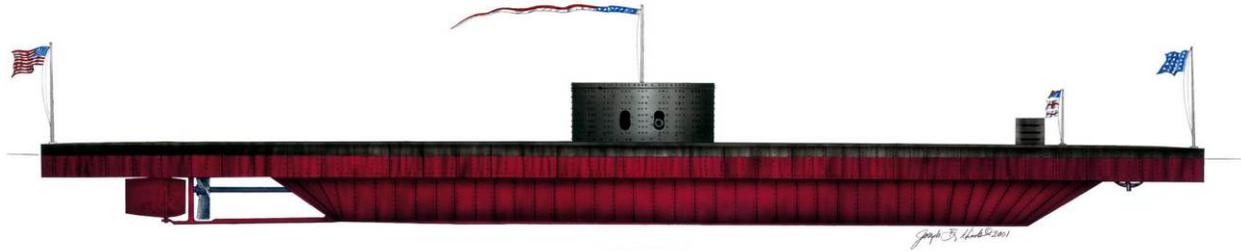


## USS Monitor

Discovering and Exploring America's Most  
Historic Ironclad

Educational Product	
Educators	Grades 4-8





### Acknowledgement

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**Cover Photo:** USS *Monitor* crew relaxing on the deck of the *Monitor*. This photo is one of eight photos taken on July 9, 1862, by photographer James F. Gibson. Courtesy of the Library of Congress

**Inside Cover Photo:** USS *Monitor* drawing, Courtesy Joe Hines



# Monitor National Marine Sanctuary

## USS *Monitor* — Discovering and Exploring America's Most Historic Ironclad

### An Educator Guide with Activities in Science, Technology, Engineering, Math and Social Studies

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#### NATIONAL MARINE SANCTUARY SYSTEM



NOAA's Office of National Marine Sanctuaries serves as the trustee for a network of underwater parks encompassing more than 600,000 square miles of marine and Great Lakes waters. The network includes a system of 13 national marine sanctuaries and Papahānaumokuākea and Rose Atoll marine national monuments. Few places on the planet can compete with the diversity of the National Marine Sanctuary System, which protects America's most iconic natural and cultural marine resources. The system works with diverse partners and stakeholders to promote responsible, sustainable ocean uses that ensure the health of our most valued ocean places. For more information, visit <http://sanctuaries.noaa.gov>.

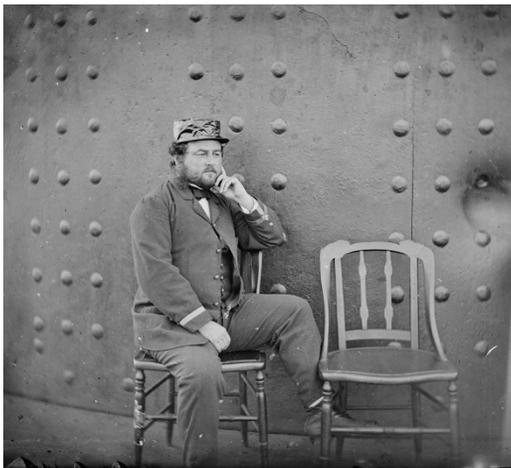


Photo of Lt. William N. Jeffers, who had the longest tenure as Captain of the *USS Monitor*. Photo taken on board the *USS Monitor* on July 9, 1862, by James F. Gibson. Photo: Courtesy of Library of Congress

For additional information about *USS Monitor - Discovering and Exploring America's Most Historic Ironclad*, contact Shannon Ricles, Monitor National Marine Sanctuary, 100 Museum Drive, Newport News, Virginia 23602; 757-591-7328; [Shannon.Ricles@noaa.gov](mailto:Shannon.Ricles@noaa.gov); or visit the website at <http://monitor.noaa.gov>

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## Partners in Education

### Monitor National Marine Sanctuary

In an effort to protect our nation's most famous shipwreck, the USS *Monitor* was designated America's first national marine sanctuary on January 30, 1975. From the beginning, partnerships have always played a crucial role in the sanctuary's mission to protect, conserve, and preserve our maritime heritage. Although the actual sanctuary is located off Cape Hatteras, North Carolina, The Mariners' Museum in Newport News, Virginia, serves as the official visitor center and headquarters for the Monitor National Marine Sanctuary. Since 1987, NOAA and The Mariners' Museum have worked closely together to tell the *Monitor's* story and to assure that this important part of our national history is shared with the American public.



The Mariners' Museum  
100 Museum Drive  
Newport News, Virginia 23606  
Phone: 757-596-2222  
<http://www.marinersmuseum.org/>

### The Mariner's Museum

The Mariners' Museum connects people to the world's waters because through the waters—through our shared maritime heritage—we are connected to one another. In 1987, the museum was designated as the principle repository for the USS *Monitor's* artifacts; and today, visitors to the museum can view many of the artifacts on display and watch the conservation process as the history of the *Monitor* lives on. In 2007, the USS *Monitor* Center opened, one of the museum's largest attractions, and it tells in vivid detail the incredible story of the USS *Monitor's* creation, battle, sinking, and recovery. The museum also offers a variety of educational programming for students of all ages, and their dedicated education staff continue to tell the *Monitor's* story to students around the world.



<http://monitor.noaa.gov>

## PROGRAM OVERVIEW

Monitor National Marine Sanctuary, in partnership with The Mariners' Museum, is excited to provide this guide on the *USS Monitor* and the lasting impact this innovative ship left on naval history. After an introduction to NOAA, students explore the story of the *Monitor* in three parts. First, students take a look at the years leading up to the Civil War and the mounting tension between the North and the South. Students also learn about the transition from wooden to iron ships and the race between the Union and the Confederacy to construct an ironclad vessel. In the next section, students investigate the Battle of Hampton Roads, which marked the end of wooden warships ushering in a new era of ironclad technology. In addition, students examine life aboard the *USS Monitor* and her tragic sinking in December of 1862. In the final section, students become underwater archeologists as they study the shipwreck of the *Monitor* and learn about the efforts of Monitor National Marine Sanctuary to protect this historic cultural resource and the conservation of its artifacts at The Mariners' Museum, the principal repository for *Monitor* artifacts.

Although designed to be taught as a unit, each lesson in this guide can be used independently to teach a particular objective. Lessons can also be combined in multiple ways to create a curriculum plan tailored just for your students.

We hope you find this guide a useful and exciting tool in bringing the past to life for your students. Please feel free to contact us with any questions, and we welcome your feedback. Be sure to visit the education section of our website at <http://monitor.noaa.gov/education> for more educational resources, and The Mariners' Museum's website at <http://www.marinersmuseum.org/>.

## Curriculum Outline

### Section A

- A. Introduction to NOAA
  - 1) Introduction to the National Oceanic and Atmospheric Administration (NOAA), Office of National Marine Sanctuaries (ONMS), Maritime Heritage Program (MHP), and Monitor National Marine Sanctuary (MNMS)

### Section B

- A. The Civil War
  - 1) Compare and identify important similarities and differences between the North and South leading up to the American Civil War
  - 2) Study the transition from wooden warships to ironclad vessels

### Section C

- A. Battle of Hampton Roads
  - 1) Analyze primary source documents to understand the Battle of Hampton Roads
  - 2) Explore historical art as a secondary source to understand different perspectives on the battle.

- B. Life of a Sailor
  - 1) Describe 1862 life on the *Monitor*
- C. Sinking of the *Monitor*
  - 1) Explore causes for the sinking of the *Monitor*

### Section D

- A. Discovering the *Monitor*
  - 1) Understand the role of sonar imaging in discovering the *Monitor*
- B. Mapping the *Monitor*
  - 1) Learn how maritime archaeologists map the *Monitor*
- C. Two Unknown Sailors
  - 1) Use detective skills to identify an unknown sailor
- D. Recovering Artifacts
  - 1) Learn how artifacts are recovered, when and why
- E. Conservation of Artifacts.
  - 1) Explain the importance of conservation and understand the process and chemistry of conservation

## Objectives

Throughout the unit, students will:

- Learn about NOAA and our nation's National Marine Sanctuary System
- Learn about the economic and social conditions in the North and South in the years leading up to the Civil War
- Examine a wide range of primary sources from the Civil War Era
- Learn about the design and construction of the Union's first ironclad vessel, the USS *Monitor*
- Examine the events of the historic Battle of Hampton Roads, the first time two ironclad vessels met in battle
- Study and analyze the strategic advantages and disadvantages of the USS *Monitor's* design
- Understand the historical significance of the USS *Monitor* and discuss the lasting impact this vessel had on naval warfare
- Learn about the men that served aboard the USS *Monitor* and examine what it was like to live and work on an ironclad vessel
- Learn about the discovery of the wreck of the USS *Monitor*
- Learn and illustrate how side scan sonar works and infer how it is used to locate and document shipwrecks
- Learn about NOAA's efforts to protect this underwater resource
- Model how maritime archaeologists map shipwrecks
- Investigate the discovery of the remains of two unknown sailors and efforts to identify them
- Appreciate the complexity involved in artifact recovery
- Analyze artifacts and understand the role artifacts play in telling us about the past
- Recognize the complexity of artifact conservation
- Evaluate the value of artifact recovery and conservation with the associated costs

## Careers

- Archivist
- Conservator
- Diver
- Educator
- Forensic anthropologist
- Historian
- Historical interpreter
- Historical re-enactor
- Laboratory technician
- Maritime archaeologist
- Materials scientist
- Metallurgist
- Museum curator
- Naval engineer
- Research engineer
- Research scientist
- Research vessel captain



Navy diver preparing to dive on the USS *Monitor*. Photo: NOAA, *Monitor* Collection

## Suggested Implementation Strategy

1. Review the suggested curriculum outline on page 5.
2. Review the various activities included in this guide and determine which activities work best for your students.
3. Review additional web and book resources for appropriate supplemental material.
4. Once ready to begin, give the students an overview of the unit and/or activity, and introduce students to NOAA, Office of National Marine Sanctuaries, Maritime Heritage Program, and Monitor National Marine Sanctuary.
5. Have students complete selected activities.

## Vocabulary—General (See each activity for associated vocabulary)

**AGARIAN** — Relating to cultivated land or the cultivation of land (e.g. farming)

**ANTEBELLUM** — Term commonly used to refer to the period just before the outbreak of the American Civil War

**ARCHAEOLOGY** — The study of human history and prehistory through the excavation of sites and the analysis of artifacts and other physical remains

**ARTIFACT** — Any object made by humans, typically an item of cultural or historical interest

**BASE LINE** — A line serving as a basis for measurement, calculation, or location; a measured line through a survey area from which triangulations are made

**BOW** — Forward part of the hull of a ship or boat; the point that is most forward when the vessel is underway

**CONSERVATION** — Preservation, repair, and prevention of the deterioration of archaeological, historical, and cultural sites and artifacts

**CONSERVATOR** — A person responsible for the repair and preservation of works of art, buildings, or other items of cultural or environmental interest

**COORDINATE** — A group of numbers used to indicate the position of a point, line, or plane

**ECONOMY** — The wealth and resources of a country or region

**INDUSTRIAL** — Relating to industry; of or relating to factories, the people who work in factories or things made in factories

**IN SITU** — To leave an object in its original place

**GRID** — A network of squares placed over a site to assist with excavation and recording

**MARITIME ARCHAEOLOGY** — A discipline within archaeology that specifically studies human interaction with the ocean, seas, lakes, and rivers through the study of physical remains

**NOAA** — National Oceanic and Atmospheric Administration; agency in the Department of Commerce that maps the oceans and conserves their living resources; predicts changes in the Earth's environment; and provides weather data and forecasts

**ONMS** — Office of National Marine Sanctuaries; part of NOAA that manages a national system of 13 national marine sanctuaries and two marine national monuments

**POPULAR SOVEREIGNTY** — The idea in the 1850s that people living in U.S. Territories should be able to decide for themselves whether or not slavery should be allowed in their territory. This doctrine would play a large role in the debate over slavery in the years leading up to the Civil War.

**PORT** — A nautical term referring to the left side of a ship when facing the bow (front)

**PRIMARY SOURCE** — A source that contains raw, original, non-interpreted, and unevaluated information

**SECONDARY SOURCE** — A source that digests, analyzes, evaluates, and interprets the information contained within primary sources

**SIDE SCAN SONAR** — A type of sonar system that is used to efficiently create an image of large areas of the seafloor

**SITE PLAN** — An accurate scaled depiction of a shipwreck showing the relationship of selected artifacts to other artifacts

**SLAVERY** — A state of bondage in which African Americans (and some Native Americans) were owned by other people, usually white, and forced to perform labor on their behalf

**STARBOARD** — A nautical term referring to the right side of a ship when facing the bow (front)

**STERN** — The rear or aft-most part of a ship; opposite the bow

## Resources

### Web Resources

#### Monitor National Marine Sanctuary

Visit this site to learn more about the USS *Monitor* and check out the teacher section for additional activities and lesson plans.

<http://monitor.noaa.gov>

#### USS *Monitor*: Preserving a Legacy

Visit this site for an in-depth look at the history, construction, life, sinking, discovery, and conservation of the USS *Monitor*.

<http://monitor.noaa.gov/150th>

#### Monitor National Marine Sanctuary—Sketchfab

Click to view and manipulate 3-D models of the USS *Monitor*, *Monitor* artifacts, and more.

<https://sketchfab.com/NOAAMonitorNMS>

#### NOAA's Office of National Marine Sanctuaries

Discover the marine life and extraordinary habitats that make up your national marine sanctuaries and learn about the continuing efforts to conserve these ocean and coastal treasures.

<http://sanctuaries.noaa.gov/>

#### NOAA's Maritime Heritage Program

Created in 2002, the program focuses on maritime heritage resources within national marine sanctuaries and promotes maritime heritage appreciation throughout the entire nation.

<http://sanctuaries.noaa.gov/maritime/aboutmhp.html>

#### NOAA National Ocean Service

Learn about side scan sonar and how scientists use it to map the ocean floor.

[http://oceanservice.noaa.gov/education/seafloor-mapping/how\\_sidescansonar.html](http://oceanservice.noaa.gov/education/seafloor-mapping/how_sidescansonar.html)

#### NOAA Celebrates 200 Years: USS *Monitor*

A collection highlighting the artifacts recovered from the USS *Monitor*.

<http://oceanexplorer.noaa.gov/explorations/02monitor/monitor.html>

#### NOAA Ocean Explorer

Visit the site to read about the 2002 expedition to the USS *Monitor* and learn more about the recovery of the turret.

<http://oceanexplorer.noaa.gov/explorations/02monitor/monitor.html>

#### NOAA Ocean Explorer

Chronicles of a five-month effort by U.S. Navy divers to recover the *Monitor's* innovative steam engine and a section of the hull.

<http://oceanexplorer.noaa.gov/explorations/monitor01/monitor01.html>

#### Civil War Trust

This website provides basic background information and teacher lesson plans on the Civil War.

<http://www.civilwar.org/education/>

### SEE INDIVIDUAL ACTIVITIES FOR ADDITIONAL WEB RESOURCES

### Book Resources

Bowens, Amanda (Editor): *Underwater Archaeology: The NAS Guide to Principles and Practice*. Blackwell Publishing (2<sup>nd</sup> Edition), 2009. ISBN-13: 978-1405175913.

Broadwater, John D.: *USS Monitor, A Historic Ship Completes Its Final Voyage*. Everbest Printing Company, 2012. ISBN-13: 978-1-60344-473-6.

Gibbons, Gail: *Exploring the Deep, Dark Sea*. Little, Brown Young Readers, April 1, 2002. ISBN 10: 0316755494.

Herbert, Janis: *The Civil War for Kids: A history with 21 Activities (For Kids Series)*. Chicago Review Press, 1999. ISBN-13: 978-1556523557.

Muckelroy, Keith: *Maritime Archaeology (New Studies in Archaeology)*. Cambridge University Press, February 28, 1979. ISBN-13: 978-0521293488.

Nelson, James L.: *Reign of Iron, The Story of the First Battle Ironclads, the Monitor and the Merrimack*. HarperCollins Publishers Inc., 2004. ISBN: 0-06-052403-0.

Platt, Richard: *Eyewitness: Shipwrecks*. DK Children, June 1, 2000. ISBN 10: 0789458845.

Platt, Richard: *DK Eyewitness Books: Shipwrecks*. DK Children, 2005. ISBN-13: 978-0756610890.

Quarstein, John V.: *A History of Ironclads, The Power of Iron Over Wood*. The History Press, 2006. ISBN-13: 978-1596291188

Quarstein, John V.: *The Battle of the Ironclads*. Arcadia Publishing, 1999. ISBN: 0-738501131.

Quarstein, John V.: *The Monitor Boys: The Crew of the Union's First Ironclad*. The History Press, 2011. ISBN-13: 978-1596294554.

Rose, Paul, Anne Laking and Phillippe Cousteau: *Oceans: Exploring the Hidden Depths of the Underwater World*. University of California Press, April 15, 2009. ISBN 10: 0520260287.

Wall, Julia: *Mapping Shipwrecks with Coordinate Planes (Real World Math: Level 5)*. Capston Press, 2011. ISBN-13 978-1429666176.

### SEE INDIVIDUAL ACTIVITIES FOR ADDITIONAL BOOK RESOURCES



Officers standing on the deck of USS *Monitor*, July 9, 1862. Photo: Library of Congress

### Additional *Monitor* Activities Not In This Guide

Be sure to check out the [Education Section](#) of the *Monitor*'s website at <http://monitor.noaa.gov> for these additional activities:

- [Putting the Pieces Together](#)—create a photomosaic of the *Monitor*
- [Lights, Cameras, Action](#)—learn how the Battle of Hampton Roads changed naval history worldwide
- [Drum Beats of the Drummer Boys](#)—learn the role of young drummer boys during the Civil War
- [A Look Through Time](#)—create an interactive timeline of the USS *Monitor* and CSS *Virginia*
- [When Johnny Comes Marching Home](#)—discover the role music played during the Civil War
- [The Civil War in Review](#)—crossword puzzle to test your knowledge
- [Test Your USS \*Monitor\* Knowledge](#)—crossword puzzle
- [Monitor Bingo](#)—try to answer all the questions in a row or diagonal to win at a bingo game
- [Monitor Paper Model](#)—download a model and instructions to build your own *Monitor*
- [Monitor Origami](#)—make your own origami *Monitor*

### Education Standards

The following pages list an overview of educational standards for

- ❖ National Council for Social Studies (NCSS)
- ❖ Common Core (CC)
- ❖ National Council of Teachers of Mathematics (NCTM)
- ❖ National Geography Standards (NGS)
- ❖ National Council of Teachers of English (NCTE)
- ❖ National Science Standards (Archived Standards from NSTA)
- ❖ Ocean Literacy Principles (OLP)

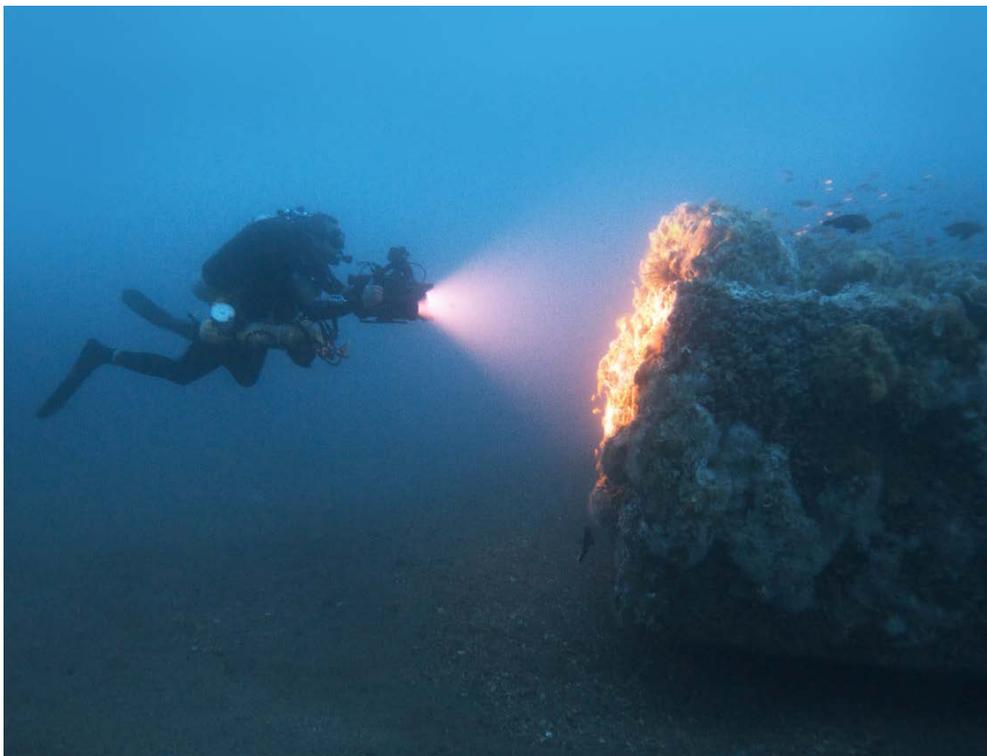
The following list of standards is not comprehensive, but indicates the standards that are prominent within the curriculum guide. Within each activity, the standards are listed on the first page of the activity in the left-hand blue box at the bottom. To understand the format used for citing the standards in each activity, see the key to citing listed in parenthesis next to each standard on the following pages (e.g. NCSS: US 5-12 ERA.9 for National Council of Social Studies, U.S. History, grades 5-12, Era 9).

## Education Standards

<p><b>National Council for Social Studies</b>  <a href="http://www.socialstudies.org">http://www.socialstudies.org</a></p>	<p><b>NCSS HISTORY THINKING STANDARDS (NCSS Thinking Standards)</b></p> <ul style="list-style-type: none"> <li>• Standard 1 — Chronological Thinking (NCSS Thinking Standard 1)</li> <li>• Standard 2 — Historical Comprehension (NCSS Thinking Standard 2)</li> <li>• Standard 3 — Historical Analysis and Interpretation (NCSS Thinking Standard 3)</li> <li>• Standard 4 — Historical Research Capabilities (NCSS Thinking Standard 4)</li> </ul> <p><b>UNITED STATES HISTORY CONTENT STANDARDS FOR GRADES 5-12 (NCSS: US 5-12: ERA)</b></p> <ul style="list-style-type: none"> <li>• Era 4 — Expansion and Reform (Era 4)</li> <li>• Era 5 — Civil War and Reconstruction ) (Era 5)</li> </ul>
<p><b>Common Core</b>  <a href="http://www.corestandards.org/">http://www.corestandards.org/</a></p>	<p><b>READING INFORMATIONAL TEXT GRADES 6-12 (CC.ELA.LIT.RI)</b></p> <ul style="list-style-type: none"> <li>• Key Ideas and Details (1, 2 and 3)</li> <li>• Craft and Structure (4)</li> <li>• Integration of Knowledge and Ideas (7) (11-12.8)</li> </ul> <p><b>WRITING</b>  <b>4<sup>th</sup> through 8<sup>th</sup> Grade:</b></p> <ul style="list-style-type: none"> <li>• Writing informative/explanatory texts (CC.ELA.LIT.W: 4.2; 5.2; 6.2; 7.2; and 8.2)</li> <li>• Write narratives to develop real or imagined experiences (CC.ELA.LIT.W: 4.3; 5.3; 6.3; 7.3 and 8.3)</li> </ul> <p><b>HISTORY/SOCIAL STUDIES (CCSS.ELA.LIT.RH)</b></p> <ul style="list-style-type: none"> <li>• Key Ideas and Details</li> <li>• Craft and Structure</li> <li>• Integration of Knowledge and Ideas</li> </ul> <p><b>SCIENCE &amp; TECHNICAL SUBJECTS (CCST.ELA.LIT.RST)</b></p> <ul style="list-style-type: none"> <li>• Key Ideas and Details</li> <li>• Craft and Structure</li> <li>• Integration of Knowledge and Ideas</li> </ul>
<p><b>National Council of Teachers of Mathematics</b>  <a href="http://www.nctm.org/Standards-and-Positions/Principles-and-Standards/">http://www.nctm.org/Standards-and-Positions/Principles-and-Standards/</a></p>	<p><b>CONTENT STANDARDS Grades 6-8 (NCTM)</b></p> <ul style="list-style-type: none"> <li>• Numbers &amp; Operations (NO)</li> <li>• Measurement (M)</li> <li>• Data Analysis &amp; Probability (D)</li> </ul>
<p><b>National Geography Standards</b>  <a href="http://education.nationalgeographic.com/standards/national-geography-standards/">http://education.nationalgeographic.com/standards/national-geography-standards/</a></p>	<ul style="list-style-type: none"> <li>• <b>NG:1</b> — How to use maps and other geographic representations...</li> <li>• <b>NG:3</b> — How to analyze the spatial organization of people, places...</li> <li>• <b>NG:9</b> — The characteristics, distribution and migration of human ...</li> <li>• <b>NG:17</b> — How to apply geography to interpret the past</li> </ul>

## Education Standards Continued

<p><b>National Council of Teachers of English</b>  <a href="http://www.ncte.org/">http://www.ncte.org/</a></p>	<ul style="list-style-type: none"> <li>• <b>Standard 1</b> — Read a wide range of print and non-print texts ... (NCTE:1)</li> <li>• <b>Standard 3</b> — Apply a wide range of strategies to comprehend ... (NCTE:3)</li> <li>• <b>Standard 7</b> — Conduct research on issues and interests ... (NCTE:7)</li> </ul>
<p><b>National Science Standards</b>                  Archived PDF:  <a href="http://www.nap.edu/openbook.php?isbn=0309053269">http://www.nap.edu/openbook.php?isbn=0309053269</a></p>	<p>Grades 5-8</p> <ul style="list-style-type: none"> <li>• <b>NS.5-8.A</b> – Science as Inquiry</li> <li>• <b>NS.5-8.B</b> — Physical Science – Properties and Changes of Property in Matter; Transfer of Energy</li> <li>• <b>NS.5-8.E</b> — Science and Technology – Abilities of technological design; Understanding about science and technology</li> <li>• <b>NS.5-8.F</b> — Science in Personal and Social Perspectives – Science and Technology in Society</li> <li>• <b>NS.5-8.G</b> — History and Nature of Science – Science as a human endeavor; Nature of Science; History of Science</li> </ul>
<p><b>Ocean Literacy Principles</b>  <a href="http://oceanliteracy.wp2.coexploration.org/">http://oceanliteracy.wp2.coexploration.org/</a></p>	<ul style="list-style-type: none"> <li>• <b>OL: 1</b> — The Earth has one big ocean with many features</li> <li>• <b>OL: 6</b> — The ocean and humans are inextricably interconnected</li> <li>• <b>OL: 7</b> — The ocean is largely unexplored (a, b, c, d, e and f)</li> </ul>



Diver shines a light on the bow of the USS *Monitor* (2011). Photo: NOAA

## Activities

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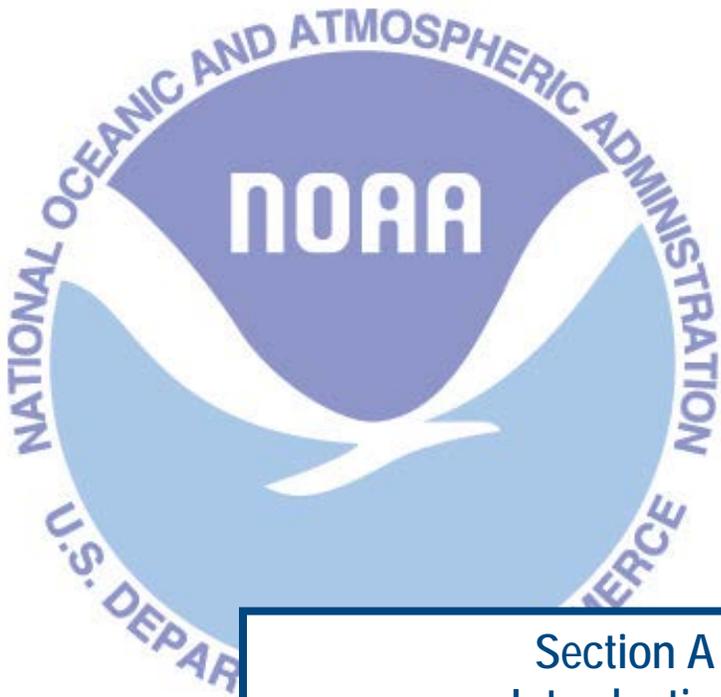
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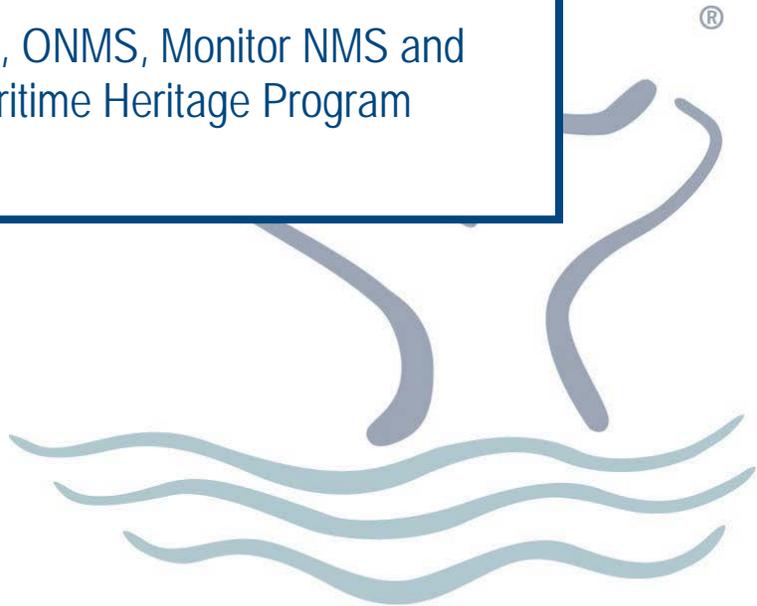
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**Section A  
Introduction**

NOAA, ONMS, Monitor NMS and  
Maritime Heritage Program



NATIONAL MARINE  
SANCTUARIES

---

MONITOR

## Exploring NOAA



### Grade Level

- 4-8

### Timeframe

- 1-2 hours

### Materials

- Computer with Internet access or
- Printed resources

### Activity Summary

This activity explores the many missions of NOAA, ONMS, Monitor NMS and NOAA's Maritime Heritage Program.

### Learning Objectives

- To understand the important work that NOAA does to provide valuable information to those who need it.
- To learn about our nation's first national marine sanctuary
- To understand the importance of our nation's maritime heritage

### Key Words

NOAA, ONMS, USS *Monitor*, national marine sanctuary, line office, maritime heritage

### National Standards:

NCSS: US 5-12: Era 4; CC.ELA.LIT.RI: 6-8.1; NCTE: 1

## Background Information

Residing under the Department of Commerce, the National Oceanic and Atmospheric Administration (NOAA) is an agency that enriches life through science. NOAA's research goes from the surface of the Sun to the depths of the ocean floor as the agency works to keep citizens informed about the changing environment around them.

From daily weather forecasts, severe storm warning and climate monitoring, to fisheries management, coastal restoration and supporting marine commerce, NOAA's products and services support economic vitality. NOAA's dedicated scientists use cutting-edge research and high-tech instrumentation to provide citizens, planners, emergency managers, and other decision makers with the reliable information they need when they need it.

NOAA has six line offices and a Program Planning and Integration Office. Each line office is involved in a different capacity, but all work together as well. The line offices are

- National Environmental Satellite, Data, and Information Service (NESDIS): <http://www.nesdis.noaa.gov/>
- National Marine Fisheries (NMFS): <http://www.nmfs.noaa.gov/>
- National Ocean Service (NOS): <http://oceanservice.noaa.gov/>
- National Weather Service (NWS): <http://www.weather.gov/>
- Office of Marine and Aviation Operations (OMAO): <http://www.omaao.noaa.gov/>
- Office of Oceanic and Atmospheric Research (OAR): <http://www.research.noaa.gov/>

Within the National Ocean Service resides the **Office of National Marine Sanctuaries** (ONMS). ONMS serves as the trustee for a network of underwater parks encompassing more than 600,000 square miles of marine and Great Lakes waters from Washington State to the Florida Keys and from Lake Huron to American Samoa. The network includes a system of 13 national marine sanctuaries and Papahānaumokuākea and Rose Atoll marine national monuments.

Our national marine sanctuaries are places of inspiration. Within their waters and along their shores are vibrant tapestries of marine life, ancient mysteries of our past, and thriving communities of men and women who have relied on the sea for generations. Sanctuaries are places where anyone can go to experience the power and beauty of the ocean and form lasting memories in spectacular natural settings, from the vibrant coral reefs of American Samoa to the towering kelp forests of Monterey Bay. These underwater treasures are sources of national pride, and protecting them ensures they will be here for future generations.

On January 30, 1975, Monitor National Marine Sanctuary (MNMS) became our nation's first national marine sanctuary. The sanctuary protects the USS *Monitor*, a Civil War ironclad that sank off the North Carolina coast in 1862 and was discovered in 1973.

## Activity Overview

In this activity, students will explore one of the agencies within the Department of Commerce, the National Oceanic and Atmospheric Administration (NOAA), and its six line offices. Students will conduct an Internet scavenger hunt to learn how each line office supports our nation's economy. They will also explore Monitor NMS and learn how it became our nation's first national marine sanctuary. In the last activity, students will understand that America's greatest museum of our past as a seafaring nation lies on the bottom of our nation's ocean, seas, rivers and lakes. They will learn how NOAA and the Office of National Marine Sanctuaries work together through the Maritime Heritage Program to protect and conserve our history.

## Learning Objectives

Students will understand the important work that NOAA does to provide valuable information in support of our nation's economic stability. They will also learn about our nation's first national marine sanctuary, and the importance of our nation's maritime heritage.

## Teacher Preparations and Implementation

1. Review the websites indicated and bookmark them for students, or create a Livebinder (or use other similar program). For more information on Livebinder, visit <http://www.livebinders.com/>.
2. Print copies of each activity sheet — *NOAA Who?*, *Monitor to the Rescue*, and *Museums of the Deep*.
3. After students complete the scavenger hunts, discuss NOAA's mission and why the agency's work is important to our nation.
4. Discuss the USS *Monitor* and its role in saving the Union and changing naval warfare.
5. Discuss the importance of protecting and conserving our nation's maritime heritage.

## Resources

### Websites

#### National Oceanic and Atmospheric Administration (NOAA)

Access this website to learn more about NOAA and the role it plays in protecting life and property and conserving and protecting natural resources.

<http://www.noaa.gov>

#### NOAA Diving Program

The program trains and certifies scientists, engineers, and technicians to perform the variety of tasks carried out underwater to support NOAA's mission.

<http://www.ndc.noaa.gov/>

#### Office of National Marine Sanctuaries (ONMS)

ONMS is the trustee for a network of marine protected areas encompassing more than 600,000 square miles.

<http://sanctuaries.noaa.gov/>

#### Monitor National Marine Sanctuary (MNMS)

The nation's first national marine sanctuary that protects the famed Civil War ironclad, USS *Monitor*.

<http://monitor.noaa.gov>

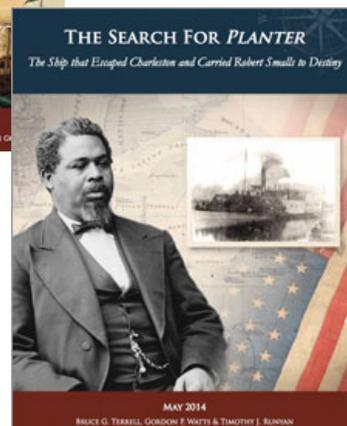
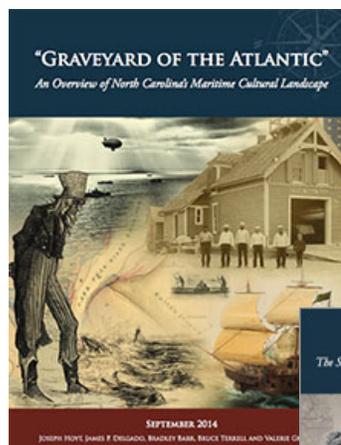
#### NOAA's Maritime Heritage Program (MHP)

MHP works to document and survey our nation's maritime heritage.

<http://sanctuaries.noaa.gov/maritime/welcome.html>

## Extensions

1. Have each student visit one or more of NOAA's line offices' websites and share with the class the overall mission and objectives of the line office.
2. Have students share one thing they found most interesting about NOAA, ONMS, MNMS, or MHP.



# NOAA Who?

The **National Oceanic and Atmospheric Administration (NOAA)** is an agency that enriches life through science. NOAA's research goes from the surface of the Sun to the depths of the ocean floor as the agency works to keep citizens informed of the changing environment around them. From daily weather forecasts, severe storm warning and climate monitoring, to fisheries management, coastal restoration and supporting marine commerce, NOAA's products and services support economic vitality. NOAA's dedicated scientists use cutting-edge research and high-tech instrumentation to provide citizens, planners, emergency managers, and other decision makers with reliable information they need when they need it.

NOAA's roots date back to 1807, when the nation's first scientific agency, the Survey of the Coast, was established. Since then, NOAA has evolved in every state and emerged as an international leader on scientific and environmental matters. There are six line offices within NOAA: 1) National Environmental Satellite, Data and Information Service (NESDIS); 2) National Marine Fisheries Service (NMFS); 3) National Ocean Service (NOS); 4) National Weather Service (NWS); 5) Office of Marine and Aviation Operations (OMAO); and 6) Office of Oceanic and Atmospheric Research (OAR).

Within the National Ocean Service (NOS), the **Office of National Marine Sanctuaries** serves as the trustee for a network of underwater parks encompassing more than 600,000 square miles of marine and Great Lakes waters from Washington State to the Florida Keys and from Lake Huron to American Samoa. The network includes a system of 13 national marine sanctuaries and the Papahānaumokuākea and Rose Atoll marine national monuments.

Our national marine sanctuaries are places of inspiration. Within their waters and along their shores, you can find vibrant tapestries of marine life, ancient mysteries of our past, and thriving communities of men and women who have relied on the sea for generations. National marine sanctuaries are places where anyone can go to experience the power and beauty of the ocean and form lasting memories in spectacular natural settings, from the vibrant coral reefs of American Samoa to the towering kelp forests of Monterey Bay. These underwater treasures are sources of national pride, and when we take care of them, we protect part of what makes America great.



## NATIONAL MARINE SANCTUARY SYSTEM



Name: \_\_\_\_\_

Date: \_\_\_\_\_

### NOAA Who?

**Purpose:** To explore the National Oceanic and Atmospheric Administration's many missions.

#### Searching for NOAA

Using *NOAA Who?* and the websites listed for each section, answer the following questions to learn more about NOAA, the National Marine Sanctuary System and the Monitor National Marine Sanctuary.

For the following questions, use this NOAA site: <http://www.noaa.gov/>

1. Use the tool bar on the right and other links within to answer the following questions.
  - a. NOAA is part of the U.S. Department of \_\_\_\_\_.
  - b. List one of NOAA's missions.
  - c. How many line offices are there in NOAA? Name one.
  - d. Which line office is the sole official voice of the U.S. government for issuing warnings during life-threatening weather situations?
  - e. How many satellites are currently flying?

For the following questions, use this link: NOAA Diving Program: <http://www.ndc.noaa.gov/>

2. What is the Diving Program's mission?
3. Where is the NOAA Diving Center located?

For the following questions, use this link: Office of National Marine Sanctuaries (ONMS): <http://sanctuaries.noaa.gov>

4. How many square miles of marine and Great Lakes waters are encompassed in the network of underwater parks?
5. How many national marine sanctuaries are there? How many marine national monuments?
6. On the ONMS website, in the top navigation bar, click on "Visit." Scroll down to the sanctuaries map and click on any of the sanctuaries listed. Explain what that sanctuary protects.
7. On the ONMS website, in the top navigation bar, click on "Explore." In the drop-down menu, click on "Maritime Heritage." Scroll down and click on "Battle of the Atlantic." Who wrote the blog for June 25? What ship did he dive on and how did it sink?

## Monitor to the Rescue

As our nation's first national marine sanctuary, Monitor National Marine Sanctuary (MNMS) was established to preserve and protect our nation's first Civil War ironclad, USS *Monitor*. The *Monitor* and her brave crew helped to turn the tide of the Civil War and forever changed naval warfare when it fought the Confederate ironclad, CSS *Virginia*, also known as the *Merrimack*.



As the two ships fought in the Battle of Hampton Roads on March 9, 1862, the battle also marked the first time that iron met iron and the age of the wooden ships came to an end. Another unique new invention that the *Monitor* ushered in was a rotating gun turret. The clever design gave warships more maneuverability during battle and became a standard on all future ships.



The *Monitor* did not see much action after the Battle of Hampton Roads. The ship was sent to support a small skirmish off Sewel's Point, and it also participated in the Battle at Drewry's Bluff near Richmond. The crew, affectionately known as the *Monitor* Boys, spent most of their time in Hampton Roads waiting for a chance to once again battle the CSS *Virginia*.



On December 31, 1862, just 11 months after it launched from Greenpoint, Brooklyn, New York, the *Monitor* encountered a storm off Cape Hatteras, North Carolina, and sank. That night, sixteen brave men made the ultimate sacrifice. The *Monitor's* exact location remained unknown until 1973, when John G. Newton and his team from the Duke University Marine Lab, using side scan sonar, identified an unknown shipwreck that they thought was the *Monitor*. They confirmed its identity in 1974. North Carolina petitioned Congress to protect this national treasure, and on January 30, 1975, the *Monitor* became our nation's first national marine sanctuary.



In 2002, NOAA, in collaboration with the U.S. Navy, raised the iconic gun turret. As Navy divers were excavating the turret, they found the remains of a *Monitor* sailor. Once the turret was on the barge's deck, a second set of remains was found. On March 8, 2013, for the 151<sup>st</sup> anniversary of the USS *Monitor*, the Secretary of the Navy authorized their interment at Arlington National Cemetery. Today, the recovered pieces of the USS *Monitor* are conserved at The Mariners' Museum in Newport News, Virginia.



**Photos Clockwise:** John Ericsson; Battle of Hampton Roads; *Monitor* crew on deck; *Monitor* sinking; Turret being raised on August 5, 2002; Burial at Arlington National Cemetery of two *Monitor* sailors. Photos: NOAA's *Monitor* Collection



Name: \_\_\_\_\_

Date: \_\_\_\_\_

### ***Monitor to the Rescue*** **Class Activity**

**Purpose:** To explore the historical significance of the USS *Monitor* and the important role it plays as our nation's first national marine sanctuary.

#### **Searching for the *Monitor***

Using *Monitor to the Rescue* and the websites below, answer the following questions to learn more about Monitor National Marine Sanctuary.

Monitor National Marine Sanctuary (MNMS): <http://monitor.noaa.gov>

*Monitor* Legacy Site: <http://monitor.noaa.gov/150th>

1. On the MNMS website, click on "About Your Sanctuary." What act gave the authority to establish Monitor National Marine Sanctuary? When was the sanctuary established?
2. Under "About Your Sanctuary," click on "History of the *Monitor*." Who designed the USS *Monitor*? How long did it take to build the *Monitor*? When was it launched?
3. In the side bar, click on "Advisory Council." What is the role of the sanctuary advisory council?
4. In the left side bar, click on "New & Events" and then click on "Press Releases." Choose one press release and read it. Summarize the importance of the press release.
5. In the left side bar, click on "Image Gallery," and click on the link in the first paragraph "Online Image Gallery." Scroll through the images and choose your favorite. Describe the image, and tell why you chose it.
6. Click on the website link above for the *Monitor* Legacy Site. Click on the top tab "Life Onboard" and then click on "Battle of Hampton Roads." Read the text and summarize the battle. Who won? What was the true significance of the battle?
7. In the top bar, click on "Life Onboard" and then click on "Sailors that Died." How many men died the night the ship sank? How many were officers? Enlisted? African-American?
8. In the top bar, click on "News & Events," and then click on the video camera icon for "Researchers Hope to Identify Remains of Unknown Men." How many human remains were found in the turret? What was the goal of creating the busts (clay facial reconstructions)?
9. Visit [http://monitor.noaa.gov/150th/feature\\_burial.html](http://monitor.noaa.gov/150th/feature_burial.html) to read about the *Monitor* sailors' interment at Arlington National Cemetery. What was significant about the date they were interred? Scroll through the pictures and summarize the events of the day by using the images.

# NOAA's Maritime Heritage Program

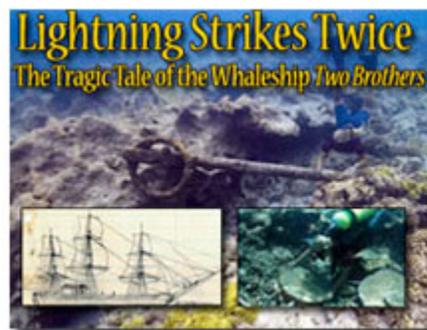
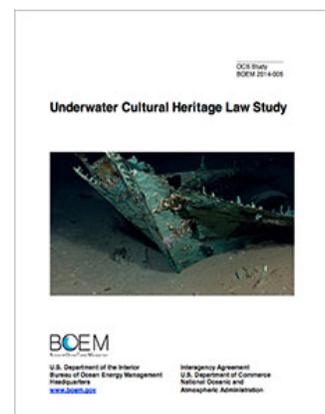
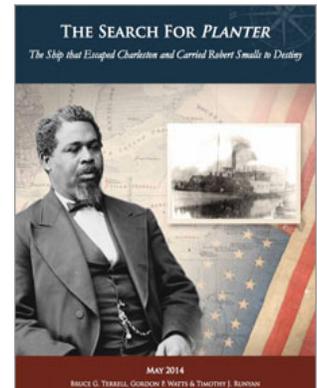
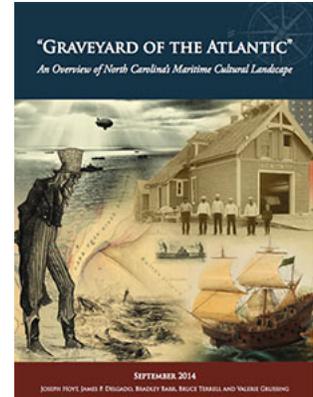
## Museums of the Deep Class Activity

### Background

America's greatest museum of our past as a seafaring nation lies on the bottom of our nation's ocean, seas, lakes and rivers. They are all places to explore, discover, and appreciate our country's maritime cultural heritage. That heritage is a legacy of thousands of years of settlement, exploration, immigration, harvesting the bounty of the sea, and creating coastal communities and maritime traditions. Overall, it is an important link to our past and how we developed as a nation. Through NOAA's dynamic education and outreach programs, exhibits, visitor's centers and media, the importance of our unique heritage provide people with the knowledge they need to promote the preservation of these nonrenewable cultural resources.

In June 2000, the president recognized the need to increase ocean exploration and thus, he established the Office of Ocean Exploration and Research (OER). The office was created to coordinate the agency's exploration and research expeditions with the mission to enhance research, policy and management decisions, to develop new lines of scientific inquiry, and to advise NOAA and the nation on critical issues. OER works with archaeologists, scientists, and oceanographers to explore the vast mysteries of our country's waterways.

Created in 2002, NOAA's Maritime Heritage Program is an initiative of the **Office of National Marine Sanctuaries (ONMS)**. Each of our thirteen national marine sanctuaries and two marine national monuments, regardless of regulation and designation purposes, contain cultural resources. However, two sanctuaries, Monitor National Marine Sanctuary and Thunder Bay National Marine Sanctuary, were specifically designated to protect shipwrecks. Today through partnerships with the Office of Ocean Exploration and Research, other state and federal agencies and academia, the program continues to focus on maritime heritage resources within the National Marine Sanctuary System and promotes maritime heritage appreciation throughout our entire nation.



Visit the web site, <http://sanctuaries.noaa.gov/maritime/aboutmhp.html>, to read more about our nation's maritime heritage and learn about the laws that govern them.

NAME: \_\_\_\_\_

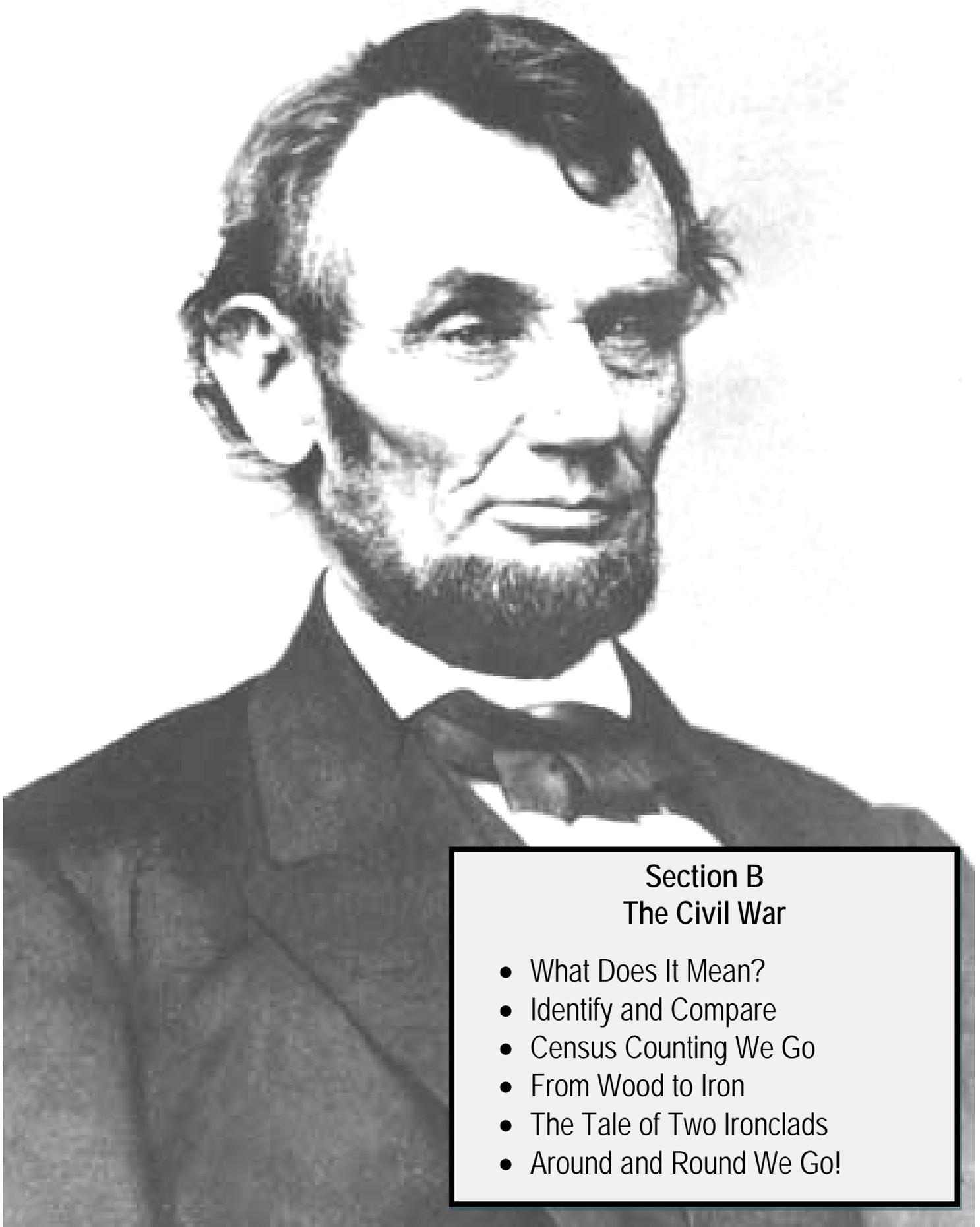
DATE: \_\_\_\_\_

### Museums of the Deep Class Activity

Visit the website, <http://sanctuaries.noaa.gov/maritime/welcome.html>, to learn more about how NOAA explores our nation's cultural resources.

1. In the grey navigation bar just below the top image, click on "About." What law is the most relevant to the National Marine Sanctuary Program? What does Section 106 require?
2. On the right under "More Information," click on "Projects." Click on the link for "*Duane*" under Florida Keys. What type of shipwreck is the *Duane* and where is it located? When was it built? How deep is the main deck?
3. Return to the main page, and in the grey navigation bar, click on "Projects," and then click on "*Monitor*." What Union ship was converted into the CSS *Virginia*? What was the diameter of the gun turret? What was the date of the Battle of Hampton Roads when the *Monitor* and *Virginia* engaged?
4. Return to main page, click on "Projects," click on "USS *Macon*" under Monterey Bay. What type of ship was the USS *Macon*? What was the most significant outcome of the first phase of its expedition?
5. Return to the main page, and in the grey navigation bar, click on "Research Topics." Click on "*Titanic*." When was the shipwreck discovered? Which office is the lead for dealing with the wreck of the RMS *Titanic*? Who do they work closely with to preserve the *Titanic*?
6. Under "Research Topics," click on "Native Cultures." The Maritime Heritage Program seeks to support research into seafaring traditions and the preservation of maritime folklore and knowledge. Choose one of the sanctuaries listed and explain what native culture it helps to preserve and protect.
7. Under "Research Topics," click on "Whaling." When was America's 'golden age' of whaling?
8. Under "Research Topics" click on "Preserve America" on the right under "More Information." In the top navigation bar, click on "What NOAA is Doing." What are the six top objectives of NOAA in preserving our nation's heritage?
9. Under "Research Topics," click on "Voyage to Discovery." On this site, read about Robert Smalls and the *Planter*. What did Robert Smalls do during the Civil War to make him famous in history? Why was his deed so spectacular?
10. Go to any area of the NOAA's Maritime Heritage Program's website and list one thing that you found most interesting.

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## Section B The Civil War

- What Does It Mean?
- Identify and Compare
- Census Counting We Go
- From Wood to Iron
- The Tale of Two Ironclads
- Around and Round We Go!

# What Does It Mean?



Photograph of three African American men and one boy posed with horse-drawn wagon loaded with bales of cotton in front of the Leflore County courthouse in Mississippi. Courtesy Library of Congress

## Grade Level

- 4-8

## Timeframe

- 1 hour

## Materials per Student/Group

- Set of flashcard handouts
- Scissors

## Activity Summary

Students define key terms related to the buildup to the American Civil War and explore why each term was important to the South and the North.

## Learning Objectives

- To identify the similarities and differences between the Northern and Southern states in the decades leading up to the Civil War

## Key Words

Perspective, economy, agrarian, industrial, antebellum, slavery, central government, constitutional, states' rights, compromise, border state

## National Standards

**NCSS:** US 5-12: Era 4:3B, Era 5:1A;  
**NCSS Thinking Standards:** 1, 2, 3, and 4;  
**CC.ELA.LIT.W:** 4-8.2; **NCTE:** 3



Slaves picking cotton on a Georgia plantation. Courtesy of Library of Congress

## Background Information

During the Civil War, the country was divided between the North (Union States) and the South (Confederate States). For many years prior to the first shots fired at Fort Sumter, the United States had been embroiled in social, economic, and political turmoil. The two halves of the country had economies and cultures that were distinct, and yet, inextricably linked.

The South was largely an agrarian society. Throughout the region were large plantations that grew cash crops, such as tobacco and cotton. Plantation owners relied on slave labor to grow and harvest these labor-intensive crops. At the start of the Civil War there were almost 4 million African Americans living in slavery in the South. While only a small portion of the Southern population actually owned slaves, the South believed that without slavery their region's economy would be destroyed. Slavery was also an essential part of Southern life and culture. Many white Southerners relied on the racial hierarchy to define their place in southern society.

In contrast, by the mid-19th century, the industrialized North consisted mostly of large urban cities. A steady flow of immigrants, many from Europe, provided a pool of laborers for the massive factories throughout the Northeast, decreasing the region's reliance on slave labor. In the decades leading up to the Civil War, the Northern economy continued to move away from slavery, and one-by-one individual states abolished the practice altogether.

In addition to their economy, Northern culture also continued to move away from slavery. The growing Abolitionist Movement in the North left many Northerners calling for an end to slavery throughout the entire country.

While the issue of slavery divided the nation, the two regions remained tied together both socially and economically. The North may have abolished slavery, but their textile factories still relied heavily on the raw cotton produced by slave labor in the South. Meanwhile, the South remained dependent on the North for processed goods produced in the region's industrial factories.

### Activity Summary

Students define key terms related to the buildup to the American Civil War and explore why each term was important to the South and the North.

### Learning Objectives

Students will be able to:

- Identify the similarities and differences between the Northern and Southern states in the decades leading up to the Civil War.

### Teacher Preparation and Implementation

- Print the provided Flashcard Handout (one set of flashcards per student or group).
- Look over the Flashcard Handout and determine the main points of each category that students should learn. Choose resources to ensure that they will surmise those points.
- Follow the steps in the Procedure section.

### Resources

#### Websites

##### Civil War Trust

This website provides basic background information and teacher lesson plans on the Civil War.

<http://www.civilwar.org/education/>

##### Civil War Trust: Glossary of Civil War Terms

This website provides an extensive list of common Civil War terms and their definitions.

<http://www.civilwar.org/education/history/glossary/glossary.html?referrer=https://www.google.com/>

### Vocabulary

**AGRARIAN** — Relating to cultivated land or the cultivation of land (e.g.: farming)

**ANTEBELLUM** — Term commonly used to refer to the period just before the outbreak of the American Civil War

**ECONOMY** — The wealth and resources of a country or region

### Books

Herbert, Janis: *The Civil War for Kids: A History with 21 Activities (For Kids Series)*. Chicago Review Press, 1999. ISBN-13: 978-1556523557.

### Procedure

1. Distribute flashcards and scissors. Ask students to cut out the flashcards.
2. Explain to the students that on each flashcard they will define the term and then list the reasons this particular term was important to both the North and the South.
3. If working in small groups, have students complete an equal number of flashcards and then share their research with each other.
4. Students can research and complete these flashcards as an individual activity (see Resources for helpful secondary sources), or they can fill out the flashcards as a class in conjunction with a classroom unit on the Civil War.
5. Answers will vary depending upon resources used and time allotted.



Lithograph of "Oh carry me back to ole Virginy"; tobacco package label showing an African American banjo player, woman, and three children in a cabin. Courtesy of Library of Congress

**INDUSTRIAL** — Relating to industry; of or relating to factories, the people who work in factories, or things made in factories

**PERSPECTIVE** — A particular attitude toward or way of regarding something; a point of view

**SLAVERY** — A state of bondage in which African Americans (and some Native Americans) were owned by other people, usually white, and forced to perform labor on their behalf

**Central Government**

DEFINITION : \_\_\_\_\_

NORTH

SOUTH

**Agriculture**

DEFINITION : \_\_\_\_\_

NORTH

SOUTH

**Constitutional**

DEFINITION : \_\_\_\_\_

NORTH

SOUTH

**Culture**

DEFINITION : \_\_\_\_\_

NORTH

SOUTH

**States' Rights**

**DEFINITION :** \_\_\_\_\_

NORTH

SOUTH

**Compromise**

**DEFINITION :** \_\_\_\_\_

NORTH

SOUTH

**Labor - Intensive**

DEFINITION : \_\_\_\_\_

NORTH

SOUTH

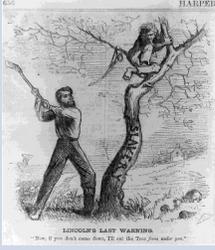
**Border State**

DEFINITION : \_\_\_\_\_

NORTH

SOUTH

# Identify and Compare



Political cartoon. Courtesy of Library of Congress

## Grade Level

- 4-8

## Timeframe

- 2 hours

## Materials per Student/Group

- Poster board
- Glue or tape
- Markers, crayons, or colored pencils
- North and South assignment cards
- Critical thinking worksheet

## Activity Summary

Students compare and identify important similarities and differences between the North and South in the period leading up to the American Civil War.

## Learning Objectives

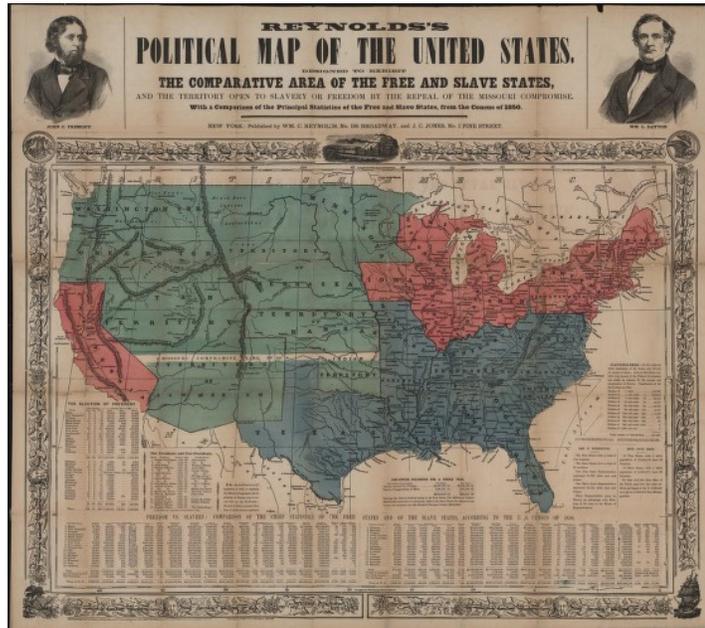
- To learn about the economic, social, and political factors that separated the North and the South in the years leading up to the Civil War.
- To better understand why a navy would be important to the North and South during the Civil War.

## Key Words

Confederacy, Union, border state

## National Standards

NCSS: US 5-12; Era 5:1A;  
 NCSS Thinking Standards: 1, 2, 3, and 4;  
 CC.ELA.LIT.W: 4-8.2; CC.ELA.LIT.RI  
 NG: 9; NCTE: 1,3, and 7



Reynold's political map of the United States, designed to exhibit the comparative area of free and slave states and the territory open to slavery or freedom by the repeal of the Missouri Compromise. Courtesy of Library of Congress

## Background Information

During the Civil War, the country was divided between the North (Union States) and the South (Confederate States). For many years prior to the first shots fired at Fort Sumter, the United States had been embroiled in social, economic, and political turmoil. By 1860, the South, a largely agrarian society, relied heavily on the labor of almost four million enslaved African Americans to farm and harvest major cash crops, such as cotton and tobacco. In the years leading up to the Civil War, as the Northern states one-by-one abolished slavery, the North transitioned to an industrial economy based on free labor. The growing abolitionist movement in the North also caused many Northerners to call for an end to slavery throughout the entire country.

The cultural and economic divide between the North and South also affected national politics. As more states joined the Union, the question of whether or not slavery would be legal in these new areas became a major point of contention. The issue of States' Rights came to a head in the presidential race of 1860, a polarizing election that ultimately increased tension between the North and South. The newly elected President Abraham Lincoln sought to keep the Union together. However, on December 20<sup>th</sup>, 1860, South Carolina seceded from the Union. By 1861, eleven states had seceded and formed the Confederate States of America.

## Activity Summary

Students compare and identify important similarities and differences between the North and South in the period leading up to the American Civil War.

## Learning Objectives

Students will:

- Learn about the economic, social, and political factors that separated the North and the South in the years leading up to the Civil War.
- Better understand why a navy would be important to the North and the South during the Civil War.

## Teacher Preparation and Implementation

- Print the provided North and South Assignment Cards and Critical Thinking Worksheet.
- Bookmark websites for students to use or provide printed information that aides in completing the assignment cards.
- Follow the steps in the Procedure section.

## Resources

### Websites

#### Civil War Trust

This website provides basic background information and teacher lesson plans on the Civil War.

<http://www.civilwar.org/education/>

#### Civil War Trust: Glossary of Civil War Terms

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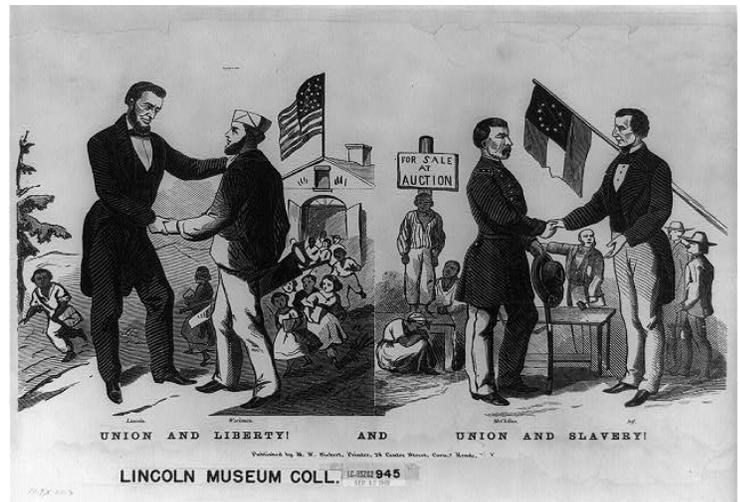
### Books

Herbert, Janis: *The Civil War for Kids: A history with 21 Activities (For Kids Series)*. Chicago Review Press, 1999. ISBN-13: 978-1556523557.

## Procedure

1. Begin by asking students to brainstorm some key words or phrases that relate to the pre-war North and South.
2. Divide students into groups of three or four. Pass out a North or South Assignment Card to each group.

3. Provide printed material or have students explore bookmarked websites in order to complete assignment cards for poster.
4. Explain to the students that they will be creating a poster with information about either the North or the South. Their poster display should answer all of the questions listed on their respective assignment cards. They can use images or text to answer the questions.
5. After the students have finished their posters, line up all of the South posters on one side of the classroom and all of the North posters on the other side of the classroom.
6. Ask the students that designed the South posters to examine the North posters. Ask the students that designed the North posters to examine the South posters.
5. Once the students finish looking over the posters, ask students to complete the Critical Thinking Worksheet. This should take approximately 15 minutes.
6. Conclude the activity by discussing the students' answers as a class.



*Union and liberty! And union and slavery!*

Political cartoon contrasting Republican candidate Abraham Lincoln's advocacy of equality and free labor in the North to Democratic opponent McClellan's alleged support of the Southern slave system. Courtesy of Library of Congress

## Vocabulary

**ABOLITIONIST** — A person who favors ending slavery

**COTTON GIN** — A machine used for separating cotton from its seeds

**POPULAR SOVEREIGNTY** — The idea that people living in the U.S. Territories should be able to decide for themselves whether or not slavery should be allowed in their territory. This doctrine would play a large role in the

debate over slavery in the years leading up to the Civil War.

**SECESSION** — The act of eleven states formally withdrawing from the United States in 1860 and 1861

**SLAVERY** — A state of bondage in which African Americans (and some Native Americans) were owned by other people, usually white, and forced to perform labor on their behalf

## SOUTH ASSIGNMENT CARD

- Define the following
  - Antebellum
  - Confederacy
  - Cotton Gin
  - Secede/Secession
  - Slavery
- Describe the economy of the Southern States in 1860, including primary industries, railways, etc.
- What role did shipping and on-the-water commerce play in the South in the 1850s?
- List the states or territories that entered the Union as **SLAVE** states after 1800.
- How did the South react to the 1860 election of Abraham Lincoln as President?
- List the states that seceded from the Union during the Civil War.
- Why would a strong navy be important to the South at the start of the Civil War?

## NORTH ASSIGNMENT CARD

- Define the following
  - Abolitionist
  - Border State
  - Popular Sovereignty
  - Union
- Describe the economy of the Northern States in 1860, including primary industries, railways, etc.
- What role did shipping and on-the-water commerce play in the North in the 1850s?
- List the states or territories that entered the Union as **FREE** states after 1800.
- How did the North react to the 1860 election of Abraham Lincoln as President?
- List the states that remained in the Union during the Civil War.
- Why would a strong navy be important to the North at the start of the Civil War?

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### Identify and Compare Critical Thinking Worksheet

List three major **differences** between the North and the South in the years leading up to the Civil War. Explain why these particular differences are important.

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

List three major **similarities** between the North and the South in the years leading up to the Civil War. Explain why these particular similarities are important.

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Census Counting We Go



Famous 1864 painting of President Lincoln and his cabinet, titled "Frist Reading of the Emancipation Proclamation by President Lincoln." The map to the right appears in the painting above. Courtesy Library of Congress

## Grade Level

- 4-8

## Timeframe

- 30 minutes

## Materials per Student/Group

- Census handout
- Critical Thinking Worksheet

## Activity Summary

Students examine the 1860 U.S. Census and use the information to draw conclusions about the North and South just before the start of the Civil War.

## Learning Objectives

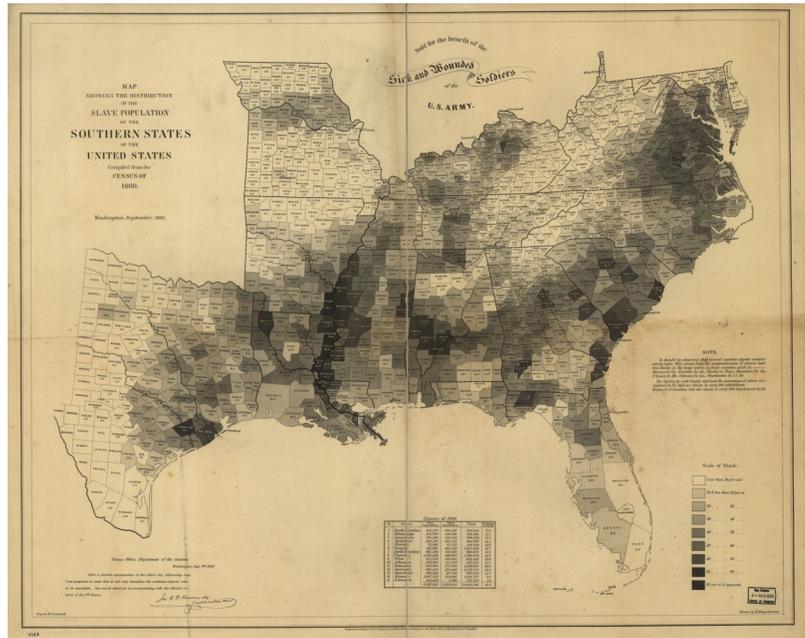
- To identify the similarities and differences between the population of Northern and Southern states just before the start of the Civil War.

## Key Words

U.S. Census, primary source, urban

## National Standards

**NCSS:** US 5-12: Era 5:1A and Era 4:2A and 2B; **NCSS Thinking Standards:** 1, 2, and 3; **CC.ELA.LIT.RI;** NG:9; **NCTE:** 1 and 7



Map showing the distribution of the slave population of the southern states of the United States. Compiled from the census of 1860. Some accounts say that this map was consulted by Abraham Lincoln throughout the course of the Civil War. Courtesy of Library of Congress

## Background Information

1860 proved to be a tumultuous year for the United States. As the nation expanded westward, the issue of slavery continued to drive a political, economic, and social wedge between the Northern and Southern states. The 1860 presidential race added to mounting tensions between the North and the South and highlighted the numerous differences between the two regions. The year ended with the election of President Abraham Lincoln and the subsequent succession of seven southern states.

During this challenging time, the federal government conducted the U.S. Census. The first U.S. Census was issued in 1790, one year after George Washington was inaugurated as the first President of the United States. Ever since that time, the census has been taken every ten years. There were multiple questionnaires used for the 1860 census, including a separate slave questionnaire. The census collected important demographic information and also served as a tool to count the number of free and enslaved people living in each state. The 1860 census is a significant primary source that provides historians with a detailed look at the population on the eve of the Civil War.

## Activity Summary

Students examine the 1860 U.S. Census and use the information to draw conclusions about the North and the South just before the start of the Civil War.

## Learning Objectives

Students will identify the similarities and differences between the population of Northern and Southern states just before the start of the Civil War.

## Teacher Preparation and Implementation

- Print Census Handout and Critical Thinking Worksheet (one per pair of students).
- Follow the steps in the Procedure section.

## Resources

### Websites

#### Civil War Trust

This website provides basic background information and teacher lesson plans on the Civil War.

<http://www.civilwar.org/education/>

#### Civil War Trust: Glossary of Civil War Terms

This website provides an extensive list of common Civil War terms and their definitions.

<http://www.civilwar.org/education/history/glossary/glossary.html?referrer=https://www.google.com/>

#### United States Census Bureau

This website has information on past censuses. It also has a description of the history of the U.S. census.

<https://www.census.gov/>

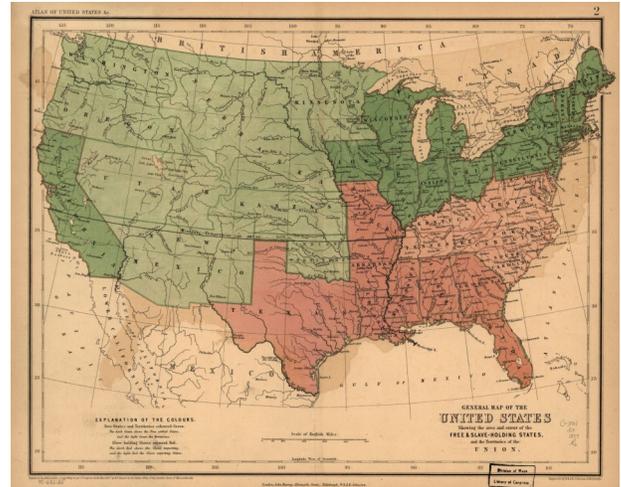
### Books

Herbert, Janis: *The Civil War for Kids: A history with 21 Activities (For Kids Series)*. Chicago Review Press, 1999. ISBN-13: 978-1556523557.

## Procedure

1. Begin by discussing the difference between a primary and secondary source. Ask students to brainstorm examples of each.
2. Explain to the students that they will examine a primary source from 1860. Discuss the U.S. Census and the important role it plays in our system of government.

3. Divide students into groups of two (students may also work individually if preferred). Distribute one Critical Thinking Worksheet and one Census Handout per group.
4. Tell the students to start by examining the census information, taking note of the different column headings.
5. Allow the students approximately 15 minutes to complete the worksheet.
6. Conclude the activity by discussing the students' answers. Have the students take turns explaining their answers to question #12 and what broad conclusions they drew based on the data examined.



General map of the United States, showing the area of extent of the free and slave-holding states and the territories of the Union (1857). Courtesy of Library of Congress

## Vocabulary

**PRIMARY SOURCE** — Original source or evidence; an artifact, a document, diary, manuscript, autobiography, a recording, or other source of information that was created at the time under study

**URBAN** — Term used to refer to major cities and densely populated areas

**U.S. CENSUS** — Beginning in 1790, every ten years the Federal Government counts the number of people living in the United States. The census provides the government with important demographic information and is used to determine the number of seats each state has in the U.S. House of Representatives.

# 1860 U.S. Census Data

US Census: 1860 STATE	TOTAL POPULATION	TOTAL NO. OF SLAVES	NO. OF FAMILIES	TOTAL FREE POPULATION	TOTAL NO. OF SLAVEHOLDERS	PERCENT OF FAMILIES OWNING SLAVES	SLAVES AS PERCENT OF POPULATION
ALABAMA	964,201	435,080	96,603	529,121	33,730	35%	45%
ARKANSAS	435,450	111,115	57,244	324,335	11,481	20%	26%
CALIFORNIA	379,985	0	98,767	379,994	0	0%	0%
CONNECTICUT	460,138	0	94,831	460,147	0	0%	0%
DELAWARE	112,216	1,798	18,966	110,418	587	3%	2%
FLORIDA	140,424	61,745	15,090	78,679	5,152	34%	44%
GEORGIA	1,057,286	462,198	109,919	595,088	41,084	37%	44%
ILLINOIS	1,711,942	0	315,539	1,711,951	0	0%	0%
INDIANA	1,350,419	0	248,664	1,350,428	0	0%	0%
IOWA	674,904	0	124,098	674,913	0	0%	0%
KANSAS	107,206	2	21,912	107,204	2	0%	0%
KENTUCKY	1,155,684	225,483	166,321	930,201	38,645	23%	20%
LOUISIANA	708,002	331,726	74,725	376,276	22,033	29%	47%
MAINE	628,270	0	120,863	628,279	0	0%	0%
MARYLAND	687,049	87,189	110,278	599,860	13,783	12%	13%
MASSACHUSETTS	1,231,057	0	251,287	1,231,066	0	0%	0%
MICHIGAN	749,104	0	144,761	749,113	0	0%	0%
MINNESOTA	172,014	0	37,319	172,023	0	0%	0%
MISSISSIPPI	791,305	436,631	63,015	354,674	30,943	49%	55%
MISSOURI	1,182,012	114,931	192,073	1,067,081	24,320	13%	10%
NEBRASKA	28,841	15	5,931	28,826	6	0%	0%
NEVADA	6,848	0	2,027	6,857	0	0%	0%
NEW HAMPSHIRE	326,064	0	69,018	326,073	0	0%	0%
NEW JERSEY	672,035	0	130,348	672,017	0	0%	0%
NEW YORK	3,880,726	0	758,420	3,880,735	0	0%	0%
NORTH CAROLINA	992,622	331,059	125,090	661,563	34,658	28%	33%
OHIO	2,339,502	0	434,134	2,339,511	0	0%	0%
OREGON	52,456	0	11,063	52,465	0	0%	0%
PENNSYLVANIA	2,906,206	0	524,558	2,906,215	0	0%	0%
RHODE ISLAND	174,611	0	35,209	174,620	0	0%	0%
SOUTH CAROLINA	703,708	402,406	58,642	301,302	26,701	46%	57%
TENNESSEE	1,109,801	275,719	149,335	834,082	36,844	25%	25%
TEXAS	604,215	182,566	76,781	421,649	21,878	28%	30%
VERMONT	315,089	0	63,781	315,098	0	0%	0%
VIRGINIA	1,596,318	490,865	201,523	1,105,453	52,128	26%	31%
WISCONSIN	775,872	0	147,473	775,881	0	0%	0%
<b>Total</b>	<b>31,183,582</b>	<b>3,950,528</b>	<b>5,155,608</b>	<b>27,233,198</b>	<b>393,975</b>	<b>8%</b>	<b>13%</b>

## Population of the 100 Largest Urban Places: 1860 Source: U.S. Bureau of the Census

Rank   Place	Population	Rank   Place	Population
1. New York city, NY *	813,669	51. Lawrence city, MA	17,639
2. Philadelphia city, PA *	565,529	52. Lancaster city, PA	17,603
3. Brooklyn city, NY *	266,661	53. Trenton city, NJ	17,228
4. Baltimore city, MD	212,418	54. Nashville city, TN	16,988
5. Boston city, MA *	177,840	55. Oswego city, NY	16,816
6. New Orleans city, LA *	168,675	56. Covington city, KY	16,471
7. Cincinnati city, OH	161,044	57. Bangor city, ME	16,407
8. St. Louis city, MO	160,773	58. Taunton town, MA	15,376
9. Chicago city, IL	112,172	59. Springfield city, MA	15,199
10. Buffalo city, NY	81,129	60. Poughkeepsie city, NY	14,726
11. Newark city, NJ	71,941	61. Norfolk city, VA	14,620
12. Louisville city, KY	68,033	62. Camden city, NJ	14,358
13. Albany city, NY	62,367	63. Wheeling city, VA *	14,083
14. Washington city, DC *	61,122	64. Norwich city, CT	14,048
15. San Francisco city, CA	56,802	65. Peoria city, IL	14,045
16. Providence city, RI *	50,666	66. Fall River city, MA	14,026
17. Pittsburgh city, PA *	49,221	67. Sacramento city, CA	13,785
18. Rochester city, NY	48,204	68. Toledo city, OH	13,768
19. Detroit city, MI	45,619	69. Quincy city, IL	13,718
20. Milwaukee city, WI	45,246	70. Harrisburg city, PA	13,405
21. Cleveland city, OH	43,417	71. Newburyport city, MA	13,401
22. Charleston city, SC	40,522	72. Chelsea city, MA	13,395
23. New Haven city, CT	39,267	73. Dubuque city, IA	13,000
24. Troy city, NY	39,235	74. Alexandria city, VA	12,652

## Population of the 100 Largest Urban Places: 1860 Source: U.S. Bureau of the Census—Continued

Rank   Place	Population	Rank   Place	Population
25. Richmond city, VA.....	37,910	75. New Albany city, IN.....	12,647
26. Lowell city, MA.....	36,827	76. Newburgh village, NY * .....	12,578
27. Mobile city, AL.....	29,258	77. Augusta city, GA.....	12,493
28. Jersey City city, NJ.....	29,226	78. Bridgeport city, CT * .....	12,106
29. Allegheny city, PA * .....	28,702	79. North Providence town, RI * .....	11,818
30. Syracuse city, NY.....	28,119	80. Elizabeth city, NJ.....	11,567
31. Hartford city, CT.....	26,917	81. Evansville city, IN.....	11,484
32. Portland city, ME.....	26,341	82. Davenport city, IA.....	11,267
33. Cambridge city, MA.....	26,060	83. New Brunswick city, NJ.....	11,256
34. Roxbury city, MA * .....	25,137	84. Auburn city, NY.....	10,986
35. Charlestown city, MA * .....	25,065	85. Gloucester town, MA.....	10,904
36. Worcester city, MA.....	24,960	86. Concord city, NH.....	10,896
37. Reading city, PA.....	23,162	87. Lockport village, NY * .....	10,871
38. Memphis city, TN.....	22,623	88. Newport city, RI.....	10,508
39. Utica city, NY.....	22,529	89. St. Paul city, MN.....	10,401
40. New Bedford city, MA.....	22,300	90. New London city, CT.....	10,115
41. Savannah city, GA.....	22,292	91. Nashua city, NH.....	10,065
42. Salem city, MA.....	22,252	92. Newport city, KY.....	10,046
43. Wilmington city, DE.....	21,258	93. Waterbury city, CT.....	10,004
44. Manchester city, NH.....	20,107	94. Haverhill town, MA.....	9,995
45. Dayton city, OH.....	20,081	95. Dorchester town, MA * .....	9,769
46. Paterson city, NJ.....	19,586	96. Hoboken city, NJ.....	9,662
47. Lynn city, MA.....	19,083	97. Columbus city, GA.....	9,621
48. Indianapolis city, IN.....	18,611	98. Schenectady city, NY.....	9,579
49. Columbus city, OH.....	18,554	99. Atlanta city, GA.....	9,554
50. Petersburg city, VA.....	18,266	100. Wilmington town, NC.....	9,552

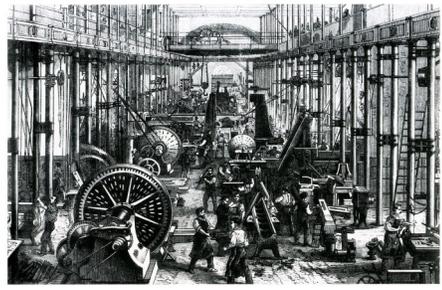
NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Evaluating the 1860 Census Critical Thinking Worksheet

1. What was the total population of the United States in 1860? \_\_\_\_\_
2. How many slaves were living in the United States in 1860? What percentage of the population did they make up?  
\_\_\_\_\_
3. The census reports that **most** of the northern states did not have slaves. What “compromise” passed in 1820 reflected this change? \_\_\_\_\_
4. The Kansas-Nebraska Act of 1854 allowed the territories to decide whether they would be slave or free. How many slaves were present in Kansas and Nebraska in 1860?  
Kansas: \_\_\_\_\_  
Nebraska: \_\_\_\_\_
5. What region of the country do you think was more densely populated? \_\_\_\_\_
6. How many people were living in Virginia in 1860? \_\_\_\_\_
7. What percentage of the population in Virginia was enslaved in 1860? \_\_\_\_\_
8. Which state had the highest percentage of slaves? \_\_\_\_\_ Why do you think this state had the highest percentage of slaves? \_\_\_\_\_
9. What U.S. city had the highest population? \_\_\_\_\_
10. How many people lived in the District of Columbia (Washington City, DC) in 1860? \_\_\_\_\_
11. How many people were living in Richmond, Virginia, in 1860, before it became the capitol of the Confederacy?  
\_\_\_\_\_
12. Based on this data, what broad conclusions can you draw about the United States in 1860?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# From Wood to Iron



The Industrial Revolution began in Europe as is depicted in this image showing the machine works of a factory in Germany during the 1860s. Photo: Hinweise zur lizenzgerechten Weiterverwendung des Bildes (Public domain)

## Grade Level

- 4-8

## Timeframe

- 45 minutes

## Materials per Student/Group

- Ironclad Report: Part I and Part II
- Complete Ironclad Report
- Critical Thinking Worksheet

## Activity Summary

Students will use primary sources to study the transition from wooden warships to ironclad vessels.

## Learning Objectives

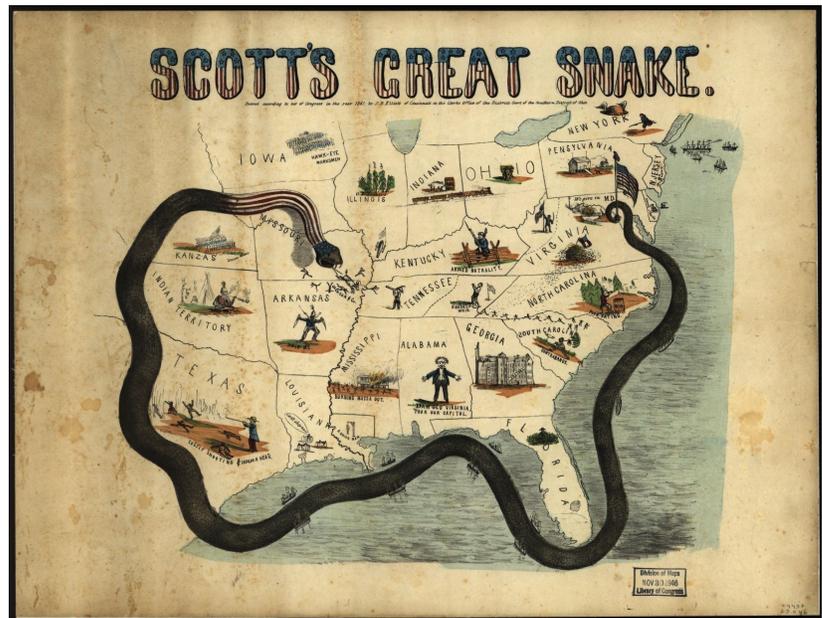
- To understand ironclad technology, and why it made wooden warships obsolete

## Key Words

Ironclad, Ironclad Board, Industrial Revolution, hull, draft

## National Standards

NCSS: US 5-12: Era 4:2A, Era 5:2A;  
 NCSS Thinking Standards: 1, 2, and 3;  
 CC.ELA.LIT.RI; CC.ELA.LIT.RH;  
 CC.ELA.LIT.W:4-8.2; CCST.ELA.LIT.RST



Cartoon map illustrating General Winfield Scott's plan to economically crush the Confederacy. It is sometimes called the "Anaconda Plan." Courtesy of Library of Congress

## Background Information

While historians tend to focus on the 1860s as the start of the ironclad era, armor plated vessels actually date back as far as the 16th century. The first documented armored vessels were built in Korea. Kobukson or "Turtle Ships" had iron spikes sticking out from the reinforced roof of the ship, which may have been armored with iron plates. During the Industrial Revolution, European shipbuilders began taking advantage of the readily available iron and incorporating it into the framework and hulls of ships. By the 1860s, armored hulled ships were becoming common, however, the battle between the Union (USS *Monitor*) and Confederate (CSS *Virginia*) ironclads would solidify this transition from wood to iron as iron met iron for the first time on March 9, 1862, in Hampton Roads, Virginia.

At the start of the Civil War in 1861, the Union enacted a strategy that would entail a naval blockade of southern ports. The "Anaconda Plan," proposed by Lincoln's general-in-chief, Winfield Scott, would put pressure on the Confederacy by cutting off access to essential supplies and stop any international sales of cotton. The South knew it needed a way to defend and keep its harbors open. Ironclad vessels, a new technology already being used in Europe, would be essential to overcoming the Northern blockade of wooden ships.

When the Union learned of the South's plan to build an ironclad ship, the U.S. Congress authorized \$1.5 million for the construction of ironclad vessels and established an Ironclad Board to review design proposals. The three naval officers appointed to the board were all veterans of the traditional sailing navy and were unfamiliar with ironclad technology. On September 16, 1861, the Ironclad Board issued the "Report on Ironclad Vessels." In this

report, the board described its concerns over ironclad ships, along with the potential benefits of this new technology. While the board was impressed with the defense capabilities of ironclad ships, they were concerned about the heavy weight of the vessels and their maneuvering capabilities. Ultimately, the Ironclad Board recommended that three ironclad vessels be constructed, one of which was a design for the USS *Monitor* submitted by Swedish engineer John Ericsson.

In March of 1862, the CSS *Virginia* and the USS *Monitor* met in the Battle of Hampton Roads. Over the course of two days, the ironclad vessels proved definitively that ironclad technology was here to stay. While the Battle of Hampton Roads ended in a draw, it marked the end of wooden warships and ushered in a new era of iron vessels.

### Activity Summary

Students use primary sources to study the transition from wooden warships to ironclad vessels.

### Learning Objectives

Students will understand ironclad technology, and why it made wooden warships obsolete

### Teacher Preparation and Implementation

- Print the provided Ironclad Report Part I and Part II and the Critical Thinking Worksheet (one per group).
- Follow the steps in the Procedure section.

### Resources

#### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her. <http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservationists at work via webcams, and read the blogs of the conservators as they uncover new finds.

<http://www.monitorcenter.org/>

#### Books

Broadwater, John D.: *USS Monitor, A Historic Ship Completes Its Final Voyage*. Everbest Printing Company, 2012. ISBN-13: 978-1603444736.

Nelson, James L.: *Reign of Iron, The Story of the First Battle Ironclads, the Monitor and the Merrimack*. Harper-Collins Publishers Inc., 2004. ISBN: 0060524030.

Quarstein, John V.: *A History of Ironclads, The Power of Iron Over Wood*. The History Press, 2006. ISBN-13: 978-159629188.

Quarstein, John V.: *The Battle of the Ironclads*. Arcadia Publishing, 1999. ISBN: 0738501131.

Quarstein, John V.: *The Monitor Boys: The Crew of the Union's First Ironclad*. The History Press, 2011. ISBN-13: 978-1596294554.



Photo: NOAA, *Monitor* Collection

### Vocabulary

**DRAFT** — The draft or draught of a ship's hull is the vertical distance between the waterline and the bottom of the hull (keel)

**HULL** — Watertight body of a ship or boat; the structure of a hull varies depending on the vessel type

**INDUSTRIAL REVOLUTION** — Rapid development of industry that occurred in the late 18th and 19th centuries and brought about the introduction of machinery

**IRONCLAD** — Originally, a wooden ship that had iron plate attached to its sides to protect it from damage. The term is often used to describe any Civil War ships that were made of iron.

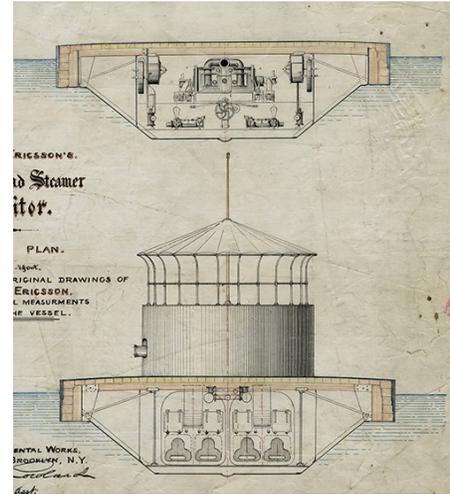
**IRONCLAD BOARD** — An advisory board established by the Union in 1861 in response to the construction of the CSS *Virginia* by the Confederacy. The board consisted of three senior naval officers Commodore Hiram Paulding, Commodore Joseph Smith, and Commander Charles Henry Davis.

## Procedure

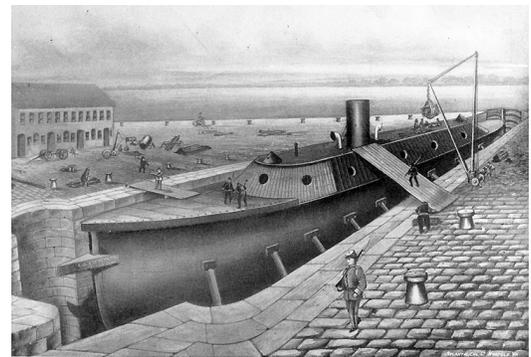
1. Begin by giving the students background information on the USS *Monitor* and the Ironclad Board (see Background Information and Resources).
2. Explain to the students that they will examine parts of the Ironclad Board's report. In the report, the board members describe some of the advantages and disadvantages of wooden and ironclad warships. Tell the students that their job is to review the "Report on Ironclad Vessels" and the board's concerns regarding ironclad technology.
3. Read the first three paragraphs of the report aloud to the class. Discuss what the board's assignment is and how the three men felt about it. Were they confident or more skeptical?
4. Tell the students that because the report is rather long, they have been provided with two worksheets, Ironclad Report Part I and II. The worksheets only contain portions of the report that pertain directly to the topic of wooden vs. iron warships.
5. Break students into groups of two or three. Distribute the provided Critical Thinking Worksheet and Ironclad Part I or II worksheet to each group of students.
6. Tell students to begin by reading through their portion of the report and then move on to answering the questions on the Critical Thinking Worksheet. This should take approximately 20 minutes.
3. Conclude the activity by discussing the students' answers as a class.

## Extension

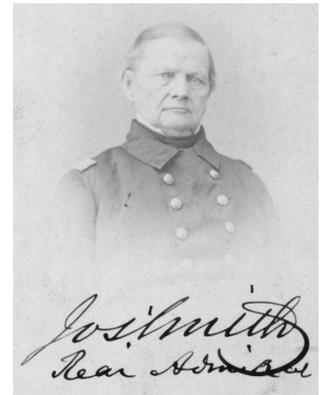
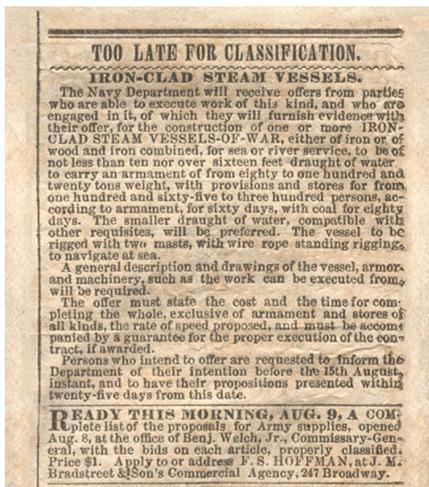
Have students read the entire report (included in this activity), and summarize to explain in their own words the pros and cons of wood versus iron.



Transverse drawing of the *Monitor* and turret.  
Photo: NOAA's *Monitor* Collection



CSS *Virginia* in dry dock at Gosport Navy Yard (now Norfolk Naval Shipyard) in Portsmouth, Virginia. Photo: Naval History and Heritage Command



In August 1862, a call for proposals went out in the newspapers to shipbuilders asking them to submit designs for ironclad vessels. The proposals were reviewed by the Ironclad Board, that consisted of (top to bottom) Commander Charles Henry Davis, Commodore Joseph Smith and Commodore Hiram Paulding. Photos: Courtesy of Naval History and Heritage Command

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## The Transition from Wood to Iron Critical Thinking Worksheet

1. Summarize some of the main points of your portion of the "Report on Ironclad Vessels."

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2. According to the "Report on Ironclad Vessels," what are some of the advantages of wooden sailing vessels?

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3. What are some of the disadvantages of wooden sailing vessels?

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4. According to the "Report on Ironclad Vessels," what are some of the advantages of ironclad vessels?

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5. What are some of the disadvantages of ironclad vessels?

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## Report on Ironclad Vessels: Part I

NAVY DEPARTMENT – BUREAU OF YARDS AND DOCKS

SEPTEMBER 16, 1861

...Opinions differ amongst naval and scientific men as to the policy of adopting iron armature for ships-of-war. For coast and harbor defense they are undoubtedly formidable adjuncts to fortifications on land. As cruising vessels, however, we are sceptical as to their advantages and ultimate adoption. But whilst other nations are endeavoring to perfect them, we must not remain idle. The enormous load of iron, as so much additional weight to the vessel; the great breadth of beam necessary to give her stability; the short supply of coal she will be able to stow in bunkers; the greater power required to propel her and the largely increased cost of construction, are objections to this class of vessels as cruisers which we believe it is difficult successfully to overcome. For river and harbor service we consider iron-clad vessels of light draught, or floating batteries thus shielded as very important; and we feel at this moment the necessity of them on some of our rivers and inlets to enforce obedience to the laws. We, however, do not hesitate to express the opinion, notwithstanding all we have heard or seen written on the subject, that no ship or floating battery, however heavily she may be plated, can cope successfully with a properly constructed fortification of masonry. The one is fixed and immovable, and though constructed of a material which may be battered by shot, can be covered, if need be, by the same or much heavier armor than a floating vessel can bear, whilst the other is subject to disturbances by winds and waves, and to the powerful effects of tides and currents.

Armored ships or batteries may be employed advantageously to pass fortifications on land for ulterior objects of attack, or run a blockade, or to reduce temporary batteries on the shores of rivers and the approaches to our harbors...

## Report on Ironclad Vessels: Part II

NAVY DEPARTMENT – BUREAU OF YARDS AND DOCKS  
SEPTEMBER 16, 1861

...From what we know of the comparative advantages and disadvantages of ships constructed of wood over those of iron, we are clearly of opinion that no iron-clad vessel of equal displacement can be made to obtain the same speed as one not thus encumbered, because her form would be better adapted to speed. Her form and dimensions, the unyielding nature of the shield, detract materially in a heavy sea from the life, buoyancy, and spring which a ship built of wood possesses.

Wooden ships may be said to be but coffins for their crews when brought in conflict with iron-clad vessels; but the speed of the former, we take for granted, being greater than that of the latter, they can readily choose their position, and keep out of harm's way entirely...

It is assumed that 4 inch plates are the heaviest armor a sea going vessel can safely carry. These plates should be of tough iron, and rolled in large long pieces. This thickness of armor, it is believed, will resist all projectiles now in general use at a distance of 500 yards, especially if the ship's sides are angular...

...One strong objection to iron vessels which, so far as we know, has not yet been overcome, is the oxidation or rust in salt water, and their liability of becoming foul under water by the attachment of sea grass and animalcules to their bottoms. The best preventative we know of is a coating of pure zinc paint, which, so long as it lasts, is believed to be an antidote to this cause of evil...

***\*\*Complete Report—Reproduced from a Primary Source Document\*\****

NAVY DEPARTMENT – BUREAU OF YARDS AND DOCKS  
SEPTEMBER 16, 1861

Sir:

The undersigned, constituting a board appointed by your order of the 8th ultimo, proceeded to the duty assigned to them, in accordance with the first section of an act of Congress, approved 3d of August 1861, directing the Secretary of the Navy “to appoint a board of three skillful naval officers to investigate the plans and specifications that may be submitted for the construction or completing of iron-clad steamships or steam batteries to be built; and there is hereby appropriated, out of any money in the treasury not otherwise appropriated, the sum of one million five hundred thousand dollars.”

Distrustful of our ability to discharge this duty, which the law requires should be performed by three skillful naval officers, we approach the subject with diffidence, having no experience and but scanty knowledge in this branch of naval architecture.

Application was made to the department for a naval constructor, to be placed under our orders, with whom we might consult; but it appears that they are all so employed on The construction of iron-clad steamships of war is now zealously claiming the attention of foreign naval powers. France led off; England followed, and is now somewhat extensively engaged in the system; and other powers seem to emulate their example, though on a smaller scale.

Opinions differ amongst naval and scientific men as to the policy of adopting iron armature for ships-of-war. For coast and harbor defense they are undoubtedly formidable adjuncts to fortifications on land. As cruising vessels, however, we are sceptical as to their advantages and ultimate adoption. But whilst other nations are endeavoring to perfect them, we must not remain idle.

The enormous load of iron, as so much additional weight to the vessel; the great breadth of beam necessary to give her stability; the short supply of coal she will be able to stow in bunkers; the greater power required to propel her and the largely increased cost of construction, are objections to this class of vessels as cruisers which we believe it is difficult successfully to overcome. For river and harbor service we consider iron-clad vessels of light draught, or floating batteries thus shielded as very important; and we feel at this moment the necessity of them on some of our rivers and inlets to enforce obedience to the laws. We, however, do not hesitate to express the opinion, notwithstanding all we have heard or seen written on the subject, that no ship or floating battery, however heavily she may be plated, can cope successfully with a properly constructed fortification of masonry. The one is fixed and immovable, and though constructed of a material which may be battered by shot, can be covered, if need be, by the same or much heavier armor than a floating vessel can bear, whilst the other is subject to disturbances by winds and waves, and to the powerful effects of tides and currents.

Armored ships or batteries may be employed advantageously to pass fortifications on land for ulterior objects of attack, or run a blockade, or to reduce temporary batteries on the shores of rivers and the approaches to our harbors.

From what we know of the comparative advantages and disadvantages of ships constructed of wood over those of iron, we are clearly of opinion that no iron-clad vessel of equal displacement can be made to obtain the same speed as one not thus encumbered, because her form would be better adapted to speed. Her form and dimensions, the unyielding nature of the shield, detract materially in a heavy sea from the life, buoyancy, and spring which a ship built of wood possesses.

Wooden ships may be said to be but coffins for their crews when brought in conflict with iron-clad vessels; but the speed of the former, we take for granted, being greater than that of the latter, they can readily choose their position, and keep out of harm's way entirely.

Recent improvements in the form and preparation of projectiles, and their increased capacity for destruction, have elicited a large amount of ingenuity and skill to devise means for resisting them in their construction of ships-of-war. As yet we know of nothing superior to the large and heavy spherical shot in its destructive effects on vessels, whether plated or not.

Rifled guns have greater range, but the conical shot does not produce the crushing effect of spherical shot.

It is assumed that 4 inch plates are the heaviest armor a sea going vessel can safely carry. These plates should be of tough iron, and rolled in large long pieces. This thickness of armor, it is believed, will resist all projectiles now in general use at a distance of 500 yards, especially if the ship's sides are angular.

Plates hammered in large masses are less fibrous and tough than when rolled. The question whether wooden backing, or any elastic substance behind the iron plating will tend to relieve at all the frame of the ships from the crushing effect of a heavy projectile, is not yet decided. Major Barnard says "to put an elastic material behind iron is to insure its destruction." With all difference to such elastic substance (soft wood, perhaps, is best) might relieve the frame of the ship somewhat from the terrible shock of a heavy projectile, though the plate should be fractured.

With respect to a comparison between ships of iron and those of wood, without plating, high authorities in England differ as to which is best. The tops of ships built of iron, we are told, wear out three bottoms; whilst the bottoms of those built of wood will outwear three tops. In deciding upon the relative merits of iron and wooden-framed vessels, for each of which we have offers, the board is of opinion that it would be well to try a specimen of each as both have distinguished advocates. One strong objection to iron vessels which, so far as we know, has not yet been overcome, is the oxidation or rust in salt water, and their liability of becoming foul under water by the attachment of sea grass and animalcules to their bottoms. The best preventative we know of is a coating of pure zinc paint, which, so long as it lasts, is believed to be an antidote to this cause of evil.

After these brief remarks on the subject generally, we proceed to notice the plans and offers referred to us for construction of plated vessels and floating batteries.

It has long been suggested that the most ready mode of obtaining an iron-clad ship-of-war would be to contract with responsible parties in England for its complete construction; and we are assured that parties there are ready to engage in such an enterprise on terms more reasonable, perhaps, than such a vessel could be built in this country, having greater experience and facilities than we possess. Indeed, we are informed there are no mills and machinery in this country capable of rolling iron 4 inches thick, though plates might be hammered to that thickness in many of our workshops. As before observed, rolled iron is considered much the best, and the difficulty of rolling it increases rapidly

with the increase of thickness. It has, however, occurred to us that a difficulty might arise with the British government, in case we should undertake to construct ships-of-war in that country, which might complicate their delivery; and moreover, we are of the opinion that every people or nation who can maintain a navy should be capable of constructing it themselves.

Our immediate demands seem to require, first, so far as practicable, vessels invulnerable to shot, of light draught of water, to penetrate our shoal harbors, rivers and bayous. We, therefore, favor the construction of this class of vessels before going into a more perfect system of large iron-clad sea-going vessels of war. We are here met with the difficulty of encumbering small vessels with armor, which, from their size, they are unable to bear. We, nevertheless, recommend that contracts be made with responsible parties for the construction of one or more iron-clad vessels or batteries of as light a draught of water as practicable consistent with their weight of armor. Meanwhile, availing of the experience thus obtained, and the improvements which we believe are yet to be made by other naval powers in building iron-clad ships, we would advise the construction, in our own dock-yards, of one or more of these vessels upon a large and more perfect scale, when Congress shall see fit to authorize it. The amount now appropriated is not sufficient to build both classes of vessels to any great extent.

We have made a synopsis of the propositions and specifications submitted, which we annex, and now proceed to state, in brief, the results of our decisions upon the offers presented to us.

J. Ericsson, New York, page 19 – This plan of a floating battery is novel, but seems to be based upon a plan which will render the battery shot and shell proof. We are somewhat apprehensive that her properties for sea are not such as a sea-going vessel should possess. But she may be moved from one place to another on the coast in smooth weather. We recommend that an experiment be made with one battery of this description on the terms proposed, with a guarantee and forfeiture in case of failure in any of the properties and points of the vessel as proposed.

Price, \$275,000; length of vessel, 172 feet; breadth of beam, 41 feet; depth of hold, 11 feet; time, 100 days; draught of water, 10 feet; displacement 1,255 tons; speed per hour, nine statute miles.

John W. Nystrom, Philadelphia, 1216 Chestnut Street, page 1 – The plan of (quadruple) guns is not known, and cannot be considered. The dimensions would not float the vessel without guards, which we are not satisfied would repel shot. We do not recommend this plan.

Price, about \$175,000; length of vessel, 175 feet; breadth of beam, 27 feet; depth of hold, 13 feet; time, four months; draught of water, 10 feet; displacement, 875 tons; speed per hour, 12 knots.

William Perine, New York, 2777 post office box, presents three plans. The specifications and drawings are not full. The last proposal (No. 3, page 2) for the heavy plating is the only one we have considered; but there is neither drawing nor model, and the capacity of the vessel, we think, will not bear the armor and armament proposed.

Price, \$621,000; length of vessel, 225 feet; breadth of beam, 45 feet; depth of hold, 15 feet; time, 9 months, draught of water, 13 feet; displacement, 2,454 tons; speed per hour, 10 knots.

John C. Ferre, Boston, page 9 – Description deficient. Not recommended. Sent a model, but neither price, time, nor dimensions stated.

E. S. Renwick, New York, 335 Broadway, presents drawings, specification, and model of an iron-clad vessel of large capacity and powerful engines, with great speed, capable of carrying a heavy battery, and stated to be shotproof and a good sea-boat. The form and manner of construction and proportions of this vessel are novel, and will attract the attention of scientific and practical men. She is of very light draught of water, and on the question whether she will prove to be a safe and convertible sea-boat we do not express a decided opinion. Vessels of somewhat similar form, in that part of vessel which is immersed, of light draught of water on our western lakes, have, we believe, proved entirely satisfactory in all weathers. To contract the effect of waves, when disturbed by the winds, by producing a jerk, or sudden rolling motion of flat, shoal vessels, it is proposed to carry a sufficient weight above the center of gravity to counterpoise the heavy weight below, which is done in this ship by the immense iron armor. If, after a full discussion and examination by experts on this plan, it should be decided that she is a safe vessel for sea service, we would recommend the construction upon it of one ship at one of our dock yards.

The estimate cost of this ship, \$1,500,000, precludes action upon the plan until further appropriations shall be made by Congress for such objects.

Time not stated; length of vessel, 400 feet; breadth of beam 60 feet; depth of hold, 33 feet; draught of water, 16 feet; displacement, 6,520 tons; speed per hour, at least 18 miles.

Whitney & Rowland, Brooklyn, Greenpoint, page 13, propose an iron gunboat, armor of bars of iron and thin plate over it. No price stated. Dimensions of vessel, we think, will not bear the weight and possess stability. Time, 5 months. Not recommended. Length of vessel, 140 feet; breadth of beam, 28 feet; depth of hold, 13 feet; draught of water, 8 feet.

Donald McKay, Boston, page 16 – Vessel, in general dimensions and armor, approved. The speed estimated slow. The cost precludes the consideration of construction by the board.

Price, k\$1,000,000; length of vessel, 227 feet; breadth of beam, 50 feet; depth of hold, 26 feet; time, 9 to 10 months; draught of water, 13 feet; displacement, 1,215 tons; speed, not stated.

William H. Wood, Jersey City, N.J., page 14 – Dimensions will not float the guns high enough; not recommended.

Price, \$225,000; length of vessel, 160 feet; breadth, 34 feet; depth of hold, 22 feet; time, 4 months; draught of water, 13 feet; displacement, 1,215 tons; speed, not stated.

Merrick and Sons, Philadelphia, pages 7 and 8. – Vessel of wood and iron combined. This proposition we consider the most practicable one for heavy armor. We recommend that a contract be made with that party, under the guarantee, with forfeiture in case of failure to comply with specifications; and that the contract require the plates to be 15 feet long and 36 inches wide, with a reservation of some modifications, which may occur as the work progresses, not to affect the cost.

Price, \$225,000; length of vessel, 220 feet; breadth of beam, 60 feet; depth of hold 23 feet; time, 9 months; draught of water, 13 feet; displacement, 3,296 tons; speed per hour, 9 knots.

Benjamin Rathburn, \_\_\_\_\_, page 20. We do not recommend the plan for adoption.

Price not stated; length of vessel not stated; breadth of beam, 80 feet; depth of hold, 74 feet; time not stated; draught of water, 25 feet; displacement, 15,000 tons; speed not stated. Specifications incomplete.

Henry R. Dunham, New York, page 11. – Vessel too costly for the appropriation; no drawings or specifications; not recommended.

Price, \$1,200,000; length of vessel, 325 feet; breadth of beam 60 feet; depth of hold not stated; time, 15 to 18 months; draught of water, 16 feet; displacement not stated; speed per hour, 12 miles.

C.S. Bushnell, & Co., New Haven, Conn., page 121, propose a vessel to be iron-clad, on the rail and plate principal, and to obtain high speed. The objection to this vessel is the fear that she will not float her armor and load sufficiently high, and have stability enough for a sea vessel. With a guarantee that she shall do these, we recommend on that basis a contract.

Price, \$235,250; length of vessel, 180 feet; breadth of beam, \_\_\_\_\_ feet; depth of hold, 12 2/3 feet; time, 4 months; draught of water, 10 feet; displacement, \_\_\_\_\_ tons; speed per hour, 12 knots.

John Westwood, Cincinnati, Ohio, page 17. – Vessel of wood, with iron armor; plan good enough, but the breath not enough to bear armor. No detailed specification; no price or time stated; only a general drawing. Not recommended.

Neafie & Levy, Philadelphia, page 5. – No plans or drawings, therefore not considered. Neither price nor time stated. Length of vessel, 200 feet; breadth of beam, 40 feet; depth of hold, 15 feet; draught of water, 13 feet; displacement, 1,748 tons; speed per hour, 10 knots.

Wm. Norris, New York, 26 Cedar Street, page 6. – Iron boat without armor. Too small, and not received.

Price, \$32,000; length of vessel, 83 feet; breadth of beam, 25 feet; depth of hold, 14 feet; time, 60 to 75 days; draught of water, 3 feet; displacement, 90 tons; speed not stated.

Wm. Kingsley, Washington, D.C., page 10. – proposes a rubber-clad vessel, which we cannot recommend. No price or dimension stated.

A. Beebe, New York, 82 Broadway, page 18. – Specification and sketch defective. Plan not approved.

Price, \$50,000; length of vessel, 120 feet; breadth of beam, 55 feet; depth not stated; time, 100 days; draught of water, 6 feet; displacement, 1,000 tons; speed per hour, 8 knots.

These three propositions recommended, viz: Bushnell & Co., New Haven, Connecticut; Merrick & Sons, Philadelphia; and J. Ericsson, New York, will absorb \$1,290,250 of the appropriation of \$1,500,00, leaving \$209,750 yet unexpended.

The board recommends that armor with heavy guns be placed on one of our river craft, or, if none will bear it, to construct a scow, which will answer to plate and shield the guns, for the river service on the Potomac, to be constructed or prepared by the government at the navy yard here for immediate use.

We would further recommend that the department ask of Congress, at its next session, an appropriation, for experimenting on iron plates of different kinds, of \$10,000.

All of which is respectfully submitted.

JOSEPH SMITH

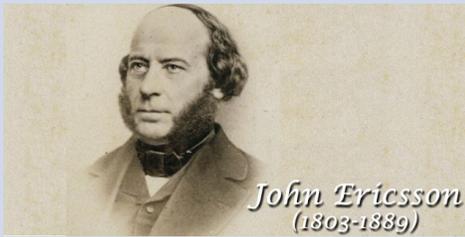
H. PAULDING

I. H. DAVIS

Hon. Gideon Welles,

Secretary of the Navy Ironsides

# The Tale of Two Ironclads



John Ericsson was one of the 19th century's most creative engineers and inventors. He drew a blueprint for an ironclad ship in 1854, that later became the USS *Monitor*. Photo: NOAA, *Monitor* Collection

## Grade Level

- 4-8

## Timeframe

- 45 minutes

## Materials per Student/Group

- [Monitor Blueprint 1 and 2](#)
- [Virginia Blueprint 1 and 2](#)
- [Ship A and B Handout](#)

## Activity Summary

Students examine original blueprints of the USS *Monitor* and the CSS *Virginia* and explore the similarities and differences between the two ironclad vessels.

## Learning Objectives

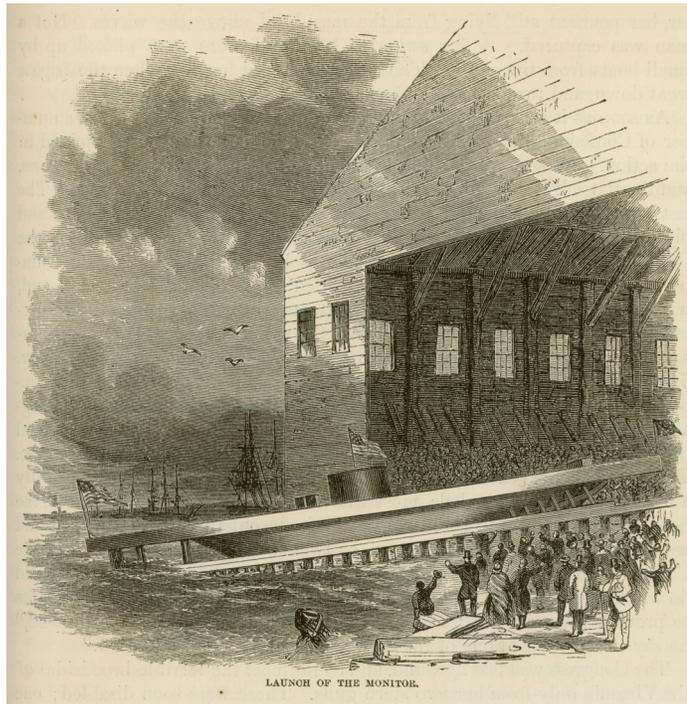
- To compare and contrast the similarities and differences between the first two ironclads vessels built in America

## Key Words

Ironclad, naval blockade

## National Standards

**NCSS:** US 5-12: Era 4:2A, Era 5:2A;  
**NCSS Thinking Standards:** 2 and 3;  
**CC.ELA.LIT.RH;** **CCST.ELA.LIT.RST;**  
**NCTE:** 1, 3, and 7; **NS.5-8.E;** **NS-5-8.G**



The launching of the USS *Monitor* on January 30, 1862, from Continental Iron Works in Greenpoint, Brooklyn, New York. *Harper's Weekly*, September 1862. Photo: NOAA, *Monitor* Collection

## Background Information

After the outbreak of the Civil War in April of 1861, President Lincoln and his administration began constructing a wartime strategy to restore the Union. Lincoln's general-in-chief, Winfield Scott, proposed a plan to put pressure on the South by enforcing a naval blockade that stretched over 3,500 miles of coast from Virginia to Mexico and up the Mississippi from New Orleans to New Madrid Bend. The "Anaconda Plan" would cut the Confederacy off from essential supplies and stop any international sales of cotton, a trade the Southern economy heavily depended upon.

At the start of the Civil War, the North already had a distinct naval advantage over the South. The North was home to most of the nation's shipyards and the industries needed to support the war effort. They also had a centralized, well-established naval administration and a much larger population of seafaring men. The new Confederacy had no central navy, each state initially creating its own independent navy. However, the South did have control of one major resource, Gosport Shipyard, which had the best dry dock in the country. The retreating Union forces had attempted to destroy the shipyard to prevent it from falling into Confederate hands. This effort failed and the Confederacy was able to take full advantage of the Gosport Shipyard. The South was also now in possession of the burned hull of the USS *Merrimack*. The shipyard and the remains of this warship would prove to be a major resource for the South.

The Confederacy knew it needed a strategy to defend and keep their harbors open. Ironclad vessels would be essential to overcoming the Northern blockade. In July of 1861, the Confederate Congress appropriated \$172,523 for the reconstruction of the *Merrimack* into an ironclad vessel.

When the North learned of the construction of a Confederate ironclad, the Union called for proposals for their own ironclad. The Ironclad Board selected Swedish inventor John Ericsson's design, and in less than 100 days, the North launched the USS *Monitor*. In March of 1862, the *Merrimack*, re-christened the CSS *Virginia*, and the USS *Monitor* met in the first battle between two iron vessels. This historic battle would have major implications for the future of naval warfare.

## Activity Summary

Students examine original blueprints of the USS *Monitor* and the CSS *Virginia* and explore the similarities and differences between the two ironclad vessels.

## Learning Objectives

Students will compare and contrast the similarities and differences between the first two ironclads vessels built in America.

## Teacher Preparation and Implementation

- Print the provided blueprints and Ship A and B Handouts (one each per group of either A or B with corresponding blueprint).
- Follow steps in the Procedure section.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her. <http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservationists at work via webcams, and read the blogs of the conservators as they uncover new finds.

<http://www.monitorcenter.org/>

#### The Mariners' Museum: USS *Monitor* Center

Description of the Battle of Hampton Roads.

<http://www.monitorcenter.org/the-battle-of-hampton-roads/>

#### The Mariners' Museum: USS *Monitor* Center

Battle of Hampton Roads timeline.

<http://www.monitorcenter.org/battle-hampton-roads-timeline/>

## Books

Broadwater, John D.: *USS Monitor, A Historic Ship Completes Its Final Voyage*. Everbest Printing Company, 2012. ISBN-13: 978-1603444736.

Herbert, Janis: *The Civil War for Kids: A history with 21 Activities (For Kids Series)*. Chicago Review Press, 1999. ISBN-13: 978-1556523557.

Nelson, James L.: *Reign of Iron, The Story of the First Battle Ironclads, the Monitor and the Merrimack*. HarperCollins Publishers Inc., 2004. ISBN: 0-060524030.

Quarstein, John V.: *A History of Ironclads, The Power of Iron Over Wood*. The History Press, 2006. ISBN-13: 9781596291188.

Quarstein, John V.: *The Battle of the Ironclads*. Arcadia Publishing, 1999. ISBN: 0738501131.

## Video

#### The USS *Monitor* and NOAA: A Look Through Time

Travel back to 1862 in this educational video to learn how the USS *Monitor* turned the tide of the Civil War. The video also highlights the *Monitor's* discovery, designation as a national marine sanctuary, and more.

<https://www.youtube.com/watch?v=EX6H3Tp-2yE>

## Vocabulary

**BEAM** — The width of a ship

**BLUEPRINT** — A design plan or other technical drawing

**CASEMATE** — A fortified enclosure

**DAHLGREN GUN** — Muzzle-loading naval artillery designed by Rear Admiral John A. Dahlgren, mostly used in the American Civil War

**DRAFT** — The depth of a ship's hull

**TONNAGE** — The cargo-carrying capacity of a ship

**TURRET** — A round, fortified structure resembling a tower

## Procedure

1. Begin by discussing the Union blockade of Southern ports and the subsequent race between the North and the South to build an ironclad vessel.
2. Explain to the students that in this activity they will be given the description of two ships (Ship A and Ship B). They will then be given original blueprints of the USS *Monitor* and the CSS *Virginia*. Working in a team and using just these primary sources, tell the students that they will have to identify Ship A and Ship B as either the *Monitor* or the *Virginia*.
3. Divide the students into groups of two or three.
4. Distribute the Ship A and Ship B Handout. Ask the students to read through the description of each vessel. Take several minutes to answer any questions the students may have about the terms (see vocabulary section for definitions).
5. As a class, discuss the questions listed below the description of the two ships.
6. Hand out copies of the *Monitor* and *Virginia* blueprints to

each group. Give students approximately 15 minutes to examine the blue prints. At the end of the 15 minutes, ask them to decide which vessel is Ship A and which vessel is Ship B. Students must provide an explanation as to their conclusions.

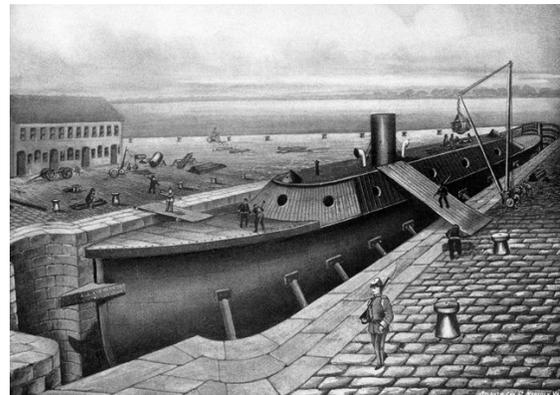
7. Discuss the students' answers as a class.

## Extension

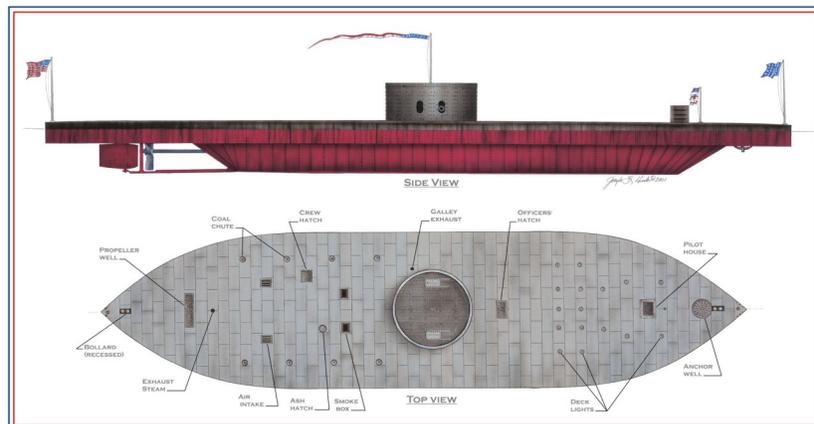
### Lights, Cameras, Action!

Activity that highlights similarities and difference between the Civil War ironclads using computer programs, such as LiveBinder and Wallwisher .

<http://monitor.noaa.gov/150th/pdfs/ action.pdf>



Union troops set the USS *Merrimack* (top left) on fire in the Gosport Navy Yard in order to keep it from falling into Confederate hands. The hull of the *Merrimack* was raised and the CSS *Virginia* (top right) was built on top of the burned hull. Photo (left): Courtesy of Naval History and Heritage Command. Photo (right): Courtesy of the Library of Congress



**U.S.S. MONITOR**

THE U.S.S. MONITOR WAS THE PROTOTYPE, ARMORED WARSHIP THAT CHANGED THE COURSE OF NAVAL HISTORY FOREVER. MADE FAMOUS BY ITS DUEL WITH THE CSS VIRGINIA ON MARCH 9, 1862, THE VALIANT AND INNOVATIVE SHIP MET DISASTER IN A GALE. OFFICERS SUFFERED AND BURN WITH A GREAT LOSS OF LIFE IN LATE 1862.

HULL LENGTH: 172'-0" BEAM: 41'-0" DRAFT: 10'-5" SPEED: 8 KNOTS CREW: 89 ARMOR: 11" TURBET: 5' DECK: 9' PILOTHOUSE: ARMAMENT: TWO 11" CALIBER GUNHOWEVERS

Plan drawing of the USS *Monitor*. Courtesy of Joseph Hines.

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

**SHIP A**

- ⇒ Length: 173 feet
- ⇒ Beam: 41.3 feet
- ⇒ Draft: 10 feet
- ⇒ 59 officers and crew members
- ⇒ Steam engine with single propeller
- ⇒ 2 Dahlgren guns
- ⇒ Entire exterior was plated with iron
- ⇒ Rotating turret that was 21.5 feet in diameter and 9 feet tall. The walls were made of 8 layers of 1-inch thick iron plates.

**SHIP B**

- ⇒ Length: 275 feet
- ⇒ Beam: 51 feet
- ⇒ Draft: 22 feet
- ⇒ 260 officers and crew
- ⇒ Steam engine with single propeller
- ⇒ Two 7-inch rifled cannons, two 6.4-inch rifled cannons, six 9-inch Dahlgren smoothbore shell guns.
- ⇒ Ironclad casemate with wooden hull
- ⇒ 1,500-pound cast-iron ram

**Consider the Following Questions:**

- Which ship is larger?
- Which ship takes more men to operate?
- How does the weaponry on Ship A compare to the weaponry on Ship B?
- What kind of defenses does Ship A have?
- What kind of defenses does Ship B have?
- What are some major differences between the two vessels?
- What are some major similarities between the two vessels?

**Ship A:** \_\_\_\_\_

How do you know? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

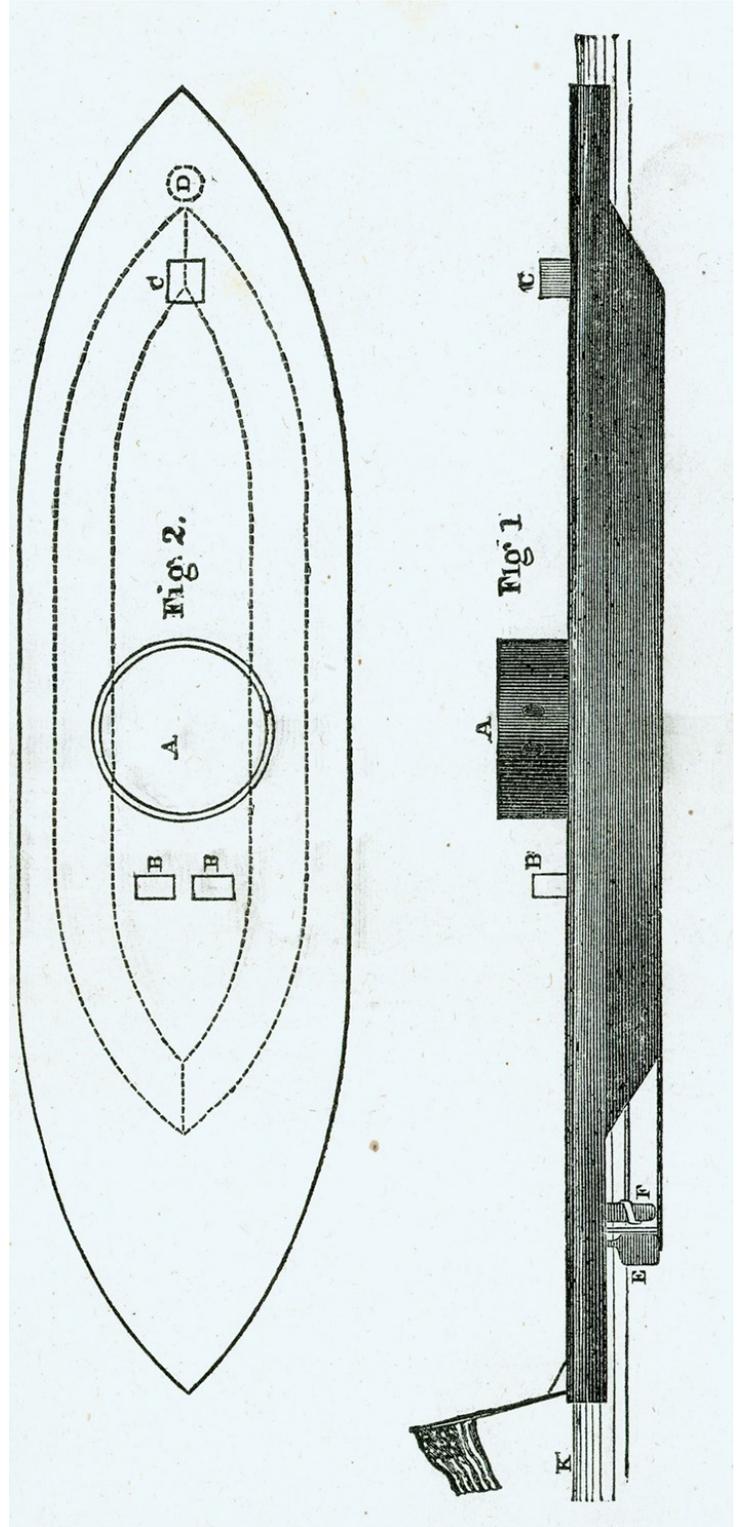
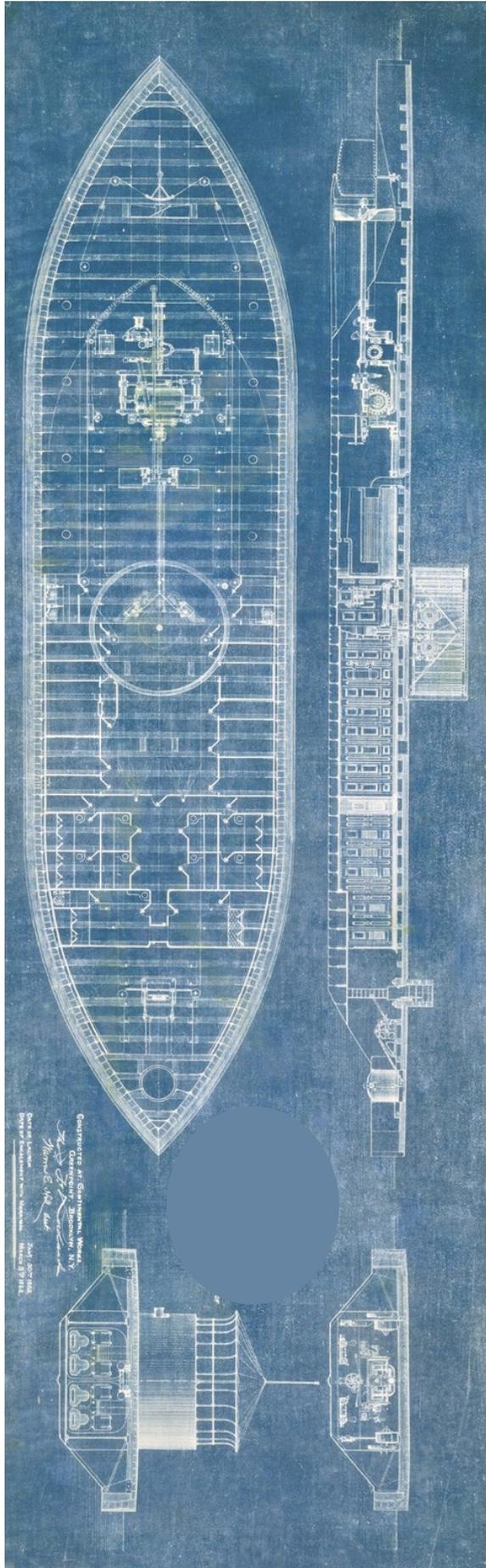
**Ship B:** \_\_\_\_\_

How do you know? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

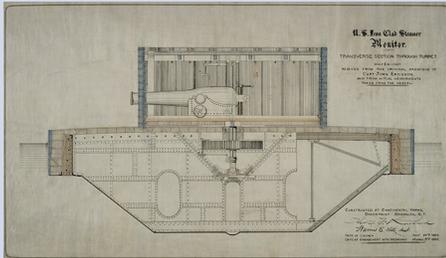
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Blueprint and drawing courtesy of The Mariners' Museum



# Around and Round We Go!



Plan view of the USS *Monitor* through the midship section of the hull and turret showing the turret gear and midship's bulkhead. Photo: NOAA, *Monitor* Collection

## Grade Level

- 4-8

## Timeframe

- 45 minutes

## Materials per Student/Group

- Captain Mask Template
- Two 10-inch strings
- Masking tape
- Swivel chair or stool
- Scrap paper
- Two blindfolds
- Bowl

## Activity Summary

Students play a game where they become the crew of the USS *Monitor* or the CSS *Virginia* and learn about some of the challenges the men faced in operating the first two ironclads.

## Learning Objectives

- To learn about some of the technological innovations of the USS *Monitor* and analyze whether or not they were successful

## Key Words

Ironclad, USS *Monitor*, CSS *Virginia*, turret, amidship

## National Standards

NCSS: US 5-12: Era 4:2A, Era 5:2A;  
 NCSS Thinking Standards: 1, 2 and 3;  
 CCST.ELA.LIT.RST; NS.5-8.E; NS.5-8.G



A Currier and Ives print depicting the Battle of Hampton Roads. Photo: Courtesy of The Mariners' Museum

## Background Information

The USS *Monitor* introduced a variety of technological innovations that continue to influence modern warship design. However, the lasting legacy of this historic ship lies in the revolving turret. The turret rested amidships of the vessel and had two separate steam engines that propelled it in a complete rotation. The turret measured 21.5 feet in diameter and 9 feet in height, contained two massive 11-inch Dahlgren smooth-bore guns and was capable of rotating a maximum of two and a half times per minute. While the *Monitor* had substantially fewer guns than most warships of the time, it was believed that the revolving turret would allow her to fire and aim her guns rapidly in all directions, giving her a distinct advantage over other vessels.

Just a couple of short months after launching in January of 1862, the *Monitor's* new technology and crew were put to the test. On March 8, 1862, the CSS *Virginia* laid waste to the Union blockade at Hampton Roads, Virginia. The wooden ships were simply no match for the ironclad vessel. On the evening of March 8, the *Monitor* arrived with the single goal of protecting the remaining Union ships, in particular the warship USS *Minnesota*.

On the early morning of March 9, 1862, the crew of the *Monitor* were nervous about their new and untested vessel in combat. As the *Virginia* moved in to destroy the *Minnesota*, the *Monitor* positioned herself between the Confederate ironclad and her target. The two ironclads spent over four hours firing at one another and testing their enemy for weaknesses.

During the battle, several things became clear to the crew of the *Monitor*. First, it was quickly discovered that it was very difficult to stop the rotating of

the turret when the enemy was on target, so the guns fired while the turret remained in motion. The men inside the turret had a very small view hole that was supposed to be used to sight the enemy ship. However, due to smoke and constant rotation of the turret, the view hole was little help. Second, maintaining clear communication between the pilot house and the turret was extremely difficult due to the deafening noise of the *Monitor's* guns and the fire from the *Virginia*. As the captain in the pilot house worked to position the *Monitor* between the *Virginia* and the remaining Union fleet, the men in the turret attempted to fire at the Confederate ship without being able to see it.

While the Battle of Hampton Roads ended in a draw, the chaotic interaction between the two ironclad vessels left a lasting impact on naval warfare. With some improvements and alterations, the rotating turret would soon become an essential component of all modern warships. The battle also marked the end of wooden naval warships and ushered in a new era of ironclad technology.

## Activity Summary

Students play a game where they become the crew of the USS *Monitor* or the CSS *Virginia* and learn about some of the challenges these men faced in operating two of the first ironclad vessels.

## Learning Objectives

Students will learn about some of the technological innovations of the USS *Monitor* and analyze whether or not they were successful.

## Teacher Preparation and Implementation

- Students will need a basic understanding of the design of the USS *Monitor* and the CSS *Virginia* prior to this activity. It is recommended that students complete “The Tale of Two Ironclads” (also included in this guide) before beginning this activity.
- Classroom setup
  - ◊ Clear a large space in the classroom (this activity can also be done outside)

- ◊ Set up for the USS *Monitor*: Using masking tape, draw a four-foot diameter circle on the floor/ carpet. This represents the turret.
- ◊ Put the swivel chair in the middle of the circle.
- ◊ Approximately 10 feet away from the turret, draw a three-foot square on the floor with the masking tape. This will represent the pilot house.
- Prepare the captain's mask (see template provided in this guide for directions).
- Crumple up pieces of scrap paper to serve as the “shells” for the *Monitor* gun and place in the bowl.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her. <http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservationists at work via webcams, and read the blogs of the conservators as they uncover new finds. <http://www.monitorcenter.org/>

#### The Mariners' Museum: USS *Monitor* Center

Description of the Battle of Hampton Roads. <http://www.monitorcenter.org/the-battle-of-hampton-roads/>

### Books

Broadwater, John D.: *USS Monitor, A Historic Ship Completes Its Final Voyage*. Everbest Printing Company, 2012. ISBN-13: 978-1603444736.

Nelson, James L.: *Reign of Iron, The Story of the First Battle Ironclads, the Monitor and the Merrimack*. HarperCollins Publishers Inc., 2004. ISBN: 0060524030.

Quarstein, John V.: *A History of Ironclads, The Power of Iron Over Wood*. The History Press, 2006. ISBN-13: 978-1596291188.

Quarstein, John V.: *The Battle of the Ironclads*. Arcadia Publishing, 1999. ISBN: 0738501131.

Quarstein, John V.: *The Monitor Boys: The Crew of the Union's First Ironclad*. The History Press, 2011. ISBN-13: 978-1596294554.

## Vocabulary

**AMIDSHIP** — In the middle of a ship

**DAHLGREN GUN** — Muzzle-loading naval artillery designed by Rear Admiral John A. Dahlgren, mostly used in the American Civil War

**TURRET** — A round, fortified structure resembling a tower

## Video

### The USS *Monitor* and NOAA: A Look Through Time

Travel back to 1862 in this educational video to learn how the USS *Monitor* turned the tide of the Civil War. The video also highlights the *Monitor's* discovery, designation as a national marine sanctuary, and more.

<https://www.youtube.com/watch?v=EX6H3Tp-2yE>

## Procedure

1. Give students a brief overview of the Battle of Hampton Roads (see Resource section). It is recommended that students be familiar with the history and design of the USS *Monitor* and the CSS *Virginia* prior to this activity.
2. Ask the students to imagine what it was like for sailors onboard each of the vessels during the battle. During this discussion be sure to highlight the following points:
  - a. The *Monitor's* captain in the pilot house had a limited field of vision.
  - b. Communication between the pilot house and the turret was very difficult.
  - c. The men inside the turret operating the two guns had only a small view hole to sight through. Also, the turret could only rotate in one direction.
  - d. The *Virginia* was substantially larger than the *Monitor* and had a deeper draft, which meant it had a difficult time maneuvering through the shallow waters of Hampton Roads.
3. Explain to the students that today they will become the crew of the two ironclad vessels. They will play a game where they have to work together to overcome some of the major challenges both crews faced during the battle, particularly the men operating the *Monitor's* turret.
4. Choose three students to represent the crew of the *Monitor*
  - a. Assign one student to be the gun. Have them put on a blind fold and sit in the swivel chair in the turret. Give this student the prepared "gun shells" (crumpled up scrap paper in bowl).
  - b. Assign one student to be the steam engine that powered the turret. While the actual turret was powered by two steam engines, for the sake of this game there is only one. Have the student put on a blind fold and stand behind the swivel chair with both hands resting on the back of the chair.
  - c. Assign one student to be the *Monitor's* captain. Have them put on the Captain's Mask and stand inside the pilot house.
5. Tell the remaining students that they will represent the *Virginia*.
  - a. Ask the students to form two equal lines. Have the two lines stand parallel to each other.

- b. Ask the students in each line to link arms with the person next to them and for the students in the back line to put their other hand on the shoulder of the student in front of them.
- c. Explain to the students in the front line that they will be in charge of "steering" the *Virginia*.
- d. Remind them that the two lines are connected, and they have to work as a team to navigate the ship through the classroom.

## Directions for the Game

1. Once all the students are in position, tell the *Virginia* to begin moving through the classroom. Give the *Virginia* approximately 30 seconds, and then tell them to freeze.
2. The crew of the *Monitor* will now attempt to fire their weapons at the *Virginia*.
  - a. The captain of the *Monitor* must first communicate to the blindfolded steam engine and gun where the *Virginia* is located.
  - b. The steam engine will then begin rotating the swivel chair in one direction only and at a very slow speed.
  - c. Using the captain's description of the *Virginia's* location, the gun will attempt to fire at the confederate ship. The gun may only fire one shell at a time and shells can only be fired with an underhand throw.
    - a. The *Monitor* crew will have 30 seconds to fire as many shots as possible.
3. After 30 seconds, tell the *Monitor* crew to freeze.
4. If a student on the *Virginia* crew is hit with a shell from the *Monitor*, they must leave the game and step to the side of the room. The remaining *Virginia* crew members will have to operate the ship without them.
5. Give the *Virginia* approximately 30 seconds to reposition themselves in the classroom, and then tell them to freeze.
6. Repeat the 30 second firing process with the *Monitor* crew. You can do this several times and see how many *Virginia* students the *Monitor* crew can hit.
7. If there is time, give students a chance to switch roles and repeat the game.
8. After several rounds of the game, distribute the provided Critical Thinking Worksheet. Give students approximately 10 minutes to answer the questions and then discuss their answers as a class.



On August 5, 2002, the USS *Monitor's* turret was raised and placed on a barge for the journey back to Newport News, Virginia. Today, it undergoes conservation at The Mariners' Museum. Photo: NOAA, *Monitor* Collection

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Around and Round We Go Critical Thinking Worksheet

**Directions:** Answer the following questions based on your observations from the game you just played.

1. What are some of the **advantages** of the USS *Monitor's* turret?

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2. What are some of the **disadvantages** of the turret?

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3. What do you think was the biggest challenge for the crew of the *Monitor*?

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4. What do you think was the biggest challenge for the crew of the *Virginia*?

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5. Explain any design changes you would make to either the *Monitor* and/or the *Virginia*. \_\_\_\_\_

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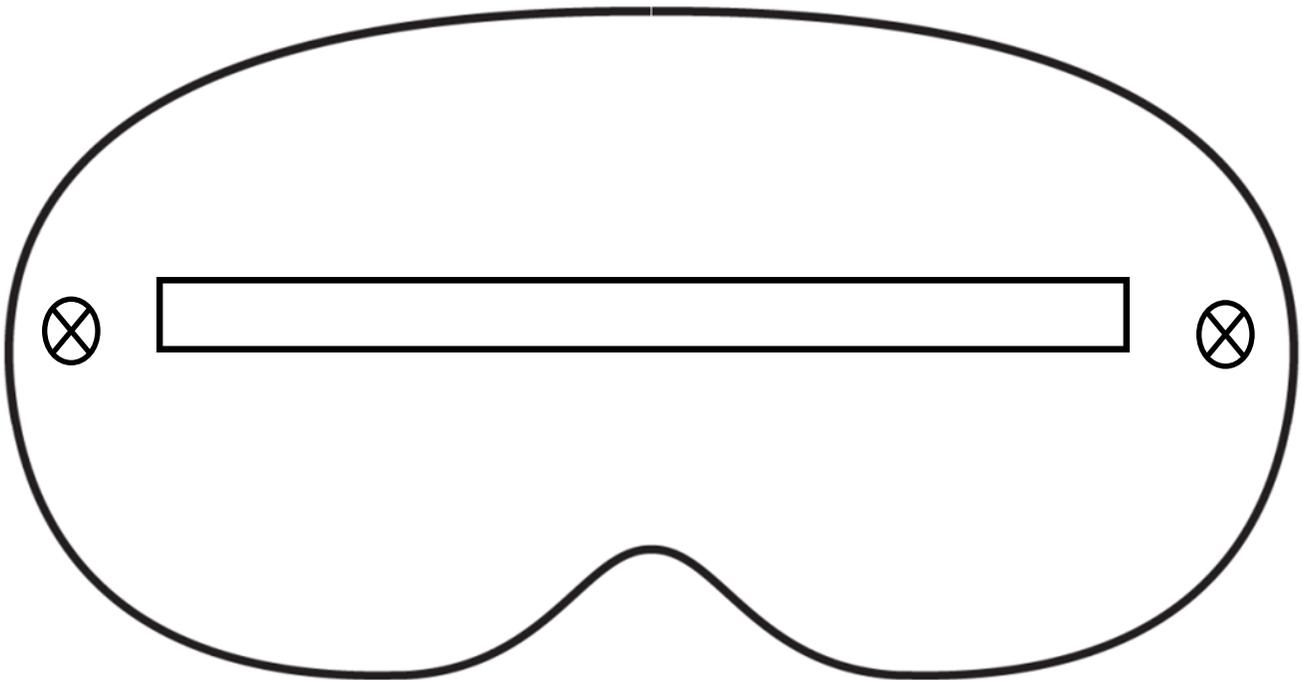
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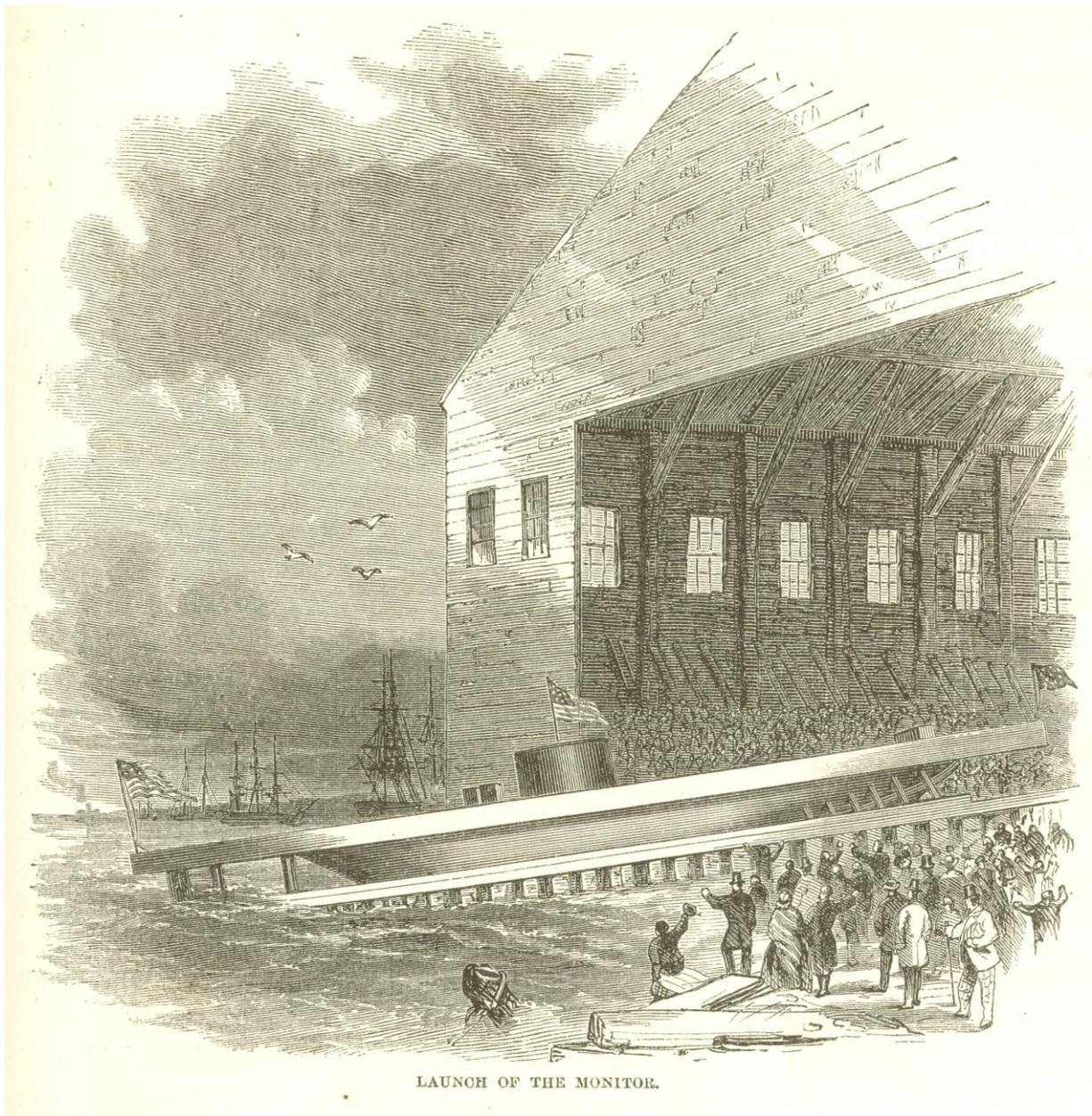
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## Captain's Mask Template

1. Make a copy of this template using card stock or other sturdy paper.
2. Cut along the solid, outside edges of the mask.
3. To limit the "captain's" vision, similar to Captain Worden's vision during the battle, cut out the rectangle in the middle of the mask.
4. Punch a hole in either side of the mask where marked. 
5. Attach the two strings by tying them securely onto the mask. Reinforce with tape if needed.



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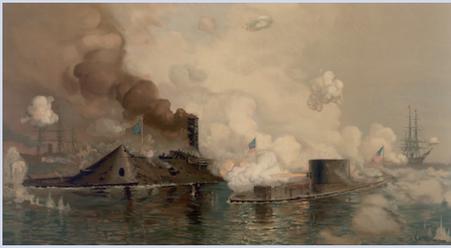
LAUNCH OF THE MONITOR.

## Section C

### Battle of Hampton Roads and Life After

- Piecing Together the Past
- Letters Home
- Interpreting the Past Through Art
- Ironclad for Sale!
- And the Winner Is...
- Music of the Civil War
- Life Aboard the *Monitor*
- It's In the Bag
- The *Monitor* is No More

# Piecing Together the Past



A painting by J.O. Davidson of the battle between USS *Monitor* and CSS *Virginia*. Photo: Courtesy of The Mariners' Museum

## Grade Level

- 4-8

## Timeframe

- 1 hour

## Materials per Student/Group

- Critical Thinking Worksheet
- Primary Sources 1-7

## Activity Summary

Students use firsthand accounts to examine the events of the Battle of Hampton Roads.

## Learning Objectives

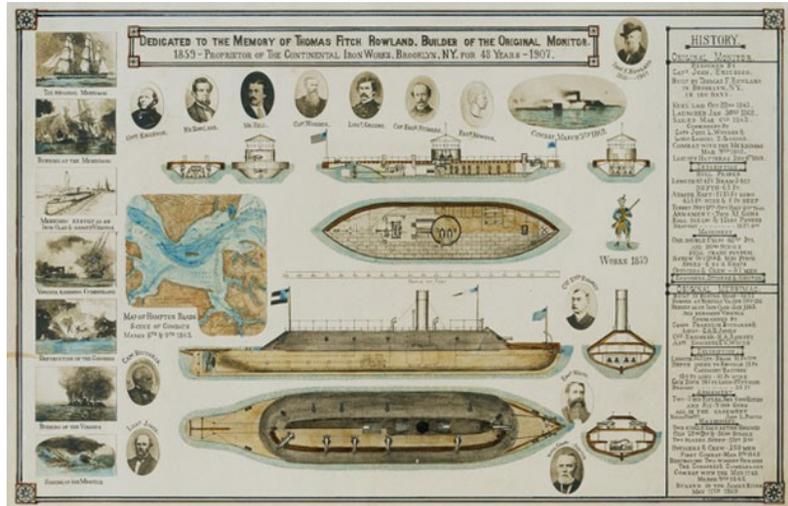
- To use primary source documents to piece together the events of the Battle of Hampton Roads
- Create a timeline of the battle

## Key Words

Battle of Hampton Roads, USS *Monitor*, CSS *Virginia*, primary source, secondary source

## National Standards

**NCSS:** US 5-12; Era 5:2A;  
**NCSS Thinking Standards:** 1, 2, 3, and 4; **CC.ELA.LIT.RI;** **CC.ELA.LIT.W:** 4-8.2;  
**NCTE:** 1, 3, and 7; **NS.5-8.E;** **NS.5-8.G**



Montage print that includes the *Monitor* and the *Virginia*, with portraits of the men responsible for building and operating them, as well as scenes from their histories. The print was dedicated to "Thomas Fitch Rowland, Builder of the Original *Monitor*." Drawn by Charles H. Corbett, circa 1907. Photo: Courtesy of The Mariner's Museum.

## Background Information

The Battle of Hampton Roads was a turning point in naval warfare. For the first time, iron met iron as the CSS *Virginia* and the USS *Monitor* fought for control over the strategically important waterways of Hampton Roads, Virginia. The battle took place over two days, March 8 and 9, 1862. When the *Virginia* sailed out of Portsmouth, Virginia, and into Hampton Roads on the afternoon of March 8, her goal was to destroy the Union blockade.

The Union blockade was comprised of experienced and well-armed warships. However, it soon became clear that these wooden vessels were no match for the Confederate ironclad. In just one short day, the *Virginia* attacked eight ships, sinking four of them. The Union lost 241 sailors and over 100 more were wounded. The *Virginia*'s rampage demonstrated the devastating effectiveness of iron against wood. The complete destruction of the USS *Cumberland* and the USS *Congress* left the Union fleet feeling powerless against this new enemy.

On the evening of March 8, the USS *Monitor* arrived in Hampton Roads and encountered a scene of loss and devastation for the Union navy. The *Monitor* positioned herself between the *Virginia* and her next target, the USS *Minnesota*. On the morning of March 9, iron met iron for the first time in history as the *Monitor* sailed out to meet the *Virginia* for battle. The innovative warship held off the *Virginia* and prevented further destruction of the Union fleet and the capture of the Hampton Roads waterways. For over four hours the *Monitor* and the *Virginia* fired at point blank range, neither causing serious damage to their enemy.

While the battle ended in a draw, it was an important strategic victory for the Union. Maintaining Union control of Hampton Roads prevented the Confederacy from gaining access to an area that would have given Southern forces an opportunity to capture Washington D.C. Because the altercation took place so close to shore, there were a variety of eyewitnesses of the Battle of Hampton Roads. Many of these civilian witnesses, along with Union and Confederate soldiers and sailors, documented their accounts of the battle.

## Activity Summary

Students use firsthand accounts to examine the events of the Battle of Hampton Roads.

## Learning Objectives

Students will use primary source documents to piece together the events of the Battle of Hampton Roads.

## Teacher Preparation and Implementation

- It is recommended that students should have some basic information on the history of the USS *Monitor* and the CSS *Virginia*. (See Part I of this teacher guide for lesson plans on the two ironclad vessels.)
- Print the provided primary sources and Critical Thinking Worksheet (one per student or group).
- Follow the steps listed in the Procedure section.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her. <http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservationists at work via webcams, and read the blogs of the conservators as they uncover new finds. <http://www.monitorcenter.org/>

#### The Mariners' Museum: USS *Monitor* Center

Battle of Hampton Roads timeline. <http://www.monitorcenter.org/battle-hampton-roads-timeline/>

#### The Mariners' Museum: USS *Monitor* Center

Description of the Battle of Hampton Roads. <http://www.monitorcenter.org/the-battle-of-hampton-roads/>

## Vocabulary

**PRIMARY SOURCE** — A source of information that was created during the time period that is being studied

**SECONDARY SOURCE** — An interpretation of historical events that was produced after the time period being studied. Secondary sources describe, interpret, and analyze primary sources.

## The Mariners' Museum: USS *Monitor* History

Explore the history of the USS *Monitor*, the CSS *Virginia*, and the Battle of the Hampton Roads.

<http://www.monitorcenter.org/the-uss-monitors-story/>

## Books

Nelson, James L.: *Reign of Iron, The Story of the First Battle Ironclads, the Monitor and the Merrimack*. HarperCollins Publishers Inc., 2004. ISBN: 0060524030.

Quarstein, John V.: *A History of Ironclads, The Power of Iron Over Wood*. The History Press, 2006. ISBN-13: 978-1596291188.

Quarstein, John V.: *The Battle of the Ironclads*. Arcadia Publishing, 1999. ISBN: 0738501131.

## Video

### The USS *Monitor* and NOAA: A Look Through Time

Travel back to 1862 in this educational video to learn how the USS *Monitor* turned the tide of the Civil War. The video also highlights the *Monitor's* discovery, designation as a national marine sanctuary, and more.

<https://www.youtube.com/watch?v=EX6H3Tp-2yE>

## Procedure

1. Begin by discussing the Battle of Hampton Roads. Give students a brief overview of the events and explain why this battle is historically significant (see Background Information and Resource section).
2. Tell students that they will use primary sources to piece together a timeline of the Battle of Hampton Roads. Explain that these primary sources come from eyewitnesses of the battle who documented their personal account of the two-day event.
3. Tell the students that their job is to examine one of the primary sources and then work with their classmates to determine what exactly happened during the battle.
5. Distribute one of the provided primary sources and one Critical Thinking Worksheet per student or group.
6. Give the students approximately 30 minutes to examine their primary source and complete the worksheet.
7. After completing the worksheet, students work as a class to assemble a general timeline for the Battle of Hampton Roads. This can be done on the classroom whiteboard or chalkboard, or students can work in teams to make timeline posters. There are also many free timeline maker websites for students. Once the students have finished their timeline, compare it with the official timeline of the battle (see Resource section).
8. End the activity by discussing with the students the benefits and challenges of using primary sources to study the past.

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Piecing Together the Past Critical Thinking Worksheet

**Directions:** Today you will be reading a firsthand account of the Battle of Hampton Roads. You will become this person and retell their story to your classmates as you work together to assemble a timeline of the battle. After reading through your primary source, answer the questions below.

1. What is your name (if provided) and occupation? \_\_\_\_\_

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2. Where were you during the battle on March 8 and 9, 1862? \_\_\_\_\_

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3. Are you a Northerner or Southerner? \_\_\_\_\_

4. Describe the events of the battle. Be as specific as possible (date, time, location, etc.).

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5. Describe the initial fighting between the CSS *Virginia* (*Merrimack*) and the wooden Union vessels.

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6. Describe the battle between the CSS *Virginia* and the USS *Monitor*. In your opinion, who won the battle?

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## Primary Source 1

Abstract log of the USS *Mount Vernon*.

March 8, 1862.—At 12:40 p. m. observed the rebel ironclad steam frigate *Merrimack* [*Virginia*] coming down the Elizabeth River. At 12:55 fired a shot in the direction of the enemy to attract the attention of the senior officer to our signal. Sent a boat to ask the senior officer to send us a tug to tow us into action, our machinery being apart and our fires not lighted. At 1:30 observed the U.S. frigates *Minnesota* and *Roanoke* weigh their anchors and proceed in the direction of the enemy in tow of steam tugs. . . . Our boat returned with the information that the senior officer needed the only tugs at his disposal for the above-named frigates. Endeavored to procure a tug from the quartermasters department without success. At 2:15 the action commenced between the U.S. frigates *Congress* and *Cumberland* and the battery at Newport News and the enemy, consisting of the *Merrimack*, *Yorktown*, *Jamestown*, and three smaller steamers. At 2:20 shots were exchanged between the rebel batteries at Sewells Point and the flagship *Minnesota*. At 3:20 the *Minnesota* grounded near Newport News. Heavy firing going on between all the vessels engaged. At 4 observed the U.S. frigate *Congress* hoist the white flag. At 4:30 sent on shore for the machinery of this vessel that was being repaired there. At 5:15 the U. S. frigate *St. Lawrence* passed up on her way to the scene of action in tow of U.S.S. *Cambridge*, the action still continuing. At 6:30 the U.S. frigate *Roanoke* returned to the roads, also the U.S.S. *Mystic*. The combatants ceased firing for the night. At 8:30 discovered the U.S. frigate *Congress* to be on fire. The U.S. S[hip] *St. Lawrence* returned to the roads. At 11:30 the U.S. ironclad battery *Monitor* passed up toward Newport News. Received the machinery from the shore, none of it being repaired. Lighted the fires and commenced getting up steam.

March 9.—At 12:30 a.m. observed the U.S.S. *Congress* blow up. At daylight observed three rebel steamers coming down toward Sewells Point. Backed the vessel down toward the senior officers' ship and fired a shot at the enemy, which fell short. From 8 to meridian: Heavy firing going on between the *Minnesota* and ironclad battery *Monitor* on one side and the *Merrimack*, *Yorktown*, and *Jamestown* on the other. At 11:30 proceeded alongside the U.S. storeship *Brandywine* to take her in tow. At meridian proceeded with the *Brandywine* in tow. At sunset New Point Comfort distant 6 miles.

Source: *Official Records of the Union and Confederate Navies in the War of the Rebellion*, Series I, vol. 7: North Atlantic Blockading Squadron (March 8–Sept. 4, 1862), 29–30.

## Primary Source 2

Abstract log of the U. S. storeship *Brandywine*.

*March 8, 1862.*—At 1:30 p.m. the *Merrimack* [meaning the CSS *Virginia*] hove in sight steering for Newport News, in company with three tugs. At 2, frigates *Roanoke* and *Minnesota* got underway and proceeded to Newport News. At 2:25 firing commenced from the Rip Raps, Sewells Point, Craney Island, and Newport News. 4: firing still continues from five rebel boats and replied to by the *Congress*, *Cumberland*, and others on our side. At 5:30 p.m. the frigate *St. Lawrence* came in, towed by the steamer *Cambridge*, and proceeded to Newport News to assist our force there. All hands to quarters. At 8:30 p.m. saw fires at Newport News, found to be the frigate *Congress* burning; continued to burn during the watch. At 11:30 the Ericsson battery [*Monitor*] came in and proceeded to Newport News.

*March 9.*—Commences with calm, clear weather. The *Congress* still burning. At 12:30 a.m. the *Congress* blew up. At 5:30, day breaking, saw the *Minnesota* in position. At 6 saw three rebel steamers approaching. Called all hands to quarters. United States gunboat hoisted signal, got underway, and fired a gun. At 8 firing commenced from the *Merrimack*, which was returned by the Ericsson battery [the *Monitor*] and *Minnesota*. It has been reported here that the U.S. ship *Cumberland* has been sunk by the *Merrimack*. All hands still at quarters. From 8 to 12 p.m. the *Merrimack* and Ericsson battery [*Monitor*] engaged each other. Approximately 12 a.m., the U.S.S. *Mount Vernon* came alongside with orders to take this ship to Baltimore.

Source: *Official Records of the Union and Confederate Navies in the War of the Rebellion*, Series I, vol. 7: North Atlantic Blockading Squadron (March 8–Sept. 4, 1862), 32.

## Primary Source 3

Report of Major-General Wool, U. S. Army, commanding Department of Virginia. HEADQUARTERS DEPARTMENT OF VIRGINIA, Port Monroe, Va., March 9, 1862.

GENERAL: Two hours after I sent my hurried dispatch to the Secretary of War last evening the *Monitor* arrived and saved the *Minnesota* and *St. Lawrence*, which were both aground when she arrived. *Merrimack* [CSS *Virginia*], 'supported by the *Yorktown* and *Jamestown*, commenced an attack on the *Minnesota* (still aground) early this morning, and after a contest of five hours was driven off in a sinking condition by the *Monitor*, aided by the *Minnesota*, and towed by the *Jamestown* and *Yorktown* toward Norfolk, for the purpose [of putting her] in the dry dock for repairs. . . . It is 'reported that [General] Magruder is approaching Newport News with a large force of infantry. I have reenforced that post with three regiments, a light battery of six pieces, and a company of dragoons. The command consists altogether of over or about 8,000 men. My command consists altogether of 10,000 effective men. The *Cumberland* was sunk, and we lost more than one half of her crew. The *Congress* surrendered, but the crew was released and the officers taken as prisoners. The *Minnesota* has got off, but it is reported she is in a sinking condition. It is to be hoped that I will be largely 'reenforced, including two additional light batteries. The is far superior to the *Merrimack*. The first has only two guns, while the *Merrimack* has eight.

I have the honor to be, very respectfully, your obedient servant,

JOHN E. WOOL, Major-General GEORGE B. MCCLELLAN, Major- General. Commanding the Army, Washington, D. C. (Similar report to Secretary of War.)

Source: *Official Records of the Union and Confederate Navies in the War of the Rebellion*, Series I, vol. 7: North Atlantic Blockading Squadron (March 8–Sept. 4, 1862), 34.

## Primary Source 4

Report of Brigadier-General Mansfield, U.S. Army, commanding brigade.  
HDQRS. FIRST BRIG., FIRST DIV., DEPT. OF VIRGINIA,  
Newport News, March 10, 1862.

SIR: I have the honor to report that in the forenoon of Saturday, the 8th instant, the commanders of the *Congress* and *Cumberland*, at anchor in the stream, notified me that the ironclad *Merrimack* [Virginia] steamer of the enemy was 'approaching from Norfolk to attack them, and I immediately telegraphed you to that effect. At about 2 o'clock p. m. she approached very near these vessels slowly, engaged first the *Congress*, and passed on to the *Cumberland* and ran into her, and all within a mile of our batteries. I immediately ordered Lieutenant-Colonel G. Nauman, chief of artillery, to open our batteries of four columbiads [cannons] and one 42-pounder James gun [cannon] to fire on her. It was done with alacrity [quickly] and kept up continuously with spirit as long as she was in range, and although our shot often struck her, they made no impression on her at all. . . . no visible serious damage to her from our guns was done, such was the strength of her mail [armor]. . . .

During the sinking of the *Cumberland*, the *Congress* slipped her cable and hoisted sail and ran ashore just above Signal Point, where many of her men escaped to the shore, and was then followed by the *Merrimack*, and after two raking shots she hauled down her flag and hoisted a white flag and ceased action. The enemy then sent two steamers with Confederate flags flying and made thus on either side of her, with a view to haul her off or burn her. As soon as I saw this I ordered Colonel Brown . . . to send two rifle companies (A and K) to the beach. The two rifled guns, under Captain Howard, and a rifled Dahlgren howitzer, manned by Master Stuyvesant and fourteen sailors of the *Cumberland*, went into action from a raking position on the beach . . . against these steamers. . . .

Thus closed the tragedy of the day. The enemy retired at dark toward the opposite shore, and the *Congress* illuminated the heavens and varied the scene by the firing of her own guns and the flight of her [cannon]balls through the air till about 2 o'clock in the morning, when her magazine exploded and a column of burning matter appeared high in the air, to be followed by the stillness of death. . . . All was done that it was possible to do under the circumstances to save these ships from the enemy. . . .

The loss on the part of our Navy must have been great by the bursting of shells and the drowning by the sinking of the *Cumberland*, although our best efforts were made to save them. Our ships were perfectly helpless against the 'Merrimack, as their broadsides produced no material effect on her.

All of which is respectfully submitted.

Jos. K. F. MANSFIELD, Brigadier-General, Commanding.  
Major-General JOHN E. WOOL, Commanding Department of Virginia.

Source: *Official Records of the Union and Confederate Navies in the War of the Rebellion*, Series I, vol. 7: North Atlantic Blockading Squadron (March 8–Sept. 4, 1862), 34–36.

## Primary Source 5

Letter from USS *Monitor* crewman George Geer to his wife.

Dear Wife,

I shall write you very little about our Fight as you shall see it in all the Papers. I was on duty in the fire room when the action commenced but was relieved and went to my station hoisting up shot and shell to the Tower [turret] Guns. I often thought of you and the little darlings when the fight was going on and what would become of you should I be killed but I should have no more such fears as our ship resisted every thing they could fire at her as though they were spit balls. I want you to send me the Times that has an account of our doings. I was not a bit sea sick and stood the trip well our only difficulty was that the water washed into us and kept us all soaking wet and did not give us any chance to sleep and when we got about ten miles off the Fortress we could hear the guns very plain and at once got to our places and were all ready to commence but passed a sleepless night for nothing which made four nights in succession we had gone with no sleep and were pretty well [in] need of. Our ship is crowded with generals and officers of all grades both Army & 'Navy they are wild with Joy and say if any of us men come to the Fort we can have all we want free as we have saved 100s of lives and millions of property to the government

[George Geer]

Source: George S. Geer Papers, 1862-1866: MS010

The Library at The Mariners' Museum, Newport News, Virginia

## Primary Source 6

Lieutenant Rochelle, a Confederate sailor aboard the C.S.S. *Patrick Henry*:  
 C. S. S. PALMETTO STATE,  
 Charleston, S. C., January 30, 1865.

DEAR SIR: I am glad to learn from you that Flag-Officer Lynch has been directed by the Department to prepare a 'narrative of the memorable and gallant deeds of the Confederate Navy. . . .

At the first peep of dawn on the 9th of March the Confederate squadron was underway, it having been determined to destroy the *Minnesota* that near as the vessel being still aground Newport News. [As] daylight increased the *Minnesota* was discovered in her old position, but the *Minnesota* was not the only thing to attract attention. Close alongside of her there lay such a craft as the eyes of a seaman never looked upon before an immense shingle floating on the water, with a gigantic cheese box rising from its center; no sails, no wheels, no smokestack, no guns. What could it be? On board the *Patrick Henry* many were the surmises [guesses] as to the strange craft. Some thought it a water tank sent to supply the *Minnesota* with water; others were of opinion that it was a floating magazine replenishing her exhausted stock of ammunition; a few visionary characters feebly intimated that it might be the *Monitor* which the Northern papers had been boasting about for a long time. All doubts about the stranger were soon dispelled. As the *Virginia* steamed down upon the *Minnesota* the cheese box and shingle steamed out to meet her. It was indeed the *Monitor*, and then and there 'commenced the first combat that had ever taken place between ironclads. The *Patrick Henry* and the other wooden vessels took little part in the events of the day, except to exchange shots with the *Monitor* at long range as she passed and repassed during her maneuvering with the *Virginia*. At one time the *Virginia* did not seem to move. Apprehensions were entertained that she had got aground or that some part of her machinery was damaged. Signal flags were run up on board of her, but the flags did not blow out clear and it was some minutes before the signal officer of the *Patrick Henry* could make out the numbers. At length he reported the signal to be "Disabled my propeller is." No wooden vessel could have floated twenty minutes under the fire that the *Virginia* was undergoing, but if her propeller was disabled it was necessary to attempt to tow her back to the cover of our batteries, so the *Patrick Henry* and *Jamestown* started to make the attempt. They had gone but a short distance before the *Virginia* was seen to move and her propeller to turn, and the sacrifice was not necessary. That evening all the Confederate vessels went into the harbor of Norfolk and 'anchored. . . .

Source: *Official Records of the Union and Confederate Navies in the War of the Rebellion*, Series I, vol. 7: North Atlantic Blockading Squadron (March 8–Sept. 4, 1862), 49, 52–53.

## Primary Source 7

Watching the “Merrimac.” By R. E. Colston, Brigadier-General, C.S.A.

In March, 1862, I was in command of a Confederate brigade and of a district on the south side of the James River embracing all the river forts and batteries down to the mouth of Nansemond River. My pickets were posted all along the shore opposite Newport News. From my headquarters at Smithfield I was in constant and rapid communication through relays of couriers and signal stations with my department commander, Major-General Huger, stationed at Norfolk.

About 1 P.M. on the 8th of March, a courier dashed up to my headquarters with this brief dispatch: “The *Virginia* is coming up the river.” Mounting at once, it took me but a very short time to gallop twelve miles down to Ragged Island.

I had hardly dismounted at the water's edge when I [saw] the *Merrimac* [*Virginia*] approaching. The *Congress* was moored about a hundred yards below the land batteries, and the *Cumberland* a little above them. As soon as the *Merrimac* came within range, the batteries and war-vessels opened fire. She passed on up, exchanging broadsides with the *Congress*, and making straight for the *Cumberland*, at which she made a dash, firing her bow-guns as she struck the doomed vessel with her prow. I could hardly believe my senses when I saw the masts of the *Cumberland* begin to sway wildly. After one or two lurches, her hull disappeared beneath the water, guns firing to the last moment. Most of her brave crew went down with their ship, but not with their colors, for the Union flag still floated defiantly from the masts, which projected obliquely for about half their length above the water after the vessel had settled unevenly upon the river-bottom. This first act of the drama was over in about thirty minutes, but it seemed to me only a moment. . . .

As soon as it was known at Fort Monroe that the *Merrimac* had come out, the frigates *Minnesota*, *Roanoke*, and *St. Lawrence* were ordered to the assistance of the blockading squadron. The *Minnesota*, assisted by two tugs, was the first to reach the scene, but the *Cumberland* and the *Congress* were already past help. As soon as she came within range, a rapid cannonade commenced between her and the *Merrimac*, aided by the *Patrick Henry* and the *Jamestown*, side-wheel river steamers transformed into gun-boats. The *Minnesota*, drawing nearly as much water as the *Merrimac*, grounded upon a shoal in the North Channel. This at once put an end to any further attacks by ramming; but the lofty frigate, towering above the water, now offered an easy target to the rifled guns of the *Merrimac* and the lighter artillery of the gun-boats. A shot from her exploded the *Patrick Henry's* boiler, causing much loss of life and disabling that vessel for a considerable time. . . .

[The next day, March 9] The sun was just rising when the *Merrimac* . . . headed toward the *Minnesota*. . . . As soon as the *Merrimac* approached her old adversary, the *Monitor* darted out from behind the *Minnesota*, whose immense bulk had effectually concealed her from view. No words can express the surprise with which we beheld this strange craft, whose appearance was tersely and graphically described by the exclamation of one of my oarsmen, “A tin can on a shingle!” Yet this insignificant-looking object was at that moment the most powerful war-ship in the world. The first shots of the *Merrimac* were directed at the *Minnesota*, which was again set on fire, while one of the tugs alongside of her was blown up, creating great havoc and consternation; but the *Monitor*, having the advantage of light draught [draft], placed herself between the *Merrimac* and her intended victim, and from that moment the conflict became a heroic single combat between the two iron-clads. For an instant they seemed to pause, as if to survey each other. Then advancing cautiously, the two vessels opened fire as soon as they came within range, and a fierce artillery duel raged between them without perceptible effect, although the entire fight was within close range, from half a mile at the farthest down to a few

## Primary Source 7 — Continued

Watching the “Merrimac.” By R. E. Colston, Brigadier-General, C.S.A.

yards. For four hours, from 8 to 12 (which seemed three times as long), the cannonading continued with hardly a moment's intermission. I was now within three-quarters of a mile of them, and more than once stray shots came near enough to dash the spray over my barge, but the grandeur of the spectacle was so fascinating that they passed by unheeded. During the evolutions, in which the *Monitor* had the advantage of light draught, the *Merrimac* ran aground. After much delay and difficulty she was floated off. Finding that her shot made no impression whatever upon the *Monitor*, the *Merrimac*, seizing a favorable chance, succeeded in striking her foe with her stem. Soon afterward they ceased firing and separated as if by common consent. The *Monitor* steamed away toward Old Point. Captain Van Brunt, commander of the *Minnesota*, states in his official report that when he saw the *Monitor* disappear, he lost all hope of saving his ship. But, fortunately for him, the *Merrimac* steamed slowly toward Norfolk, evidently disabled in her motive power. The *Monitor*, accompanied by several tugs, returned late in the afternoon and they succeeded in floating the *Minnesota* and conveying her to Old Point.

Source: *Official Records of the Union and Confederate Navies in the War of the Rebellion*, Series I, vol. 7: North Atlantic Blockading Squadron (March 8–Sept. 4, 1862), 49, 52–53.

# Letters Home



## Grade Level

- 4-8

## Timeframe

- 1 hour

## Materials per Student/Group

- [Critical Thinking Worksheet](#)
- [Letter Template](#)
- Lined paper

## Activity Summary

Students become Civil War soldiers or sailors and write a letter to their family about the historic Battle of Hampton Roads.

## Learning Objectives

Students will understand how soldiers and sailors in the North and South communicated with their families and shared news of the war.

## Key Words

Battle of Hampton Roads, civilian, home front

## National Standards

NCSS: US 5-12: Era 5:2A and 2B;  
 NCSS Thinking Standards: 1, 2, and 3;  
 CC.ELA.LIT.RI; CC.ELA.LIT.W: 4-8.2;  
 CC.ELA.LIT.W: 4-8.3; NCTE: 1, 3, and 7;  
 NG:17



Photo image of an envelope from a letter written by Private John W. Derr of the 48th Pennsylvania Volunteer Infantry Regiment, Company D (1861 –1865). Photo: Courtesy of JWDLetters (See Resource section for website.)

## Background Information

During the Civil War, the home front and the battlefield were very much intertwined. Families watched as husbands, fathers, brothers, and sons marched off to war, leaving mostly women and children behind to maintain the home and support the war effort. As families throughout the country attempted to adjust to wartime realities, they relied on letter writing as the main form of communication with relatives in the field.

The chaos and disruption caused by the war meant that families and soldiers would often have to wait long periods of time between letters. Mail carriers in the North and South were faced with the challenge of locating the armies that were continually on the move. Sending and receiving letters was particularly difficult for families on different sides of the conflict.

When war broke out in 1861, the Union began developing ways to cut off supplies and isolate the states that had succeeded. Along with a naval blockade of Southern ports, the Postmaster General Montgomery Blair ended all mail service to Confederate states. However, Confederate blockade runners did manage to carry some mail with them across the border.

Despite the numerous challenges, families and soldiers continued to write letters to each other. Today these letters are invaluable primary sources for historians and provide unique glimpses into the experiences of people from every side of the conflict.

## Activity Summary

Students become Civil War soldiers or sailors and write a letter to their family about the historic Battle of Hampton Roads.

## Learning Objectives

Students will understand how soldiers and sailors in the North and the South communicated with their families and shared news of the war. They will write letters simulating Civil War letters.

## Teacher Preparation and Implementation

- Print Critical Thinking Worksheet and Letter Template.
- It is necessary that students have a basic understanding of the Battle of Hampton Roads to complete this lesson. We recommend that prior to this activity, students complete “Piecing Together the Past” (also found in this teacher guide).
- Follow the steps in the Procedure section.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her.

<http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservationists at work via webcams, and read the blogs of the conservators as they uncover new finds.

<http://www.monitorcenter.org/>

#### The Mariners' Museum: USS *Monitor* Center

Battle of Hampton Roads timeline.

<http://www.monitorcenter.org/battle-hampton-roads-timeline/>

#### The Mariners' Museum: USS *Monitor* Center

Description of the Battle of Hampton Roads.

<http://www.monitorcenter.org/the-battle-of-hampton-roads/>

#### The Mariners' Museum: USS *Monitor* History

Explore the history of the USS *Monitor*, the CSS *Virginia*, and the Battle of the Hampton Roads.

<http://www.monitorcenter.org/the-uss-monitors-story/>

#### National Postal Museum

Article on the history of letter writing in America.

<http://postalmuseum.si.edu/letterwriting/index.html>

#### John W. Derr Letters

A private online collection of letters written by John W. Derr as he served in the 48th Pennsylvania Volunteer Infantry Regiment, Company D from 1861 to 1865. Letters, images, and history all intertwined to tell the story of one Civil War soldier.

<http://www.jwdletters.com/>

### Books

Broadwater, John D.: *USS Monitor, A Historic Ship Completes Its Final Voyage*. Everbest Printing Company, 2012. ISBN-13: 978-1603444736.

Nelson, James L.: *Reign of Iron, The Story of the First Battle Ironclads, the Monitor and the Merrimack*. HarperCollins Publishers Inc., 2004. ISBN: 0060524030.

Quarstein, John V.: *A History of Ironclads, The Power of Iron Over Wood*. The History Press, 2006. ISBN-13: 978-596291188

Quarstein, John V.: *The Battle of the Ironclads*. Arcadia Publishing, 1999. ISBN: 0738501131.

Quarstein, John V.: *The Monitor Boys: The Crew of the Union's First Ironclad*. The History Press, 2011. ISBN-13: 978-1596294554.

### Video

#### The USS *Monitor* and NOAA: A Look Through Time

Travel back to 1862 in this educational video to learn how the USS *Monitor* turned the tide of the Civil War. The video also highlights the *Monitor's* discovery, designation as a national marine sanctuary, and more.

<https://www.youtube.com/watch?v=EX6H3Tp-2yE>

### Procedure

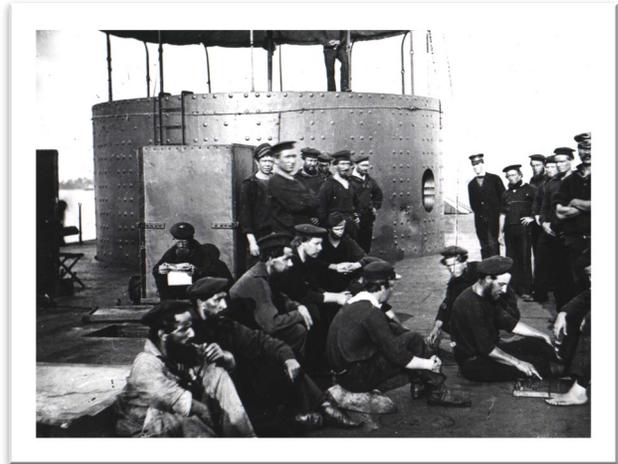
1. Begin by discussing the Northern and Southern home fronts during the Civil War. Ask students to brainstorm a list of all of the different communication forms we have today (phones, computers, newspapers, etc.). Which of these modes of communication were available during the Civil War? How did soldiers/sailors share news with their families? How did families contact loved ones who were serving in the military?
2. Discuss the importance of letter writing during the Civil War.

## Vocabulary

**PRIMARY SOURCE** — A source of information that was created during the time period that is being studied

**SECONDARY SOURCE** — An interpretation of historical events that was produced after the time period being studied. Secondary sources describe, interpret, and analyze primary sources.

3. Explain to the students that they will take on the role of either a Northern or Southern soldier/sailor that has just witnessed the Battle of Hampton Roads. They did not fight in the battle, but witnessed it from the shoreline and are now preparing to write a letter home to their families.
4. Distribute the provided Critical Thinking Worksheet. Give students approximately 15 minutes to complete the worksheet. After finishing the questions, they should have a general idea of what they will write in their letter.
5. Distribute the provided Letter Template and a piece of lined paper. Explain that the ballpoint pen was not invented yet, therefore, have them write in pencil or give them quill and ink. Allow students approximately 20 minutes to write their letter.
6. Conclude the activity by giving students the opportunity to read their letter to the class.

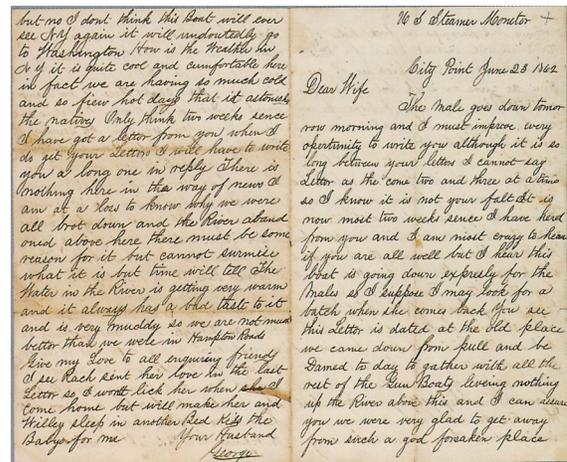


USS Monitor crew relax on deck. Note the sailor sitting against the turret reading either a letter or newspaper. Photo: Courtesy of Library of Congress

## Extension

Today, there are over 1.4 million active duty military personnel stationed around the world. To connect students to the present day military:

1. Have students create cards and/or write letters to our military:
  - Contact your local recruiter to get an address for a unit/division officer to send the letters.
  - Have students address the card/letter as “Dear Sailor,” “Dear Soldier,” “Dear Marine,” or “Dear Airman” as appropriate.
  - Mail the letters together in a small package or large envelope.
  - Only use the school’s address for the return address.
  - Do not allow students to give any specific personal information, such as their address or last name.
  - Encourage the soldier or sailor to write back to the class and/or student and tell them what life in the military is like for them.
2. Find the point of contact for your local Veterans Administration (VA) hospital and have students write to our military recovering from wounds received. The VA will not give out specific names and addresses, so have students address the letters as above.
3. For a holiday, have students bring in packaged treats, such as candy, individually sized hot chocolate or oatmeal, cookies, etc. Package all the items into one box and send to a unit or division, along with holiday cards made by the students. See number 1 above for how to obtain addresses.



Above and below: George S. Geer penned over 80 letters while serving on the USS Monitor offering great insight into life on board the ironclad. Photos: The Mariners’ Museum



NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Letters to Home Critical Thinking Worksheet

**Directions:** You are a Union or Confederate soldier/sailor who has just witnessed the Battle of Hampton Roads. After watching this historic battle, you decide to send a letter home describing the extraordinary events you witnessed. Begin by answering the questions listed below. These questions will help you brainstorm the content for your letter.

1. What is your name? \_\_\_\_\_
2. How old are you? \_\_\_\_\_
3. Are you a Union or a Confederate soldier/sailor? \_\_\_\_\_
4. When did you enlist, and how long have you been away from home? \_\_\_\_\_  
\_\_\_\_\_
5. What are the major events you witnessed at the Battle of Hampton Roads? Consider the timeline of events for both days of the battle. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
6. In your opinion, who won the Battle of Hampton Roads? Support your answer with evidence.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
7. How did witnessing this battle impact your view of the war? Did it give you hope in victory or make you fearful of defeat? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
8. If you are an artist, consider drawing a picture of the battle for your family. What would you draw and why?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Letter Template

Date

Greeting

Introduction

Describe what you have been doing since you last wrote home.

Explain what has prompted you to write this letter.

Body

Describe what you have seen. Be sure to include general details of the event and your perspective of the battle.

Conclusion

Describe how witnessing the battle has affected you and your current view of the war.

Predict when you will be able to write again

Signature

# Interpreting the Past Through Art



"The First Battle Between 'Iron' Ships of War – The Monitor", 1862. Courtesy of The Mariners' Museum

## Grade Level

- 4-8

## Timeframe

- 45 minutes

## Materials per Student/Group

- Critical Thinking Worksheet
- Images 1-4

## Activity Summary

Students compare and contrast the details of historical prints depicting the Battle of Hampton Roads.

## Learning Objectives

- To examine historical paintings from the Civil War era and explore the difference between primary and secondary sources

## Key Words

Primary source, secondary source, perspective, eyewitness

## National Standards

**NCSS:** US 5-12: Era 4: 4B, Era 5:2A;  
**NCSS Thinking Standards:** 1, 2 and 3;  
**CC.ELA.LIT.RI;** **CC.ELA.LIT.W:** 4-8.2;  
**NCTE:** 1, 3, and 7



"Battle Between the Monitor and the Merrimack," 1889. Photo: Courtesy of The Mariner's Museum.

## Background Information

The Battle of Hampton Roads was a turning point in naval warfare. For the first time, iron met iron as the CSS *Virginia* and the USS *Monitor* fought for control over the strategically important waterways of Hampton Roads, Virginia. The battle took place over two days, March 8 and 9, 1862.

Due to the battle's close proximity to shore and the number of military and civilian eyewitnesses, the Battle of Hampton Roads is a well-documented naval event. Primary source accounts of the battle include newspaper articles, journal entries, ship log entries, military reports, and letters from soldiers and sailors to their families. Images from the battle were also recreated in artwork in the form of lithographs, engravings, and paintings.

Historical paintings are often considered both a primary and a secondary source. They can provide firsthand knowledge of an event or time period and can also serve as recreations of important historical moments. There are many pieces of artwork featuring the Battle of Hampton Roads. Some pieces were produced by eyewitnesses, while other artists created their artwork based on other firsthand accounts. Each work of art tells a different story and represents a different point of view of the battle.

## Activity Summary

Students compare and contrast the details of historical prints depicting the Battle of Hampton Roads.

## Learning Objectives

Students will examine historical paintings from the Civil War era and explore the difference between primary and secondary sources.

## Teacher Preparation and Implementation

- Print provided images 1 – 4 and Critical Thinking Worksheet.
- We recommend that students complete “Piecing Together the Past,” (also found in this teacher guide) prior to this activity.
- Follow the steps listed in the Procedure section.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her.

<http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

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### Books

Nelson, James L.: *Reign of Iron, The Story of the First Battle Ironclads, the Monitor and the Merrimack*. HarperCollins Publishers Inc., 2004. ISBN: 0060524030.

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Quarstein, John V.: *The Battle of the Ironclads*. Arcadia Publishing, 1999. ISBN: 0738501131.

### Videos

#### The USS *Monitor* and NOAA: A Look Through Time

Travel back to 1862 in this educational video to learn how the USS *Monitor* turned the tide of the Civil War. The video also highlights the *Monitor's* discovery, designation as a national marine sanctuary, and more.

<https://www.youtube.com/watch?v=EX6H3Tp-2yE>

## PBS Learning — Picturing America

Learn about the Civil War through the art of Augustus Saint-Gaudens and Winslow Homer in this video from *Picturing America on Screen* and its supporting materials.

<https://www.pbslearningmedia.org/resource/pa11.vhssocst.us.indust.sainthom/picturing-america-augustus-saint-gaudens-and-winslow-homer/#.WSWDN4zyuF4>

## Procedure

1. Begin by discussing the difference between a primary and a secondary source.
2. Ask students to consider historic artwork. Would a painting of a Civil War battle be considered a primary or secondary source? Why or why not?
3. Divide students into groups of two to analyze one of the provided images of the Battle of Hampton Roads.
4. Give each group one image and Critical Thinking Worksheet. Depending on the number of students in your class, multiple groups may analyze the same image.
5. Ask students to work with their partner to answer all of the questions on the critical thinking worksheet.
6. After students have completed the questions, review their answers with the entire class and discuss their findings.

## Extension

Visit the Smithsonian American Art Museum's “Civil War and American Art” collection. It includes 75 works—57 paintings and 18 vintage photographs. Have students review various pieces and discuss what the paintings and photographs tell us about the Civil War. [http://americanart.si.edu/exhibitions/archive/2012/art\\_civil\\_war/](http://americanart.si.edu/exhibitions/archive/2012/art_civil_war/)

List of the collection with photos:

[http://americanart.si.edu/pr/library/2012/civilwar/civilwar\\_checklist.pdf](http://americanart.si.edu/pr/library/2012/civilwar/civilwar_checklist.pdf)

## Vocabulary

**EYEWITNESS** — A person who personally saw something happen and can give a firsthand description of the event

**PERSPECTIVE** — A particular attitude toward or a way of regarding something; a point of view

**PRIMARY SOURCE** — A source of information that was created during the time period that is being studied

**SECONDARY SOURCE** — An interpretation of historical events that was produced after the time period being studied. Secondary sources describe, interpret and analyze primary sources.

Name: \_\_\_\_\_

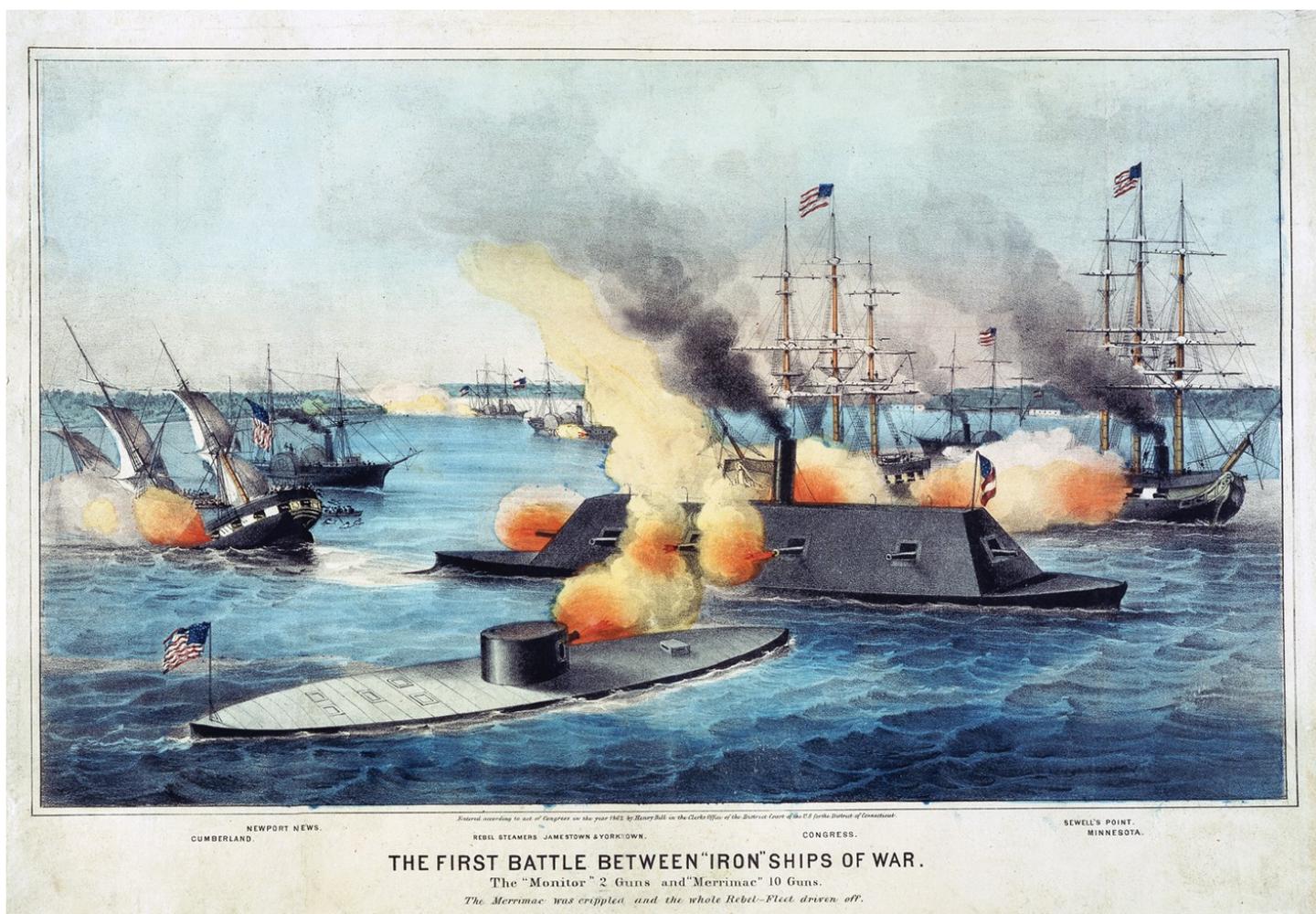
Date: \_\_\_\_\_

## Interpreting the Past Through Art Critical Thinking Worksheet

**Directions:** Begin by examining your historical artwork. Discuss your initial reaction and thoughts with your partner and then answer the questions listed below. As you go through the worksheet, consider whether or not this image is a primary source.

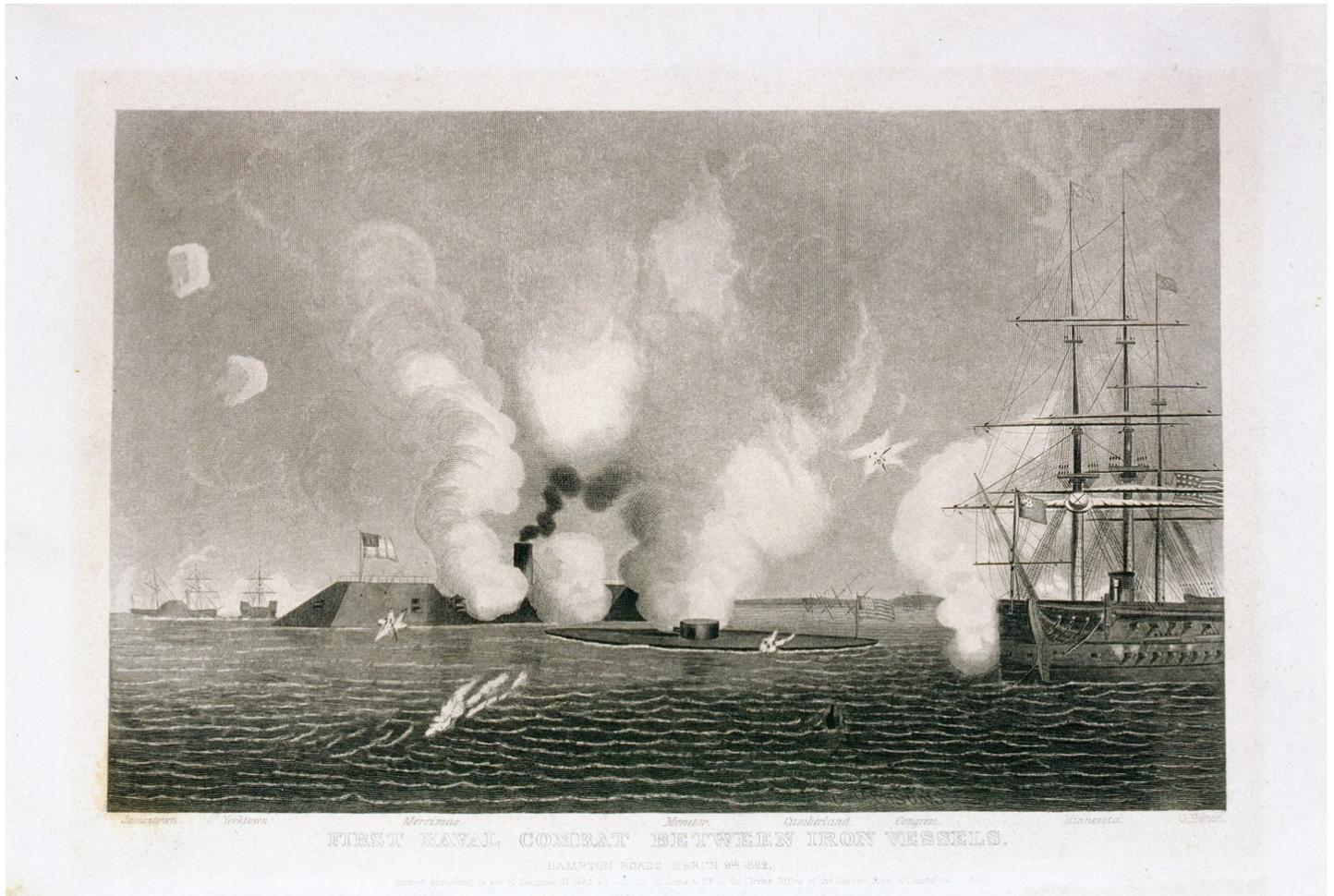
1. What is the date and title of this image? \_\_\_\_\_  
\_\_\_\_\_
2. What perspective of the Battle of Hampton Roads does this image show? For example, is it painted from the point of view of someone on shore or on board one of the ships? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. Describe what is happening in the image. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. Do you see any flags in the image? Are they Union or Confederate? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
5. What observations can you make about the USS *Monitor* and the CSS *Virginia* based on this image? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
6. Is there any writing on the image? What does it say? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
7. Is this image a primary or a secondary source? Explain your answer. \_\_\_\_\_  
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## Image 1



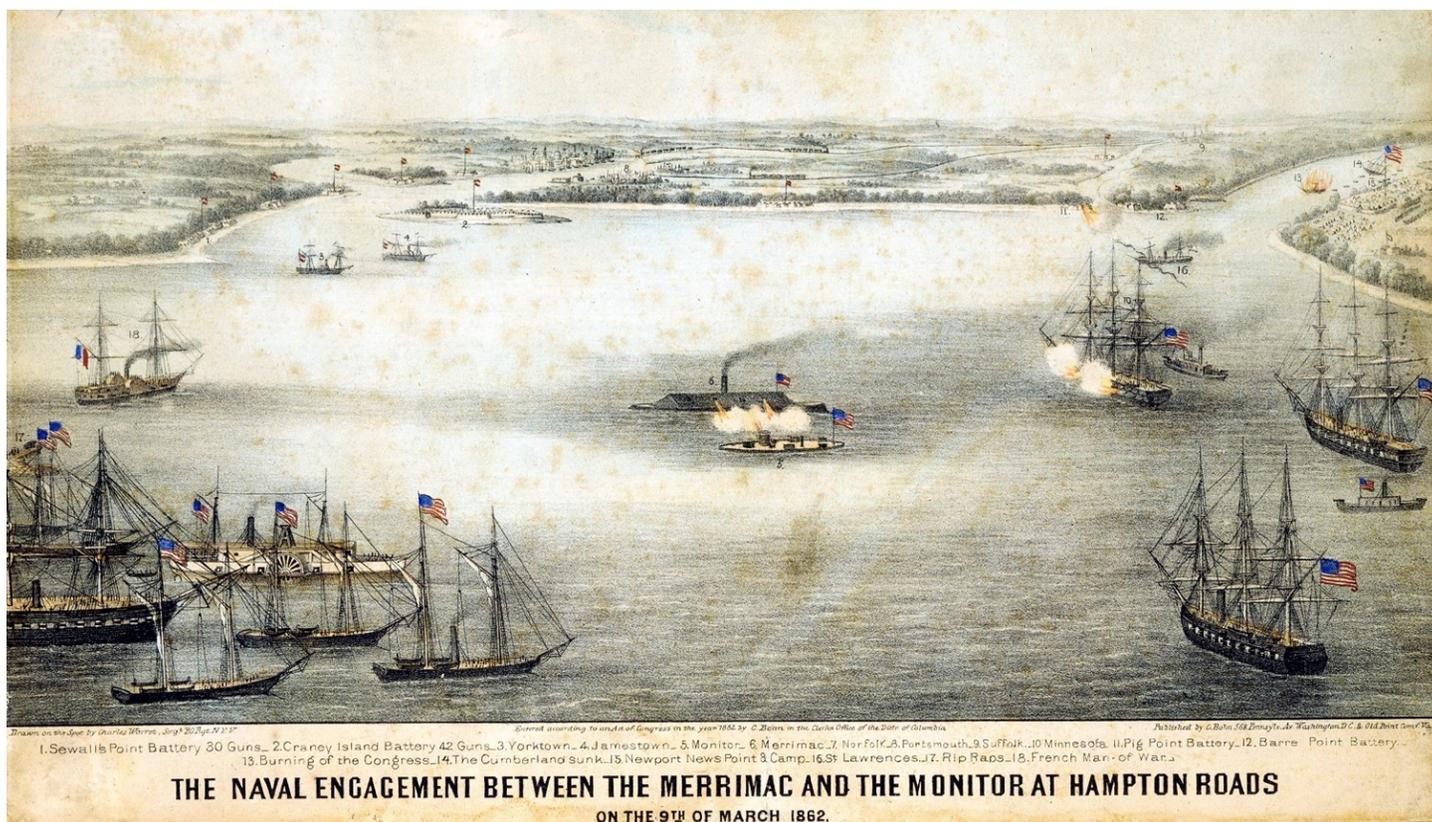
The First Battle Between 'Iron' Ships of War – The Monitor", 1862.  
Courtesy of The Mariners' Museum

## Image 2



"The Naval Conflict in Hampton Roads – Action Between the Monitor and Merrimac," 1862.  
Courtesy of The Mariners' Museum

### Image 3



“The First Battle Between ‘Iron’ Ships of War – The Monitor,” 1862.  
Courtesy of The Mariners’ Museum

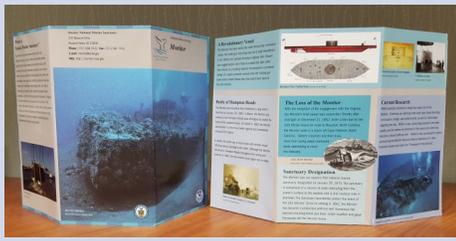
## Image 4



BATTLE BETWEEN THE MONITOR AND MERRIMACK.

“Battle Between the Monitor and the Merrimack,” 1889.  
Courtesy of The Mariners’ Museum

# Ironclad for Sale!



Monitor National Marine Sanctuary brochure.  
Photo: NOAA

## Grade Level

- 4-8

## Timeframe

- 2 hours

## Materials per Student/Group

- Brochure Template
- Critical Thinking Worksheet
- Computer with Internet access
- Paper
- Markers, crayons, colored pencils

## Activity Summary

Students design a sales brochure for the CSS *Virginia* or the USS *Monitor* that assesses the advantages and disadvantages of each vessel's design.

## Learning Objectives

- To explore the design of ironclad vessels from the American Civil War and assess their strengths and weaknesses

## Key Words

Battle of Hampton Roads, casemate, ironclad, turret, USS *Monitor*, CSS *Virginia*

## National Standards

**NCSS:** US 5-12; Era 5:2A;  
**NCSS Thinking Standards:** 1, 2, 3 and 4;  
**CC.ELA.LIT.W:** 4-8.3; **NCTE:** 3; **NS.5-8.E;**  
**NS.5-8.G**



One of eight known photos of the USS *Monitor* taken on July 9, 1862, by James F. Gibson.  
Photo: Courtesy of the Library of Congress

## Background Information

The Battle of Hampton Roads was a turning point in naval warfare. For the first time, iron met iron as the CSS *Virginia* and the USS *Monitor* fought for control over the strategically important waterways of Hampton Roads, Virginia. The Battle of Hampton Roads took place over two days, March 8 and 9, 1862. On March 8, the *Virginia* tested her weapons and defenses for the first time as she attacked the Union blockade of Hampton Roads.

Comprised of wooden ships, the Union fleet had never encountered an enemy like the *Virginia*. The *Virginia*'s iron casemate could not be penetrated by the weapons of the Union vessels so she was able to destroy the wooden ships while suffering minimal damage. Over the course of one day, the Confederate ironclad attacked eight ships, sinking four of them. The Union lost 241 sailors and over 100 more were wounded, while the *Virginia* only suffered two casualties. The *Virginia*'s devastating rampage demonstrated that wooden vessels were no match for an ironclad. Only an iron ship could stop another iron ship.

On the morning of March 9, the *Monitor* and the *Virginia* fought for over four hours. As the *Monitor* and the *Virginia* exchanged fire and tested their enemy for weaknesses, it became clear that the design of each vessel had both strategic advantages and disadvantages. For example, while the *Virginia* was substantially larger than the Union ironclad, the vessel's deeper draft made navigating the shallow waterways of Hampton Roads problematic. Additionally, while the *Monitor*'s rotating turret was a major technological innovation, the constant rotation made it difficult for the men inside the turret to properly aim the cannons. While the battle ended in a draw, the Battle of

Hampton Roads marked the end of wooden warships. The new technology introduced in the designs of the *Virginia* and *Monitor* left a lasting impact on naval warfare and continues to influence the design of modern naval vessels.

## Activity Summary

Students design a sales brochure for the CSS *Virginia* or the USS *Monitor* that assesses the advantages and disadvantages of each vessel's design.

## Learning Objectives

Students will explore the design of ironclad vessels from the American Civil War and assess their strengths and weaknesses.

## Teacher Preparation and Implementation

- It is recommended that students complete the following lesson plans prior to this activity: The Tale of Two Ironclads, Around and Round We Go!, and Piecing Together the Past. All lesson plans can be found in this teacher guide.
- Print the provided brochure template and Critical Thinking Worksheet.
- Gather decorating materials.
- Follow steps listed in the Procedure section.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her.  
<http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservations at work via webcams, and read the blogs of the conservators as they uncover new finds.  
<http://www.monitorcenter.org/>

#### The Mariners' Museum: USS *Monitor* History

Explore the history of the *Monitor*, the CSS *Virginia*, and the Battle of the Hampton Roads.  
<http://www.monitorcenter.org/the-uss-monitors-story/>

#### The Mariners' Museum: USS *Monitor* Center

Additional activities and trivia on the design and construction of the USS *Monitor* and the CSS *Virginia*.  
<http://www.monitorcenter.org/trivia-activities/>

#### The Mariners' Museum: USS *Monitor* Center

Description of the Battle of Hampton Roads.

<http://www.monitorcenter.org/the-battle-of-hampton-roads/>

#### The Mariners' Museum: USS *Monitor* Center

Battle of Hampton Roads timeline.

<http://www.monitorcenter.org/battle-hampton-roads-timeline/>

## Books

Broadwater, John D.: *USS Monitor, A Historic Ship Completes Its Final Voyage*. Everbest Printing Company, 2012. ISBN-13: 978-1603444736.

Nelson, James L.: *Reign of Iron, The Story of the First Battling Ironclads, the Monitor and the Merrimack*. HarperCollins Publishers Inc., 2004. ISBN-13: 978-0060524043.

Quarstein, John V.: *A History of Ironclads, The Power of Iron Over Wood*. The History Press, 2006. ISBN-13: 978-1596291188.

Quarstein, John V.: *The Battle of the Ironclads*. Arcadia Publishing, 1999. ISBN-13: 978-0738501130.

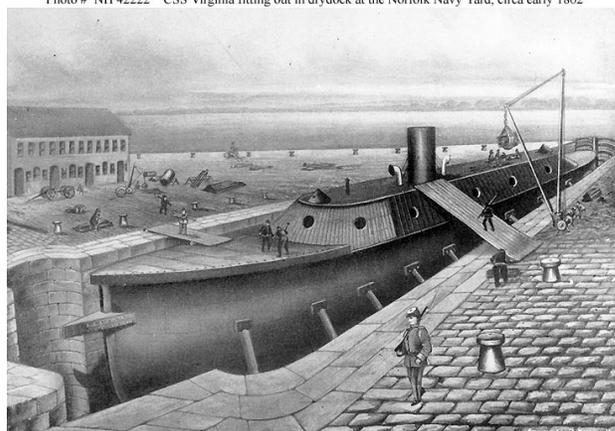
## Video

### The USS *Monitor* and NOAA: A Look Through Time

Travel back to 1862 in this educational video to learn how the USS *Monitor* turned the tide of the Civil War. The video also highlights the *Monitor's* discovery, designation as a national marine sanctuary, and more.

<https://www.youtube.com/watch?v=EX6H3Tp-2yE>

Photo # NH 42222 CSS *Virginia* fitting out in drydock at the Norfolk Navy Yard, circa early 1862



CSS *Virginia* fitting out in drydock at the Norfolk Navy Yard, circa early 1862.  
Photo: Courtesy of Naval History and Heritage Command

## Procedure

1. Explain that in this activity students will be putting together all that they have learned about the CSS *Virginia* and the USS *Monitor*. Give students the following assignment:

"Today you are a ship salesman. Your job is to convince potential buyers to purchase a new ship. Your responsibilities include creating accurate advertisements for your ships that highlight the best qualities of the vessels. However, you are also required to warn customers of potential issues that might exist with the boat they purchase, such as possible issues with the navigation system. As a salesman, your job today is to design a sales brochure for either the CSS *Virginia* or the USS *Monitor*."

2. Ask students to choose which vessel they would like to create a brochure for.
3. Distribute the provided Critical Thinking Worksheet and Brochure Template.
4. Have students begin by filling out the worksheet and then using the template as a guideline for creating their own brochure. **Note:** See Resources for useful books and websites for students to use in researching their vessel. Students can also refer to the materials from *The Tale of Two Ironclads*, *Around and Round We Go!*, and *Piecing*

## Vocabulary

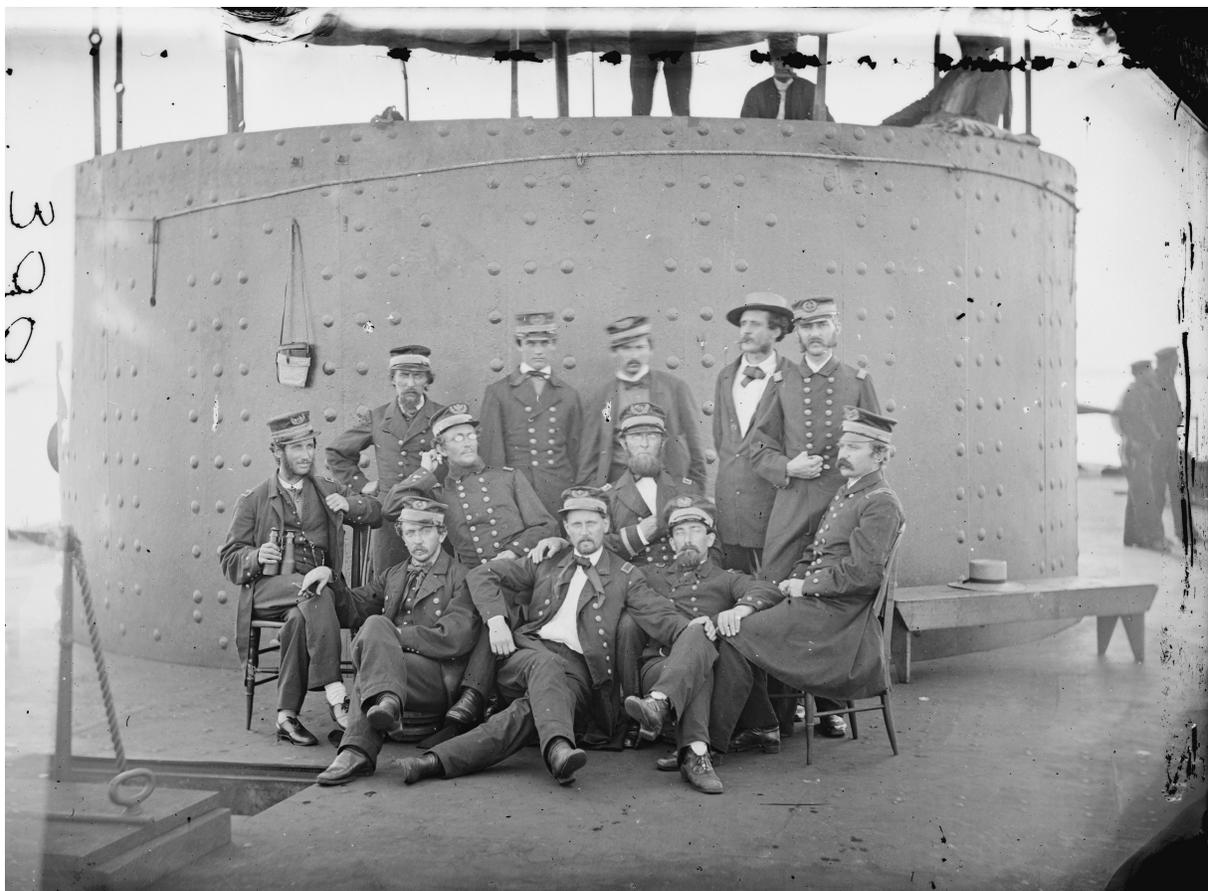
**CASEMATE** — A fortified enclosure

**IRONCLAD** — Originally a wooden ship that had iron plates attached to its side to protect it from damage. The term is often used to describe any Civil War ship made from iron.

**TURRET** — A round fortified structure

Together the Past for additional information on their vessel.

5. After completing the brochures, give each student an opportunity to present their brochure to the class.
6. End the activity with a discussion of what the students chose to include in the "Benefits and Exciting Features" and "Vessel Disclaimers" sections of their brochures. Have them explain why they chose those features.



Officers on deck of the USS *Monitor*. Photo was taken on July 9, 1862, by James F. Gibson. Photo: Courtesy of Library of Congress

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Ironclad for Sale! Critical Thinking Worksheet

1. What is the basic history of the design and construction of your ironclad? Who built it and why was it built?

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2. What are some of the interesting features of your ironclad? What makes it unique?

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3. How did your ironclad fare in the Battle of Hampton Roads? List three advantages your ship had over its enemy.

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4. List three disadvantages or problems your ironclad encountered during the Battle of Hampton Roads.

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<p><b><i>Name of Vessel</i></b></p> <div data-bbox="380 1436 953 1850" style="border: 1px solid black; padding: 10px; text-align: center;"><p>Image of Vessel</p></div> <p>Brief description of the vessel</p>	<p><b><u>Benefits and Exciting Features of the Vessel</u></b></p> <p>Use this section to list the new and innovative aspects of your vessel. Be sure to consider</p> <ul style="list-style-type: none"><li>• Weaponry</li><li>• Defense capabilities</li><li>• Officer and crew accommodations</li><li>• Maneuverability</li></ul>	<p><b><u>Vessel Disclaimers</u></b></p> <p>Use this section to list potential issues a new owner might face with this vessel. Of what potential problems should a new captain be aware?</p>
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## And the Winner Is...



Map of Hampton Roads and Vicinity from *The Century Magazine*, Vol. XXIX, March 1885, Public Domain.

### Grade Level

- 4-8

### Timeframe

- 45 minutes

### Materials per Student/Group

- [Critical Thinking Worksheet](#)

### Activity Summary

Students debate whether the Union or the Confederacy would have won the Battle of Hampton roads had the battle not ended in a draw.

### Learning Objectives

- To discover the strengths and weaknesses of the USS *Monitor* and the CSS *Virginia*

### Key Words

Battle of Hampton Roads, blockade, casemate, ironclad, turret, USS *Monitor*, CSS *Virginia*

### National Standards

NCSS: US 5-12: Era 5:2A;  
 NCSS Thinking Standards: 1, 2, 3 and 4;  
 CCST.ELA.LIT.RST; NS.5-8.E; NS.5-8.G



Wood carving of the Battle of Hampton Roads. Photo: Courtesy of the Library of Congress

### Background Information

In early March 1862, the Confederate ironclad *Virginia* launched from Portsmouth, Virginia, and set out for its first mission: to destroy the Union blockade of Hampton Roads. The USS *Monitor*, the Union's response to the *Virginia*, was also heading for Hampton Roads with the mission of finding and destroying the Confederate ironclad.

The Battle of Hampton Roads took place over two days, March 8 and 9, 1862. The battle on March 8 showed the devastating effectiveness of iron against wood as the *Virginia* decimated the Union blockade. In just one short day, the *Virginia* attacked eight ships, sinking four of them. Additionally, 241 Union sailors were lost and over 100 were wounded. The *Virginia's* rampage demonstrated the devastating effectiveness of iron against wood and left the Union fleet feeling powerless against this new enemy.

On the evening of March 8, the USS *Monitor* arrived in Hampton Roads and encountered a scene of loss and devastation for the Union navy. The *Monitor* positioned herself between the *Virginia* and her next target, the USS *Minnesota*. On the morning of March 9, this innovative warship was able to hold off the *Virginia* and prevent further destruction of the Union fleet or the capture of the Hampton Roads waterways. For over four hours the *Monitor* and the *Virginia* fired at point blank range, neither causing serious damage to their enemy.

Just after noon, the *Monitor's* Commander, John Lorimer Worden was injured while looking out of the ship's pilot house. Worden gave the order to "shear

off temporarily. The *Virginia* believed the *Monitor* to be in retreat, so the Confederate ship began to pull away and headed for Gosport Shipyard for repairs. Both sides claimed victory. Ultimately, the battle ended in a draw with the Union and the Confederacy achieving some of its goals. The *Virginia* destroyed key Union vessels, while the Union maintained control of Hampton Roads and prevented the Confederacy from gaining access to an area that would have given Southern forces an opportunity to capture Washington D.C.

## Activity Summary

Students debate whether the Union or the Confederacy would have won the Battle of Hampton Roads had the battle not ended in a draw.

## Learning Objectives

Students discover the strengths and weaknesses of the USS *Monitor* and the CSS *Virginia*.

## Teacher Preparation and Implementation

- It is recommended that students complete the following lesson plans prior to this activity: "The Tale of Two Ironclads," "Around and Round We Go!," "Piecing Together the Past," and "Ironclad for Sale!" All lesson plans can be found in this teacher guide.
- Print the provided Critical Thinking Worksheet.
- Follow the steps listed in the Procedure section.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her. <http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservationists at work via webcams, and read the blogs of the conservators as they uncover new finds. <http://www.monitorcenter.org/>

#### The Mariners' Museum: USS *Monitor* History

Explore the history of the *Monitor*, the CSS *Virginia* and the Battle of the Hampton Roads. <http://www.monitorcenter.org/the-uss-monitors-story/>

#### The Mariners' Museum: USS *Monitor* Center

Description of the Battle of Hampton Roads. <http://www.monitorcenter.org/the-battle-of-hampton-roads/>

#### The Mariners' Museum: USS *Monitor* Center

Battle of Hampton Roads timeline.

<http://www.monitorcenter.org/battle-hampton-roads-timeline/>

### Books

Nelson, James L.: *Reign of Iron, The Story of the First Battle Ironclads, the Monitor and the Merrimack*. HarperCollins Publishers Inc., 2004. ISBN: 0060524030.

Quarstein, John V.: *A History of Ironclads, The Power of Iron Over Wood*. The History Press, 2006. ISBN-13: 978-1596291188.

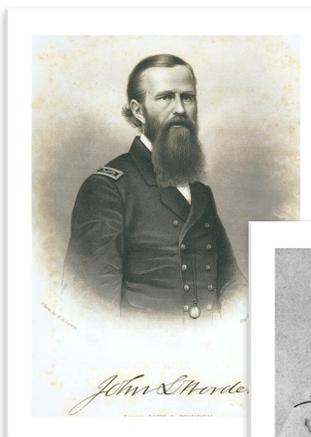
Quarstein, John V.: *The Battle of the Ironclads*. Arcadia Publishing, 1999. ISBN: 0738501131.

### Video

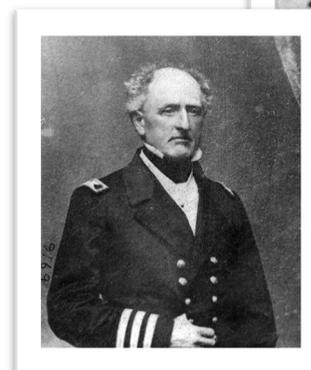
#### The USS *Monitor* and NOAA: A Look Through Time

Travel back to 1862 in this educational video to learn how the USS *Monitor* turned the tide of the Civil War. The video also highlights the *Monitor's* discovery, designation as a national marine sanctuary, and more.

<https://www.youtube.com/watch?v=EX6H3Tp-2yE>



During the Battle of Hampton Roads, the USS *Monitor* was commanded by Lt. John L. Worden (left) and the CSS *Virginia's* commander was Catesby ap Jones (bottom). Photos: Courtesy of The Mariners' Museum



On March 8, the first day of the Battle of Hampton Roads, Franklin Buchanan (left) was the commanding officer of the CSS *Virginia*. He led the ship and crew in attacking eight Union ships, sinking four and killing over 240 men during the one-day battle. Buchanan was known as one of the fiercest commanders, and he had handed the U.S. Navy the worst defeat it would take until the attack on Pearl Harbor. Buchanan was wounded on March 8, as he fired a rifle furiously toward the shore from the *Virginia's* deck. Catesby ap Roger Jones took over for Buchanan and commanded the *Virginia* on March 9. Would the outcome had been different if Buchanan had remained in command?

## Procedure

1. Begin by discussing the Battle of Hampton Roads. Students can also research the battle independently using the secondary sources listed in the Resource section.
2. Ask students to imagine that the Battle of Hampton Roads had not ended in a draw, and that they will answer the question: "If the *Monitor* and the *Virginia* had continued to fight, who would have won the battle?"
3. Distribute the Critical Thinking Worksheet to each student. Allow approximately 20 minutes for students to complete the questions.
4. After completing the questions, tell students to divide into two groups, those who believe the *Monitor* would have won, and those who believe the *Virginia* would have won.
5. Give each group approximately 15 minutes to put together a list of the five major reasons their vessel would have been victorious.
6. Ask each group to present their list of reasons and then discuss as a class.

## Vocabulary

**BLOCKADE** — An act or means of sealing off a place to prevent goods or people from entering or leaving

**IRONCLAD** — Originally a wooden ship that had iron plates attached to its side to protect it from damage. The term is often used to describe any Civil War ship made from iron.

## Extension

Have students research the commanding officers of the USS *Monitor* and the CSS *Virginia* and debate 1) their warfare styles and 2) whether or not the outcome of the battle might have been different if John Worden and Franklin Buchanan had not been injured. If Worden was not injured, the ship would not have had to turn from the battle. Would the battle have ended differently? If the *Virginia*'s Captain Buchanan had not been injured on March 8, would he had commanded the *Virginia* differently than Jones? Would the outcome have been different?



J.O. Davidson's "The *Monitor* and *Merrimac*: The First Fight Between Ironclads"; a chromolithograph of the Battle of Hampton Roads, produced by Louis, Prang & Co., Boston. Photo: Courtesy of Library of Congress

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## And the Winner Is... Critical Thinking Worksheet

**Directions:** The Battle of Hampton Roads ended in a draw. But what would have happened if the USS *Monitor* and the CSS *Virginia* had continued to fight? Use the questions below to help you decide which ironclad would have won the battle.

1. What were the advantages and disadvantages of the *Virginia's* weaponry? \_\_\_\_\_

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2. What were the advantages and disadvantages of the *Monitor's* weaponry? \_\_\_\_\_

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3. Which vessel had superior maneuverability? Support your answer with evidence. \_\_\_\_\_

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4. Which vessel had stronger defense capabilities? Support your answer with evidence. \_\_\_\_\_

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5. If the *Monitor* and the *Virginia* had continued to fight, who would have won the battle? Support your answer with specific points. \_\_\_\_\_

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## Music of the Civil War



"God Save the South" sheet music cover. A rare music cover illustration, published by the composer, C. T. De Coeniél, in Richmond, Virginia. Photo: Courtesy of Library of Congress

### Grade Level

- 4-8

### Timeframe

- 1 hour

### Materials per Student/Group

- Critical Thinking Worksheet
- Computer with internet access

### Activity Summary

Students analyze popular songs from both the North and South during the Civil War and assemble an album/playlist that tells a story about the conflict.

### Learning Objectives

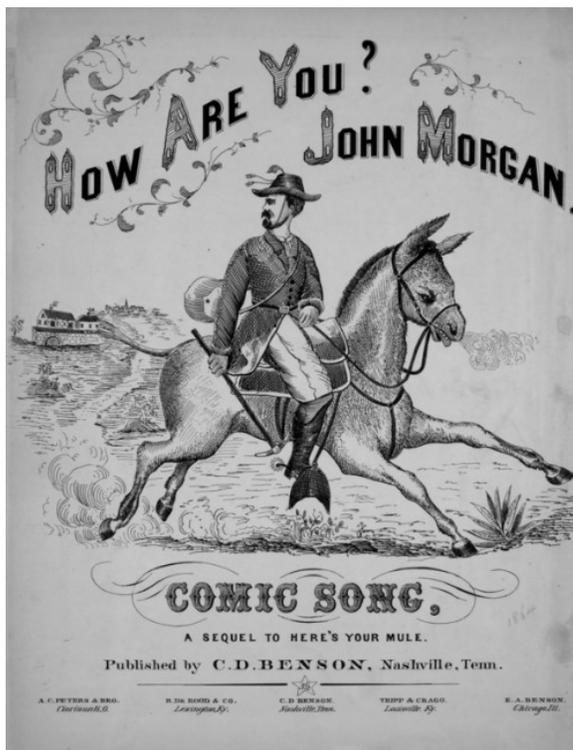
- To understand the important role music played among soldiers from both the North and the South during the Civil War

### Key Words

Album/playlist, lyrics

### National Standards

**NCSS:** US 5-12: Era 4:4B; Era 5:1A;  
**NCSS: Thinking Standards:** 1, 2, 3 and 4;  
**CC.ELA.LIT.W:**4-8.2 and 4-8.3;  
**CC.ELA.LIT.RI; NCTE:** 1, 3, and 7



Typical cover of sheet music, with songs depicting the individuals of the era, such as John Hunt Morgan. C. D. Benson—"How Are You? John Morgan: A Sequel to Here's Your Mule." (Sheet music). Nashville, Tennessee. Photo: Public Domain

### Background Information

Studying the music of a particular time period can provide historians with insight into the perceptions and views of people from the past. Created with the specific intention of eliciting an emotional response, music can embody the feelings and memories of a composer and the broader listening audience. The music of the American Civil War provides a unique lens for examining this conflict.

Prior to the start of the Civil War, music was a popular form of entertainment in the North and the South. On both sides of the Mason-Dixon Line, band concerts attracted large audiences and the sale of sheet music was a very profitable business. There were musical institutes in several parts of the country and pianos could be found in many Southern and Northern homes. When Union and Confederate soldiers marched off to war in 1861, they brought with them their instruments and love for music.

During the Civil War, music had both practical applications and emotional significance for soldiers, sailors, and civilians. Soldiers and sailors on both sides of the conflict turned to music as a source of comfort and a much needed connection to their homes and families. Music was also used as a tool to keep time and rhythm as armies marched to a new location or prepared to head into battle. Similarly, sailors aboard naval vessels used sea shanties to synchronize their movements when completing daily tasks. On the Northern and Southern home fronts, music also served as a means of communicating sadness, frustration, and hope for an end to the war.

## Activity Summary

Students analyze popular songs from both the North and South during the Civil War and assemble an album/playlist that tells a story about the conflict.

## Learning Objectives

Students will understand the important role music played among soldiers from both the North and the South during the Civil War.

## Teacher Preparation and Implementation

- Print the provided Critical Thinking Worksheet.
- Bookmark websites or use <http://www.livebinders.com/> (or similar website) to create a digital binder of web resources for students to use in the activity.
- Follow the steps listed in the Procedure section.

## Resources

### Websites

#### Civil War Trust

This website provides basic background information on the Civil War and includes teacher lesson plans.

<http://www.civilwar.org/education/>

#### The Music of the American Civil War (April, 1861 to May, 1865)

This online data base provides both music and lyrics for popular songs during the Civil War.

<http://pdmusic.org/civilwar.html>

#### Civil War Songs and Lyrics

This online data base provides both music and lyrics for popular songs during the Civil War.

<http://www.civilwarheritagetrails.org/civil-war-music/>

### Books

Herbert, Janis: *The Civil War for Kids: A History with 21 Activities (For Kids Series)*. Chicago Review Press, 1999. ISBN-13: 978-1556523557.

## Procedure

1. Begin by asking students to think of a particular musical artist or song that is important to them and why.
2. Distribute the provided Critical Thinking Worksheet and ask students to complete Part I. This should take approximately 10 minutes.
3. As a class, discuss the students' answers to Part I.
4. Ask students to think about why music may have been important to Northern and Southern soldiers fighting in the Civil War. Explain to the students that music was an extremely popular form of entertainment during the mid-nineteenth century. When men from the North and South left to fight in the Civil War, they brought with them songs from home. Music became an important source of comfort and entertainment for the soldiers.
5. Explain to the students that they will be researching music from the time period of the American Civil War. Their task is to assemble an album/playlist of five songs that tells a story about the conflict. See the Resource section for a list of online databases students can use to research Civil War music.
6. As they assemble their album/playlist, have the students begin working on Part II of the Critical Thinking Worksheet, answering several questions about each of their selected songs.
7. Once students have completed Part II, ask them to move onto Part III. In Part III, they will write a brief essay describing their five songs and the story their album/playlist tells about the Civil War.
8. Optional: Have the student perform one of their chosen songs.

## Vocabulary

**ALBUM** — A collection of recordings issued as a single item on some medium, such as a CD or record

**LYRICS** — The words of a song



NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### Music of the American Civil War Critical Thinking Worksheet

#### PART I

1. Name one particular musical artist or song that you enjoy listening to: \_\_\_\_\_

\_\_\_\_\_

2. Why do you like this artist/song? \_\_\_\_\_

\_\_\_\_\_

3. How does music help people express themselves? \_\_\_\_\_

\_\_\_\_\_

#### PART II

**Directions:** Select five songs from the time period of the American Civil War. These five songs should tell a story about the war. This story can be from the perspective of a Union or Confederate soldier/sailor or a civilian from the Civil War home front. Complete the following questions for each of your selected songs.

#### Song #1

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Composer: \_\_\_\_\_

Summarize the story or message of this song: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

How does this song relate to the experiences of Union and/or Confederate soldiers?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

**Music of the American Civil War  
Critical Thinking Worksheet — Continued**

**Song #2**

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Composer: \_\_\_\_\_

Summarize the story or message of this song: \_\_\_\_\_

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How does this song relate to the experiences of Union and/or Confederate soldiers?

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**Song #3**

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Composer: \_\_\_\_\_

Summarize the story or message of this song: \_\_\_\_\_

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How does this song relate to the experiences of Union and/or Confederate soldiers?

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NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

**Music of the American Civil War  
Critical Thinking Worksheet — Continued**

**Song #4**

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Composer: \_\_\_\_\_

Summarize the story or message of this song: \_\_\_\_\_

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How does this song relate to the experiences of Union and/or Confederate soldiers?

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**Song #5**

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Composer: \_\_\_\_\_

Summarize the story or message of this song: \_\_\_\_\_

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How does this song relate to the experiences of Union and/or Confederate soldiers?

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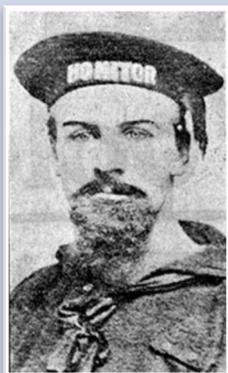
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**PART III**

**Directions:** Write a brief essay about the five songs you have selected. Your essay should explain why you chose these five songs and the story they tell about the Civil War.

## Life Aboard the *Monitor*



Crewman George S. Geer penned over 80 letters while serving aboard the USS *Monitor* during the Civil War. Photo: Courtesy of The Mariners' Museum

### Grade Level

- 4-8

### Timeframe

- 45 minutes

### Materials per Student/Group

- [Critical Thinking Worksheet](#)
- [Geer Letters Worksheet](#)

### Activity Summary

Students examine the letters of a sailor aboard the USS *Monitor* and use these primary sources to learn about life aboard the ironclad vessel.

### Learning Objectives

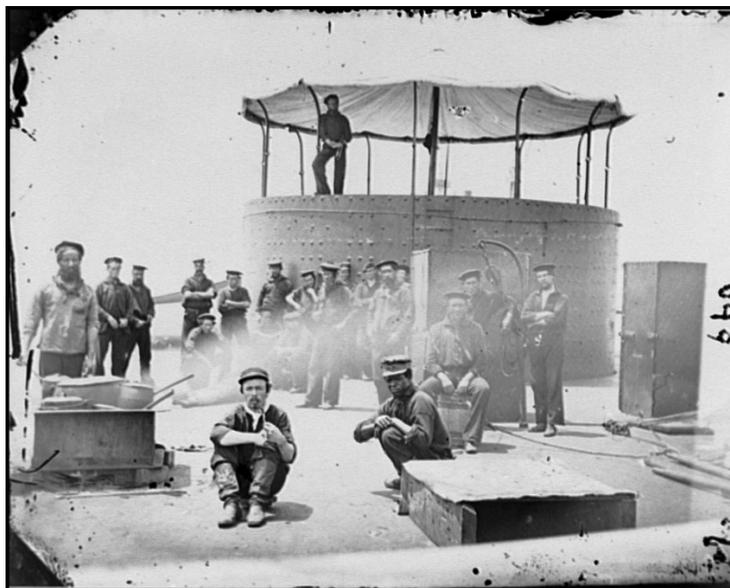
- To learn about everyday life for sailors aboard the USS *Monitor*

### Key Words

Engineer, galley, ironclad, primary source, USS *Monitor*

### National Standards

**NCSS:** US 5-12; Era 5:1A;  
**NCSS Thinking Standards:** 1, 2 and 3;  
**CC.ELA.LIT.W:** 4-8.2; **CCSS.ELA.LIT.RH;**  
**CC.ELA.LIT.RI;** NCTE: 1, 3, and 7



USS *Monitor* crew cooking on deck while moored on the James River (Hampton Roads, Virginia). This is one of eight known photos taken on July 9, 1862, by James F. Gibson. Photo: Courtesy of Library of Congress

## Background Information

The USS *Monitor* is well known for its technological innovations and involvement in the historic Battle of Hampton Roads. While the *Monitor* was a machine that left a lasting impact on naval warfare, it was also home to between 58 and 63 men throughout its career.

Due to the design of the ship, John Ericsson, inventor of the *Monitor*, had to place the officers' quarters towards the bow of the ship. Traditionally, their quarters were more toward the stern, which was a better location to be in rough seas. Therefore, John Ericsson spared no effort in making the living spaces as comfortable as possible for the men, particularly the officers. The captain's cabin was located in the bow, as far away as possible from the noisy engines which were located in the stern. Higher-ranking officers occupied small cabins behind the captain's cabin, while the enlisted men would string hammocks in the birth deck, an area of the ship even closer to the stern. Despite Ericsson's efforts, the men still had to deal with several major challenges while living aboard the *Monitor*.

Since the ironclad was a very small vessel, privacy was limited. Poor ventilation and oppressive heat were also constant issues faced by the sailors. The Virginia summer in 1862 was particularly difficult. With the sun beating down on the black iron deck, temperatures inside the *Monitor* were well over 100 degrees. The engine room and galley were by far the hottest parts of the ship. One crew member recorded temperatures of 127 degrees in the engine room and 155 degrees in the galley. When possible, the men would escape to the deck of the ship for a reprieve from the intense heat below. From altercations with Confederate forces, to periods of monotony

and boredom, the crew of the *Monitor* dealt with sweltering summer heat and unpredictable stormy weather.

An invaluable source in understanding everyday life aboard the *Monitor* comes from crewman George S. Geer. While little is known of his early life, at the start of the Civil War, Geer and his wife, Martha were living in New York City with their two young children. On February 15, 1862, Geer enlisted in the United States Navy. He was accepted as a first-class fireman and eventually assigned to the *Monitor*. Geer served on the *Monitor* from February 1862, until her sinking on December 31, 1862.

After surviving the sinking, Geer went on to serve as an engineer on several other ships for the remainder of the Civil War. While serving on the *Monitor*, Geer wrote over 80 letters to his wife and family. Along with describing the Battle of Hampton Roads, the fall of Norfolk, and the Peninsula Campaign, the letters also detail Geer's role aboard the vessel and the daily activities of the men. Geer's descriptions of his duties, living conditions, meals, and daily routines offer a detailed glimpse into the lives of the sailors serving on the *Monitor*.

## Activity Summary

Students examine the letters of a sailor aboard the USS *Monitor* and use these primary sources to learn about life aboard the ironclad vessel.

## Learning Objectives

Students will use primary source documents to learn about everyday life for sailors aboard the USS *Monitor*.

## Vocabulary

**ENGINEER** — Responsible for running and maintaining a ship's engine

**GALLEY** — A ship's kitchen

### Right: Paymaster William Frederick Keeler

Keeler was a successful merchant from Illinois who served as paymaster on the USS *Monitor*. It was his first assignment as a naval paymaster, and he remained there throughout the ship's short life.

While on the *Monitor*, Keeler wrote regular letters to his wife Anna during the war in which he detailed all aspects of his life aboard the *Monitor* and recorded his personal views and insights into daily life on the ship. These letters also help to give invaluable insights into what it was like being on ironclad ships during that period, and they are considered an excellent primary source of information on the *Monitor*.

You can view Keeler's letters in the Library Directory of The Mariner's Museum's online catalog.

<http://www.marinersmuseum.org/catalogs/>

## Teacher Preparation and Implementation

- Print the provided Critical Thinking Worksheet
- Print the Geer Letters Worksheet
- Follow the steps in the Procedure section.

## Resources

### Websites

#### The Mariners' Museum: "Guide to George S. Geer Papers"

This document provides background information on George Geer and a brief synopsis of each of his letters.

[https://www.marinersmuseum.org/sites/default/files/MS010\\_George\\_Geer.pdf](https://www.marinersmuseum.org/sites/default/files/MS010_George_Geer.pdf)

#### Monitor National Marine Sanctuary

Explore this 150<sup>th</sup> anniversary website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her.

<http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservationists at work via webcams, and read the blogs of the conservators as they uncover new finds.

<http://www.monitorcenter.org/>

#### The Mariners' Museum: Search Our Catalogs

The Mariners' Museum online catalog is a useful tool for finding primary sources related to the USS *Monitor*. Additional Geer letters can also be found in this collection located in the Library Directory of the online catalog.

<http://www.marinersmuseum.org/catalogs/>



Photo: Courtesy of The Mariner's Museum

## Books

Broadwater, John D.: *USS Monitor, A Historic Ship Completes Its Final Voyage*. Everbest Printing Company, 2012. ISBN-13: 978-1603444736.

Nelson, James L.: *Reign of Iron, The Story of the First Battle Ironclads, the Monitor and the Merrimack*. HarperCollins Publishers Inc., 2004. ISBN: 0060524030.

Quarstein, John V.: *A History of Ironclads, The Power of Iron Over Wood*. The History Press, 2006. ISBN-13: 978-1596291188.

## Procedure

1. Begin by discussing the history of the USS *Monitor* and why this ship is historically significant.
2. Provide students with some information about the design and layout of the *Monitor* (see Background Information and Resource section) and ask students to imagine what life was like for sailors on the *Monitor*.
3. Explain to students that they will be learning about life aboard the *Monitor* by examining primary source documents, the letters from one particular sailor, George S. Geer.
4. Distribute the provided Geer Letters Worksheet and Critical Thinking Worksheet. The Geer Letters Worksheet has excerpts from three of Geer's letters, but additional letters can be found in The Mariners' Museum online collection (see Resource section). Extend this assignment by having students examine some of the original letters in addition to the provided letters.



5. Give students approximately 20 minutes to read Geer's letter and complete the Critical Thinking Worksheet.
6. Discuss the students' answers as a class.
7. End the activity by asking students to explain why primary sources, like Geer's letters, are valuable in helping to understand the past.

## Extensions

1. Have students take on the role of a sailor aboard the USS *Monitor* and write a letter home describing what life was like while serving on the *Monitor*. Note: If needed, see "Letters Home" activity in this guide for letter writing guidance.
2. When writing a personal letter, the author usually does not worry a great deal about spelling and grammar. In the 1860s, spelling of words and grammar was not as formalized as it is today. Have students discuss unique spellings and grammar in the Geer letters. Have the students correct them for today's accepted spelling and grammar. Discuss if the meaning of the ideas expressed changed after correction.
3. Visit The Mariner's Museum's Online Catalog to find letters from other *Monitor* sailors and compare and contrast how each portrayed life aboard the *Monitor* and/or the Battle of Hampton Roads. See the Resource section for catalog information.
4. Although many slaves did not know how to write, some did. Have students write a letter describing life on board the *Monitor* from the perspective of an African American sailor who served on the *Monitor*.

Siah Carter was an African American slave who was born in Charles City, Virginia. Before running away and being enlisted aboard the USS *Monitor*, he worked on the Shirley Plantation in Virginia, which was owned by a Confederate Army colonel. Once Siah Carter came aboard, he was given a job as a coal heaver and assistant to the cook. While working in the close quarters and intense heat, Siah Carter stated that the work on the ship was often as difficult as when he was on the plantation.

Photo: Excerpted from the original James F. Gibson photo, courtesy of Library of Congress.

Learn more about Siah Carter and other *Monitor* crewmen at [https://www8.nos.noaa.gov/onms/park/Parks/USSMonitor/History\\_Crew\\_Siah\\_Carter.htm](https://www8.nos.noaa.gov/onms/park/Parks/USSMonitor/History_Crew_Siah_Carter.htm)

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Life Aboard the *Monitor* Critical Thinking Worksheet

1. What is George Geer's position on the USS *Monitor*? \_\_\_\_\_

2. What locations does Geer mention in his letter? Do you recognize the names of any of these places?

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3. Describe an average day for Geer aboard the *Monitor*. \_\_\_\_\_

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4. What are some of Geer's concerns and frustrations with life on the *Monitor*? \_\_\_\_\_

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5. How would you describe the living conditions for Geer and the other men? \_\_\_\_\_

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6. Geer mentions several occasions when people are punished for lack of cleanliness. Why is cleanliness so important to the crew and officers of the *Monitor*? \_\_\_\_\_

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7. Based on these letters, what observations can you make about Geer's family? \_\_\_\_\_

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8. Why are Geer's letters valuable primary sources for historians studying the Civil War? \_\_\_\_\_

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## Life Aboard the *Monitor* The Geer Letters

### USS Steamer Monitor

Hampton Roads April 21 1862

Your paper came to hand yesterday only one week from the time you mailed it but I was glad to get it and glad to get the envelopes Your letter of Wednesday should have been here on Friday has not arrived yet it may come before I close this as we expect the mail every moment if not I shall feel very disappointed. We have been housed up here sence Friday it has rained and blowed steady all the time and the waves wash over us so it [is] most impossible to stand on deck and our hatches fit so poorly they let the water down in torants and I have been wett as sop for three days but I am wett so much I do not mind it and have not had a cold sence I left New York.

I have hardly news enough to make a letter... Merimack has not made her appearance sence and I think she will not very soon. On Saturday evening the Rebels fired at shot from a very heavy gun on Sewells Point towards the Rip Raps but they done no damage and in return the Rip Raps commenced firing from three of their large rifted guns and we could see the shell explore in their camp and I think must have made bad work as they did not fire any more... Every day we can hear heavy firing in the direction of Yorktown I suppose when the fight commences in good earnest we will hear it very plain I am very glad the time is drawing near when you will be able to get that money so you can be a little indipendant... Your letter has this moment come to hand with one from Johnny the delay in your letter was caused by your not putting a one cent stamp on and I have had to pay three cents or rather get the [Purser] to trust me as I did not have the money The mail is going on shore and I will have to stop I will answer your letter next time don't make a mistake about the stamps again

Yours in Haste

George

George S. Geer Papers, 1862-1866: MS010

The Library at The Mariners' Museum, Newport News, Virginia



Crewman George S. Geer penned over 80 letters while serving aboard the *Monitor* during the Civil War. Image courtesy of The Mariners' Museum.

**USS Steamer Monitor**  
**City Point Va May 20 1862**

Dear Wife

...We have had sturring times sence I wrote you last... I believe I wrote you last on the way down from the Fort we had been fighting 8 miles from Richmond... we came down here and droped anchor on Friday more of the Enemy were to be seen and the people on the shore told us there were more of them there but we put no confidence in what they say and keep so far from shore that their sharp shooters cannot reach us In the action I acted as Third Engineer... On Sunday we were all dressed in our best setting on deck and I was thinking of you and wondering if you were busy cleaning up and if you found as much to do on Sunday morning as you used [to] when I as home and thinking if Gilley and Willey had got dressed yet or were playing on deek- the floor... my mind was in New York I had forgotten I was hundreads of miles away when I was suddenly startled by one of the Firemen calling out Geer Mr. Newton wants you down in the Engine Room. I commenced to wonder what he could want of me if I had done any thing wrong or if he was going to give me some work to do but my suspence was not long I presented my self to him and he told me I was promoted to Engineers Yeoman which in other ships would be called Engineers Store Keeper I get no more pay but have scarse any thing to do I have a nice room with a lock and key no one but my self is allowed in it... the old Yeoman lost this position because he was so dirty I think it was as dirty filthy [a] room as I ever had to clean but I have it looking [clean] and shall keep it so. I was not sorry to get away from the fires as I commenced to find it very hard and hot work my hands are very badly calised but they will soon come off now and if I keep my place I will come home looking respectable... You will not have to say in future that your Husband is a fireman on the Monitor but that he is Engineer Yeoman... I am all out of Postage Stamps again send me some if you can. I supposed you see very little about us in the News Papers as I hear the powers that be will not allow any thing to be published regarding us...

Your Love  
 George

George S. Geer Papers, 1862-1866: MS010  
 The Library at The Mariners' Museum, Newport News, Virginia



Geer letters. Photo: Courtesy of The Mariners' Museum

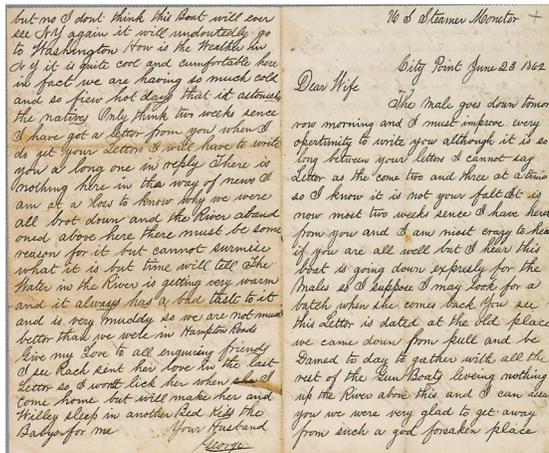
## USS Steamer Monitor City Point May 20 1862

Dear Wife

I hardly know what to do this evening to while away time I thought I would write you a few lines...but what will I write about I wrote so much before I am out of news I think I did not tell you before that I have no night watch I can go to bed when I like and can lay until six if I please but I cannot sleep after four and am up and have a good wash and clean my room before breakfast I told you I would write you how we live and what we eat so I will give you a little sketch in this. To commence on Sunday as every other day the... shrill whistle is heard [at] six and every body must turn out and lash their hammock up and stow them away all hand[s] make their way on deck get a pail when their turn comes and have a good wash most of them strip to waist and wash so you see there is not many dirty ones among us... So seven o'clock as we on ship call it six Bells the... whistle is sounded for grog and breakfast which consist of a pot of coffee and hard crackers...Our cook takes these crackers and brakes them up puts some fat pork in it... puts salt and pepper in and cooks it until the crackers are soft and that makes us what we hungry men call a good Breakfast but what I hardly think I should eat were I home After breakfast every thing is cleaned up about the ship which takes about one hour and after that there is nothing to do but keep watch which amounts to laying around deck for the saylors and laying around the Engine room for the firemen... At twelve the whistle sounds again and grog and dinner is the order I forgot I was describing Sunday and will have to go back a little before I describe dinner I forgot to tell you of the Muster which only comes on Sunday at 9 o'clock the word is passed to get ready to muster all hand[s] get their Bags and out comes their Sunday... clothes every body must have on clean clothes and at 10 o'clock we are all mustered on the main deck and the Captain takes a look at each one as our names are called and woe be to the one who is found dirty as he will be given over to the Master at Arms whose business it is to take him on deck strip him naked and take a scrubbing brush and give him a cleaning... I think I had rather do my own washing. But about our grog and Dinner the grog is whiskey and they give a full cup twice each day... For dinner on Sunday we have Rost Beef put up in cans and preserved potatoes. The potatoes taste like I dont know what any thing that has no taste at all and the Beef is all parts of the cow cooked together until it is next to a jelly and will drop to pieces. It is good. Where there is more better to be continued in the ledger next week.

George S. Geer Papers, 1862-1866: MS010

The Library at The Mariners' Museum, Newport News, Virginia



Letter dated June 28, 1862, from George Geer, crewman on the USS Monitor to his wife, Martha, in New York. Image: Public domain, scanned from book: George S. Geer: *The Monitor Chronicles: One Sailor's Account* (2000) by Simon and Schuster, p. 102.

## It's In the Bag



During the excavation of the *Monitor's* turret, 24 pieces of silverware were discovered. Some pieces were engraved with the names or initials of crewmembers or officers who served on the *Monitor*.  
Photo: Courtesy of The Mariners' Museum

### Grade Level

- 4-8

### Timeframe

- 30 minutes for craft
- 1 hour for presentations

### Materials per Student/Group

- Paper lunch bags (one per student)
- Crayons, markers, colored pencils

### Activity Summary

Students create a ditty bag representing a sailor aboard the USS *Monitor*.

### Learning Objectives

- To explore what life was like for sailors serving on the USS *Monitor*

### Key Words

USS *Monitor*, ditty bag

### National Standards

**NCSS:** US 5-12; Era 5:2B;  
**NCSS Thinking Standards:** 1, 3, and 4;  
**CC.ELA.LIT.RI;** NCTE: 1 and 3



When the turret was recovered in 2002, the remains of two sailors were found inside. These are some of the artifacts that were recovered with the remains. Photo: Courtesy of The Mariners' Museum

## Background Information

The USS *Monitor* is well known for its technological innovations and involvement in the historic Battle of Hampton Roads. While the *Monitor* was a machine that left a lasting impact on naval warfare, it was also home to between 58 and 63 men throughout its career.

John Ericsson, the inventor of the *Monitor*, spared no effort in making the living spaces as comfortable as possible for the men, particularly the officers. The captain's cabin was located in the bow, as far away as possible from the noisy engines which were located in the stern. Higher-ranking officers occupied small cabins behind the captain's cabin, while the enlisted men would string hammocks in the birth deck, an area of the ship even closer to the stern. Despite Ericsson's efforts, the men still had to deal with several major challenges while living aboard the *Monitor*.

Since the ironclad was a very small vessel, privacy was limited. Poor ventilation and oppressive heat were also constant issues faced by the sailors. The Virginia summer was particularly difficult. With the sun beating down on the black iron deck, temperatures inside the *Monitor* were well over 100 degrees. The engine room and galley were by far the hottest parts of the ship. One crew member recorded temperatures of 127 degrees in the engine room and 155 degrees in the galley. When possible, the men would escape to the deck of the ship for a reprieve from the intense heat below. From altercations with Confederate forces, to periods of monotony and boredom, the crew of the *Monitor* dealt with sweltering summer heat and unpredictable stormy weather.

One essential item every sailor brought with them was a ditty bag. This small bag, made from cloth or canvas, had both emotional significance and practical applications.

Ditty bags typically contained a range of items that helped with life aboard a ship. One common item found in a ditty bag during the Civil War was a small sewing kit as sailors were expected to mend their own clothing. In addition, a ditty bag usually contained personal items like photographs, letters, and playing cards. During long months at sea, separated from their loved ones, ditty bags made life a little easier for the sailors and also served as a connection to their home and families.

### Activity Summary

Students create a ditty bag representing a sailor aboard the USS *Monitor*.

### Learning Objectives

Students explore what life was like for sailors serving on the USS *Monitor*.

### Teacher Preparation and Implementation

- Gather the materials that will be used to create the ditty bags.
- Follow the steps listed in the Procedure section.

### Vocabulary

**DITTY BAG** — A small bag, usually made from cloth or canvas, which could contain small items and mementos

Conservator at The Mariners' Museum works on a shoe excavated from the USS *Monitor's* turret. Photo: Courtesy of The Mariner's Museum

In 1987, NOAA named The Mariners' Museum as the principal repository for *Monitor* artifacts. Today, visitors to the museum can stand just feet from the turret, steam engine, and Dahlgren guns and watch conservators as they work in the Batten Conservation Laboratory housed within the museum.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this 150<sup>th</sup> anniversary website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her. <http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservationists at work via webcams, and read the blogs of the conservators as they uncover new finds.

<http://www.monitorcenter.org/>

#### The Mariners' Museum: USS *Monitor* Center

Explore various artifacts recovered from the USS *Monitor*.

<http://www.monitorcenter.org/featured-artifacts/>

### Books

Broadwater, John D.: *USS Monitor, A Historic Ship Completes Its Final Voyage*. Everbest Printing Company, 2012. ISBN-13: 978-1603444736.



Photo: Courtesy of The Mariner's Museum

Nelson, James L.: *Reign of Iron, The Story of the First Battle Ironclads, the Monitor and the Merrimack*. HarperCollins Publishers Inc., 2004. ISBN: 0060524030.

Quarstein, John V.: *A History of Ironclads, The Power of Iron Over Wood*. The History Press, 2006. ISBN-13: 978-1596291188.

## Procedure

1. Begin by discussing what a sailor's ditty bag was and why it was important (see Background Information and Resource section).
2. Explain to the students that they will be making their own ditty bags out of paper bags.
3. Distribute paper bags and decorating supplies and have the students work on decorating their bags.
4. Give students the following assignment:
  - Pretend that you are a sailor aboard the USS *Monitor*. You are getting ready to set sail tomorrow and must prepare your ditty bag. Tomorrow, bring to class one or two items that you would put in your ditty bag. Remember, these items must be small enough to fit in your bag and time-period appropriate. Be prepared to explain to the class why you have chosen each item.
5. On a following day, have the students take turns presenting their ditty bags and items to the class.

6. Conclude the activity with a discussion of why ditty bags were so important to sailors and how they served as a connection to their homes and families.
7. Discuss the personal items found in 2002 inside the *Monitor's* turret along with two sets of human remains. Discuss how these items help archaeologists to learn more about these sailors that died the night the ship sank.

## Extension

As an alternative to the class presentation of ditty bags, have students exchange ditty bags and try to determine why the sailor would have brought each item. Explain to the students that when maritime archaeologists find artifacts, they are not always easily recognizable. Sometimes only a piece of an artifact is found, making it even harder to induce what the item is. Many items were very personal to a sailor, and he may be the only one who would have known what it is and why it was important to him. Help students understand that some items are easy to understand, such as a comb or shaving cup, while others may not be so easy to figure out! And each adds a clue to the puzzle of the past.

**Optional:** Discuss the death of the 16 sailors that went down with the *Monitor* on New Year's Eve 1862. Discuss the human cost of war and how men and women make the ultimate sacrifice to defend freedom.



Officers standing on the USS *Monitor's* deck. Photo taken on July 9, 1862, by James F. Gibson. Photo: Courtesy of Library of Congress

# The *Monitor* is No More



Illustration from *Harper's Weekly* depicting the *Monitor's* final moments. Photo: Courtesy of Naval History and Heritage Command



Painting of the USS *Monitor* sinking on December 31, 1862. Photo: Courtesy of Tom Freeman ©

## Grade Level

- 4-8

## Timeframe

- 30 minutes

## Materials per Student/Group

- Tinfoil
- Pennies or marbles
- Containers to hold water for testing boats
- Spoons

## Activity Summary

Students explore the sinking of the USS *Monitor* through a hands-on demonstration.

## Learning Objectives

- To understand the conditions that led to the sinking of the USS *Monitor*.

## Key Words

USS *Monitor*, steam engine, Cape Hatteras

## National Standards

NCSS: US 5-12: Era 5:2A;  
 NCSS Thinking Standards: 1 and 3;  
 NS.5-8: A, B, and E; OL:6

## Background Information

On December 30, 1862, the USS *Monitor*, in tow of the USS *Rhode Island*, was on her way to Beaufort, North Carolina. Just before dawn a swell blew in from the south. As the day continued, the weather worsened and the *Monitor's* crew were forced to go below deck due to the waves breaking over the vessel.

By the time the *Monitor* began to round Cape Hatteras, an area known for dangerous and unpredictable storms, the weather conditions had deteriorated. As night approached, the turret trembled from the force of the waves, and the *Monitor* began slowly taking on water. The captain of the *Monitor* signaled to the *Rhode Island* that if they ran into trouble during the night, the ironclad would hoist a red lantern signaling distress.

As the night continued, the *Monitor's* pumps attempted to keep up with the flooding. Water was coming in from a leak in the bow and under the turret. The ship's supply of coal became wet, which forced the crew to feed damp coal into the *Monitor's* boilers. With steam pressure for the engines and pumps decreasing, it became even more difficult for the *Monitor's* crew to keep up with the flooding. At 10:00 pm, the order was given to hoist the red distress lantern, and soon after, the *Rhode Island* launched the first rescue boat.

As the waves tossed and turned the two ships, the rescue boats attempted to save as many men as possible from the foundering ironclad. Men on the *Rhode Island* watched the red light bobbing in the distance until it disappeared completely. Just after 1:00 am on December 31, 1862, the *Monitor* sank 16 miles south-southeast of Cape Hatteras, North Carolina. That night, four officers and 12 crewman went down with the *Monitor*.

## Activity Summary

Students explore the sinking of the USS *Monitor* through a hands-on demonstration.

## Learning Objectives

Students will understand the conditions that led to the sinking of the USS *Monitor*.

## Teacher Preparation and Implementation

- Gather the materials. You will also need a timer or watch with second hand.
- For each group, precut two pieces of tinfoil, one piece approximately 10 inches x 10 inches and another piece approximately 3 inches x 3 inches.
- Determine the number of containers needed for students to test their boats. Depending on size of container, either provide one per group, or if the containers are large, provide one per 2-3 groups.
- Fill containers with enough water for students to test their tinfoil boats.
- Follow the steps listed in the Procedure section.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this 150<sup>th</sup> anniversary website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her.

<http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservationists at work via webcams, and read the blogs of the conservators as they uncover new finds.

<http://www.monitorcenter.org/>

#### Monitor National Marine Sanctuary

Description of the sinking of the USS *Monitor*.

<http://monitor.noaa.gov/150th/sinking.html>

## Vocabulary

**STEAM ENGINE** — A motor that gets its power from compressed steam

**CAPE HATTERAS** — Cape on the coast of North Carolina and is an area known for unpredictable weather

## Books

Broadwater, John D.: *USS Monitor, A Historic Ship Completes Its Final Voyage*. Everbest Printing Company, 2012. ISBN-13: 978-1603444736.

Nelson, James L.: *Reign of Iron, The Story of the First Battle Ironclads, the Monitor and the Merrimack*. HarperCollins Publishers Inc., 2004. ISBN: 0060524030.

Quarstein, John V.: *A History of Ironclads, The Power of Iron Over Wood*. The History Press, 2006. ISBN-13: 978-1596291188.

Quarstein, John V.: *The Monitor Boys: The Crew of the Union's First Ironclad*. The History Press, 2011. ISBN-13: 978-1596294554.

## Procedure

1. Divide students into groups of two. Give each group a piece of tinfoil (approximately 10 inches x 10 inches).
2. Tell the students that they have 10 minutes to work as a team to make a simple boat from the tinfoil and to test its buoyancy. Does it float?
3. After students finish constructing their boat, ask them to add 10 pennies to further test their vessel's buoyancy.
4. Have the students remove all materials from the water.
5. Discuss the sinking of the USS *Monitor* (see Background Information). Explain to the students that the pumps aboard the *Monitor* were not able to keep up with the flooding and eventually the vessel became too flooded to stay afloat.
6. Explain to students that they will now recreate some of the conditions of the storm the *Monitor* encountered and see how their tinfoil boats fare.

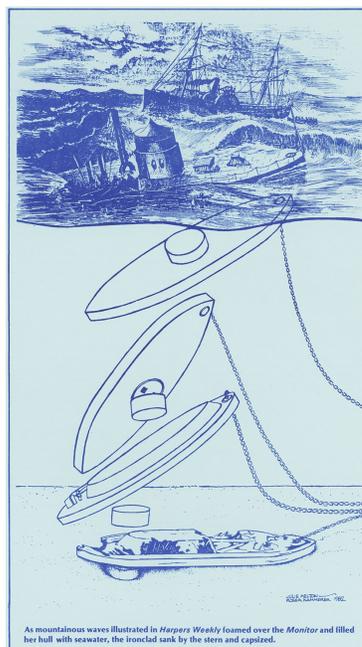


Illustration of the USS *Monitor* sinking. Caption at the bottom of the illustration reads: "As mountainous waves illustrated in *Harpers Weekly* foamed over the *Monitor* and filled her hull with seawater, the ironclad sank by the stern and capsized." Photo: NOAA

7. Have the students determine who on their team will play the role of the storm and who will play the role of the *Monitor's* crew.
8. Give another piece of tinfoil (approximately 3 inches x 3 inches) to the student representing the *Monitor's* crew.
9. Give a spoon to each student representing the storm.
10. Ask the students acting as the crew to place their tinfoil boats and 10 pennies back in the water.
11. Tell the students that the storm is now brewing and just like the *Monitor*, their tinfoil boats are starting to take on water.
12. Have the student representing the storm to scoop one spoonful of water into the boat.
13. Using the small piece of tinfoil, the students representing the *Monitor's* crew will then have 30 seconds to bail out as much water as possible.
14. After 30 seconds, tell the students representing the storm to scoop another spoonful of water into their tinfoil boats.
15. Give the students representing the *Monitor's* crew another 30 seconds to remove the water. Repeat these steps several times until the tinfoil boats begin to sink.

16. Conclude the activity by discussing with the students why the tinfoil boat sank and how this compares to the sinking of the *Monitor*.

### Extension

Have students imagine themselves as a sailor on the *Monitor* the night it sank. Have each student write a descriptive paragraph of what they might have experienced. Be sure to have them include all five senses. Share the stories as a class.



Painting of the USS *Monitor* sinking off Cape Hatteras, North Carolina on December 31, 1862, while under tow by the USS *Rhode Island* on the way to Beaufort, North Carolina. Photo: Courtesy of Library of Congress

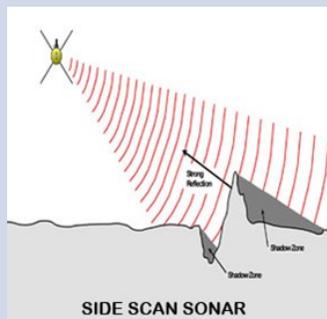
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left blank.

## Section D Discovery, Recovery, and Conservation

- Searching the Deep
- Mapping the *Monitor*
- Sleuthing Through 1862
- Growing the Family Tree
- The Art of Artifacts
- Conservation Conservators



# Searching the Deep



## Grade Level

- 4-8

## Timeframe

- 1 to 1.5 hours

## Materials per Student/Group

- Prepared box
- Masking tape
- Different colored pencils
- Graph paper
- Wooden skewer (~30 cm)

## Activity Summary

Students will simulate how side scan sonar works when searching for shipwrecks.

## Learning Objectives

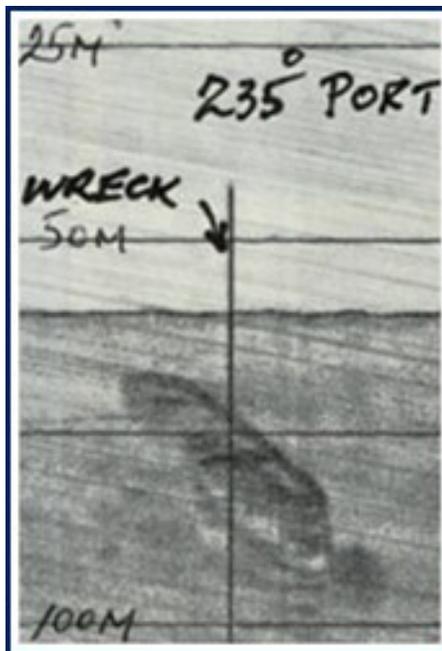
- Use a coordinate grid system to map a simulated ocean floor
- Have an understanding of how side scan sonar works
- Make inferences about the topography of an unknown and invisible landscape

## Key Words

Echo, profile, side scan sonar, topography

## National Standards

**NCSS Thinking Standards:** 1, 2, 3, and 4;  
**NG:** 1 and 3; **NCTE:** 1; **CCSS.ELA.LIT.RST:**  
**NCTM:** 6-8:NO.D; 6-8:MS.A; 9-12:G.A and B; **NS.5-8:** A, E, and G; **OL:** 1, 6, and 7



First side scan sonar image of the USS *Monitor*, August 27, 1973.  
 Photo: NOAA, *Monitor* Collection

## Background Information

Side scan sonar is a specialized system to detect objects on the seafloor. Sonar is short for “sound navigation and ranging.” Thus, sonar uses sound waves to locate underwater objects by measuring the time it takes for a transmitted sound wave to be reflected back to its source. The sound wave is transmitted through a transducer, which is comparable to a speaker in a radio. Side-scans use a transducer, housed in a hollow container called a towfish, that is towed through the water 10 to 20 feet above the bottom. The transducer emits sound waves to either side of the towfish and measures the time it takes for the waves to be reflected back to the towfish.

These sound waves are processed into an image that resembles an aerial photograph and can be viewed in real-time on a computer monitor aboard the towing vessel. A global positioning system (GPS) is used to guide the towing vessel along predetermined search paths, as well as to identify points of interest on the side scan image. This allows scientists to return to any point on the image for further investigation.

In a side scan, the transmitted energy is formed into the shape of a fan that sweeps the seafloor from directly under the towfish to either side. Typically, this distance is about 100 meters (~330 feet), but actual distance is based on frequency. The strength of the return echo is continuously recorded, creating a picture of the ocean bottom. Side scan sonar does not depend upon light and can be used under conditions that would make searching by divers dangerous or impossible. Because it covers a swath of up to 100 meters (~330 feet) or more at about 2-4 miles per hour, it is a very efficient way to search large areas.

Experimental side scan sonar systems began during the 1950s by both the military and commercial industry. Dr. Harold Edgerton was a professor of electrical engineering at the Massachusetts Institute of Technology. He was intrigued with the unique challenges of underwater research and worked to design and develop many tools used in underwater exploration including side scan sonar.

In 1973, Edgerton and John G. Newton from Duke University teamed together to see if side scan sonar imaging could be used to locate shipwrecks. Working off the North Carolina coast, the one ship that had a unique distinct “signature” was the USS *Monitor*. In August 1973, the team began to map the ocean floor in an area where they thought the *Monitor* might lay. On August 27, the side scan sonar recorded a “long amorphous” echo, and in April 1974, the location of the *Monitor* was verified for the first time in 112 years!

### Activity Summary

Students will use a prepared box to simulate the ocean floor. Using dowels and graph paper, they will map the simulated ocean floor to understand how side scan sonar works.

### Learning Objectives

Students will

- Use a coordinate grid system to simulate mapping the ocean floor.
- Make observations and inferences about the topography of an unknown and invisible landscape.
- Have an understanding of how side scan sonar works and how it is used in locating shipwrecks.

### Teacher Preparation and Implementation

- For each student or group, prepare one box by lining the bottom of the box unevenly with mounds of clay, spray insulating foam, or plaster-of-Paris. (*Suggested types of boxes: 1) a cardboard shoebox with holes punched in lid; 2) small plastic tub, spray painted with holes drilled in the lid; or 3) copy paper box, for larger terrains, with inner part of box lid cut out leaving only an outer edge and an air filter taped to the inside [see image on right].* Visit [http://oceanservice.noaa.gov/education/seafloor-mapping/sounding\\_box\\_make1.html](http://oceanservice.noaa.gov/education/seafloor-mapping/sounding_box_make1.html) for additional ideas.

- ◇ Add objects to the box, such as Ping-Pong balls, toy boats, blocks, etc. Objects should be secure, and each box should have areas of different reliefs.
- ◇ In the lid of the box, use a nail or similar sharp object to punch 5-7 rows of holes 3-4 mm in diameter and spaced 2 cm apart.
- ◇ Temporarily fasten the lids to the completed box with masking tape.
- Lightly sand skewers until smooth. Mark skewers from pointed tip upward in 2 cm increments. Color each increment a different color.
- For each group, copy and color a Sounding Pole Key to match the colors of the skewers.
- For each student, make and give copies of the Student Activity pages for Part I and II.
- For each group make and give a copy of the Sounding Pole Key, Topographic Map, Profile Graph, and Part III—Sonar Image.
- Follow the steps listed in the Procedure section.



Simulating sonar imaging.  
**Left:** Plastic tub spray painted.  
**Right:** Copy paper box with filter inset in lid and sounding pole (skewer). Photos: NOAA

### Vocabulary

**ECHO** — A sound or series of sounds caused by the reflection of sound waves from a surface back to the listener

**SIDE SCAN SONAR** — A type of sonar system used by scientists to map the sea floor to create a picture or an image of the area. It measures the strength of how “loud” the return echo is.

**TOPOGRAPHY** — Arrangement of the natural and artificial physical features of an area; a detailed description or representation on a map of the natural and artificial features of an area

## Answer Key

See Teacher Key for Sample Finished Topography Map and sample finished Profile Graph.

Part III — Sonar Image page: the top and right (middle) images are the same. They depict the *Herbert D. Maxwell* located in the Chesapeake Bay, Maryland.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her.

<http://monitor.noaa.gov/150th>

#### Monitor National Marine Sanctuary—Sketchfab

Click to view and manipulate 3-D models of the USS *Monitor*, *Monitor* artifacts, and more.

<https://sketchfab.com/NOAAMonitorNMS>

#### NOAA Ocean Service Education

Learn about side scan sonar and watch a movie of a NOAA survey ship using a multibeam and side scan sonar.

[http://oceanservice.noaa.gov/education/seafloor-mapping/how\\_sideescansonar.html](http://oceanservice.noaa.gov/education/seafloor-mapping/how_sideescansonar.html)

#### Lead Line — The Mariners' Museum

Learn more about the history and use of the lead line.

<http://ageofex.marinersmuseum.org/index.php?type=navigationtool&id=3>

#### NOAA Office of Coast Survey

Great explanation of how side scan sonar works and how NOAA uses it.

<http://www.nauticalcharts.noaa.gov/hsd/SSS.html>

#### NOAA Ocean Explorer — SONAR

Learn more about active and passive sonar and how side-scan and multibeam sonar technology is used to map the ocean floor and shipwrecks.

<http://oceanexplorer.noaa.gov/technology/tools/sonar/sonar.html>

#### NOAA USS *Monitor* Legacy Website

Learn more about side scan sonar and the discovery of the USS *Monitor*.

<http://monitor.noaa.gov/150th/discovery.html>

#### Harold “Doc” Edgerton

Read about the life of Doc Edgerton, MIT professor, who designed and developed various underwater instruments including side scan sonar.

<http://edgerton-digital-collections.org/stories/features/fathoming-the-oceans-3-under-water-sonar-acoustics>

## Books

Morrison, Taylor. *The Coast Mappers*. Houghton Mifflin Books for Children, April 2004. ISBN: 10-0618254080.

Oleksy, Walter G. *Mapping the Seas (Watts Library: Geography)*. Franklin Watts, March 2003. ISBN 13: 978-0531166345.

Smith, K.C. *Exploring for Shipwrecks (Watts Library)*. Franklin Watts, 2000. ISBN 13: 978-0531164716.

Walker, Sally M. *Shipwreck Search: Discovery of the H. L. Hunley (On My Own Science)*. First Avenue Editions, November 30, 2006. ISBN 10: 0822564491.

Wall, Julia. *Mapping Shipwrecks with Coordinate Planes (Real World Math: Level 5)*. Capston Press, 2011. ISBN 13: 978-1429666176.

## Video

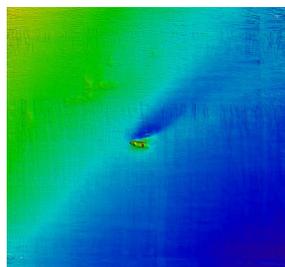
### The USS *Monitor* and NOAA: A Look Through Time

Travel back to 1862 in this educational video to learn how the USS *Monitor* turned the tide of the Civil War. The video also highlights the *Monitor's* discovery, designation as a national marine sanctuary, and more.

<https://www.youtube.com/watch?v=EX6H3Tp-2yE>

## Procedure

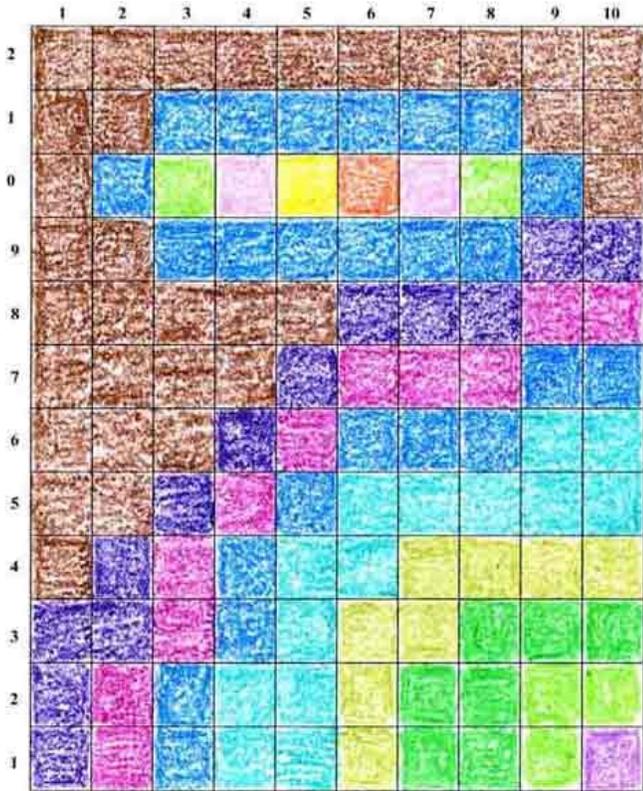
1. Assess the students understanding of sound, sonar, and echoes. Give appropriate background information as needed.
2. Describe how scientists use sonar imaging to create a map of the ocean floor and how it is also used to search for shipwrecks.
3. Explain that they will be simulating the use of side scan sonar to map an ocean floor.
4. Pass out the Student Activity pages and have students read “Setting the Stage.” Discuss and check for understanding.
5. Have students read “The Expedition” section and check for understanding, answering any questions.
6. Working in teams, have the students begin Part 1 of the activity using the Sounding Pole, Sounding Pole Key, Depth Table graph, and Topographic Map graph.
7. Next, in Part II, students make a profile using the Profile Graph provided or graph paper.
8. Have students complete Part III by looking at real sonar images to determine features of a shipwreck.



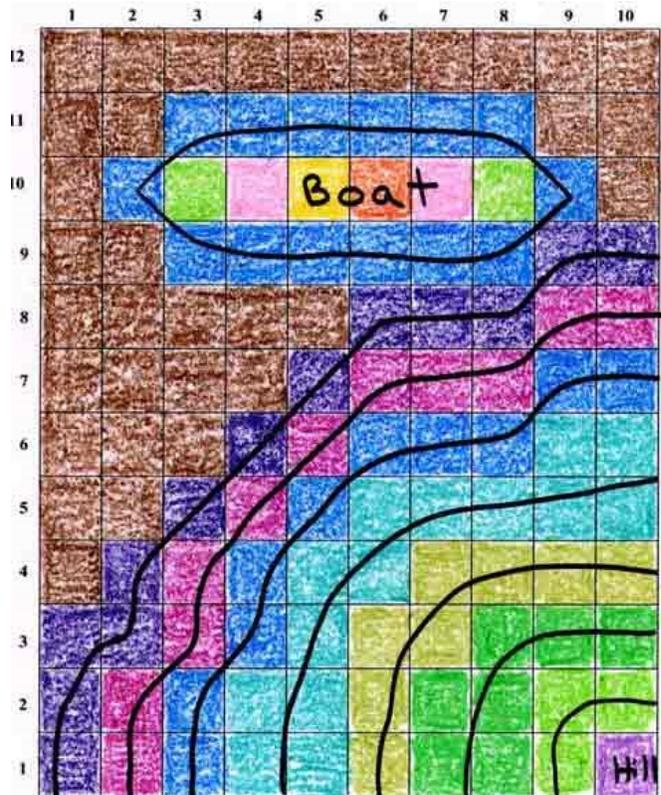
Sonar image of the USS *Monitor* taken in 2016. Image: NOAA

## Teacher Key Searching the Deep

### Sample of Finished Topography Map — Part I



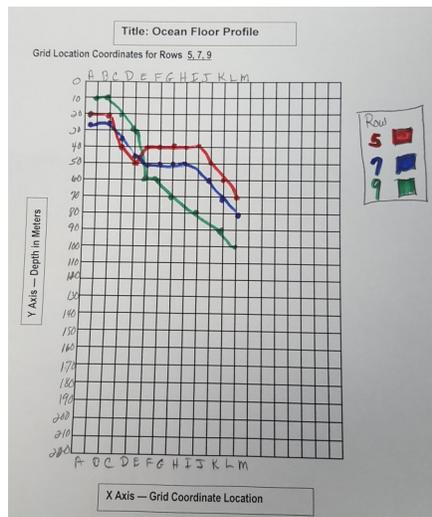
When finished, each square on the depth chart should be colored.



Drawn lines connect grid boxes that have the same colors to show what objects or landforms are on the bottom of the sea floor.

For additional information, see NOAA Ocean Service “Sounding Box Activity” at [http://oceanservice.noaa.gov/education/seafloor-mapping/sounding\\_box\\_make1.html](http://oceanservice.noaa.gov/education/seafloor-mapping/sounding_box_make1.html)

### Sample of Finished Profile Graph — Part II



Students choose three rows from the Depth Table and plot each row's depth using a different color for each row. This creates a profile of the ocean floor. Students should title the graph, label x- and y-axis, and create a key indicating the color used for each row.

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Searching the Deep Part I — Topographic Map

### Setting the Stage

Historically, mariners lowered a lead weight attached to a measured line into the water until the weight touched the bottom (or some object resting on the bottom). Then, they would note the length of line and call it out to the captain to make him aware of the water depth so as to not run a ship aground. Known as a “lead line,” the device was first used in about 3400 BCE by the oldest known boat trading peoples, the Egyptians.

Today, a conventional sonar system provides a continuous record of depth directly beneath a ship. This type of sonar improves resolution along the search path, but there are still gaps between the paths that are much greater than the area actually imaged. Side scan sonar fills in these gaps and gives an almost continuous picture of the search area. When mapping the ocean floor topography and identifying objects, such as shipwrecks, it is important to have a high resolution of an image for more accurate identification.



Sounding Lead, 7 lbs., marked in 25 fathom increments (156 feet). Photo: The Mariners' Museum

### The Expedition

A group of scientists, researchers, and maritime archaeologists, led by NOAA's Monitor National Marine Sanctuary, are conducting an expedition onboard NOAA's 90 foot Small Research Vessel (SRVx), *Sand Tiger*, to search for a German U-boat. The U-boat sank off the North Carolina coast during a battle in 1942, and it has never been found. The expedition team used side scan sonar to explore a large ocean area near Cape Hatteras, North Carolina. The sonar images show several anomalies that are areas of interest. Just before the end of the expedition, the team goes back to one area to take a closer look.

Your team's mission is to conduct the side scan sonar imaging of the area of interest and to interpret the image. Follow the directions below.

1. Observe the sounding box and sounding pole. Note the grid system on the box. Observe the colored sections on the sounding pole (wooden skewer) and note how they correlate to the Sound Pole Key for depth.
2. Starting at the top left, insert the sounding pole (wooden skewer) into the first hole in the first row.
3. Use your finger to mark where the sounding pole exits the surface (lid). Don't move your fingers, and pull the sounding pole out of the box. Note the color that your fingers are touching.
4. Using the *Sounding Pole Key*, determine the depth and record this measurement in the *Depth Table*. Be sure to record in meters. Repeat for all rows.



NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### Part I — Continued

5. Once you have found the depth measurements for all rows, use the data from the Depth Table to create a topographic map of your ocean floor.
  - A. First, on the **Topographic Map** graph, color the map's "Sounding Key" the correct corresponding colors as indicated in the Sounding Pole Key.
  - B. Next, start at the top of the **Depth Table** and use the data from in each square to color the corresponding square on the **Topographic Map** the correct color for its depth.
6. When the **Topographic Map** is completed, work as a team to analyze your the map.
7. In your science journal or on the back of the map describe the ocean floor you mapped.
  - A. Where are the peaks and valleys?
  - B. Hypothesize what your ocean floor looks like.
  - C. Note any distinguishing features that are helpful.

Use the table below to record your depth measurements.

**Depth Table**

	A	B	C	D	E	F	G	H	I
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Searching the Deep Part I — Topographic Map

Complete the *Sounding Key* by filling in the boxes with correct corresponding colors according to the Sound Pole Key. To create a topographic map, use your recorded measurements in the *Depth Table* and the key to color each square with the correct corresponding color indicating its depth.

	A	B	C	D	E	F	G	H	I
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									

Sounding Key	
10	10 meters
20	20 meters
30	30 meters
40	40 meters
50	50 meters
60	60 meters
70	70 meters
80	80 meters
90	90 meters
100	100 meters
110	110 meters
120	120 meters
130	130 meters
140	140 meters

**Part I — Sounding Pole Key (make one key per group)**

**Sounding Pole Key  
All Depths Measured  
in Meters**

	10
	20
	30
	40
	50
	60
	70
	80
	90
	100
	110
	120
	130
	140

**Sounding Pole Key  
All Depths Measured  
in Meters**

	10
	20
	30
	40
	50
	60
	70
	80
	90
	100
	110
	120
	130
	140

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Searching the Deep Part II — Ocean Floor Profile

- To create a profile of your ocean floor, label the **Profile Graph** with a title and label the x-axis and y-axis. (*NOTE: This is a profile; therefore, the x-axis should correspond to the numbers or letters indicated for each hole along the x-axis. For example, in the sample below, the first hole corresponds to A on the x-axis, the second hole to B, and so on. The y-axis of your Profile Graph should correspond to the depth measurements that you recorded for each row or y-axis.*)
- From your **Depth Table**, choose a row, such as Row 2 shown on the sample Depth Table below. Then on the **Profile Graph**, plot the depth for each column (A, B, C, D, E, etc.).

**Example Depth Table**

	A	B	C	D	E
<b>1</b>					
<b>2</b>	20 meters	20 meters	60 meters	70 meters	85 meters
<b>3</b>					
<b>4</b>					

- Connect the dots on your graph using a colored pencil/marker. This is the profile of the ocean floor topography for that row.
- Based on these measurements from the first plotted row and the topography map, predict what the topography is like inside the box. What do you think the simulated ocean floor looks like?
- Repeat steps 2-4 for two or more rows using a different color for each. Create a Key on the Profile Graph for each color indicating which row is represented by the color. Is your data for the second and subsequent rows the same? What does this new information reveal?
- Analyze your graph. What predictions do you have about your mystery landscape?
- Present your graph and report your conclusion, describing the mystery landscape.
- After each group has reported its conclusions, open your box and compare the actual topography with your prediction.
- Write in your science journal how your investigation could be improved.
- As a class, discuss the methods that were used to map the topography and how the ocean floor is mapped today with sonar.
- Look at the sonar images on the sonar image page of the unknown shipwreck(s) and record any identifiable parts.

NAME: \_\_\_\_\_

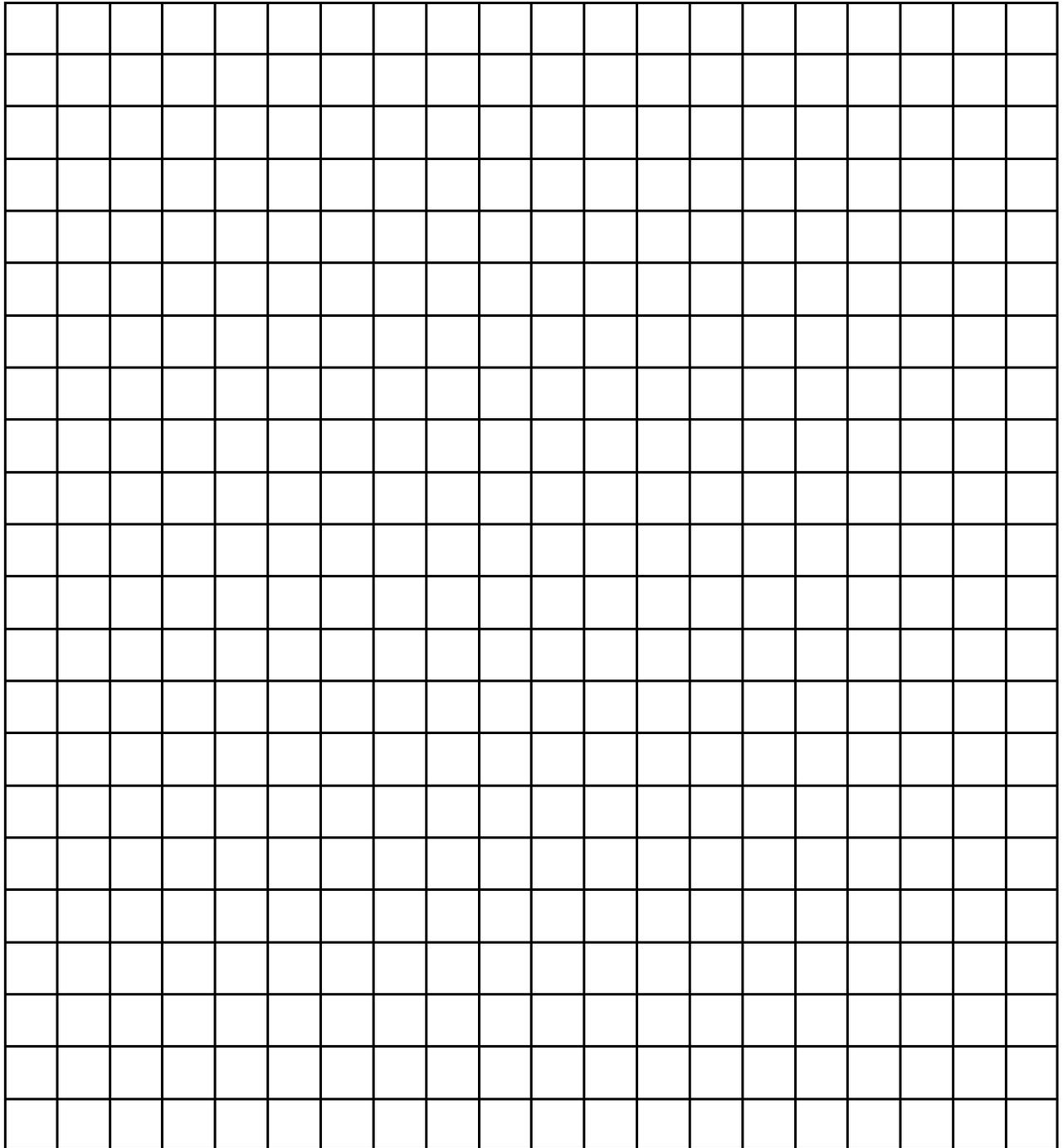
DATE: \_\_\_\_\_

### Searching the Deep Part II — Profile Graph

**Title:** \_\_\_\_\_

Grid Location Coordinates for Rows \_\_\_\_\_

Y Axis — Depth in Meters

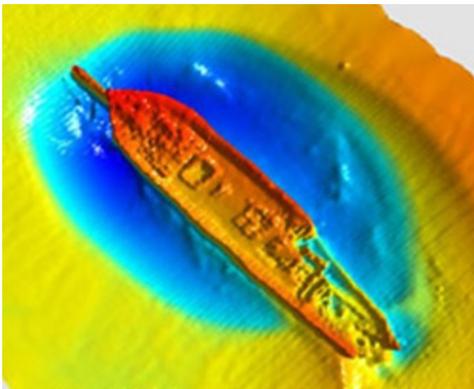


X Axis — Grid Coordinate Location

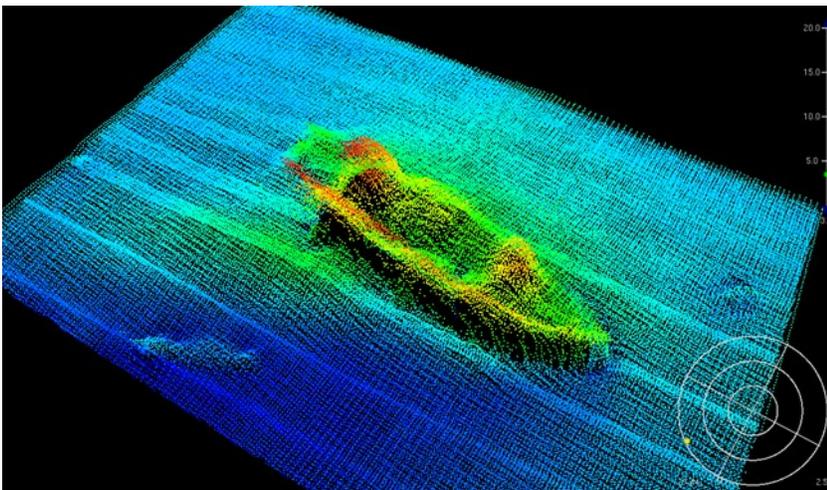
NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### Searching the Deep Part III — Sonar Images



1. Observe the image above and label any parts of the ship that are identifiable.
2. From this image, can you determine why the ship sank? Explain.
3. Observe the image to the left and label all recognizable parts.
4. Can you determine why the ship sank? Explain.
5. Compare the two images (top and left). Do they have any similarities? Explain and discuss.
6. Observe the image of the USS *Monitor* below. Compare and contrast the three images. Which one has the best detail?



Scientists use computer-mapping software to turn sonar echoes or soundings into rainbow-colored maps and 3-D models. This multibeam rainbow sonar image is of the USS *Monitor* taken in April 2015 by NOAA Ship *Thomas Jefferson*. All Images: NOAA

## Mapping the *Monitor*



USS *Monitor*'s bulkhead.  
Photo: NOAA, *Monitor* Collection

### Grade Level

- 4-8

### Timeframe

- 1 hour

### Materials per Student/Group

- Site Plan Grid
- Artifact Worksheet
- Artifact Cards (optional)
- Student Activity Worksheet
- Pencil or colored pencils

### Activity Summary

Students will use a coordinate grid system to map the location of *Monitor* artifacts.

### Learning Objectives

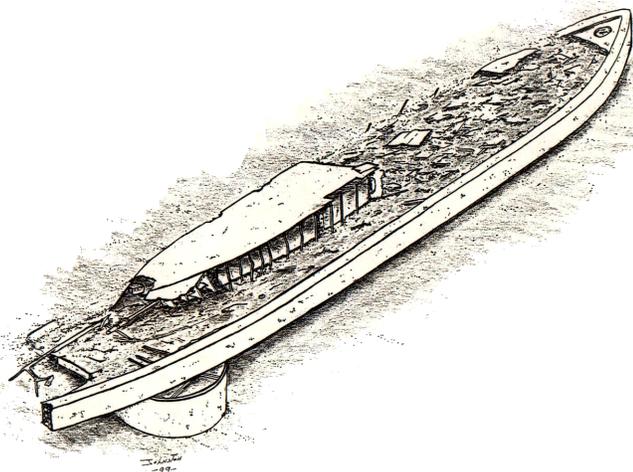
- Have an understanding of plotting coordinates on a grid system
- Use a coordinate grid system to simulate mapping artifacts
- Make observations and inferences about artifacts
- Understand why it is important to carefully map artifacts

### Key Words

Artifact, grid, *in situ*, coordinates

### National Standards

NG:1 and 3; NCTE:1;  
CCSS.ELA.LIT.RST; NCTM: 6-8:NO.D;  
NCTM:6-8:MS.A; NCTM: 9-12:G.A and B;  
NS.5-8: E and G; OL: 6 and 7



Wreck drawing of the USS *Monitor*.  
Photo: NOAA, *Monitor* Collection

## Background Information

During August 1973, a scientific team on board the Duke University Marine Laboratory research vessel *Eastward* conducted an oceanographic cruise off North Carolina with two objectives: first, a geological study of the Continental Shelf off Cape Hatteras and second, a search for the USS *Monitor*.

Initially, 22 possible targets for the *Monitor* were located. The team ruled out 21 of the targets as “not the *Monitor*.” Then on August 27, the last day of the expedition, the team of scientists surveyed a target that was a shipwreck lying in about 230 feet of water, approximately 16 miles south-southeast of Cape Hatteras. After laboriously imaging the site, the scientists observed what they believed to be the *Monitor*'s uniquely shaped hull. However, as the expedition ended, there was just not enough evidence to identify conclusively the wreck as the *Monitor*.

Over the next seven months, the team intensively studied the visual evidence collected. The ironclad was difficult to identify in part because it was lying upside down with its turret, also upside down, separated from the hull and wedged under the port stern. The team decided that they needed more data, and in April 1974, they revisited the site and confirmed the shipwreck as that of the USS *Monitor*.

Since its discovery, many expeditions to the *Monitor* have yielded valuable information about the unique and historic ship. In the 1990s, Congress mandated that NOAA create a plan to recover iconic pieces of the *Monitor* so that generations to come could see and learn about the *Monitor*. After developing a comprehensive plan for the removal of artifacts, maritime archaeologists began the process of recovery. Between 1998 and 2002, recovery included several large artifacts, such as the propeller and 9 feet of shaft, steam engine, condenser, turret, and hundreds of smaller artifacts. The Mariners' Museum in Newport News, Virginia, designated in 1987 as the

official repository for *Monitor* artifacts, continuously works to conserve and study each artifact in order to learn more about the ship and life in 1862.

Generally, maritime archaeologists prefer to leave shipwrecks *in situ* so as not to disturb the artifacts, because each artifact and its location plays a unique role in telling the story of the ship and her crew. Some ships, such as the *Monitor*, are historically significant or offer insight into the past that cannot be obtained in other ways; therefore, removal of artifacts is acceptable. However, only professional maritime archaeologists should do the removal!

Before removing any artifacts from a shipwreck, maritime archaeologists carefully document each artifact and map its location. To map an artifact, maritime archaeologists use a coordinate grid system and employ measuring and scaling techniques to sketch a drawing of the shipwreck, noting the location of artifacts. Often maritime archaeologists have limited time under water to map a shipwreck due depth or other factors; therefore, they also take video and still photography of the wreck site to aid in their mapping techniques.

One might say that a maritime archaeologist is much like a detective who searches for evidence and analyzes clues to reach a conclusion. By careful documentation and observation, maritime archaeologists can better obtain the goal of understanding the past and connecting the past to real people and everyday life. With thousands of shipwrecks in our ocean, lakes, and rivers waiting to be discovered and studied, maritime archaeology is an exciting career providing many career opportunities based in science, technology, engineering, and mathematics (STEM)!

## Activity Summary

Students will use a coordinate grid system to map artifacts found on the USS *Monitor*. They will understand the need for accurate mapping and documenting artifacts in order to tell a ship's complete story.

## Learning Objectives

Students will

- Understand the plotting of coordinates on graphs.
- Use a coordinate grid system to simulate locating and mapping artifacts on the USS *Monitor*.
- Make inferences about the artifacts and their location on the *Monitor*.
- Understand why it is important to carefully map artifacts.

## Teacher Preparation and Implementation

There are two alternative ways to teach this lesson. Read both alternatives and prepare accordingly.

- **Standard Lesson Plan:** This activity can be completed individually or in small groups of two using only the Site Plan Grid and Artifact Worksheet.
  - For each student or pair, print copies of the USS *Monitor* Site Plan Grid (p. 133), Artifact Worksheet (p. 135), and Student Activity Worksheet (p. 131).
  - See step 5 in Procedures for implementation details.
- **Alternate Lesson Plan:** In this activity, students work in teams of 3-4 and use an enlarged Site Plan Grid and Artifacts Cards to map the artifacts.
  - For each group, print on cardstock the 14 large Artifact Cards (two per page) (pp. 137-142) Cut apart and laminate if desired.
  - For each group, print on cardstock the 14 smaller Artifact Cards (p. 136). Cut apart and laminate if desired.

## Vocabulary

**ARCHAEOLOGY** — The study of human history and prehistory through the excavation of sites and the analysis of artifacts and other physical remains

**ARTIFACT** — An object made by a human being, typically an item of cultural or historical interest

**BOW** — The forward part of the hull of a ship or boat, the point that is usually most forward when the vessel is underway.

**GRID SYSTEM** — A basic system of reference lines for a region, consisting of straight lines intersecting at right angles; a network of horizontal and perpendicular lines uniformly spaced for locating points on a map or chart

**IN SITU** — Left in its original place, position

**PORT** — Left on a ship or boat when looking toward the bow

**SCALE FACTOR** — Ratio of a scaled figure/image to original figure/image

**STARBOARD** — Right on a ship or boat when looking toward the bow

**STERN** — The back or aft-most part of a ship or boat.

- For each group, print a Site Plan Grid (p. 133) increasing the size to approximately 3 feet by 18 inches). Print on thick paper and laminate.
- Print the Student Activity Worksheet (p. 132) for each student or group.
- See step 6 in Procedures for implementation details.

## Procedure

1. Introduce students to the USS *Monitor* and why the ship is historically significant.
3. Review or explain a coordinate grid and discuss scale.
4. Divide students into groups as appropriate.

### 5. Standard Lesson Plan

- ◇ Give each student or pair of students a copy of the Site Plan Grid, Artifact Worksheet, and Standard Student Activity Worksheet.
- ◇ Have students read the Background Information on the Student Activity Worksheet. Discuss why it is important to carefully document any removal of artifacts from a shipwreck or other cultural site.
- ◇ Have the students label the bow, stern, port, and starboard of the shipwreck (see vocabulary).
- ◇ Explain that they will use a coordinate grid system to map the artifacts on the USS *Monitor* wreck site (Site Plan Grid). If needed, do one as an example.
- ◇ Have the students read the Artifact Worksheet to learn about each artifact, and then use a pencil or marker to mark the location of each artifact on the Site Plan Grid and label the artifact.
- ◇ In their science journals or on the back of the Site Plan Grid, have students describe where each artifact was located on the shipwreck (bow, stern, port, starboard). Have them explain if the location had any significance. For example: Why were shoes and buttons found in the turret? Perhaps sailors took their shoes and coats off in a hurry as they abandoned ship in case they were washed overboard and needed to swim.

### 6. Alternate Lesson Plan

- ◇ Give each student an Alternate Student Activity Worksheet.
- ◇ Give each group a large Site Plan Grid, 14 large Artifact Cards and 14 small Artifact Cards.
- ◇ Have them locate on the Site Plan Grid the bow, stern, port, and starboard of the shipwreck.
- ◇ Have the students read the background information on the Student Activity Worksheet and discuss the importance of documenting the removal of artifacts.
- ◇ Have the students divide the large Artifact Cards and matching small Artifact Cards between the group.

- ◇ Explain that they will work as a group using a coordinate grid system to map the artifacts recovered from the USS *Monitor* wreck site (Site Plan Grid). If needed, do one as an example.
- ◇ Have the students read their large Artifact Cards to learn about the artifacts.
- ◇ Once everyone is finished reading, have the students take turns summarizing and sharing the information about their artifacts.
- ◇ Once they have shared the artifact's information, have them place the small artifact card on the *Monitor* Site Plan Grid in the appropriate place.
- ◇ After everyone has had a turn to share and map their artifacts, have the students write in their science journals describing where each artifact was located on the shipwreck (bow, stern, port, starboard). Have them explain if the location had any significance. For example: Why were shoes and buttons found in the turret? Perhaps sailors took their shoes and coats off in a hurry in case they were washed overboard and needed to swim.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her.

<http://monitor.noaa.gov/150th>

#### NOAA Ocean Service Education

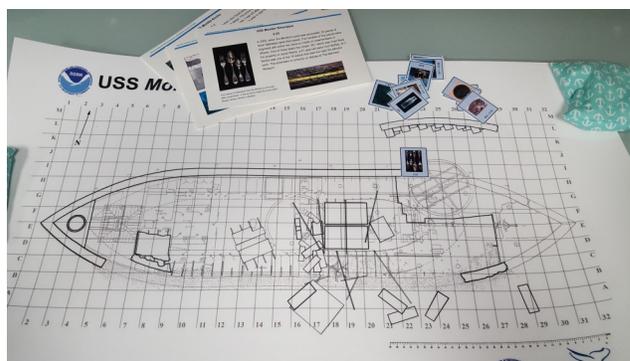
Learn about side scan sonar and watch a movie of a NOAA survey ship using a multibeam and side scan sonar.

[http://oceanservice.noaa.gov/education/seafloor-mapping/how\\_sideescanar.html](http://oceanservice.noaa.gov/education/seafloor-mapping/how_sideescanar.html)

#### NOAA Office of Coast Survey

Great explanation of how side scan sonar works and how NOAA uses it.

<http://www.nauticalcharts.noaa.gov/hsd/SSS.html>



Enlarged Site Plan Grid with large and small Artifact Cards (Alternate Lesson Plan). Photo: NOAA

### NOAA USS *Monitor* Legacy Website

Learn more about side scan sonar and the discovery of the USS *Monitor*.

<http://monitor.noaa.gov/150th/discovery.html>

### Harold "Doc" Edgerton

Read about the life of Doc Edgerton, MIT professor, who designed and developed various underwater instruments including side scan sonar.

<http://edgerton-digital-collections.org/stories/features/fathoming-the-oceans-3-under-water-sonar-acoustics>

### Books

Morrison, Taylor. *The Coast Mappers*. Houghton Mifflin Books for Children, April 2004. ISBN: 10-0618254080.

Oleksy, Walter G. *Mapping the Seas (Watts Library: Geography)*. Franklin Watts, March 2003. ISBN 13: 978-0531166345.

Smith, K.C. *Exploring for Shipwrecks (Watts Library)*. Franklin Watts, 2000. ISBN 13: 978-0531164716.

Walker, Sally M. *Shipwreck Search: Discovery of the H. L. Hunley (On My Own Science)*. First Avenue Editions, November 30, 2006. ISBN 10: 0822564491.

Wall, Julia. *Mapping Shipwrecks with Coordinate Planes (Real World Math: Level 5)*. Capston Press, 2011. ISBN 13: 978-1429666176.

### Video

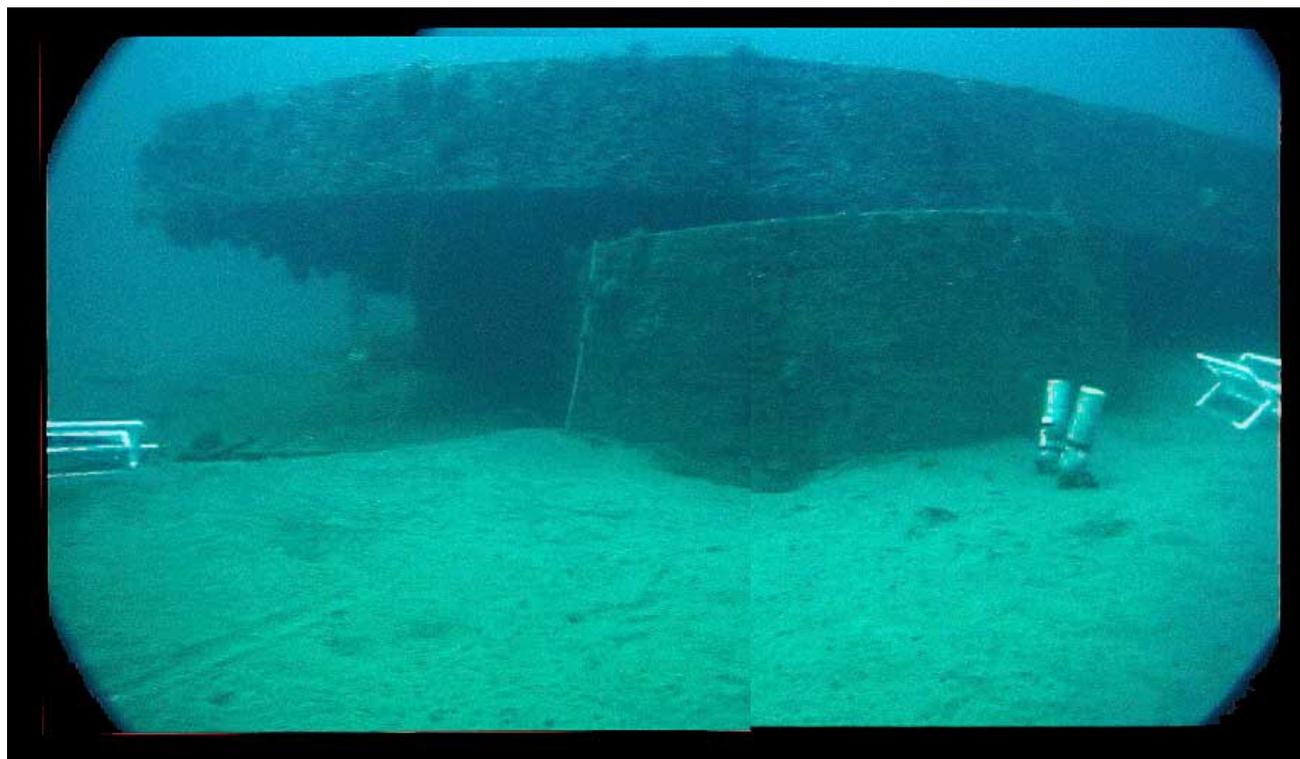
#### The USS *Monitor* and NOAA: A Look Through Time

Travel back to 1862 in this educational video to learn how the USS *Monitor* turned the tide of the Civil War. The video also highlights the *Monitor's* discovery, designation as a national marine sanctuary, and more.

<https://www.youtube.com/watch?v=EX6H3Tp-2yE>



Above: Diver working to recover the *Monitor's* steam engine.  
Left: Archaeologists excavate the *Monitor's* turret after recovery.  
Photos: NOAA, *Monitor* Collection



Turret lies upside down under the *Monitor*, also upside down. NOAA installed sacrificial anodes, mounted on PVC frames, to provide temporary corrosion protection for the *Monitor* while recovery planning was underway. Photo: NOAA, *Monitor* Collection

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Mapping the USS *Monitor* Standard Student Worksheet

### Background Information

Generally, maritime archaeologists prefer to leave shipwrecks *in situ* so as not to disturb the artifacts because each artifact and its location plays a unique role in telling the story of the ship and her crew. Some ships, such as the *Monitor*, are historically significant or offer insight into the past that cannot be obtained in other ways; therefore, removal of artifacts is acceptable. However, only professional maritime archaeologists should do the removal!

Before removing any artifacts from a shipwreck, maritime archaeologists carefully document each artifact and map its location. To map an artifact, maritime archaeologists use a coordinate grid system and employ measuring and scaling techniques to sketch a drawing of the shipwreck, noting the location of artifacts. Often maritime archaeologists have limited time under water to map a shipwreck due to depth or other factors; therefore, they also take video and still photography of the wreck site to aid in their mapping techniques.

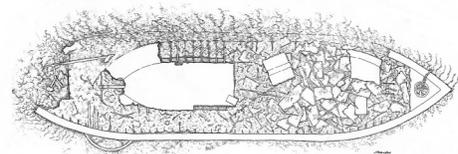
One might say that a maritime archaeologist is much like a detective who searches for evidence and analyzes clues to reach a conclusion. By careful documentation and observation, maritime archaeologists can better obtain the goal of understanding the past and connecting the past to real people and everyday life. With thousands of shipwrecks in our ocean, lakes, and rivers waiting to be discovered and studied, maritime archaeology is an exciting career providing many career opportunities based in science, technology, engineering, and mathematics (STEM)!

### Procedure

1. Read the Background Information.
2. Today, you will dive on the USS *Monitor* and map artifacts. Before beginning your dive, orient yourself to the ship by labeling the parts of the ship: bow, stern, port, and starboard.
3. Review the list of artifacts on the Artifact Worksheet. Note the letters and numbers (coordinates) at the front of each description.
4. Using the coordinates (letters and numbers), map each artifact on the Site Plan Grid. For example, the first artifact is the *Monitor's* engine with the coordinates of E-22. Find "E" on the Site Plan Grid and use your finger to mark the position. Next, find 22 on the grid and mark it with your finger on the other hand. Run your two fingers parallel with their letter/number until they meet. The intersection of the two is where the artifact is/was located.
5. Once the location is found, use a pencil or marker to draw a circle around the location.
6. Label the circle with either the artifact's name or coordinates.
7. Once all artifacts are mapped and labeled, answer the discussion questions below.

### Discussion

1. Why is it important to map the location of artifacts before recovering them?
2. Did all the artifacts appear to be in their "correct" location (where they would have been on the ship)? Why or why not?
3. If archaeologists from Monitor National Marine Sanctuary were to recover additional artifacts, where would you recommend that they search and why?
4. Write a short essay describing your two favorite artifacts.
5. Archaeologists keep a visual record of artifacts by taking photos, videos and drawing them. Draw a picture of two artifacts, write a brief description of each, and note where they were found (coordinates).



Monitor Collection, NOAA

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Mapping the USS *Monitor* Alternate Student Worksheet

### Background Information

Generally, maritime archaeologists prefer to leave shipwrecks *in situ* so as not to disturb the artifacts because each artifact and its location plays a unique role in telling the story of the ship and her crew. Some ships, such as the *Monitor*, are historically significant or offer insight into the past that cannot be obtained in other ways; therefore, removal of artifacts is acceptable. However, only professional maritime archaeologists should do the removal!

Before removing any artifacts from a shipwreck, maritime archaeologists carefully document each artifact and map its location. To map an artifact, maritime archaeologists use a coordinate grid system and employ measuring and scaling techniques to sketch a drawing of the shipwreck, noting the location of artifacts. Often maritime archaeologists have limited time under water to map a shipwreck due depth or other factors; therefore, they also take video and still photography of the wreck site to aid in their mapping techniques.

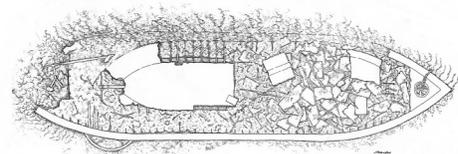
One might say that a maritime archaeologist is much like a detective who searches for evidence and analyzes clues to reach a conclusion. By careful documentation and observation, maritime archaeologists can better obtain the goal of understanding the past and connecting the past to real people and everyday life. With thousands of shipwrecks in our ocean, lakes, and rivers waiting to be discovered and studied, maritime archaeology is an exciting career providing many career opportunities based in science, technology, engineering, and mathematics (STEM)!

### Procedure

1. Read the Background Information.
2. Today, you will dive on the USS *Monitor* and map artifacts. Before beginning your dive, review the Site Plan Grid and orient yourself to the ship by identifying the parts of the ship: bow, stern, port, and starboard.
3. As evenly as possible, divide the large Artifact Cards and the corresponding small Artifact Cards among the divers in your group.
4. Each diver will read his/her artifacts' descriptions. When everyone is finished reading, take turns sharing what each diver learned about his/her artifacts.
5. After a diver shares what they learned, he/she will map that artifact. To map an artifact, note the letters and numbers (coordinates) on each of the Artifact Cards. Using the coordinates (letters and numbers), find the location for each artifact on the Site Plan Grid. For example, the *Monitor's* engine has coordinates of E-22. Find "E" on the Site Plan Grid and use your finger to mark the position. Next, find 22 on the grid and mark it with your finger on the other hand. Run your two fingers parallel with their letter/number until they meet. The intersection of the two is where the artifact is/was located.
6. Once the location is found, place the small Artifact Card at the location.
7. Once all artifacts are mapped and labeled, answer the discussion questions below.

### Discussion

1. Why is it important to map the location of artifacts before recovering them?
2. Did all the artifacts appear to be in their "correct" location (where they would have been on the ship)? Why or why not?
3. If archaeologists from Monitor National Marine Sanctuary were to recover additional artifacts, where would you recommend that they search and why?
4. Write a short essay describing your two favorite artifacts.
5. Archaeologists keep a visual record of artifacts by taking photos, videos and drawing them. Draw a picture of two artifacts, write a brief description of each, and note where they were found (coordinates).



Monitor Collection, NOAA

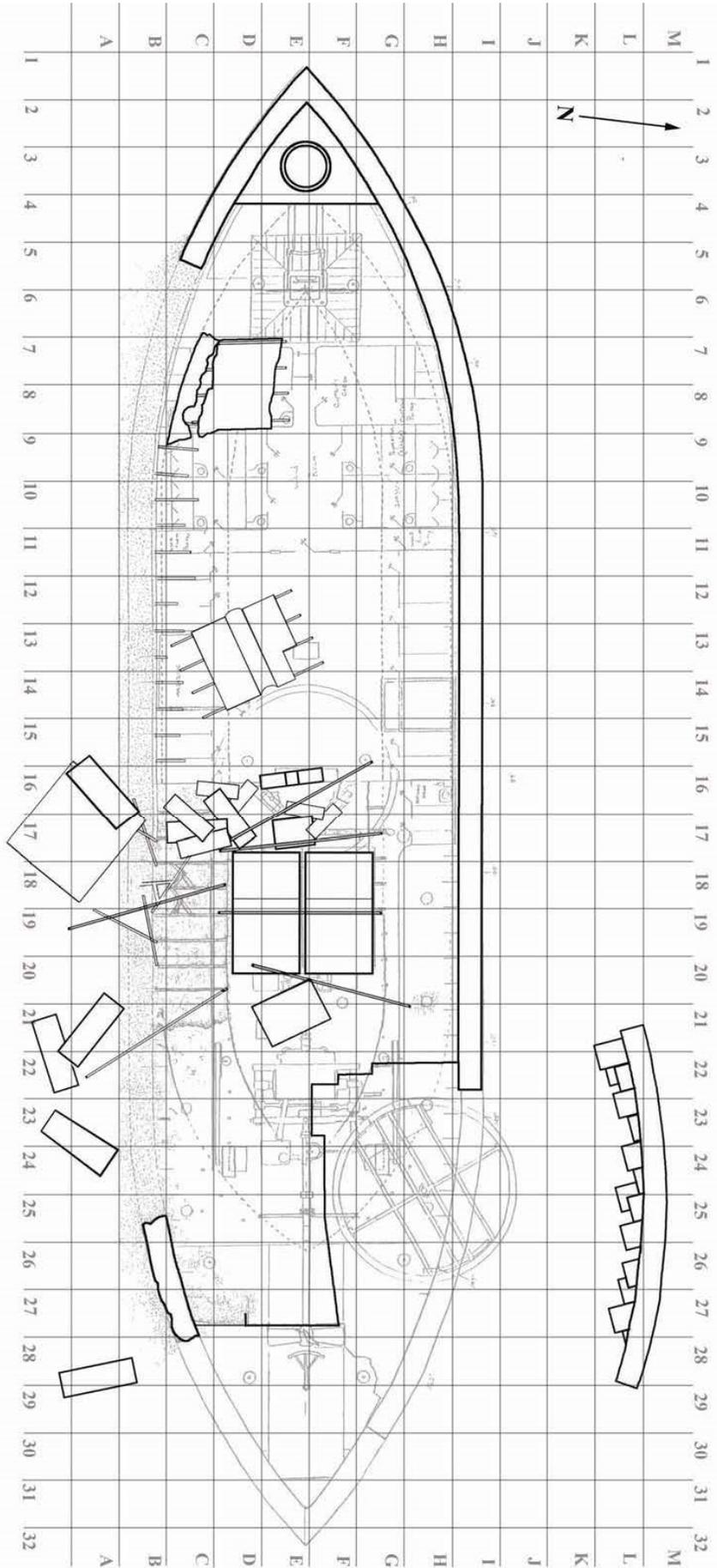
# USS Monitor

## Student Site Plan Grid



### Monitor National Marine Sanctuary

Date: \_\_\_\_\_ Diver: \_\_\_\_\_



Notes:



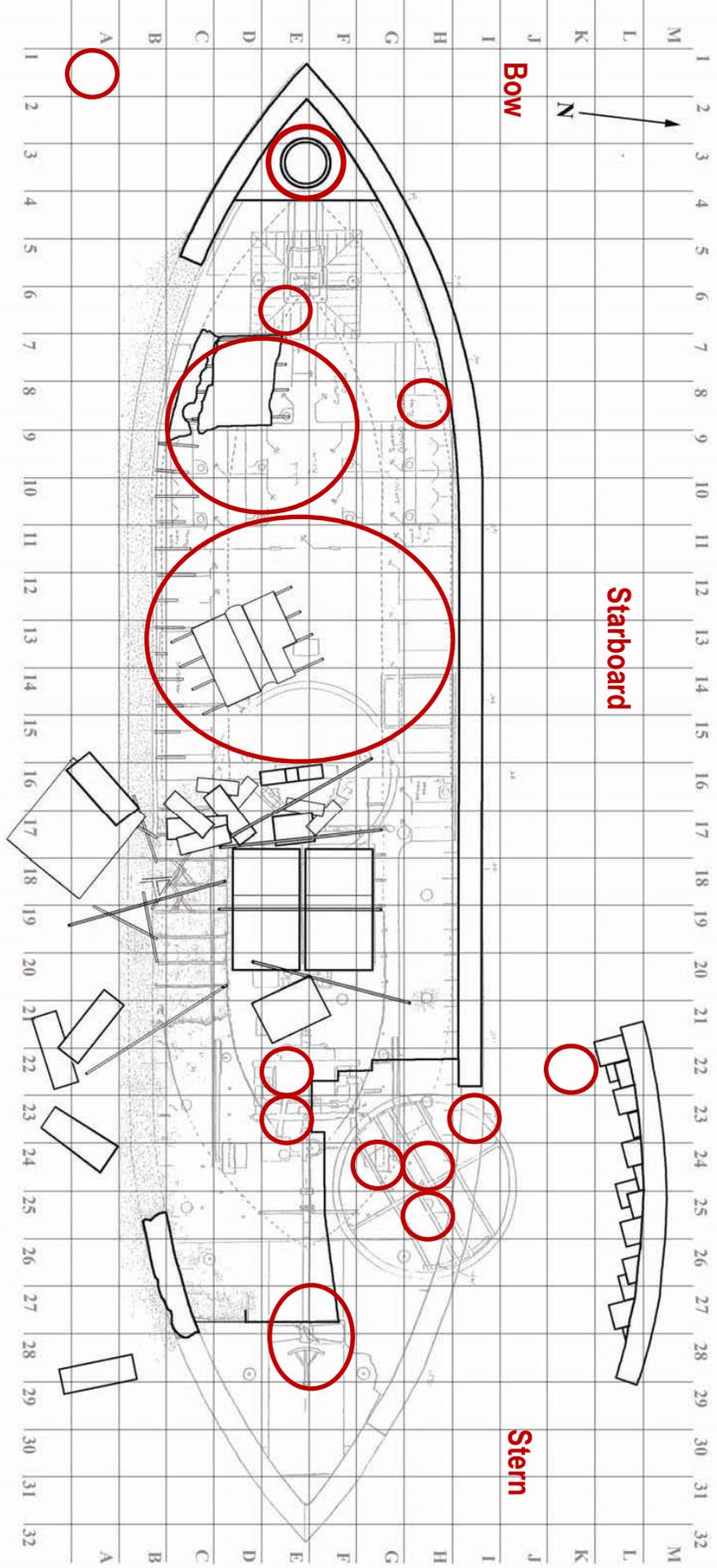
# USS Monitor Site Plan Grid

## Answer Key



### Monitor National Marine Sanctuary

Date: \_\_\_\_\_ Diver: \_\_\_\_\_



Notes:

Port



## Mapping the *Monitor* Artifact Worksheet — Standard Lesson Plan



**E-22** *Monitor's* engine - It was classified as the vibrating side lever engine. It weighed 30 tons and had 400 horsepower.



**A-1** *Monitor's* anchor - It weighed about 1,350 pounds and was recovered in 1983 approximately 495 feet south-southwest of the bow of the ship.



**E-F—27-28** *Monitor's* propeller - It had four blades and it weighed about 4,600 pounds. It had cast iron screws that were 9 feet in diameter.



**H-24** *Monitor's* Turret - It is 22 feet in diameter and 9 feet tall, it was constructed of eight 1 inch iron plates. It weighed 120 tons and was able to rotate with the help of two steam engines that used a crank to turn four gears.



**K-22** *Monitor's* Lantern - It was used as a distress signal towards the USS *Rhode Island* which was towing the USS *Monitor* in the Atlantic Ocean off Cape Hatteras, North Carolina



**E-23** *Monitor's* Engine Register - The middle disk has six rectangular spaces where numerical digits could be seen. This showed how many hours the ship engine had.



**H-25** Buttons - That were found in the turret, they could have come off anything like shirts and even underwear!



**G-24** Shoes - A single brown boot that probably belonged to an officer, which was left behind during the *Monitor's* sinking.



**H-8** Mustard Condiment Bottles - These were found along with plate fragments.



**I (i)-23** Silverware - Some were engraved with the initials or names of the crew.



**E-F—3** Anchor well - Where the anchor was tied up when the ship was underway.



**B-H—11-15** Crew Quarters - Area where the crew resided.

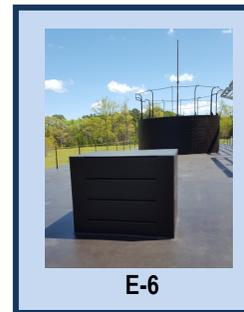
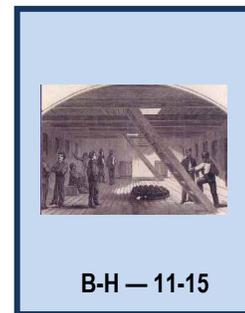
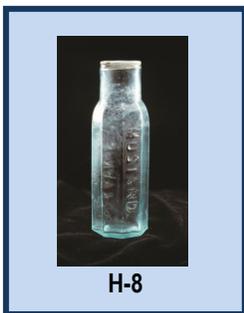
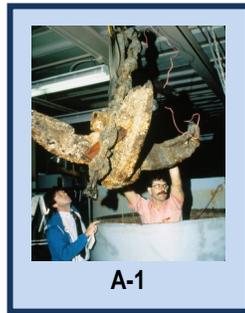


**C-F—7-10** Officer Quarters - Area where the officer's slept.



**E-6** Pilot House - Where the captain would sit to pilot the *Monitor*.

### Mapping the *Monitor* — Alternate Lesson Plan Small Artifact Cards



## USS *Monitor* Anchor Well

### E-F-3

An anchor is a heavy device attached to a boat or ship by a rope or chain. It is thrown into the water to hold the boat or ship in place. The anchor well is the hole in the ship where an anchor is lowered and raised. Usually, it is placed in the forward overhang of a ship. Maritime archaeologists easily identified the *Monitor's* anchor well.



*Monitor's* anchor (left) on display at The Mariners' Museum in Newport News, Virginia.  
*Monitor's* anchor well (right). Photos: NOAA, *Monitor* Collection

## USS *Monitor* Anchor

### A-1



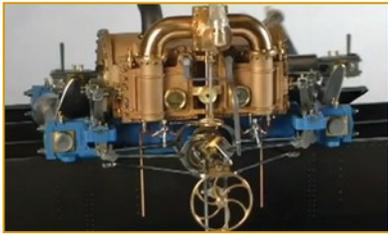
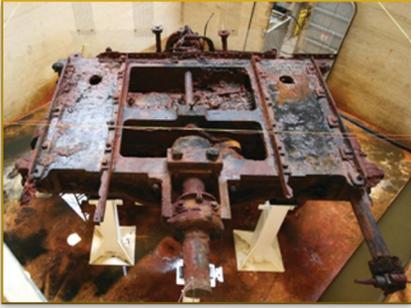
The *Monitor's* anchor was a short, flour-fluked anchor weighing over 1,000 pounds. It was unique in its design. The anchor was recovered in 1983, just south of the bow of the wreck. It was still attached to the ship and the anchor chain had to be cut in order to raise the anchor. Conservators restored the anchor, and it is currently on display at The Mariners' Museum in Newport News, Virginia.

The *Monitor's* anchor (left) underwent three years of treatment to remove corrosion before being placed on display (right).  
Photos: NOAA, *Monitor* Collection



## USS *Monitor* Engine

### E-22



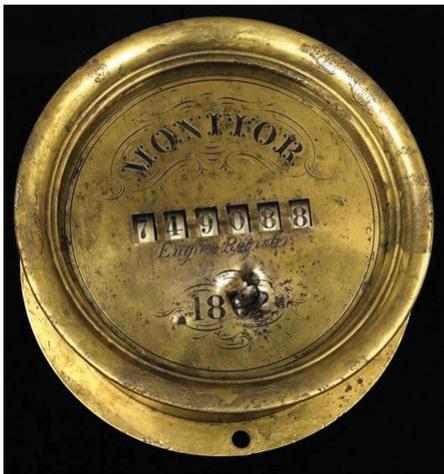
Top: *Monitor*'s engine in conservation tank.  
Below: A 1/16 scale operating model of the engine . Photos: NOAA

Swedish-American, John Ericsson, designed the *Monitor*'s engine as a “vibrating side-lever engine.” Most steam engines of the time had pistons that operated in a vertical motion, which took up a lot of space on a ship. They were also more likely to be destroyed by enemy fire because they were partially above the waterline. However, *Monitor*'s 30-ton, 400-horsepower engine had pistons that moved horizontally, which allowed it to be mounted below the waterline.

The engine was recovered from the wreck site in 2001. It is now resting upside-down in a conservation tank at The Mariners' Museum being preserved.

## USS *Monitor* Engine Register

### E-23



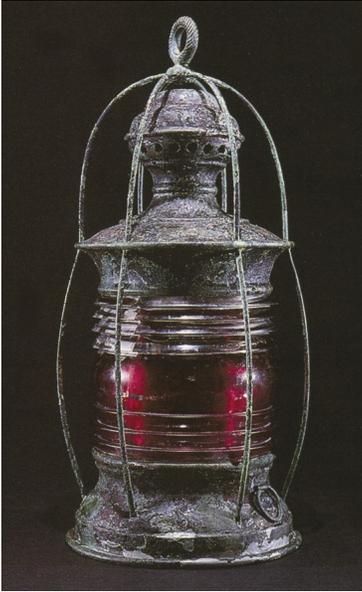
The conserved engine register displays how many hours were on the *Monitor*'s engine when the ship sank. Photo: NOAA

Mounted to the *Monitor*'s coal-fired steam engine, the circular engine register was recovered in 2001. It was the first, and currently only, artifact recovered from the wreck bearing the ship's name. Small metal disks on the register would slowly click over to show the engineer how many hours were on the ship's engine.

The engine register underwent conservation and is now on display at The Mariners' Museum in Newport News, Virginia.

## USS *Monitor* Lantern

K-22



While being towed to Beaufort, North Carolina, the *Monitor* was caught in a severe storm on New Year's Eve, December 31, 1862. When the ship was in extreme distress, the captain raised this red lantern on top of the turret as a final distress signal. It was the last object seen by the *Monitor*'s crew, and later became the first object recovered from the wreck site.

In 1977, the lantern was seen rolling across the ocean bottom next to the turret. It was recovered and conserved at the Smithsonian Institution. It is now on display at The Mariners' Museum in Newport News, Virginia.

In 1977, the red signal lantern was recovered and underwent seven years of restoration. Photo: NOAA, *Monitor* Collection

## USS *Monitor* Mustard Bottle

H-8



While searching the *Monitor*'s wreck forward of the mid-ship's bulkhead, six condiment bottles were recovered along with a plate fragment. These items were exposed because of severe hull deterioration, most likely due to currents flowing over the hull. One of the bottles was a "Hartell's Guaranteed Air Tight" storage jar that was filled with pickle relish. Amazingly, the wax seal was still intact and the relish still looked and smelled relatively fresh!

Mustard bottle (left) and a jar filled with pickle relish (center) were recovered from the *Monitor*. Condiment jars (right) on display at The Mariners' Museum. Photos: NOAA *Monitor* Collection



## USS *Monitor* Officers' Quarters

### C-F—7-10

The *Monitor* was the first U.S. Navy warship to house all officers and crewmen in the same section of the ship. Because all space aft of the amidships bulkhead was occupied by the engine, boilers, galley, and auxiliary machinery, there was no room for the officers, who normally occupied cabins in the stern. Instead, officers' cabins were well forward, opening into a wardroom. Because the officers and crew were required to spend most of their time below decks, the *Monitor* was equipped with a forced-air ventilation system and the world's first below-the-waterline flushing toilets.



Artist illustration of the officer's wardroom (left); recreation of an officer's stateroom (center); recreation of the captain's cabin (right) with flushing toilet (door on right). Photos: Left: *Harper's Weekly*; Center and Right: Ricles, NOAA

## USS *Monitor* Pilot House

### B-H—11-15



John Ericsson designed the *Monitor* to present the smallest target possible to enemy gunfire. Therefore, most of the ship was below the water, meaning there were no portholes (windows). In order for the captain to command the ship during a battle, he needed to see the action. To allow the captain to view the battle, but remain protected, Ericsson built a small armored pilothouse on the upper deck towards the bow. However, its position prevented *Monitor* from firing her guns straightforward.

Replica of the pilot house on a full scale model of the USS *Monitor* located at The Mariners' Museum in Newport News, Virginia. Photo: Ricles, NOAA

## USS *Monitor* Sailors' Shoes

### G-24



When the turret was recovered, archaeologists found a variety of objects inside, many of them personal, such as shoes and boots. One item was a Wellington boot (left). It, along with several other shoes, were most likely discarded by the sailors when they exited the ship as it was sinking. If the sailors were swept overboard, shoes and heavy coats would make it more difficult to swim, so they were left behind.

Shoes were made from leather, an organic material, and usually deteriorate quickly in a marine environment. However, because these were buried in coal and sediment for over 100 years, they survived fairly intact.



*Wellington boot (top) and a shoe (bottom) recovered from the turret.*  
Photos: NOAA, *Monitor* Collection

## USS *Monitor* Propeller

### E-F—27-28



The *Monitor*'s propeller was designed by John Ericsson as a four-blade, 4,600-pound, cast-iron screw propeller that was nine feet in diameter. Ericsson's revolutionary design was more efficient than a paddlewheel and allowed the engine to be mounted below the waterline so that it was protected from enemy fire.

The propeller and a section of the shaft were recovered in 1998. Conservators placed the propeller in a tank and after six years of conservation, it was placed on display at The Mariners' Museum in Newport News, Virginia .

The *Monitor*'s propeller (above) underwent six years of treatment to remove corrosion before being placed on display (right). Photo: NOAA, *Monitor* Collection



## USS *Monitor* Silverware

### I-23



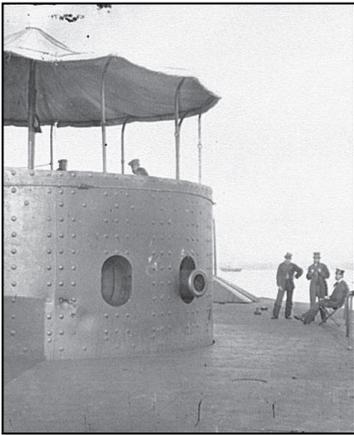
Four pieces of silverware from the *Monitor's* turret (top) after conservation. A fork as found inside the turret (right).  
Photos: NOAA, *Monitor* Collection

In 2002, when the *Monitor's* turret was excavated, 24 pieces of silver tableware were discovered. The handles of five pieces were engraved with either the name or initials of crewmembers or officers. One of these bears the initials "JN," which was most likely the property of Jacob Nicklis, a 21-year-old sailor from Buffalo, New York. Nicklis was one of the 16 sailors that died the night the *Monitor* sank. The silverware is currently on display at The Mariners' Museum in Newport News, Virginia.



## USS *Monitor* Turret

### H-24



When constructed in 1862, the *Monitor's* rotating gun turret was the first of its kind. While John Ericsson, *Monitor's* designer, was not the first to envision a revolving turret, his design was the first completed. The turret is 21.5 feet in diameter and nine feet tall. It was constructed of eight one-inch thick iron plates and weighed about 120 tons.

The turret was recovered in 2002, and placed in a specially designed conservation tank where it is undergoing a 15-20 year conservation process at The Mariners' Museum in Newport News, Virginia.



On July 9, 1862, *Monitor's* officers relaxed on the deck beside the turret (top left). U.S. Navy salvage divers assisted with the recovery of the turret (bottom left), and it was raised from the water on August 5, 2002 (right). Photos: Top Left: Library of Congress. Bottom left and right: NOAA, *Monitor* Collection



## Sleuthing Through 1862



Casts created from the remains of two USS *Monitor* sailors recovered from the *Monitor's* turret during excavation in 2002. Photo: NOAA, *Monitor* Collection

### Grade Level

- 4-8

### Timeframe

- 1–2 hours

### Materials per Student/Group

- Small cloth bags (8)
- Tub with sand
- Artifacts for bags and tub
- Disposable gloves (for teacher)
- Story Sheet (per group)
- Worksheet (per student)

### Activity Summary

Students become detectives to identify the remains of an unknown sailor.

### Learning Objectives

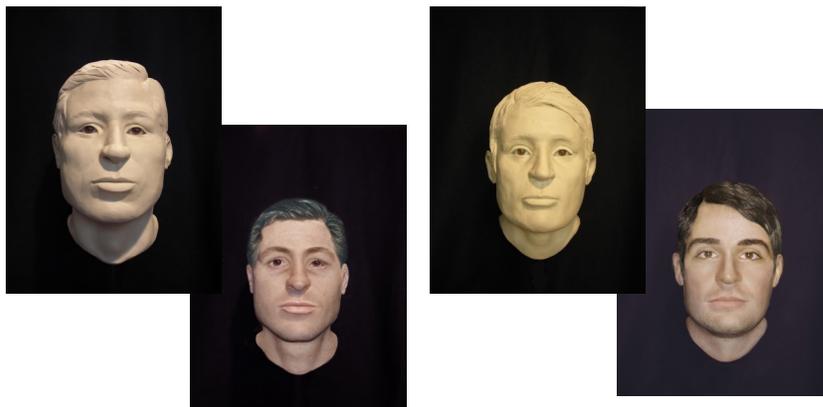
Students will understand the complex and difficult nature of identifying unknown service members.

### Key Words

Artifact, DNA, genealogy, DPAA, forensics

### National Standards

**NCSS:** US 5-12; Era 5:2A;  
**NCSS Thinking Standards:** 1, 2 and 3;  
**CC.ELA.LIT.W:** 4-8.2; **NCTE:** 1, 3, and 7



In 2002, as the USS *Monitor's* turret was excavated for recovery, one of the *Monitor* sailors was discovered buried deep inside. After the turret was raised, a second *Monitor* sailor was found. In 2012, to commemorate the 150th anniversary of the *Monitor*, Louisiana State University's FACES Lab recreated the sailors' faces using casts of their skulls and computer programs. Photo: NOAA, *Monitor* Collection

## Background Information

On December 31, 1862, a stormy New Year's Eve, 16 men perished when the USS *Monitor* sank off Cape Hatteras, North Carolina. Official reports of the incident listed four officers and twelve enlisted men as lost. The USS *Rhode Island* brought onboard the remaining 47 *Monitor* sailors, who were affectionately known as the '*Monitor* Boys'.

In 2002, when NOAA archaeologists and U.S. Navy divers worked to raise the *Monitor's* turret, they knew that it was possible that they might encounter human remains. Therefore, in anticipation of a likely encounter with skeletal remains inside the turret, the Monitor National Marine Sanctuary solicited participation of the U.S. Military's Central Identification Laboratory in Hawaii, now known as the Defense POW/MIA Accounting Agency (DPAA). Two sets of skeletal remains were discovered and the remains were sent to DPAA for further investigation. Personal artifacts recovered with the remains were sent to The Mariners' Museum in Newport News, Virginia, for conservation.

At DPAA, scientists collected mitochondrial DNA from both sets of remains. It was hoped that with the national and international publicity generated related to *Monitor* expeditions, excavations, and the 150th anniversary, maternal descendants of the lost crewmen would come forward to submit DNA samples for comparison. Unfortunately, to date there has not been a match.

In 2012, in commemoration of the 150th anniversary, NOAA hired a genealogist to trace the family history of each of the 16 sailors that died. In addition, in an effort to bring the sailors to life, Louisiana State University voluntarily recreated the sailors' faces using casts of their skulls and clay. We

now know what the sailors looked like; we just do not know their names.

Due to no known next of kin, in 2012, the Secretary of the Navy ordered that the sailors' remains be interred at Arlington National Cemetery. They were laid to rest on March 8, 2013, with full military honors and a headstone was placed honoring all 16 sailors that perished on that fateful December 31, 1862, when the *Monitor* sank beneath the waves.

## Activity Summary

Students become detectives to identify the remains of an unknown sailor.

## Learning Objectives

Students will

- Analyze clues to identify an unknown fictitious sailor.
- Understand the complexity and difficulty in identifying unknown service members.

## Activity Overview

In this activity, students read a story of a fictional ship, USS *Martin*, which sank in 1862. In the story, eight sailors perished with the ship. The story then jumps to 2011, when the shipwreck was found, along with human remains. The remains were sent to DPAA in Hawaii, but the section of ship that held the remains, went to The Mariners' Museum, where it was carefully excavated. During the excavation, clues were found that could help to identify the unknown sailor (Noah Street).

## Teacher Preparation and Implementation

- Optional: Review Growing the Family Tree, also found in this guide, and do in conjunction with this activity.
- Review Artifact Sheet—For Teacher Preparation
- Using small cloth bags, create eight ditty bags with small “artifacts” that will help to identify the owners of each bag.
  - Use the Artifact Sheet for suggestions of what to place in the bags, but substitute items as needed for what is readily available. **NOTE:** *If items are not available, print images of items and laminate.*

- You will need a duplicate set of artifacts for Noah Street (one for ditty bag and one for the tub of sand).
- Be sure to have each sailor's story match the items you place in the bag (e.g.— if the story says that the sailor had a wife and two children, then the photograph should be of a woman and two children. Internet searches are helpful in finding images).
- Write letters from sweethearts (see Sample Letters for Sailors' Ditty Bags).
- Gather a large tub or small wading pool and fill halfway with sand (if wet, allow the sand to dry).
- In the sand, bury the duplicate set of suggested artifacts for the unknown sailor, Noah Street, whose remains have been discovered.
- Place other objects in the sand, such as seashells or other marine related objects.
- Optional: To spark a conversation on marine debris, bury items, such as a soda can or plastic bag and ask the students if they had soda or plastic in 1862. How did these items get there?
- Divide students into eight groups.
- For each group, print Student Activity—Sleuthing into 1862, Fictional Story of a Fictional Ship.
- For each group, print Student Sheet—List of Missing Sailors.
- For each student, print Student Activity—Historical Synopsis of the USS *Monitor* (two pages).
- Follow the steps in the Procedure section.



The USS *Monitor*'s turret breaks the surface of the ocean for the first time in 140 years. Photo: NOAA, *Monitor* Collection

## Vocabulary

**ARTIFACT** — Any object made by humans, typically an item of cultural or historical interest

**DNA** — Deoxyribonucleic acid, the genetic material in the nuclei of all cells; nucleic acid that carries the genetic information in the cell and is capable of self-replication and synthesis of RNA

**DPAA** — Defense POW (Prisoner of War) / MIA (Missing In Action) Accounting Agency where unknown service members' remains are identified

**FORENSICS** — The use of science and technology to investigate and establish facts in criminal or civil courts of law

**GENEALOGY** — The study or investigation of ancestry and family histories

## Procedure

1. Begin the activity by reading *Sleuthing Into 1862*, either as a class, individually, or in a group.
2. Explain that the students will use the artifacts found inside their ditty bag and the List of Missing Sailors to determine whose ditty bag they have.
3. Give students about 15 minutes to go through the bag.
4. Once all the students have identified their sailor, then start going through the sand (for realism, wear gloves as you handle the "artifacts").
5. As each item is excavated, ask if that item matches any of the sailors listed as missing.
6. Once all items are recovered, ask the students who they think the unknown sailor is and why?
7. To wrap up the activity, have the students read Historical Synopsis of the USS *Monitor* and answer the questions to verify which sailor's remains were found.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her.

<http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservationists at work via webcams, and read the blogs of the conservators as they uncover new finds.

<http://www.marinersmuseum.org/uss-monitor-center/uss-monitor-center>

#### Louisiana State University FACES Lab

Forensic Anthropology and Computer Enhancement Services lab provides forensic anthropology and forensic imaging services to agencies within Louisiana.

<http://www.lsu.edu/faceslab/>

#### Defense POW/MIA Accounting Agency (DPAA)

The DPAA is responsible for the recovery and accounting of missing service members from past conflicts.

<http://www.dpaa.mil/>

### Books

The Mariners' Museum: *The Monitor Chronicles: One Sailor's Account. Today's Campaign to Recover the Civil War Wreck*. Simon & Schuster, July 3, 2000. ISBN-13: 978-0684869971.

Thompson, Gare: *The Monitor: The Iron Warship That Changed the World (All Aboard Reading, Station Stop 3)*. Grosset & Dunlap, September 29, 2003. ISBN-13: 978-0448432458.

Quarstein, John V.: *The Monitor Boys: The Crew of the Union's First Ironclad*. The History Press, February 25, 2011. ISBN-13: 978-1596294554.

Wiese, Jim: *Detective Science: 40 Crime-Solving, Case-Breaking, Crook Catching Activities for Kids*. Wiley, February 20, 1996. ISBN-13: 978-0471119807.

## Video

### The USS *Monitor* and NOAA: A Look Through Time

Travel back to 1862 in this educational video to learn how the USS *Monitor* turned the tide of the Civil War. The video also highlights the *Monitor's* discovery, designation as a national marine sanctuary, and more.

<https://www.youtube.com/watch?v=EX6H3Tp-2yE>

## Extensions

1. Set up each bag as a station and have students rotate through each station to determine which sailor belongs to each bag.
2. Discuss the USS *Monitor* and the two sets of remains discovered inside the turret as it was excavated in 2002. Visit the USS *Monitor's* Preserving a Legacy website at <http://monitor.noaa.gov/150th> to learn more about the 16 sailors that died, the genealogy research conducted, the unveiling of the faces for the two sailors recovered, the burial at Arlington National Cemetery, and more. Have students debate what should happen to a service member's remains if no living relatives are found. Should they be buried? If so, where? Why?

## Answer Key — Sleuthing Through 1862

1) USS *Monitor*; 2) North Carolina; 3) CSS *Virginia*; 4) Hampton Roads; 5) USS *Rhode Island*; 6) sixteen; 7) three; 8) December 31, 1862; 9) red lantern; and 10) storm

Answer: NOAH STREET



The USS *Monitor's* turret is being conserved at The Mariners' Museum in Newport News, Virginia. In this photo, the tank has been drained to allow conservators to work. Photo: NOAA

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### Artifact Sheet For Teacher Preparation

Create eight ditty bags that offer clues for identification. Use the suggested items below or other items that are more readily available. Be sure to make the items in the bags correlate with the information given for each sailor. Add additional general items to the bag, such as soap, clothing, shaving kit, hardtack, and other items as available.

**NOTE:** *If items are difficult to find, print images of items needed and laminate. Also, explain to students that finding paper intact and readable after being submerged for over 100 years is not likely unless the paper was in a container such as a sealed glass jar or wooden box that was buried quickly in sediment.*

In the large tub or pool, place the duplicate set of items related to **Noah Street**. Be sure to place the following items in the tub that positively identify him as the unknown sailor: **wedding ring, pipe, letter with pressed bluebonnets** (fold and place in a wooden box or glass jar). Other optional items: buttons, belt or belt buckle, silverware, and/or comb.

<p><b><u>Noah Street</u></b>  <b>Age:</b> 32  <b>Home state:</b> Texas (Austin)  <b>Other:</b> Married with a baby  <b>Items in bag:</b></p> <ul style="list-style-type: none"> <li>• Picture of wife (and baby)</li> <li>• Wedding ring</li> <li>• Letter from wife with pressed blue bonnet (Texas state flower) tucked in glass jar. Letter might mention Austin.</li> <li>• Pipe tobacco in drawstring pouch (this will link him to the pipe)</li> </ul>	<p><b><u>Timmy Able</u></b>  <b>Age:</b> 12  <b>Home state:</b> Massachusetts  <b>Other:</b> Youngest member of the crew  <b>Items in bag:</b></p> <ul style="list-style-type: none"> <li>• Wooden toy</li> <li>• Boy's small shirt</li> <li>• Train whistle or other item he might have whittled</li> <li>• Letter from father or mother</li> </ul>
<p><b><u>Charles Wright</u></b>  <b>Age:</b> 50  <b>Home state:</b> Kentucky  <b>Other:</b> Married with two children  <b>Items in bag:</b></p> <ul style="list-style-type: none"> <li>• Something indicating hometown of Louisville, Kentucky (wooden horse)</li> <li>• Letter from wife</li> <li>• Picture of wife (and kids)</li> </ul>	<p><b><u>Siah Williams</u></b>  <b>Age:</b> 30  <b>Home state:</b> South Carolina  <b>Other:</b> African American, has a sweetheart  <b>Items in bag:</b></p> <ul style="list-style-type: none"> <li>• Letter from sweetheart with a sketch of a palmetto tree (SC tree)</li> <li>• Picture of sweetheart (African American woman)</li> <li>• Pipe tobacco in drawstring pouch</li> </ul>
<p><b><u>Robert Carter</u></b>  <b>Age:</b> 45  <b>Home state:</b> Virginia  <b>Other:</b> Married with four children  <b>Items in bag:</b></p> <ul style="list-style-type: none"> <li>• Something indicating hometown of Richmond, Virginia</li> <li>• Tobacco and cigarette rolling papers</li> <li>• Letter from wife</li> <li>• Picture of wife (and four children)</li> <li>• Harmonica</li> </ul>	<p><b><u>John Tommy</u></b>  <b>Age:</b> 18  <b>Home state:</b> California  <b>Other:</b> Of Asian descent  <b>Items in bag:</b></p> <ul style="list-style-type: none"> <li>• Letter from his mother</li> <li>• Asian trinket (i.e. Buddha figure)</li> <li>• Chopsticks</li> <li>• Fishing reel or lure</li> </ul>
<p><b><u>Antonio Gomez</u></b>  <b>Age:</b> 20  <b>Home state:</b> North Carolina  <b>Other:</b> Native American, has a sweetheart at home  <b>Items in bag:</b></p> <ul style="list-style-type: none"> <li>• Dream catcher (or other Native American item)</li> <li>• Picture of sweetheart</li> </ul>	<p><b><u>Elijah Benning</u></b>  <b>Age:</b> 20  <b>Home state:</b> New York  <b>Other:</b>  <b>Items in bag:</b></p> <ul style="list-style-type: none"> <li>• Unfinished letter to sweetheart at home</li> <li>• Picture of sweetheart</li> <li>• Tobacco and cigarette rolling papers</li> <li>• Piece of women's jewelry</li> </ul>

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Sleuthing Into 1862 A Fictional Story of a Fictional Ship

Shortly after midnight, on June 2, 1862, a strong gale blew as a nor'easter came onshore. After a long struggle to keep afloat, the USS *Martin* succumbed to the sea as it sank off the Virginia coast. Eight brave souls drowned that night as the ship sank beneath the dark waters.

On April 28, 2011, two maritime archaeologists discovered the wreck of what they believed to be the USS *Martin*. The *Martin* was a Civil War Union ship, so they notified the U.S. Navy that they had found it. The Navy verified that it was the wreck of the *Martin*. The shipwreck was considered historically significant and after much discussion, the U.S. Navy decided to recover a small section of the shipwreck. That section would be conserved and placed in a museum for future generations to see and learn about its history and significance to our nation.

As the section of the shipwreck was being recovered, divers came across human remains of what they believed to be a *Martin* sailor. The recovery efforts now took on a new meaning, and the Defense POW/MIA Accounting Agency (DPAA) was notified. All recovery activity stopped until DPAA arrived to properly recover the remains. Once the remains were recovered, they were sent to the DPAA office, where scientists collected DNA samples and gathered other forensics evidence, such as the sailor's ethnicity, height, weight, and approximate age.

Maritime archaeologists and Navy divers worked to finalize the recovery of that section of the ship, and it was taken to The Mariners' Museum in Newport News, Virginia, where artifacts from the USS *Monitor* are being conserved. Once at the museum, conservators carefully excavated the section to locate and remove any artifacts found. They were hopeful that the artifacts might offer clues to the identity of the unknown sailor.

In researching the ship, a document written in 1862 was found that offered some insights into the eight men that died on the *Martin*. It was not a legal document, but it was a primary source document written by a *Martin* sailor in remembrance of his former shipmates. The document contained each sailor's physical description, taken from the ship's log, and a brief description of the sailor as recollected by the author and crew. The physical descriptions might be helpful. However, in 1862, records were not always accurate and often sailors would not even give their real names.

### Directions:

Your job is to try to identify the unknown sailor.

1. First, you must become familiar with all eight sailors who died. To learn about each of the eight men, ditty bags have been created that will help you discover more about each sailor.
2. Work in groups to go through the document that describes them.



**Left:** Sailors onboard a Civil War ship in 1863, courtesy U.S. Naval History and Heritage Command

**Right:** Sailors onboard the deck of the USS *Monitor*, courtesy Library of Congress



NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Sleuthing Into 1862—Student Worksheet Continued

### List of Missing Sailors

**John Tommy**

Height—5'5" Weight—125 lbs

John was of Asian descent, and he was just 18 years old. He came from California after hearing about the Civil War. He was passionately against slavery and wanted to do whatever he could to help end it. He had been a fisherman before the war, so he wanted to join the Union Navy. He was not married and no one remembers him talking about a sweetheart.

**Siah Williams**

Height—6' 2" Weight—200 lbs

Siah was in his early 30s and from South Carolina. He was a runaway slave, who wanted to fight for the freedom of all slaves. He talked all the time about his sweetheart and how she had run away with him. He was eager to have the war over so he could go home and marry her. As he sat out on the deck smoking, he would talk about all the things he was going to do when the war was over and he was a free man.

**Charles Wright**

Height—6' Weight—180 lbs

Charles was one of the older men on the boat, probably around 50. He was an officer. He hailed from Kentucky and talked about how beautiful his farm was just outside of Louisville. He loved horses and had a china collection of tiny horses in his cabin. He wanted to raise horses after the war. Charles was married, but he did not talk much about his wife. He did say he had two children.

**Robert Carter**

Height—6' 4" Weight—220 lbs

Robert was a big man from Charlottesville, Virginia. He was in his 40's, probably about 45 or 46. He loved to sit on the deck and roll and smoke cigarettes as he talked about his wife and kids. He couldn't wait to go home to them. He also loved playing his harmonica.

**Noah Street**

Height—5' 11" Weight—190 lbs

Noah was in his early 30s, married, and had a baby. Noah loved to brag, but he would always say that he wasn't bragging, it was just fact. He hailed from the "Great State of Texas" and boy was he proud to be a Texan. He talked a lot about the big sky and these blue flowers that grow in Texas. His father and uncles had fought in the Texas war against Santa Anna to gain its independence from Mexico. Noah wanted to be as brave as his father and uncles. He would sit out on the deck, smoke his pipe, and tell tall tales of Texas.

**Timmy Able**

Height—5' 2" Weight—100 lbs

Timmy was the cabin boy on the ship. He had just had his 12<sup>th</sup> birthday before the ship sank. He had walked all the way from Massachusetts to join the ship in Virginia. He loved to sit on the deck at night and whittle. He whittled dogs, chickens, and all kinds of things. Once he whittled this whistle that sounded just like a train.

**Antonio Gomez**

Height—5' 10" Weight—160 lbs

Antonio was quiet and didn't talk much. He might have been from North Carolina. He was a Native American, but not sure what tribe. He would hang up a circle thing with feathers where he slept and said it was to catch his dreams or bad spirits or something. He also had a sweetheart at home, but he never said much about her.

**Elijah Benning**

Height—5' 11" Weight—170 lbs

Elijah was young, maybe around 20, and from New York. He talked about how he was going to singlehandedly win the war. He would sit on the deck, smoke his cigarettes, and write his sweetheart back at home. He wanted to marry her before he left, but her dad said no, so Elijah was trying to prove himself as a man to her father. He also bought her some real nice woman things when we were in port once.

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

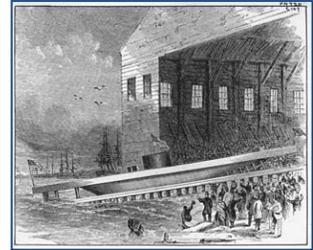
### Sleuthing Into 1862—Student Worksheet Continued

#### Historical Synopsis of the USS *Monitor*

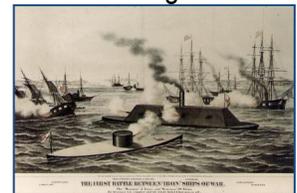


Swedish-American engineer John Ericsson designed the *Monitor*. Based on an earlier concept Ericsson had presented to Napoleon III of France in 1854, the *Monitor* was a radical departure from traditional warship design. The vessel was fully steam powered, with engineering, crew, and officer spaces and the galley all below the waterline. The vessel, constructed almost entirely of iron, was completely armored. A notable feature was the *Monitor's* 21 ½-foot diameter, 9-foot-high revolving turret, which was located at midships and housed two 11-inch Dahlgren smoothbore cannons.

Built in only 98 days at the Continental Iron Works in New York, the *Monitor* launched on January 30, 1862. In early March 1862, the *Monitor* was ordered to Hampton Roads to counter the threat to the federal fleet posed by the CSS *Virginia*, a Confederate ironclad built from the burned hull of the USS *Merrimack*. The Union ironclad arrived on the evening of March 8 in time to see the results of the havoc and destruction caused by the *Virginia* on the Union wooden frigates *Cumberland* and *Congress*. The steam frigate, USS *Minnesota*, had run aground, and the *Monitor* was ordered to protect her because the *Virginia* was sure to return at first light.

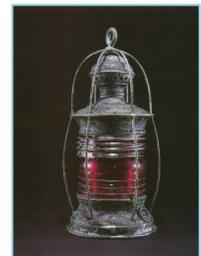


When the *Virginia* steamed out the next morning on March 9, it was with the purpose to finish the *Minnesota*. However, she was met by the *Monitor*, and thus began what is known as the Battle of Hampton Roads. Despite the *Virginia's* much larger size, the *Monitor* demonstrated the advantages of a rotating turret over traditional broadside guns. Over the course of four hours, the two vessels frequently bombarded each other at point-blank range with no substantial damage to either vessel. However, a shell exploded in the view-port of the *Monitor's* pilothouse, temporarily blinding Captain John Worden. The *Monitor* steamed off into shallow water, where the *Virginia* could not follow, to assess the captain's wounds and damage to the ship. The *Virginia's* captain, assuming that the *Monitor* was leaving the battle, withdrew in supposed victory. When the *Monitor* returned to resume the engagement and found the *Virginia* gone, her crew also assumed victory. Although there was no clear victor in the battle, the *Monitor* succeeded in preventing further destruction to the Union blockade.



After the Battle of Hampton Roads, the *Monitor* did not see much action. However, the ship participated in the bombardment of Sewell's Point and in the battle at Drewry's Bluff. In addition, there was a small skirmish in the Appomattox River, but it was considered a failure. Then on Christmas Eve 1862, orders came for the *Monitor* to proceed to Beaufort, North Carolina. On December 29, two massive hawsers were passed from the *Monitor* to the vessel assigned for the ocean tow—the USS *Rhode Island*. At 2:30 p.m., the two vessels got underway. The weather was clear and pleasant.

Just before dawn on December 30, the *Monitor* began to experience a "swell from the southward," and as the day progressed, the clouds increased "till the sun was obscured by their cold grey mantle." Soon the sea began to break over the vessel and the storm grew worse. By 7:30 p.m., one of the hawsers snapped and the *Monitor* began rolling wildly. Below deck, the water level rose and at 10:00 p.m., the red distress lantern was ordered hoisted. At 11:00 p.m., the *Rhode Island* launched rescue boats, and the *Monitor* crew began to abandon ship. Shortly after 1:00 a.m. on December 31, 1862, just off Cape Hatteras, North Carolina, the red lantern was seen from the *Rhode Island* for the last time. Sixteen sailors (four officers and 12 enlisted men of which three were African American and nine were Caucasian) lost their lives that night, but 47 *Monitor* sailors were safely rescued, and they became affectionately known as the "*Monitor* Boys."



NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

**Sleuthing Into 1862**  
**Historical Synopsis of the USS *Monitor* — Continued**

Read *Historical Synopsis of the USS Monitor* to answer the questions below. Place the letters in the bubbles in the answer section at the bottom of the page to identify the unknown sailor.

1. What is the name of the first Civil War Union ironclad?

\_\_\_\_\_

2. Off the coast of which state did the USS *Monitor* sink during a violent storm?

\_\_\_\_\_

3. What is the name of the first Civil War Confederate ironclad?

\_\_\_\_\_

4. Where did the two ironclads meet in an infamous battle of iron vs. iron?

\_\_\_\_\_

5. What is the name of the ship that was towing the USS *Monitor* when she sank during a violent storm off the East Coast?

\_\_\_\_\_

6. How many sailors died when the USS *Monitor* sank?

\_\_\_\_\_

7. How many African American sailors died when the USS *Monitor* sank?

\_\_\_\_\_

8. What is the exact date of the sinking of the USS *Monitor*?

\_\_\_\_\_ , \_\_\_\_\_

9. What item onboard the USS *Monitor* was the last thing seen from the *Rhode Island* before the *Monitor* sank to the bottom of the Atlantic Ocean?

\_\_\_\_\_

10. What caused the USS *Monitor* to sink?

\_\_\_\_\_

**ANSWER:**

\_\_\_\_\_

# Growing the Family Tree



USS *Monitor* crew cooking on deck (July 9, 1862).  
Photo: Courtesy of Library of Congress

## Grade Level

- 4-8

## Timeframe

- 1–2 hours

## Materials per Student/Group

- Computer with Internet access
- Paper and pencil
- Various art supplies

## Activity Summary

Students learn about genealogy and trace their own family ancestry to better understand the difficulty in finding living relatives of the two unknown USS *Monitor* sailors.

## Learning Objectives

Students will understand the importance of knowing a person's ancestry.

## Key Words

Ancestor, descendants, DNA, exhume, Genealogy, generation

## National Standards

**NCSS:** US 5-12; Era 5:2B;  
**NCTE:** 1, 3, and 7; **NG:** 9

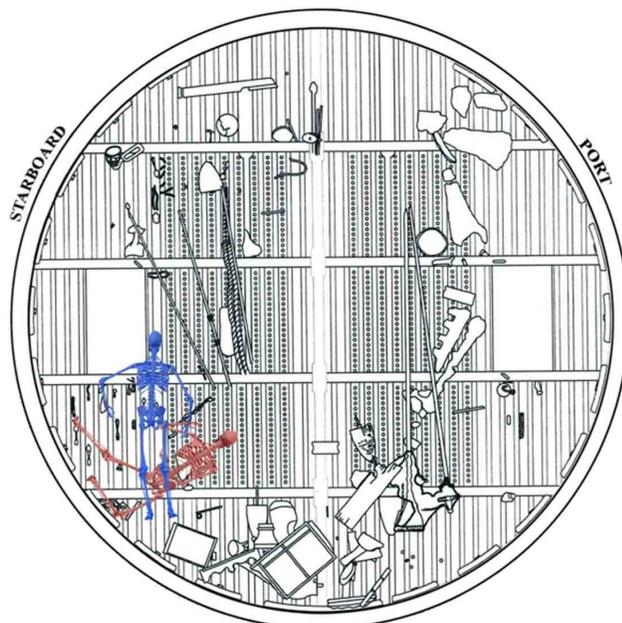


Diagram showing the location of the skeletal remains of two *Monitor* sailors. Photo: NOAA

## Background Information

On New Year's Eve, December 31, 1862, the USS *Monitor* sank when it encountered a storm and began to take on water. That night 16 sailors went down with the ship just 16 miles south-southeast of Cape Hatteras, North Carolina. In 1973, the shipwreck was discovered and in 1975, it was designated our nation's first national marine sanctuary.

In 2002, after 140 years of lying on the bottom of the Atlantic Ocean, NOAA and the U.S. Navy launched an expedition to recover the *Monitor's* iconic revolving gun turret. As Navy divers began to vacuum sand and sediment from the turret in order to bring it to the surface, they discovered the skeletal remains of one of those 16 sailors. Soon after, archaeologists discovered the remains of a second sailor.

Who were these sailors? What were their names? Who were their families? Where were they born? How long had they served on the *Monitor*? All these questions begged for answers. Before any questions could be answered, the remains needed to be carefully and reverently removed, and then transferred to the military's Central Identification Laboratory in Hawaii (currently called Defense POW/MIA Accounting Agency—DPAA).

In hopes to find answers to these questions and to the identity of the sailors, the laboratory collected DNA samples and conducted other forensic tests. Much was learned about each man and many descendants came forward to give DNA, but none matched either of the two sailors. Therefore, for the next ten years, the remains of these unknown sailors remained at DPAA waiting for their descendants to be found.

The night the *Monitor* was lost, a list of the surviving sailors was made and the names of the 16 sailors lost were determined and given to the Navy. Therefore, as the scientists began the identification process, the names of the 16 sailors were known.

To learn more about these 16 sailors, scientists researched each one gathering basic information, such as their origin of birth, ethnicity, approximate height and weight, approximate age, and so on, obtained from the ship's records and other documents. Along with this information and the DNA and other forensic evidence collected, scientists hoped to narrow the field of possible candidates and to eventually identify the sailors.

As the 150<sup>th</sup> anniversary of the *Monitor* approached in 2012, Monitor National Marine Sanctuary continued to search for any living relatives. It was NOAA and the sanctuary's hope to reunite the remains of these two sailors with their relatives to bring closure to the families. However, since it had been 10 years since the remains were recovered, many wanted the sailors finally laid to rest at Arlington National Cemetery. Without a living relative, they would be buried as 'unknowns'. Today, with modern forensic techniques and DNA, military personnel are no longer buried as unknowns. Understanding that the sailors had died in 1862 and that finding a living relative would be extremely difficult, the U.S. Navy agreed to bury them. However, the Navy requested that NOAA make one final effort to identify the sailors.

To help in that effort, NOAA hired a genealogist to research the ancestry of each of the 16 sailors to discover possible living relatives. Any relatives found of the 16 sailors could submit DNA, hopefully providing a positive match and confirming the identify of the two unknown sailors.

To reach as many *Monitor* descendants as possible, NOAA also worked with Louisiana State University FACES Lab to recreate the two sailors' faces. Their faces were unveiled at the U.S. Navy Memorial Museum in Washington, DC, and many news stories were published with the call for descendants to submit DNA samples. Additional DNA samples were submitted by descendants, but there still were no matches.

After the exhaustive search, the U.S. Navy honored the sailors and commemorated the 151<sup>st</sup> anniversary of the *Monitor*, with their burial at Arlington National Cemetery. The sailors were interred with full military honors on March 8, 2013. Today, NOAA continues to tell the story of the USS *Monitor* and to seek living relatives of these *Monitor* sailors.

## Activity Summary

Students learn about genealogy and trace their own family ancestry to better understand the difficulty in finding living relatives of the two unknown USS *Monitor* sailors.

## Learning Objectives

Students will understand the importance genealogy plays in identifying unknown service members.

## Teacher Preparation and Implementation

- Optional: Review Sleuthing Through 1862 and do that activity in conjunction with this one.
- Review the student activity and determine how the students will create their ancestry book (it can be a paper project or completed as an online assignment).
- If a paper project, gather any art supplies needed, such as glue, construction paper, manila paper, markers, colored pencils, and such.
- If using the computer, make sure students are familiar with any programs they will use, such as Word, PowerPoint, etc.



Turret being raised on August 5, 2002. Photo: NOAA

## Vocabulary

**ANCESTOR** — A person who is your relative that lived in the past, especially if they lived before a grandparent

**DESCENDANT** — A person whose descent can be traced to a particular individual or group

**DNA** — A nucleic acid that carries the genetic information in the cell and is capable of self-replication and synthesis of RNA

**EXHUME** — To remove a body from the place where it is buried

**GENEALOGY** — The study or investigation of ancestry and family histories

**GENERATION** — All of the offspring that are at the same stage of descent from a common ancestor; mother and daughters represent two generations

- Determine if students will research their own family tree or that of another person. **NOTE:** *Some students may not have access to their family's information. To be sensitive to their situation, provide them with the name of a historical person whose family tree is easily traced or see the **Alternate Activity** in this guide.*
- Print Growing the Family Tree Activity page for each student.
- Follow the steps in the Procedure section.

## Procedure

1. Begin the activity by reading the background information provided on the USS *Monitor*'s sinking and the recovery of two sets of human remains found inside the turret in 2002.
2. Discuss ancestry and family trees. Have students provide information about their grandparents. Ask the students if they know their great grandparents? If not, why? (i.e. lived too long ago, died before they were born, etc.)
3. Discuss ancestry:
  - Explain that most people know the names of their parents and possibly grandparents, but the further you go back in your family history, the more distant the relatives become and the fewer names we know.
  - Explain that the United States has people from all nations around the world, but as people marry others from different cultures, distinct ancestry may be lost.
  - Discuss how discovering your ancestry has become very important to people and that there are websites devoted to helping people search for distant relatives.
  - Explain that today, anyone can send their DNA through a simple swab of the cheek and discover where their ancestors were from and connect to possible relatives.
  - If appropriate, discuss how people who are adopted may not know their direct descendants and why. Be sensitive to the issues.
5. Ask the students why it would be important to know the family ancestry of each of the USS *Monitor* sailors. Discuss reasons as a class.
6. Tell the students that they are going to be creating a family tree of their family (or that of a fictitious family).

## Alternate Activity

If having the students trace their own ancestry is not feasible, have them create a fictitious family tree. Let them create the names and lives of each individual in their family tree and have them write short biographies (2-3 sentences) for each member of the family. Draw photographs of the family and create additional documents that tell the story of the family.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her. <http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservationists at work via webcams, and read the blogs of the conservators as they uncover new finds. <http://www.marinersmuseum.org/uss-monitor-center/uss-monitor-center>

#### Louisiana State University FACES Lab

Forensic Anthropology and Computer Enhancement Services lab provides forensic anthropology and forensic imaging services to agencies within Louisiana. <http://www.lsu.edu/faceslab/>

#### National Archives Resources for Genealogists

Research tips and hundreds of files waiting to be searched. <http://www.archives.gov/research/genealogy/>

#### Arlington National Cemetery

Designated in 1864 as a military cemetery, there are more than 300,000 people buried at Arlington National Cemetery. Veterans from all the nation's wars are buried there. Over four million people visit the cemetery annually, and the Tomb of the Unknowns is one of the more-visited sites at the cemetery. <http://www.arlingtoncemetery.mil>

#### Defense POW/MIA Accounting Agency (DPAA)

The DPAA is responsible for the recovery and accounting of missing service members from past conflicts. <http://www.dpaa.mil/>



Descendants of the USS *Monitor* attended the burial of the two unknown *Monitor* sailors at Arlington National Cemetery on March 8, 2013. Photo: Courtesy of U.S. Navy

## Ancestry Websites

Today, there are many ancestry websites. Here is a suggested list of 25 genealogy websites for beginners. <http://www.familytreemagazine.com/article/25-best-genealogy-websites-for-beginners>

## Books

Beller, Susan Provost: *Roots for Kids*. Genealogical Publishing Company, 2nd edition, 2010. ISBN-13: 978-0806317779.

Chorzempa, Rosemary: *My Family Tree Workbook (Dover Children's Activity Books)*. Dover Publications, 1982. ISBN-13: 978-0486242293.

Douglas, Ann: *The Family Tree Detective: Cracking the Case of Your Family's Story*. Maple Tree Pres, 1999. ISBN-13: 978-1895688894.

Hubbs, Susan H.: *Dig Up Your Roots and Find Your Branches*. Writer's Showcase Press, 2000. ISBN-13: 978-0595131624.

Leavitt, Caroline: *The Kids' Family Tree Book*. Sterling, 2007. ISBN-13: 978-1402747151.

Mason, Jenn: *The Art of the Family Tree: Creative Family History Projects Using Paper Art, Fabric and Collage*. Quarry Books, 2007. ISBN-13: 978-1592533398.

Rose, Christine: *The Complete Idiot's Guide to Genealogy, 2nd Edition*. Alpha, 2006. ISBN-13: 978-1592574308.

Wolfman, Ira: *Climbing Your Family Tree: Online and Offline Genealogy for Kids*. Workman, 2001. ISBN-13: 978-0761125396.

## Video

### The USS *Monitor* and NOAA: A Look Through Time

Travel back to 1862 in this educational video to learn how the USS *Monitor* turned the tide of the Civil War. The video also highlights the *Monitor's* discovery, designation as a national marine sanctuary, and more.

<https://www.youtube.com/watch?v=EX6H3Tp-2yE>

## Extensions

Discuss the USS *Monitor* and the two sets of remains discovered in 2002 inside the turret as it was excavated. Visit the USS *Monitor's* Preserving a Legacy website at <http://monitor.noaa.gov/150th> to learn more about the 16 sailors that died, the genealogy research conducted, the unveiling of the faces for the two sailors recovered, the burial at Arlington National Cemetery, and more. Have students debate what should happen to service member remains if no living relatives are found. Should they be buried? If so, where? Why?

## Who Were the Lost?

After a complete accounting of the survivors, it was determined that four officers and 12 enlisted men were among the missing. Among the enlisted personnel that died, were three African-Americans. Some initial research conducted on the Caucasian enlisted is noted after each name.

### Officers:

- ATTWATER, Norman Know, Act. Ensign
- FREDERICKSON, George, Act. Ensign
- HANDS, Robinson, Woolen, 2rd Asst. Eng.
- LEWIS, Samuel Augee, 3rd Asst. Eng.

### Enlisted African-Americans:

- COOK, Robert, 1st Cl. Boy
- HOWARD, Robert H., Officer's Cook
- MOORE, Daniel, Landsman

### Caucasian Enlisted Crew:

- ALLEN, William, Landsman, born in England, 5'-10", 24y.o., ships #70
- BRYAN, William, Yeoman, born in NYC, 5'- 7 ½" 31y.o., ships #39
- EAGAN, William H., Landsman, born in Ireland, 5' – 6", 21y.o., ships #73
- FENWICK, James R., Quarter Gunner, born in Scotland, 5' – 5", 23yo, ships #48
- JOYCE, (Joice) Thomas, 1st Cl. Fireman, born in Ireland, 5' – 9- ½", 23yo, ships #35
- LITTLEFIELD, George, Coal Heaver, born in Saco, ME, 5' – 7 ½", 25yo, ships #67
- NICKLIS (Nickles), Jacob, Seaman, born in Buffalo (?), NY, 5' – 7 ½", 21yo, ships #61
- WENTZ, Wells (John Stocking), Boatswain's Mate, born in Binghamton, NY, 5'-8", 32yo, ships #43
- WILLIAMS, Robert, 1st Class Fireman, born in Wales, 5' 8 ½", 30yo, ships #4



Officers standing on the deck of USS *Monitor*, July 9, 1862. Photo: Courtesy of Library of Congress

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Growing the Family Tree Student Worksheet

What is **genealogy**? Genealogy is defined as the study and tracing of a person's lines of descent. Or more simply, it is the investigation of your family. Do you know who your great-, great-, great-grandmother was? Do you know from what country your ancestors originated? Maybe one of the *Monitor* sailors was your relative! You might be surprised at what you learn if you trace your family tree!

A **family tree** is a picture record of a person's ancestors. It is called a tree, because the farther you go back into your past, the more family branches. You have two parents, four grandparents, eight great-grandparents and so on. Most people do not know their ancestors past their great-grandparents because great-great-grandparents may have lived a long time ago. You might need some help in tracing your family tree. Some ways to discover your past is to ask your relatives for information or look at old family photos, read old letters, or even visit the family cemetery. If your family lived in the same place for many generations, look in the library, museum, church, or town hall for your family records. **Genealogists**, people trained and paid to search for clues to your ancestors, are sometimes hired to search for ancestry records. NOAA hired a genealogist to help research the 16 sailors that went down with the USS *Monitor* the night it sank.

Today, there are also websites that help people trace their family tree. Many records have been digitized, added into a database, and are searchable. Ancestry websites help you search those databases, and sometimes they even connect you to other relatives that you might not have known existed. However, before exploring any ancestry website, be sure to get permission from your parent/guardian.

### Activity

1. Fill in as much of the family tree diagram for your family (or the family you were assigned).
2. Conduct research on your family by asking your relatives, looking at old photos, etc., and fill in any additional blanks on the family tree diagram.
3. Once you have your family tree complete, create a family tree book starting with the oldest generation you were able to identify. For example, great-great-grandparents would all go on the same page; then great-grandparents, next grandparents, then your parents, and finally you.
4. For each person in your family tree book, include stories and photos about the relatives. Were there any "black sheep" in the family? Anyone famous? Was there a romantic love story? Do you look like any of your ancestors?
5. The final page of your book will explain which ancestor you admire and/or would most like to be like and why.

### Discussion

1. In 1862, if a sailor died and no one knew who he was, there was not much the Navy could do to return him to his family. He would have been buried as an "unknown." What advances in science and technology today help prevent service personnel from being an "unknown"?
2. Arlington National Cemetery is where those who have served our nation through military service with dignity and honor are often laid to rest. It is a national shrine and a living history of our nation's freedom. Within Arlington National Cemetery, stands the "Tomb of the Unknown Soldier." Inside the white marble sarcophagus lies an unidentified American soldier from World War I. There are also one unknown buried from World War II and two from the Korean War. A Vietnam soldier was buried on May 28, 1984, but was exhumed on May 14, 1998 after he was identified through DNA testing. He was Air Force 1st Lt. Michael Joseph Blassie, who was shot down near An Loc, Vietnam in 1972.
  - If one or both of the *Monitor* sailors are ever identified, should they be exhumed and returned to their family? Why or why not?
  - Learn more about Arlington National Cemetery and the Tomb of the Unknown Soldier and share two interesting facts with your class. <http://www.arlingtoncemetery.mil/#/>

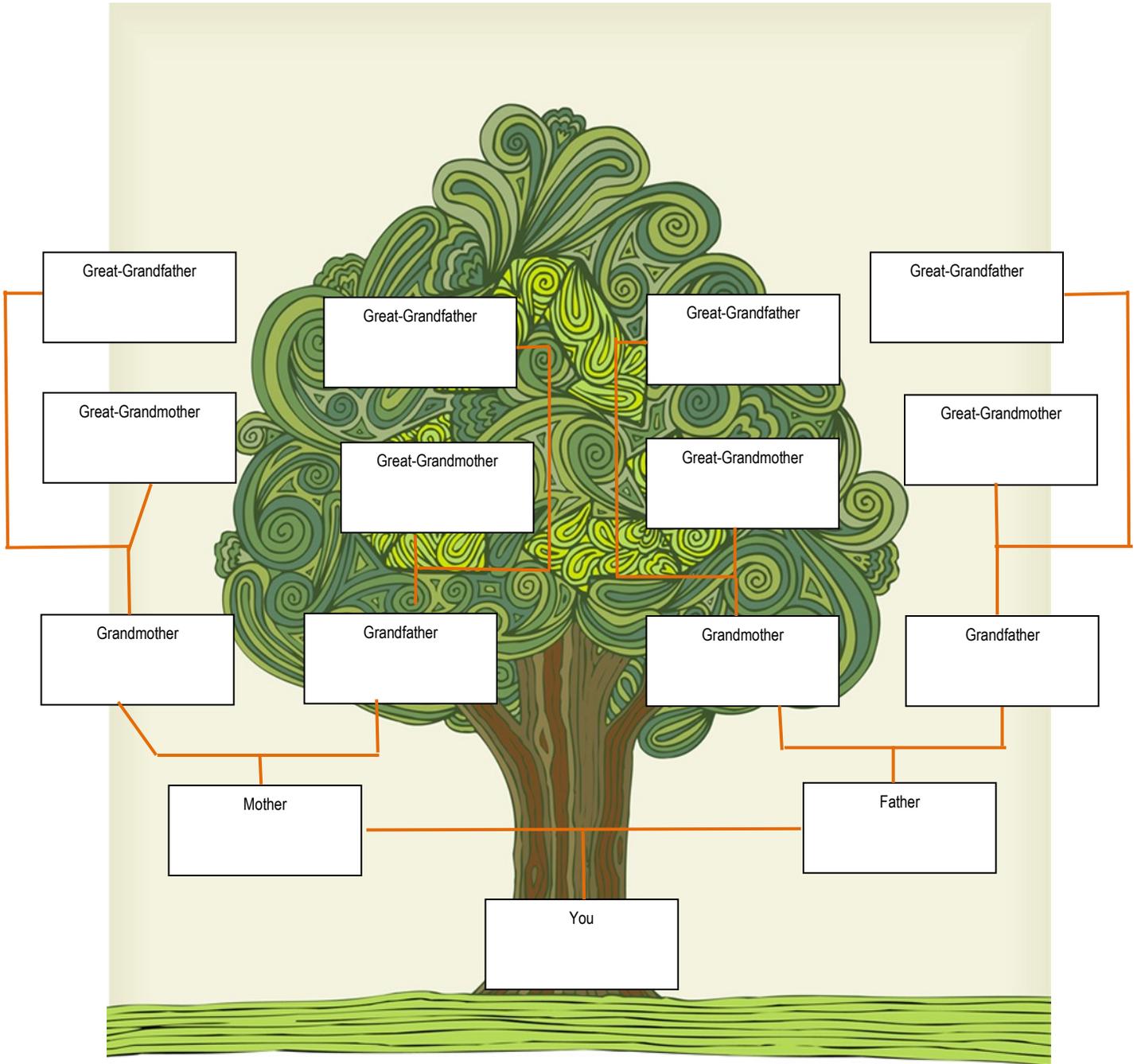


NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### Growing the Family Tree Student Worksheet — Continued

Use this diagram to create your family tree. If you can trace your family further than the diagram, add your own lines and boxes.



## The Art of Artifacts



USS *Monitor*'s red signal lantern was the last thing the crew saw before the ship sank and the first artifact recovered.

Photo: Courtesy of The Mariners' Museum

### Grade Level

- 4-8

### Timeframe

- 15-30 minutes per activity

### Materials per Student/Group

- Artifacts (see Teacher Prep)
- Science journal or paper and pencil

### Activity Summary

Students become an archaeologist to analyze artifacts found in a fictitious archaeological site. By conducting four activities, students better understand the role artifacts play in telling us about the past and the difficulty in identifying artifacts.

### Learning Objectives

- Understand that artifacts offer clues to the past and help scientists learn about other cultures and times
- Realize artifacts should only be removed by trained archaeologists
- Make observations and inferences

### Key Words

Artifact, conservation, conservator, ethics, *in situ*

### National Standards

**NCSS Thinking Standards** 1, 2, 3, and 4;  
**CCSS: ELA LIT.RH; NS.5-8:** A, E, and G;  
**OL:** 1, 6, and 7



Conservators clean a wool coat found during excavation of the USS *Monitor*'s turret.  
 Photo: NOAA, *Monitor* Collection

## Background Information

Shipwrecks are remnants of human history. The suddenness with which a ship often sinks creates an “accidental” moment in time and is the perfect place for archaeologists to study the past and to learn what to expect over time. However, a shipwreck is more than just a collection of objects lying on the seabed. Specifically, they offer a wealth of information that represent the human activities and cultural and social systems of their time. For example, they can tell us what items were considered essential for survival on a ship; give us a look at a cross-section of social classes by the different quarters (living spaces) on board; tell us how ships were constructed; teach about ship life; help to understand the trade of goods; and through the personal belongings of the crew and passengers, give us glimpses into the lives of the people who sailed on the ship. Sometimes, something as seemingly insignificant as a small stamp or mark on an artifact can even provide valuable, previously unknown information. Therefore, a shipwreck's treasure is not its cargo, but rather the infinite amount of information that can be learned about our past.

Although legend and lore often provide us with stories of shipwrecks full of treasure, every shipwreck, even those without “treasure,” provide archaeologists with a special bounty—information. For instance, the position of the wreck, distribution of wreckage and/or other items, rate of deterioration, and much more help archaeologists tell a ship's complete story. Therefore, it is important to preserve a shipwreck *in situ* (in its original place), so that it can be studied as a whole. Removal of artifacts from a site destroys the archeological context. If artifacts are removed, it should be done with archaeologists that have been trained to keep an accurate record of the artifacts through notes, photographs, site plans, and other documents.

However, no matter how well archaeologists collect data, once artifacts are removed, the site will never be intact and completely whole again.

The raising of a shipwreck and the removal of artifacts is often debated. For most shipwrecks, archaeologists agree they should be studied *in situ*. However, a water environment, especially salt water, can have devastating effects on a shipwreck. Specifically, salty water, hurricanes, storms, and human activities can all cause a shipwreck to deteriorate quickly. Therefore, in a few instances, when a shipwreck is nationally and historically significant, such as the USS *Monitor*, a decision is made to recover some or all of the ship's artifacts.

Any recovery of artifacts must be carefully planned as it is imperative that they be immediately conserved. Conversely, without conservation, most artifacts will perish and all historical data lost. Organic material can crumble within a few hours after it dries; iron may last a few days or months, but will eventually fall apart; and glass and pottery will slowly become hard, opaque or crystalline. Therefore, it is imperative that all factors be considered before recovering artifacts. Some factors considered include the location for conservation and display after artifacts are preserved; the amount of money available to conserve the artifacts; and the reasons to conserve an artifact.

### Activity Summary

Students conduct four different activities to better understand the important role artifacts play in the story of a shipwreck. They analyze and interpret "artifacts," and discover the difficulty often encountered when trying to put together pieces of artifacts. Through these activities, students not only understand the difficulty in identifying artifacts, but also learn how artifacts teach us much about a society's culture.

### Learning Objectives

Students will understand that artifacts should only be removed by trained archaeologists. They will experience the difficulty in identifying unknown artifacts and make observations and inferences about the uses of unfamiliar tools. Students discover the difficulty in piecing together artifacts.

### Teacher Preparation and Implementation

- Review the activities and resources. There are four parts to this unit. Students can complete one or all four.
- Determine group size.
- Make copies of chosen Student Activity pages.
- Begin with **Activity 1**.
- After the students complete all the activities, wrap up with a discussion on what artifacts tell us, why it is important to only remove artifacts for specific reasons, and how difficult it is to analyze and piece them back together.
- **Optional:** Have students explain what they have learned by writing a report, creating a video, or posting to a fake social media sources such as Facebook, Twitter, or Instagram.

### Procedure

1. **Activity 1**
  - Have students read the Background Information on worksheet for Activity 1.
  - Have students answer the discussion questions and go over them as a class checking for understanding. Make sure that students clearly understand that removal of artifacts from a shipwreck should only be done by highly skilled archaeologists and for a valid reason.
2. **Activity 2**
  - Review observations and inferences.
  - Collect a variety of discarded empty containers, such as soda cans, cereal boxes, or frozen food boxes so that each student/group has at least one. The containers are "artifacts."



Conserved shoes found inside the USS *Monitor*'s turret. Photo: Courtesy of The Mariners' Museum

### Vocabulary

**ARTIFACT** — Any object made by humans, typically an item of cultural or historical interest

**CONSERVATION** — Preservation, repair and prevention of deterioration of archaeological, historical and cultural sites and artifacts synthesis of RNA

**CONSERVATOR** — A person responsible for the repair and preservation of works of art, building or other things of cultural or environmental interest

**ETHICS** — Moral principles that govern a person's or group's behavior

**IN SITU** — Latin phrase that means in its original place or position

- Have students follow directions to analyze their artifact.
3. **Activity 3**
- Review observations and inferences.
  - Collect several unique kitchen/garden tools or other unusual objects, such as a cherry pitter or garlic press that students might not readily recognize. Provide one for each group.
  - Using a tag, label each item with a number. On an index card, record the number of the artifact, what it actually is and the purpose of the object. Save the cards until the conclusion of the activity.
  - Answer Key: 1) partial shoe, 2) pocket knife, 3) button, and 4) wedding ring. Have students infer why these items were found inside the turret.
4. **Activity 4**
- Purchase or acquire, from places such as thrift stores, several inexpensive and various shaped ceramic objects. If possible, have two objects that are similar.
  - Carefully break the objects into four or more pieces and remove at least one piece from each broken object.
  - Divide the class into small groups and give each group a basket with most of the pieces from several objects. For more difficulty, divide the broken pieces among all the groups in the class and have them confer with other groups to see if they have their missing pieces.
  - **Optional:** In lieu of ceramic objects, for each student break apart into a small snack baggie two different kinds of cookies. (See Extensions—Activity 4.)

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her.

<http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservationists at work via webcams, and read the blogs of the conservators as they uncover new finds.

<http://www.marinersmuseum.org/uss-monitor-center/uss-monitor-center>

#### East Carolina University

Read about the recovery of artifacts from Blackbeard's ship, *Queen Anne's Revenge*.

<http://www.ecu.edu/cs-admin/news/QARlab.cfm#.VcJStPIVhuA>

#### NOAA's Maritime Heritage Program

Visit the Office of National Marine Sanctuaries to learn how NOAA maritime archaeologists explore the ocean.

<http://sanctuaries.noaa.gov/maritime/welcome.html>

#### Monitor National Marine Sanctuary—Sketchfab

Click to view and manipulate 3-D models of the USS *Monitor*, *Monitor* artifacts and more.

<https://sketchfab.com/NOAAMonitorNMS>

### Books

Davis, Robert P. *Stobart: The Rediscovery of America's Maritime Heritage*. Dutton, 1985. ISBN-10:0525243623.

Bowens, Amanda (Editor): *Underwater Archaeology: The NAS Guide to Principles and Practice*. Blackwell Publishing (2nd Edition), 2009. ISBN-13: 978-1405175913.

Hume, Ivor Noël: *A Guide to Artifacts of Colonial America*. University of Pennsylvania Press, May 18, 2001. ISBN-13: 978-0812217711.

Levitt, Peggy: *Artifacts and Allegiances: How Museums Put the Nation and the World on Display*. University of California Press, July 7, 2015. ISBN-13: 978-0520286078.



The USS *Monitor*'s turret was raised on August 5, 2002, and brought to The Mariners' Museum in Newport News, Virginia, for excavation by archaeologists. Photo: NOAA, *Monitor* Collection

Panchyk, Richard: *Archaeology for Kids: Uncovering the Mysteries of Our Past*. Chicago Review Press, 2001. ISBN: 1556523955.

Sanford, Patricia: *Archaeology for Young Explorers: Uncovering History at Colonial Williamsburg*. Colonial Williamsburg Foundation, 1995. ISBN: 087935089X.

Spirek, James D. and Della A. Scott-Ireton (Editors): *Submerged Cultural Resource Management: Preserving and Interpreting Our Maritime Heritage*. Springer, July 31, 2003. ISBN-13: 978-0306478567.

Smith, Robert H.: *Maritime Museum of North America*. C Books, August 6, 2009. ISBN-13: 978-0941786072.

## Video

### The USS *Monitor* and NOAA: A Look Through Time

Travel back to 1862 in this educational video to learn how the USS *Monitor* turned the tide of the Civil War. The video also highlights the *Monitor's* discovery, designation as a national marine sanctuary, and more.

<https://www.youtube.com/watch?v=EX6H3Tp-2yE>

### PBS Learning — Historic Archaeology at Camp Nelson

In this video segment, Dr. Stephen McBride discusses how the analysis of food remains and personal items provide insight into the lives of the soldiers and family of the black enlistees who trained during the Civil War at Camp Nelson. Supporting materials available.

<https://www.pbslearningmedia.org/resource/c1b66afb-b2be-4e86-b821-d7fb1464011b/historic-archaeology-at-camp-nelson-shedding-light-on-undocumented-lives/#.WSWEkYzyuF4>

## Extensions

**Activity 2:** Create a time capsule by collecting items that represent your culture. Put the items in a coffee can or other container that is waterproof and can be sealed tightly. Record the date the items were collected. You may wish to bury the container and leave it for someone to find in the future or put the can in a safe place to be opened by a future class.

**Activity 3:** Conduct research to find out about primary and secondary sources of information. How do historians use inferences to help them interpret events from the past?

**Activity 4:** Place three animal cookies (or other shaped cookie) in a small baggie and gently break them apart. Have students spread the cookies out on a paper towel and try to put the cookies back together again. Students cannot eat the cookies until they have them together...well at least almost together!



**Top:** Archaeologists excavating the turret after it was recovered in 2002. Many personal items belonging to USS *Monitor* sailors were found inside the turret and offer insight into their lives. **Center:** More than 20 pieces of silverware were recovered; many are engraved with the names or initials of the sailors. **Bottom:** Wedding ring found on one of the *Monitor* sailors whose remains were recovered. **Left:** Lots of buttons were found inside the turret, perhaps due to the sailors hastily ripping off their coats and shirts to enable them to swim better if they were washed overboard. Photos: Courtesy of The Mariners' Museum

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## The Art of Artifacts Student Worksheet—Activity 1

### Background Information

Shipwrecks are remnants of human history. The suddenness with which a ship often sinks creates an “accidental” time capsule and is the perfect place for archaeologists to study the past and learn what to expect from the progression of time. However, a shipwreck is more than just a collection of objects lying on the seabed. Specifically, they offer a wealth of information that represents the human activities and cultural and social systems of their time. For example, they can tell us what items were considered essential for survival on a ship; give us a look at a cross-section of social classes by the different quarters (living spaces) onboard; tell us how ships were constructed; teach about ship life; help to understand the trade of goods; and through the personal belongings of the crew and passengers, give us glimpses into the lives of the people that sailed on the ship. Sometimes, something as seemingly insignificant as a small stamp or mark on an artifact can provide valuable, previously unknown information. Therefore, a shipwreck’s treasure is not always its cargo, but rather the infinite amount of information that can be learned about the past.

Although legend and lore often provide us with stories of shipwrecks full of treasure, every shipwreck, even those without “treasure,” provide archaeologists with a special bounty—information. For instance, the position of the wreck, distribution of wreckage and/or other items, rate of deterioration, and much more help archaeologists tell a ship’s story. Therefore, it is important to preserve a shipwreck *in situ* (in its original place), so that it can be studied as a whole. Removal of artifacts from a site destroys the archeological context. If artifacts are removed, it should be done by archaeologists that have been trained to keep an accurate record of the artifacts through notes, photographs, site plans, and other documents. However, no matter how well archaeologists collect data, the site will never be intact and whole again once artifacts are removed.

The raising of a shipwreck and the removal of artifacts is often debated. For most shipwrecks, archaeologists agree they should be studied *in situ*. However, a water environment, especially salt water, can have devastating effects on a shipwreck. Specifically, salty water, hurricanes, storms, and human activities can all cause a shipwreck to deteriorate quickly over just a few decades. Therefore, in a few instances, when a shipwreck is historically significant, such as the USS *Monitor*, a decision is made to recover some or all of the ship’s artifacts.

Any recovery of artifacts must be carefully planned as it is imperative that they be immediately conserved. Conversely, without conservation, most artifacts will perish and all historical data lost. Organic material can crumble within a few hours after it dries; iron may last a few days or months, but will eventually fall apart; and glass and pottery will slowly become hard, opaque, or crystalline. Therefore, it is imperative that all factors be considered before recovering artifacts. Some factors include the location for conservation and where to display artifacts after they are preserved; the amount of money available to conserve the artifacts; and the reason to conserve artifacts.

### Discussion Questions

1. Explain “accidental time capsule.”
2. What can artifacts from shipwrecks tell an archaeologist? How?
3. Why is it important to sometimes preserve the shipwreck *in situ*?  
When might artifacts be recovered?
4. Explain why it is imperative to plan for conservation before recovering artifacts?



Archaeologists excavating the USS *Monitor*'s turret. Photo: Courtesy of The Mariners' Museum

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Analyzing Artifacts Student Worksheet—Activity 2

### Background Information

An artifact is an object that is made or used by humans. Archaeologists often study cultures that existed before the written word, so they must try to interpret the artifacts that are left by the people that used them. A shipwreck, for instance, can offer a unique look at the life of the people that sailed on a ship and the culture when the ship sank. These time capsules hold a wealth of information and even their “trash” provides clues of what life was like on board. Moreover, artifacts that were discarded as trash many years ago are treasures today to archaeologists. Archaeologists carefully examine the objects and analyze them to learn their stories. A simple everyday object may actually tell us more than we think about the people that made and used it. An artifact might even tell us what their lives were like, how they thought, what they valued and how they changed the world in which they lived.

### Procedure

1. You are an archaeologist analyzing artifacts that were recovered from an archaeological site. Select an artifact.
2. Carefully observe the artifact.
3. In your science journal, record your observations and provide as many details as possible about the artifact.
4. Answer the following questions about the artifact and write a sentence to explain its potential culture of origin and/or the values of the culture. For example, a nutritional label on a box might indicate that the culture was concerned about its health.
  - a. Is the artifact plain or decorated?
  - b. Is there any writing on the artifact?
  - c. What material was used to make the artifact?
  - d. Where was the product made?
  - e. What other details offer clues?
5. Share and compare your findings and explanations with the other archaeologists in your class.

### Discussion

1. Explain why archaeologists look at objects that were discarded or thrown away by people?
2. What are some of the things archaeologists can learn about a culture by studying artifacts?



**Left:** Boot recovered from the USS *Monitor*.  
Photo: NOAA, *Monitor* Collection

**Right:** Silver spoon after its removal from USS *Monitor*'s turret.  
Photo: NOAA, *Monitor* Collection



NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### Go, Go, Gadgets: Making Inferences Student Worksheet—Activity 3

#### Background

When artifacts are found and/or recovered, they are analyzed, which may prove to be difficult. Unless an artifact is something that was used and documented in history, archaeologists are left to interpret the purpose and use of the artifact based on what they know about the culture and how people might use the same kind of object today. When ancient Egyptian artifacts were first uncovered, the archaeologists had difficulty interpreting the objects and making sense of how they were used. After the discovery and translation of the Rosetta Stone, archaeologists were able to interpret Egyptian hieroglyphics (picture writing), which gave them a new and better understanding of Egyptian artifacts.

You and your class are future maritime archaeologists from the twenty-third century that uncover some unique artifacts from the twenty-first century.

#### Procedure

1. Carefully observe the artifact.
2. In your science journal, draw a picture of the object. Record your observations including as many details as possible.
3. In your group, discuss your observations and based on what you know about life in the twenty-first century; determine a purpose for the object. Come to a consensus on its purpose.
4. In your science journal, explain what the artifact might have been used for and why your group came to that conclusion.
5. As a group, create a short 2-3 minute skit that explains to the other archaeologists in your class the artifact (without naming it) and its use.
6. After all archaeologists have completed their skits, get the card from your teacher that explains what the artifact is and how it was/is actually used.
7. Compare your inferences and conclusions.

#### Discussion

1. Were you able to identify the purpose of your artifact? Why or why not?
2. Did everyone agree about the purpose of each artifact? Why or why not?
3. How is this activity similar to what happens when an archaeologist recovers an artifact?

#### Extensions

1. Read excerpts from historical journals. What clues do the authors leave about the cultures in which they lived? How are journals helpful to archaeologists? What might an archaeologist learn from these kinds of records found at a site?
2. Look at a picture of an old painting. What can you learn about the culture from the painting? Conduct research to find out about ancient artworks that have been found on cave walls or rock cliffs.
3. Visit a museum to look at the artifacts from another culture. Before reading the information cards, predict how the object may have been used; then read about the object in the museum case. Keep track of the number of times you were correct in your predictions.

Look at the photo and identify the four objects recovered from the USS *Monitor*'s turret in 2002. List them in the box to the right of the photo. What can be inferred by these objects? Why were they found inside the turret? Were any of the artifacts difficult to identify? Why or why not?



1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

**Inferences:**

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Picking Up the Pieces Student Worksheet—Activity 4

### Background Information

Once a maritime archaeologist has uncovered artifacts, recorded their location, and documented each piece, the scientific process of archaeology continues. The artifacts are usually brought to a lab where they may be washed, counted, weighed, and catalogued. Next, archaeologists carefully sort the artifacts into groups according to their characteristics. Think of the last time you put a puzzle together. Did you first find all the edge pieces? Or did you find all the ones of the same color? Similarly, an archaeologist sorts the artifacts and any pieces.

All artifacts are unique and offer valuable information; in particular, pottery is an especially important artifact for archaeologists to find. Specifically, pottery does not break down as easily as cloth, and it is often the most abundant artifact found. Another helpful characteristic of pottery is that the method and style for making pottery changes over time and across different cultures. Therefore, pottery can be used to determine the age of the site and its relationship to other cultures.

### Procedure

1. Carefully, observe the pieces of artifacts in your group's basket.
2. Come to a consensus in your group on how to best sort the artifacts and then carefully sort them.
3. Once the artifacts are sorted, try to put the pieces together and determine the identity of the artifact.
4. Continue until you have either no more pieces or you can no longer make them fit together.
5. Sometimes broken artifacts can be recovered at different times and/or in different places. Therefore, be sure to consult with the other groups to see if they have any pieces that are similar to yours.
6. Is there is a group that has pieces similar to your artifacts? If so, join groups and try to put the artifacts together.
7. As a class, discuss the difficulty of piecing together the artifacts.

### Discussion

1. What was the most difficult part about putting the pieces together?
2. In a real archaeological recovery, why might there be missing pieces?
3. Are all artifacts always identified?



Pottery is useful to identify the time period and culture of a shipwreck.



A conservator works to conserve a shoe found inside the USS *Monitor*'s turret. Photo: NOAA, *Monitor* Collection

# Conservation Conservators



Conservators at work inside the USS *Monitor*'s turret. Photo: Courtesy of The Mariners' Museum

## Grade Level

- 4-8

## Timeframe

- 15-30 minutes per activity

## Materials per Student/Group

See [Teacher Preparation and Implementation](#) for each activity's materials list

## Activity Summary

Students explore the conservation of artifacts through online learning and experimentation

## Learning Objectives

- Understand that artifact conservation is complex and can take years to complete
- Observe the destructive properties of rust
- Discover that modern metals differ from historic metals

## Key Words

Artifact, conservation, conservator, *in situ*, corrosion, iron, rust, restoration

## National Standards

**NCSS Learning Standards: 1; CC:ELA LIT.RI; NS:5-8: A, B, E, F, and G**



Conservators unload one of the USS *Monitor*'s Dahlgren guns. Photo: The Mariners' Museum

## Background Information

When planning to recover artifacts from a marine archaeological site, two of the most important items to consider are: 1) how to preserve the artifact, and 2) how much it will cost including who is funding it. Without conservation, most artifacts would perish and all historical information would be lost. Conservation may seem like a straightforward and simple process, but it is very complicated. Conservation is also time consuming and expensive, often costing more than the original recovery of an artifact.

Conservation does not simply involve a single set of procedures; therefore, only highly trained professional conservators should work to conserve artifacts. Moreover, professional conservators are often the first person to see an actual artifact, and for that reason, they are deeply concerned with the integrity of the artifact and the history it represents.

Conservators take on the same responsibilities as an archaeologist, and they also fill the roles of mender, caretaker, and recorder of the artifacts they conserve. They take great care to handle the artifact with respect and ensure that the artifact is conserved correctly. Additionally, conservators are guided by a set of ethical guidelines adopted by the International Institute for Conservation.

When artifacts are recovered from a saltwater environment, they must not be allowed to dry. Artifacts absorb salt from the water and over time, these salts become embedded in an artifact, especially in iron objects. The presence of salt can be fatal for an artifact, because as the artifact dries, salt comes out of solution and crystalizes. Salt crystals act as tiny wedges that can break apart an artifact. Therefore, before an artifact can dry, the salt must be removed. The salt removal process varies in length. Many other factors can also affect the length of time it takes to conserve an artifact, such as its size and source material.

Removing salt from objects can take years or even decades, like with the USS *Monitor's* turret. The process requires that skilled, professional conservators and other support staff are hired. A facility must be acquired and then, there are numerous other costs, such as utilities, supplies, chemicals, and more. Therefore, funding is a key component in recovering artifacts from a shipwreck site. If decades are required, as with the *Monitor*, then the amount of funding required can be in the millions of dollars.

### Activity Summary

In the first activity, students explore the conservation of the USS *Monitor's* turret. Next, they perform two experiments. In the first, they will observe the destructive properties of rust; and in the final activity, they will learn that the composition of metals has changed over time.

### Learning Objectives

Students will recognize that artifact conservation is a costly and complex process requiring years to complete. They will observe the destructive properties of rust and predict how rust forms in different environments. They will recognize that metal composition has changed over time and predict the most effective way to clean copper.

### Teacher Preparation and Implementation

- Review the background information, resources, and three activities.
- Determine group size for each activity.
- Bookmark websites for students or create a digital binder using a program, such as Livebinder. For more information on Livebinders: <http://www.livebinders.com/welcome/education>
- Print copies of the activity pages. If Internet is not available, print the information from the website.

- **Activity 1: Materials per Student or Group:**
  - ◊ Computer with Internet access or print web pages for each group/student
  - ◊ Worksheet and pencil
- **Activity 2: Materials per Group**
  - ◊ 5 pieces of steel wool (without soap)
  - ◊ 5 shallow plastic disposable bowls
  - ◊ 5 small clean jars
  - ◊ 15 mL baking soda
  - ◊ 60 mL vinegar
  - ◊ 15 mL salt
  - ◊ 180 mL water
  - ◊ 2 stir sticks
  - ◊ 2 tongue depressors (or tweezers)
  - ◊ 5 paper plates
  - ◊ Safety goggles
- **Activity 3: Materials for each Group:**
  - ◊ ~8 pennies that are not shiny
  - ◊ 7 small plastic cups
  - ◊ Graduated cylinder or beaker
  - ◊ 30 mL water
  - ◊ 30 mL vinegar
  - ◊ 15 mL baking soda mixed in 30 mL water
  - ◊ 30 mL lemon juice
  - ◊ 30 mL liquid hand soap
  - ◊ 15 mL salt mixed in 30 mL water
  - ◊ 30 mL ketchup
  - ◊ Tape
  - ◊ Soft paper towels
  - ◊ Seven litmus strips
- Follow the steps in the Procedure section.

### Procedure

1. Have students work individually or in groups determined by number of computers and/or time allotted.

### Vocabulary

**ARTIFACT** — Any object made by humans, typically an item of cultural or historical interest

**CONSERVATION** — Preservation, repair and prevention of deterioration of archaeological, historical, and cultural sites and artifacts synthesis of RNA

**CONSERVATOR** — A person responsible for the repair and preservation of works of art, building, or other things of cultural or environmental interest

**CORROSION** — A chemical action that causes the breakdown of a material, especially metal

**IN SITU** — Latin phrase that means in its original place or position

**IRON** — A strong, hard magnetic silvery-gray metal, often used as a material for construction and manufacturing, especially in the form of steel

**METAL** — A solid material that is typically hard, shiny, malleable, fusible, and ductile, with good electrical and thermal conductivity

**RESTORATION** — The action of returning something to a former owner, place, or condition

**RUST** — A reddish- or yellowish-brown flaky coating of iron oxide that is formed on iron or steel by oxidation, especially in the presence of moisture

## 2. Activity 1:

- Show the students where to find the bookmarks for the two webpages they will explore.
- Have students read background information for Activity 1: Exploring *Monitor's* Turret and discuss.
- Tell the students to read each bookmarked page and answer the questions on the worksheet.
- Discuss as a class how artifacts are conserved and why it is such an expensive process.
- Ask the students if artifacts from every discovered shipwreck should be brought up for conservation. Have them explain why or why not.

## 3. Activity 2:

- Explain or review corrosion and its effects on materials, such as metal.
- Have students read the background information on the student worksheet *Rusting Away*.
- Explain that they will be performing an experiment over five days.
- Have the students read and follow the directions for setting up their five stations. Answer any questions if needed.
- Set aside about 10 minutes each day for five days so that the students can make observations and record them in the Student Observation Chart.
- At the end of the five days, have the students answer the discussion questions and go over them as a class.

## 4. Activity 3:

- Explain or review acids and bases and how to use a litmus strip.
- Have the students read the background information on the student worksheet *Changing Metal*.
- Discuss and check for understanding.
- Have the students follow the procedure and place their cups in a secure location overnight.
- The next day, have the students observe the pennies and make observations.
- Have students answer the discussion question and review as a class.
- Have the students determine which solution cleaned the pennies most effectively (best). Ask them to explain how they determined "best." (i.e. got the most gunk off, made it the shiniest, cleaned the fastest, etc.)
- Conclude the activities with a discussion on the complexity of the conservation of artifacts. Help students to understand that because the process is complex, expensive, and time consuming, most artifacts should be left *in situ* unless they are historically significant in some way that warrants their recovery.

## Resources

### Websites

#### Monitor National Marine Sanctuary

Explore this legacy website to learn about the Civil War ironclad, USS *Monitor*, which changed naval warfare forever. Read about the men who made her, the men who commanded her, and the men that served and died on her. <http://monitor.noaa.gov/150th>

#### The Mariners' Museum: USS *Monitor* Center

The Mariners' Museum is home to hundreds of artifacts recovered from the USS *Monitor*. Visit this site to learn how they are being conserved, watch conservationists at work via webcams, and read the blogs of the conservators as they uncover new finds.

<http://www.marinersmuseum.org/uss-monitor-center/uss-monitor-center>

#### Monitor National Marine Sanctuary—Sketchfab

Click to view and manipulate 3-D models of the USS *Monitor*, *Monitor* artifacts and more.

<https://sketchfab.com/NOAAMonitorNMS>

#### Comic Book Periodic Table

Explore the periodic table of elements in a whole new way. Connect each element to a comic book hero who has the same characteristics as the element.

<http://www.uky.edu/Projects/Chemcomics/>



Conservator at The Mariners' Museum in Newport News, Virginia, works to deconcrete the USS *Monitor's* condenser. Photo: NOAA, *Monitor* Collection

## Chemistry for Kids

Explore the structure of molecules and learn how atoms combine to form compounds.

[http://www.chem4kids.com/files/atom\\_intro.html](http://www.chem4kids.com/files/atom_intro.html)

## The National World War II Museum

Visit this site to learn more about the techniques and guidelines to preserve artifacts.

<http://www.nationalww2museum.org/give/donate-an-artifact/preservation-of-artifacts.html>

## Science Kids: Metals for Kids

Check out the cool topic of metals with a range of free games, experiments and more.

<http://www.sciencekids.co.nz/metals.html>

## Chemical Elements

An online, interactive Periodic Table of the elements.

<http://www.chemicalelements.com/>

## Books

Bowens, Amanda (Editor): *Underwater Archaeology: The NAS Guide to Principles and Practice*. Blackwell Publishing (2nd Edition), 2009. ISBN-13: 978-1405175913.

Llewellyn, Claire: *Metal*: Scholastic Library Publishing, 2001. ISBN: 0531148343.

Mebane, Robert C. and Thomas Rybolt: *Metals (Everyday Material Science Experiments)*. 21<sup>st</sup> Century, 1997. ISBN: 0805028420.

Oxlade, Chris: *How We Use Metal*. Raintree, 2004. ISBN: 1410908933.

Sparrow, Giles: *Iron*. Marshall Cavendish, 1999. ISBN: 0761408800.

Zronik, John Paul: *Metals*: Crabtree Publishing Company, 2004. ISBN: 0778714500.

## Video

### The USS *Monitor* and NOAA: A Look Through Time

Travel back to 1862 in this educational video to learn how the USS *Monitor* turned the tide of the Civil War. The video also highlights the *Monitor's* discovery, designation as a national marine sanctuary, and more.

<https://www.youtube.com/watch?v=EX6H3Tp-2yE>

## Extensions

1. Have students learn more about the human remains discovered inside the *Monitor's* turret and their burial at Arlington National Cemetery.

<http://monitor.noaa.gov/150th>

2. Explore the difference between chemical and physical changes. Have students create a poster, skit or song that explains the differences.
3. Repeat Activity B using pennies, paper-covered metal twist ties, and brass nails. Have students make a poster to compare and contrast the results. Have them explain what the experiment tells them about the corrosion of different metals in the same environments? Use this information to talk about the kinds of buildings that might be built in different climates or which kinds of metals will need the most protection from corrosion.
4. Have students visit the United States Mint's website <http://www.usmint.gov> to learn more about the metals that are used in coins.
5. Have students visit or contact a museum to find out how they clean and restore paintings or other artifacts. Have them prepare a report to share with the class.



**Top:** Steam engine register. **Center:** Ring found with human remains. **Bottom:** Alloy spoon found in turret. **All Photos:** NOAA, *Monitor* Collection

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Exploring the Conservation of the *Monitor's* Turret Student Worksheet—Activity 1

### Background Information

When planning to recover artifacts from a marine archaeological site, one of the most important items to consider is how to preserve the artifact. Specifically, without conservation, most artifacts would perish and all historical information would be lost. For many people, conservation seems like a straightforward and simple process, but it is very complicated. Conservation is also time consuming and expensive, often costing more than the original recovery of the artifact.

Conservation does not simply involve a single set of procedures; therefore, only highly trained professional conservators should work to conserve artifacts. Moreover, professional conservators are often the first people to see an actual artifact, and for that reason, they are deeply concerned with the integrity of an artifact and the history it represents. Conservators take on the same responsibilities as an archaeologist, and they also fill the roles of mender, caretaker, and recorder of the artifacts they conserve. They take great care to handle the artifact with respect and ensure that the artifact is conserved correctly. Additionally, conservators are guided by a set of ethical guidelines adopted by the International Institute for Conservation.

When artifacts are recovered from a salt water environment, they must not be allowed to dry. Artifacts absorb salt from the water and over time, these salts become embedded in an artifact, especially in iron objects. The presence of salt can be fatal for an artifact because, as the artifact dries, salt comes out of solution and crystalizes. Salt crystals act as tiny wedges that can break apart an artifact. Therefore, before an artifact can dry, the salt must be removed. The salt removal process varies in length. Many other factors can also affect the length of time it takes to conserve an artifact, such as its size and its source material.

Removing salt from objects can take years or even decades, like with the USS *Monitor's* turret. The process requires that skilled, professional conservators and other support staff are hired. A facility must be acquired and then, there are numerous additional costs, such as utilities, supplies, chemicals, and more. Therefore, funding is a key component to making any decision to recover artifacts from a shipwreck site. If decades are required, as with the *Monitor*, then the amount of funding can be in the millions of dollars.

### Getting Started

In this activity, you will explore the conservation process for the USS *Monitor's* turret, observe the destructive properties of rust, and understand that the composition of metals has changed over time.



A look inside the Batten Conservation Lab where artifacts from the USS *Monitor* are being conserved. In the foreground is the steam engine tank and behind it is the turret tank. Note that visitors can view inside the lab through an observation deck with windows to watch conservation at work. Photo: NOAA, *Monitor* Collection

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### Activity 1: Exploring the Conservation of the USS *Monitor*'s Turret—Continued

Visit each website listed and in your science journal, answer the questions for each site.

#### The Mariners' Museum: A Race to Save History

<http://www.monitorcenter.org/a-race-to-save-history/>

1. Where are the USS *Monitor*'s turret, steam engine, condenser, Dahlgren guns, and other artifacts being conserved?
2. How many years were these artifacts submerged in the ocean?
3. How many tons of iron artifacts are being conserved at the museum?
4. When the conservation process is completed, where are the artifacts displayed?
5. What is concretion?

#### The Mariners' Museum: Countering the Effects of Corrosion

<http://www.monitorcenter.org/countering-the-effects-of-corrosion/>

6. What is electrolytic reduction? Explain fully.
7. Why is a negative charge applied to an artifact?
8. When is the solution changed?
9. Why are there bubbles?
10. What happens when objects are finally removed from the tanks?



The 90,000-gallon tank must be drained in order for conservators to work inside the turret. The process takes about five hours and typically occurs in the summer over 1-5 weeks. Photo: Ricles, NOAA

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Rusting Away Student Worksheet—Activity 2

### Background Information

Corrosion is a naturally occurring physical and chemical deterioration, or break down, of a material as it reacts with oxygen and other parts of its environment, such as acids, salts, or moisture. Corrosion takes place slowly over a long period of time. Often, there are no clues to announce that the reaction is taking place until the corrosion is seen. In the United States, corrosion of metals causes more than five billion dollars of damage each year. Different metals corrode in different ways. When iron is exposed to oxygen for an extended period of time, iron oxide ( $\text{Fe}_2\text{O}_3$ ), or rust, forms on the surface. Because rust is porous, exposure to oxygen and water in the air continues the corrosion process until the metal breaks down entirely.

When copper is exposed to gases in the air, the product of the corrosion reaction is a green finish that acts much like a coat of paint that prevents the air from further reaching the metal so only the surface of the object corrodes. This green coating is a layer called patina. Corrosion on silver is a dull tarnish that changes the physical appearance of silver. Tarnish can be removed using another chemical reaction with aluminum foil and baking soda.

Scientists and researchers study ways to reverse the problems of corrosion and to prevent corrosion from happening, and conservators work to find ways to slow or stop the corrosion of artifacts.

### Procedure

1. Put on your safety goggles.
2. Label the five bowls:
  - Water
  - Salt
  - Baking soda
  - Vinegar
  - Control (no liquid added to this bowl)
3. Pour 60 mL of vinegar into the bowl labeled "Vinegar."
4. Pour 60 mL of water into each of the other three bowls.
5. In the bowl marked "Salt," add 15 mL salt to the water and stir until dissolved. Discard stir stick.
6. In the bowl marked "Baking Soda," add 15 mL baking soda to the water and stir until dissolved. Discard stir stick.
7. Place a piece of steel wool in each of the five bowls.
8. Turn a jar upside down over each piece of steel wool in the bowls to form a sealed environment. See image above.
9. Place the bowls in a location where they will not be disturbed.
10. Predict what will happen to the steel wool in each of the bowls. Record your predictions.
11. Determine which bowl will show the most change. Record your predictions on your *Student Observation Chart*.
12. Over the next four days, while wearing your safety goggles, observe the steel wool. Record your observations on the *Student Observation Chart*.
13. On day 5, label five plates with the same labels as the bowls. Put on your safety goggles and remove the steel wool from each of the bowls. Place the steel wool on its corresponding paper plate.



**Left:** Conservators work inside the *Monitor*'s turret once it is drained.  
**Right:** Conservators place anodes around one of the *Monitor*'s Dahlgren guns.  
 All photos: NOAA, *Monitor* Collection

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

**Activity 2: Rusting Away—Continued**

14. Using the tongue depressors (or tweezers if available), pull apart each piece of steel wool.
15. Observe what happens and record your observations.
16. Compare the “Control” sample to the other samples and record your observations. Make inferences as to why the steel wool is different in each bowl.

**Discussion**

1. What happened to the steel wool pieces in each of the bowls?
2. Which bowl showed the most change after four days?
3. Why is it important to protect metal surfaces from corrosion?
4. Using what you have learned from your test results, how does iron react in salt water? Fresh water?

**Student Observation Chart**

Day	Water	Baking Soda	Vinegar	Salt Water	Control
Prediction					
0					
1					
2					
3					
4					

**In your science journal, answer the following questions:**

1. Which piece of steel wool rusted the fastest?
2. Which piece rusted the most?
3. What happened when you used the tongue depressors to pull apart the steel wool from the four experimental containers?
4. What happened when you tried to pull apart the control piece of steel wool?
5. Explain what this activity taught you about rust.

**Extensions**

1. Place one of the rusty pieces of steel wool in a glass of cola for one hour. What happens to the rust? Can the metal that was destroyed be replaced?
2. Visit a car dealership or automotive shop that puts protective coatings on the underside of a car. Interview the technician to find out what the coating is made from and why it is used.

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## Changing Metal Student Worksheet—Activity 3

### Background Information

Scientists look for ways to protect metals and prevent corrosion. Because different metals corrode in different ways, scientists can develop new combinations of metals that will resist corrosion and last longer.

Although many common items are made of metals, the composition of the metals used today may be different from in the past. Pennies are a good example of this difference.

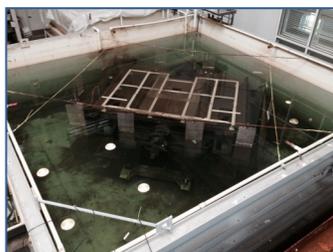
- From 1793 to 1837, pennies were made of pure copper.
- From 1837 to 1857, pennies were made of bronze (95% copper and 5% tin and zinc).
- From 1857 to 1864, the penny was 88% copper and 12% nickel, giving the coin a whitish appearance.
- From 1864 to 1962 (except for the year 1943), the penny was again bronze.
- In 1943, copper was needed for use in World War II, so most of the pennies that were minted, or made, were zinc-coated steel coins.
- In 1962, the small amount of tin that was used in earlier pennies was removed, making the metal composition of the one-cent piece 95% copper and 5% zinc.
- From mid-1982 to present day, pennies are made with 97.5% zinc and 2.5% copper.

A penny is shiny when it is made, but exposure to oxygen and dirt cause it to become dull and turn dark brown. Copper oxide forms and coats the penny, much like tarnish on silver. Copper oxide reacts with mild acids. When dipped in an acidic solution, the copper oxide dissolves, leaving a bright shiny penny again.

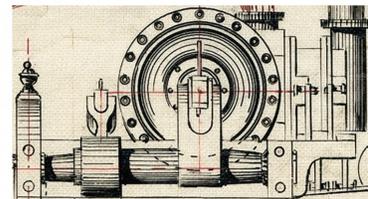
Archaeologists, museum curators, and art restoration technicians all use a variety of cleaning methods to restore artifacts. Scientists have discovered that oxygen atoms react with organic materials causing them to dissolve. Many common laundry and carpet cleaners today use the power of oxygen to boost their cleaning power. People that do metal restoration must consider the time period in which the metal was made because metals were created differently throughout time, just like the penny. Concurrently, knowledge of the time period helps archeologists to know how best to clean or restore an item.

### Procedure

1. Observe the chemicals for this experiment and predict which will clean the pennies, making them shiny again.
2. Write your predictions in your science journal and explain your predictions.
3. Label each cup: water, vinegar, water and baking soda, lemon juice, soap, saltwater, and ketchup.
4. Using a graduated cylinder or beaker, measure and pour the amounts listed for each cup: 30 mL water, 30 mL vinegar, 15 mL baking soda mixed with 30 mL water, 30 mL lemon juice, 30 mL liquid hand soap, 15 mL salt mixed with 30 mL water, and 30 mL ketchup.
5. Place a dirty penny into each cup.
6. Leave the last penny on the table. This penny is your control.
7. Leave the pennies in the cups overnight.
8. The next day, observe the penny in each cup and record your observations. What changes did you see?
9. Remove one penny from its solution.



The *Monitor*'s steam engine in its tank. Photo: Courtesy of The Mariners' Museum



The *Monitor*'s steam engine after undergoing deconcretion. Photo: Courtesy of The Mariners' Museum

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

**Activity 3: Changing Metal—Continued**

10. Rinse the penny with plain water and dry with a soft paper towel.
11. Observe the penny after it is rinsed and dried. Record your observations.
12. Tape the penny onto the chart in the correct space provided.
13. Repeat with the other pennies, one at a time.
14. Determine which solutions cleaned the pennies most effectively.
15. Test each solution using a litmus paper strip to determine if the solutions were primarily acids or bases.

**Discussion**

1. What changes did you observe after the pennies had soaked in the solutions overnight?
2. Which solutions were the most effective to clean the pennies?
3. Why do you think rinsing the pennies with water made a difference?
4. Would you achieve the same effect by simply wiping the pennies with a clean paper towel? Why or why not?
5. What conclusions can you draw about the types of substances that would most effectively remove corrosion from a copper surface?

**Penny Observation Chart**

Solution	Prediction	Results Before	Results After	pH of Solution	Penny (Tape in
Water					
Vinegar					
Water and Baking Soda					
Lemon Juice					
Soap					
Salt Water					
Ketchup					

**What do the results tell you?**



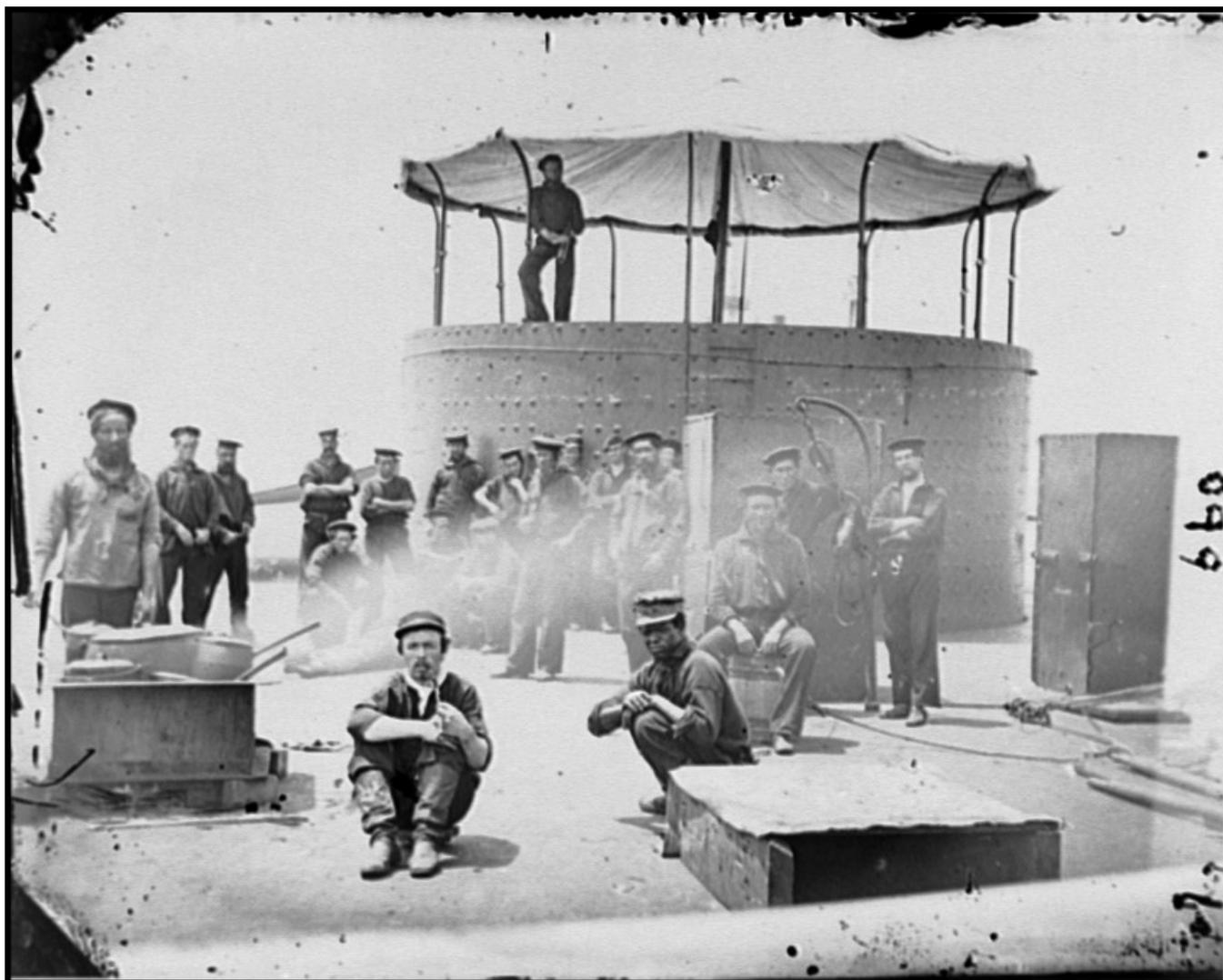
## USS *Monitor* — Discovering and Exploring America's Most Historic Ironclad

A curriculum guide that discovers and explores our nation's most historic ironclad, USS *Monitor*. Through the activities of this guide, students explore the mounting tensions between the North and the South that led to the Civil War; discover how new technology ended the age of the wooden warships; investigate the Battle of Hampton Roads; research life on an ironclad; learn about the *Monitor's* sinking; illustrate how side scan sonar was used to discover the *Monitor's* final resting place; and conclude to analyze artifacts and understand the role they play in telling the *Monitor's* story.

To learn more about the USS *Monitor* and to download other curriculum, modules, and activities, visit

<http://monitor.noaa.gov/education/>

<http://monitor.noaa.gov/150th/>



USS *Monitor* crew cooking on deck after a fire damaged the galley. This photo is one of eight photos taken on July 9, 1862, by photographer James F. Gibson. Courtesy of the Library of Congress.