Interpret a map using information from its title, compass rose, scale, and legend. (G)

**5-CS-4.** Use maps and globes to identify absolute locations (latitude and longitude). (G)

**LS-3.1.** On a map of the United States, locate the New England states (Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, Maine) and the Atlantic Ocean. On a map of Massachusetts, locate major cities and towns, Cape Ann, Cape Cod, the Connecticut River, the Merrimack River, the Charles River, and the Berkshire Hills.(G)

**LS-3.8.** On a map of Massachusetts, locate the class's home town or city and its local geographic features and landmarks. (G)

**LS-3.9.** Identify historic buildings, monuments, or sites in the area and explain their purpose and significance. (H, C)

### **ESSENTIAL QUESTIONS**

Why are primary sources critical to the study of past events?

## OBJECTIVES

By the conclusion of the lesson students will be able to:

- Interpret basic map features and chart a course using cardinal directions, longitude and latitude.
- Compare the similarities and differences between an 18<sup>th</sup> century and a modern map of Cape Cod.

## MATERIALS

1. Satellite Map of Coastal Massachusetts, 2017 (provided in **Unit Materials** package).
2. Cyprian Southack's Map of Coastal Massachusetts, 1717 (provided in **Unit Materials** package).
3. Compass Rose
4. Pen or pencil and notebook or lined paper

## LESSON BACKGROUND

After the *Whydah's* destruction, salvor and cartographer, Captain Cyprian Southack was hired by the governor of the Massachusetts Bay Colony, Samuel Shute, to salvage what he could from the shipwreck. Southack's recovery operation was hampered by delays, bad weather and uncooperative locals. He ultimately did not recover much from the wreck. But he did leave behind crucial primary sources that would become invaluable to the team that discovered the *Whydah* two and a half centuries later.

Captain Southack left behind a journal—detailing the daily operations (and frustrations) of the *Whydah* salvage—and a map that provided the relative location of the wreck. This map from 1717 served as the starting point in the search for the pirate galley. In the 1980s, the dive team made calculations to account for the considerable erosion of the coastline. After years of persistence, Barry Clifford and his team were able to do what Cyprian Southack could not centuries before: recover artifacts from the *Whydah*.

Southack's map has value beyond its role in the *Whydah's* discovery— it allows us to look back in time. This primary source document shows its viewers that much of Cape Cod from 1717 is still present today. The towns where students live today can be seen on this map from the past.

People were living in these same towns 300 years ago. The map also reveals how much *has* changed. Modern maps contain road names and highway numbers; shopping outlets and satellite photos. Southack's map harkens to a world built around the sea. His maps detail water depth,

rocky shallows, and passable channels. While Cape Cod still has a connection to its past—and to the sea—daily life in the colonial period was much different from our own.

## METHODS

Students will examine both a modern and an eighteen century map of Coastal Massachusetts. Maps will be used to practice skills such as navigation (cardinal direction, longitude and latitude) and to discuss the key features and purpose of the map.

## LESSON

### Warm-Up:

Teachers should discuss the principle characters and events from **Lessons One** and **Two**.

Students should be able recall these key points:

- Bellamy's romance with Maria Hallett
- Global maritime trade and lucrative shipping lanes of the Caribbean
- Capture of the *Whydah* and her destruction off the Cape Cod
- The *Whydah*'s discovery in 1984

### Activity:

Teachers will pass out **Materials A (Satellite Map)** and **B (Historical Map)** to each student. Teachers should ask students to describe the materials in front of them. What are they? Where are these maps centered? Which map covers a larger area? When were they made? How and by who?

The class should also discuss the purpose of each map. How might a satellite map be used today? How might Southack's map be used in 1717? What use(s) does an old map have today?

For the final part of the discussion, the class should analyze Southack's **Historical Map**. What present day towns and locations existed back in 1717? Were they spelled the same way, and if not, why were they spelled differently? What features do not exist or would be different on a modern map? Is Southack's drawing accurate? Could it be used for navigation today?

After comparing, describing, and discussing the two maps, students will practice basic skills.

Using the **Satellite Map**, students will write down the approximate longitude and latitude coordinates of Cape Cod (42° N, 70° W). Students may also record the coordinate range of the **Historical Map** (between 41°-43° N and 69°-71° W).

Referring to the **Historical Map**, students will then practice navigating by cardinal and ordinal directions. With the Bay of Massachusetts, their own school, or some other location as a central point, students will write down the direction (with the aid of a Compass Rose if needed) of various towns and landmarks of the teacher's choosing. For example, with the Bay of Massachusetts as the starting point, these five locations would correspond with the following compass directions:

- |                       |                              |
|-----------------------|------------------------------|
| 1. Yarmouth - South   | 4. Buzzard's Bay - Southwest |
| 2. Plymouth - West    | 5. Whydah wreck site - East  |
| 3. Boston - Northwest |                              |

Wrap up:

Teachers should conclude the lesson with a discussion about the importance and function of Southack's map to the team of divers and archaeologists who found the wreck in 1984.

## **LESSON FOUR: BURIED TREASURE BENEATH THE SANDS**

### DURATION

45 - 60 minutes

### OVERVIEW

Students will learn about archaeology and artifacts. By using examples of everyday objects, students will determine what objects and materials will survive in a saltwater environment and how they react in the ocean. Students will learn about artifact recovery and conservation in underwater archaeology by following an object's journey from the past into a modern museum.

### SKILLS AND LEARNING STANDARDS

The following learning standards are addressed:

**2-PS1-1 Describe and classify different kinds of materials by observable properties of color, flexibility, hardness, texture, and absorbency.**

**2-PS1-3 Analyze a variety of evidence to conclude that when a chunk of material is cut or broken into pieces, each piece is still the same material and, however small each piece is, has weight. Show that the material properties of a small set of pieces do not change when the pieces are used to build larger objects.**

**4-ESS1-1 Use evidence from a given landscape that simple landforms and rock layers to support a claim about the role of erosion or deposition in the formation of the landscape over long periods of time.**

**5-PS1-2 Measure and graph the weights (masses) of substances before and after a reaction or phase change to provide evidence that regardless of the type of change that occurs when heating, cooling, or combining substances, the total weight (mass) of matter is conserved.**

**5-PS1-3 Make observations and measurements of substances to describe characteristic properties of each, including color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility.**

## ESSENTIAL QUESTIONS

How do we learn things about the past? What does an archaeologist do? How is underwater archeology different from archeology on land?

## OBJECTIVES

By the conclusion of the lesson students will be able to:

- Understand how science and history work together as archaeology
- Discuss what an artifact is and how artifacts are recovered
- Discuss the physical properties of objects

## LESSON BACKGROUND

As discussed in the previous lesson, one important way we learn about the past is through **primary sources** - information that was produced/documentated by people who lived during a time period of interest. A second important source of information about the past comes in the form of material objects left behind by people in the past. These objects, called, '**artifacts**,' are recovered and studied by **archaeologists** in order to gain insight into human history and culture.

What the objects are made out of determines how they will survive over time. A lot of objects don't become artifacts because they don't survive from the past to today. The artifacts that archaeologists find tell a narrative about the people that used these objects. Sometimes we only see part of the picture because we only have some of the artifacts.

The objects at the Whydah Pirate Museum were on a ship in the ocean. When the ship wrecked and sank into the water, all of the objects ended up on the ocean floor or were brought onto the beach by the ocean currents and waves. The objects remained underwater for almost 300 years before they were discovered by divers.

This process is where underwater archaeology differs from archaeology on land. Artifacts that have been on dry land from the time they stopped being used by the people of the past to when they were rediscovered by modern people do not undergo the same changes as artifacts that have been in the ocean.

When an object that was not designed to be **waterproof** or **water-resistant** is exposed to water, the object undergoes a chemical **reaction**. This reaction breaks down the **material**

of the object as it is submerged. The physical and chemical **properties** of these materials will determine how that object reacts in the water.

In the ocean—a saltwater environment—these reactions are different. Saltwater and freshwater have different properties. The main effect this has on shipwrecked artifacts is that the salt is very **corrosive** to these objects. Underwater environments present a challenge to archaeologists because the artifacts need to have special treatment before they can be allowed back into the air.

Many artifacts are recovered from the ocean inside a **concretion**. Concretions are hardened aggregates of sand, clay, rock, and even seashells from the ocean floor. They form around man-made objects because of a chemical reaction between the salt in the sea water and the materials of the objects themselves (primarily iron). These hardened lumps may look like rocks, but x-rays can reveal the artifacts hidden inside.

The water and salt that are absorbed by these artifacts over time while they are in the ocean need to be gradually removed upon recovery from the sea. This process is called **conservation**. Artifacts recovered from land and the sea all have to go through conservation, but underwater conservation may take a much longer time to complete because of all of the damage caused by the absorption of the water.

Not everything from the *Whydah* survived after centuries underwater. Many fragile objects, such as paper, maps, and books, as well as organic material like food and even the pirates' bodies, are not recovered by archaeologists. Some iron pieces are too rusted to be **preserved** and put on display, much of the wood from the ship has rotted away. Sometimes removing, or **excavating**, an object from the concretion is impossible.

The Whydah Pirate Museum displays the artifacts from the *Whydah Galley* that have been recovered, cleaned, and preserved. As you go through the museum (or virtual tour) think about what objects are on display. What sort of things do you expect to find on a pirate ship? Think about what objects have survived and what objects are not on display and why that is. What story do these artifacts tell us about history based on what has made the journey from past to present?

## GLOSSARY

Archaeologist	a person who studies human history through the excavation and examination of physical objects from historical sites
Artifact	an object made by a human being, typically used to specify an item of historical importance
Concretion	a hard solid mass formed by the accumulation of matter, particularly sediment such as sand and dirt in the presence of iron
Conservation	the preservation, repair, and prevention of deterioration of archaeological, historical, and cultural sites and artifacts
Corrode	destroy or damage slowly by chemical reaction
Deteriorate	become worse, get damaged, decay
Excavate	dig or remove materials
Material	the matter or substance from which a thing is made
Preserve	treat or prepare an object in its current state to keep it intact and prevent decay
Primary Resource	Information (e.g., from books, newspaper articles, maps, testimonies) recorded by people who were alive during the time period being studied
Properties	characteristics of an object, can be physical (size, shape, color, density) or chemical (flammable, corrosive, reactive)
Reaction	a chemical process in which different materials act on each other and are changed in the process, this can cause physical and/or chemical property changes
Waterproof	not allowing water to pass through; a material not damaged by water
Water-resistant	able to partially stop water from passing through; a material that could be somewhat damaged by water

## ACTIVITIES:

### **Physical Properties of Objects**

This activity will provide a visual representation of what an artifact can be.

#### **Materials:**

A selection of everyday objects

#### **Task:**

Select a variety of objects - different sizes, materials, and functions. Discuss what materials each object is made of and what it is or what it does. Try to have a variety of examples that are all one material (wood, plastic, glass, ceramic, etc.), made of two or more materials (wood and metal, plastic and metal), organic (plants, food) and inorganic. Based on the properties of these objects, discuss which things would survive on land, which will survive in the water? Will they last 10 years? 50 years? 100 years?

### **How Do Objects Settle in the Ocean?**

This activity will demonstrate the density of objects compared to the environment.

#### **Materials:**

A rectangular fish tank or similar clear-sided container

Sand, clay, rocks

Water

Objects of various weights and materials (marbles, coins, rubber duck (something that floats), wooden sticks/twigs, shells, etc.)

#### **Task:**

Fill the tank with clay and sand, add water but leave a large space at the top. Place the objects into the simulated ocean. Shake the tank back and forth to simulate ocean movement. See where the objects settle - which things sink, which float, which are heavier than others. Do some pieces keep moving, or do they stop at a certain depth as they move through the sand?

## **What Do Your Artifacts Tell About You?**

This activity will teach students to think about how history is learned.

### **Materials:**

Students' backpacks and contents (Alternatively, for distance learning, ask students to collect a handful of different items from their households).

### **Task:**

What objects from their own backpacks will survive over time? What if their backpack ended up in the ocean? What would archaeologists be able to learn about a person based on what objects they found? Theoretically students will have papers, books, pencils, ipads/phones (they wouldn't work after being in the water, or even a long time on land without power - what would historians think of this technology?), lunch/snacks, and toys.

## **From Object to Artifact**

In this activity students will create a diagram of the journey of an object on board the *Whydah*.

### **Materials:**

Paper/poster  
Art supplies

### **Task:**

Create a diagram of an item as it goes from everyday object to an artifact in a museum. The diagram should follow this pattern and include the corresponding questions to trace that specific object the students choose: The object arrives on the pirate ship, how did it get there? What country did it come from, was it traded for other goods? Did it come from another ship and was then stolen by the pirates who brought it aboard the *Whydah* when they captured her?

The *Whydah* sank into the ocean off of Cape Cod and all of these objects went to the ocean floor, where they sat for many years. Divers recover the objects, where many have become transformed into unrecognizable shapes trapped inside concretions. The concretions are x-rayed to see what is inside and are moved into tanks of water on land to keep them preserved until they can be excavated.

Archaeologists will excavate the objects, some of which may be stuck together inside the concretion. They remove the sand and debris from around the objects (see image below) and then the extracted pieces are cleaned. From the cleaning stage the object undergoes preservation where it is stabilized and sealed to prevent further damage to the pieces. These artifacts are then put on display in the museum.

*A concretion in the midst of being excavated. Silver 'cobs' (coins) can be seen protruding from the side.*



### **Bonus Exercise:**

Have students look up pictures of artifacts from different archaeological sites. For each artifact, instruct students to write an 'artifact card' that describes the artifact, to include categories such as shape, color(s), composition, age, location. Ask them to consider what factors enabled each artifact to survive over time and become part of the archaeological record. For example, the image below shows artifacts recovered from the Whydah shipwreck. What explains the survival of a delicate material like the embroidered silk ribbon? (Answer: It was wrapped around the pistol - When the iron barrel interacted with salt water, it formed a large concretion that covered the ribbon and protected it from sources of degradation like bacteria, sunlight, etc.).

