

## Chapter 2—A History of Marine Science

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### MULTIPLE CHOICE

1. What does voyaging offer people?
  - a. Expansion of trade
  - b. Increased availability of food
  - c. Mobility of residence
  - d. All of these choices

ANS: D

Voyaging was important for people to pursue. It allowed people to find new places to live. There were definitely new nutritional and economic opportunities that opened up when people began to voyage. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1                      DIF: Knowledge

2. Who is considered the first marine scientist?
  - a. Captain James Cook
  - b. Hypatia
  - c. Prince Henry
  - d. John Harrison

ANS: A

Captain Cook, along with his scientists, collected marine and terrestrial specimens. He also sampled the ocean floor and various geological features. Captain Cook was also a very accurate cartographer. His charts were even used in World War II, a testament to their precision. Information can be found in the section *Voyaging Combined with Science to Advance Ocean Studies*.

PTS: 1                      DIF: Knowledge

3. Whose expedition was able to prove circumnavigation of the globe was possible?
  - a. Captain James Cook
  - b. Matthew Murray
  - c. Ferdinand Magellan
  - d. Christopher Columbus

ANS: C

Ferdinand Magellan thought he could find an open westerly trade route to the Orient. Although he died in the Philippines, his crew continued the expedition. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

4. What was not the goal of Admiral Zheng He's explorations?
- Show kindness to people in distant places
  - Display the powers of the Ming Dynasty
  - Distribute treasures
  - Conquer people in distant places

ANS: D

It was important for the Admiral to show the wealth and power of the Ming Dynasty on his explorations. They set out to show the world that China was the only civilized state. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1                      DIF: Knowledge

5. The Smithsonian obtained many specimens and artifacts from which groundbreaking hybrid expedition?
- The *Discovery* Expedition
  - The *Resolution* Expedition
  - The United States Exploring Expedition
  - The *Challenger* Expedition

ANS: C

The United States Exploring Expedition conducted sampling throughout its mission. They returned with charts, specimen, and artifacts. The final report associated with it was nineteen volumes. This was the first big hybrid expedition, but it was still primarily a naval expedition. Information can be found in the section *The First Scientific Experiments Were Undertaken by Governments*.

PTS: 1

6. How many degrees of longitude equals one hour of time?
- 15°
  - 24°
  - 25°
  - 45°

ANS: A

The Earth rotates its 360° in 24 hours of time. Thus, 360° divided by 24 hours equals the rotation of 15° every hour. Information can be found in the section *Voyaging Combined with Science to Advance Ocean Studies*.

PTS: 1

7. Who led a fleet of at least 317 during the dark ages?
- Bjarni Herjulfsson
  - Prince Henry
  - Admiral Zheng He
  - Christopher Columbus

ANS: C

Admiral Zheng He led this great fleet with approximately 27,000 men. They explored the Indian Ocean, Indonesia, and traveled around the tip of Africa. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

8. What prevented explorers like Christopher Columbus from finding precise longitude?
- Calculations necessary for determining longitude
  - The lack of accurate pendulums
  - A durable and precise clock
  - Longitude was not the issue, latitude was the problem

ANS: C

The key to longitude problem was the invention of a sturdy clock that remained consistent during weather changes that would occur while at sea. Prior to the chronometer, clocks were propelled by the use of a pendulum which was not practical at sea. Information can be found in the section *Voyaging Combined with Science to Advance Ocean Studies*.

PTS: 1

9. Who was able to prove that there was not an actual continent in the Arctic?
- John Murray
  - Fridtjof Nansen
  - Robert E. Peary
  - Charles Wyville Thomson

ANS: B

Fridtjof Nansen was able to prove there was no continent in the Arctic, but it did not come easily. He allowed his ship to be trapped in the ice for four years. The ice, along with the ship, drifted 1,650 kilometers over that period of time. Information can be found in the section *Contemporary Oceanography Makes Use of Modern Technology*.

PTS: 1

10. The first consistent ocean traders were the:
- Egyptians
  - Cretans
  - Greeks
  - Vikings

ANS: B

After the Cretan civilizations were destroyed due to a series of earthquakes, the ocean trading legacy likely passed to the Phoenicians. The Egyptians, however, were also conducting ship borne commerce along the Nile River. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

11. What kind of information can be determined about the ocean with the use of satellites?
- The height of the sea surface
  - The temperature of the sea surface
  - The amount of plankton productivity
  - All of these choices

ANS: D

The National Aeronautics and Space Administration (NASA) has been a large contributor to marine science. Their satellites are able to provide a vast amount of very accurate information. Information can be found in the section *Contemporary Oceanography Makes Use of Modern Technology*.

PTS: 1

12. Who was responsible for most of the progress in science and math after the fall of the Roman Empire?
- Arabs
  - Greeks
  - Asians
  - Vikings

ANS: A

The progress in medicine, astronomy, philosophy, and mathematics was primarily made by Arabs. They also imported advances in technology, like the compass, from Asia. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

13. Who set out to explore worldwide wind and current patterns for commercial and naval purposes?
- Charles Wilkes
  - Benjamin Franklin
  - Tim Folger
  - Matthew Maury

ANS: D

Although Benjamin Franklin and Tim Folger were the first to document these patterns off eastern North America, Matthew Maury used their information and a trove of additional information to create worldwide charts with these patterns. He would then issue these charts to mariners in exchange for their own logbooks. Information can be found in the section *The First Scientific Experiments Were Undertaken by Governments*.

PTS: 1

14. \_\_\_\_ was one of the first researchers to attack issues related to deep-sea sampling.
- Sir John Ross
  - Matthew Maury
  - Fridtjof Nansen
  - John Harrison

ANS: A

Sir John Ross and his nephew, Sir James Clark Ross, attacked deep-sea sampling. They used a clamping sampler which trapped specimens from various depths. They even sampled from 1,919 meters deep near the coast of Greenland. Information can be found in the section *Voyaging Combined with Science to Advance Ocean Studies*.

PTS: 1

15. What information was not available for early cartographers to put on charts?
- Direction of currents
  - Water depths and related information
  - Location of rocks in harbors
  - Sailing times

ANS: B

Early cartographers were able to include information on the directions of currents, position of large rocks in harbors, and even sailing times. They also included various landmarks that would be helpful for navigation. Initially these charts did not have water related information like depths because they were just used to stimulate a sailor's memory of the journey rather than to specifically guide his path. Information can be found in the section *Marine Scientists Use the Logic of Science to Study the Ocean*.

PTS: 1

16. What was the *Meteor* expedition's most important innovation?
- The echo sounder
  - The bathyscaphe
  - Modern optical equipment
  - The steam winch

ANS: A

Although the *Meteor* expedition introduced the use of modern optical and electronic equipment, the echo sounder was considered the most important. An echo sounder is a device that bounces sound waves off the ocean bottom to study the depth and shape of the seafloor. Information can be found in the section *Contemporary Oceanography Makes Use of Modern Technology*.

PTS: 1

17. What was not an invention rendered by the Chinese to facilitate their ocean voyages?
- Central rudder system
  - Watertight compartments
  - Chronometer
  - Compass

ANS: C

The Chinese had many technological innovations which made their voyaging possible. They invented central rudders, watertight compartments, compasses, and a sophisticated sail system. The chronometer, however, was invented by John Harrison. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

18. What did Polynesians use to determine if an island was near, but could not be seen yet?
- The change in the rhythmic set of waves against the hull
  - The Flight tracks of birds at dusk
  - The Smell of the water
  - All of these choices were used

ANS: D

The Polynesians used many indicators to find islands that were out of sight over the horizon. They used the pattern of waves, bird flight patterns, and the smell of water. They also used stars, water's temperature, salinity, and color to find these islands. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

19. What stimulated the new field of science called oceanography?
- The results of the HMS *Beagle* expedition
  - The naturalist Alexander Agassiz
  - Samples and information from the *Challenger* expedition
  - The United States Exploring Expedition's discovery of new species

ANS: C

The HMS *Challenger* expedition was the first to discover life in the depths of the ocean. They found over 4 thousand new species. This was key to a new field of study—oceanography. Information can be found in the section *The First Scientific Experiments Were Undertaken by Governments*.

PTS: 1

20. What is the possible cause for the Renaissance in Europe?
- The start of exploring for commerce
  - The reestablishment of information from Alexandria
  - The need to come together for protection
  - Climate change

ANS: C

Europeans were powerless against Vikings who raided their villages on a regular basis. It is thought that the Europeans came together for the purpose of creating a common defense. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1                      DIF: Knowledge

21. Which Library of Alexandria librarian is responsible for the development of the longitude and latitude system?
- Hipparchus
  - Claudius Ptolemy
  - Hypatia
  - Eratosthenes

ANS: D

The first system of longitude and latitude was invented by Eratosthenes. He placed the lines through key landmarks so it was different than the system we know today. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

22. What country was the first to found an oceanographic institution to meet some of the demands associated with scientific oceanography?
- United States
  - England
  - Japan
  - Monaco

ANS: D

The first oceanographic institution, a lab and a museum, was founded by Prince Albert I of Monaco in 1906. The famous Jacques Cousteau was a student at this facility. Later, in 1921, Monaco was the site of the International Hydrographic Bureau, an oceanographic agency. Information can be found in the section *Contemporary Oceanography Makes Use of Modern Technology*.

PTS: 1

23. The orientation of charts that placed north at the top and east was on the right was done by:
- Claudius Ptolemy
  - Eratosthenes
  - Hypatia
  - Hipparchus

ANS: A

Ptolemy was also responsible for dividing each degree of longitude and latitude into minutes and seconds. This aided navigation. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

24. What motivated Europeans to explore during the Age of Discovery?
- Empire expansion
  - Possible commerce
  - Food sources
  - Just to explore

ANS: B

Although all of these things were byproducts of being able to voyage, alternative ocean routes were being sought out for potential commerce. The already established Asian and Arabian trade routes through the desert were unstable and eventually cut off in 1453. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

25. \_\_\_\_\_ was longest continuous scientific oceanographic expedition.
- The *Challenger* expedition
  - The *Fram* expedition
  - The *Meteor* expedition
  - The *Albatross* expedition

ANS: A

The *Challenger* was truly a revolutionary undertaking. The expedition, conceived and led by scientists, was devoted purely to scientific exploration and was the first of its kind. The expedition launched in December of 1872 and ended in May of 1876. During that time, 4,717 new species were discovered, and there was enough information gathered to generate a fifty volume report. Information can be found in the section *The First Scientific Experiments Were Undertaken by Governments*.

PTS: 1

26. Where was the first "zero longitude" line?
- Athens
  - Rome
  - Alexandria
  - Greenwich

ANS: B

Hipparchus divided the Earth's surface into 360 degrees and created a uniform grid system of latitude and longitude. Alexandria, the home of Hipparchus and the great Library of Alexandria, was the location of the first "zero longitude" line. *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

27. Which is not included in the specialized information that AQUA can obtain?
- Evaporation rates of the ocean
  - Phytoplankton in the ocean
  - Wave heights
  - Land, air, and water temperature

ANS: C

The focus of AQUA is on the Earth's water cycle, but it is unable to gather information about wave heights. AQUA gathers information about ocean water evaporation, the amount of water vapor present in the atmosphere, and the amount of phytoplankton and dissolved organic matter amounts in the oceans. AQUA also gathers information about land, air, and water temperatures. Information can be found in the section *Contemporary Oceanography Makes Use of Modern Technology*.

PTS: 1

DIF: Knowledge



28. What vessel is attributed to being able to descend into the Challenger Deep?
- Glomar Challenger*
  - Trieste*
  - Meteor*
  - HMS *Challenger II*

ANS: B

The *Trieste* was a blimp-like bathyscaphe designed by the Swiss. United States Navy lieutenant Don Walsh and Jacques Piccard were able to use this to go down into the Challenger Deep in 1960. This was the beginning of manned and unmanned travel into the depths of the ocean. Information can be found in the section *Contemporary Oceanography Makes Use of Modern Technology*.

PTS: 1

29. What organization conducted the largest scientific program attempted by physical oceanographers?
- International Geosphere-Biosphere Programme (IGBP)
  - Integrated Ocean Drilling Program (IODP)
  - Ridge Interdisciplinary Global Experiment (RIDGE)
  - World Climate Research Programme (WCRP)

ANS: D

The WCRP launched CLIVAR (Climate Variability and Predictability) to study the seasonal changes in climate variability and the dynamics of the global ocean-atmosphere-land system, as well as long term climate predictability and variability, and changes in atmospheric temperature and circulation due to human impact. Information can be found in the section *Stars and Seas*.

PTS: 1

30. Which European was responsible for the accumulation of detailed charts which led to increased commerce to include the west coast of Africa?
- Christopher Columbus
  - Prince Henry
  - Charles Wilkes
  - Captain James Cook

ANS: B

Prince Henry the Navigator established a center at Sagres dedicated to the study of marine science and navigation. Captains under his patronage explored the unknown southern seas, including West Africa, and accumulated detailed charts wherever they went. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

### TRUE/FALSE

1. Phoenician sailors were more skilled than Greek sailors, so they ventured beyond the sight of land for trade on a regular basis.

ANS: F

Both the Greeks and the Phoenicians stayed within the sight of land despite their skills on "the river" or the ocean. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

2. Matthew Maury is considered to be the "father of oceanography" due to his life accomplishments pertaining to ocean and wind currents.

ANS: T

Matthew Maury spent much of his life compiling information on ocean and surface wind currents throughout the world. He wrote *The Physical Geography of the Seas* which explains his findings and enabled sailors to cut days of traveling time off sailing voyages. Information can be found in the section *The First Scientific Experiments Were Undertaken by Governments*.

PTS: 1

3. Longitude can be found using a protractor and the north polar star.

ANS: F

Latitude can be found using this method. This allowed sailors to easily determine their latitudinal location. Longitude was more difficult to find, but eventually clocks were used to determine longitude. Information can be found in the section *Voyaging Combined with Science to Advance Ocean Studies*.

PTS: 1

4. Although John Harrison was a cabinetmaker, he was awarded a monetary prize for building an accurate clock used to determine longitude.

ANS: T

John Harrison built the first longitudinal time piece in 1728. It was called a chronometer and the new spring escapement mechanism facilitated its success aboard ships. He went on to build three more. He did not collect the balance of his prize money until he was able to show that the clock's technology was able to be replicated proving that it would be able to be produced in quantity. Information can be found in the section *Voyaging Combined with Science to Advance Ocean Studies*.

PTS: 1

5. The fall of the Library of Alexandria can be attributed to growing tensions between Hypatia and early Christian Romans.

ANS: T

The tension peaked while Hypatia was the librarian. Christian Romans identified science and knowledge with pagan practices, and in CE 415 the library was burned and Hypatia was murdered. 700,000 irreplaceable scrolls were lost. Alexandria ceased to be the center of learning in the ancient world, and this great loss of information likely sent Europe into the Dark Ages after the Roman Empire fell in 476 A.D. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

6. The Scripps Institute of Oceanography and the Woods Hole Oceanographic Institute are important examples of prominent oceanographic institutions in the United States.

ANS: T

The idea of the Oceanographic Institution in Monaco had spread across the world. The Scripps Institute in La Jolla, California was founded in 1912. Woods Hole was founded in 1930 in Cape Cod on the east coast of the United States. Information can be found in the section *Contemporary Oceanography Makes Use of Modern Technology*.

PTS: 1

7. Hipparchus developed our present grid system of longitude and latitude.

ANS: T

Although Eratosthenes developed the concept of longitude and latitude, Hipparchus turned this idea into a grid system which divided the Earth's surface into 360°. Ptolemy advanced this by dividing the degrees into minutes and seconds to assist navigators. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

8. Alfred Thayer Mahan recognized and emphasized that military and commercial control of commerce and transportation had a great effect on the overall success of a nation.

ANS: T

Alfred Thayer Mahan analyzed previous studies on the rise and fall of nations. He stressed the interdependence of military and commercial control of seaborne commerce and the ability of safe lines of transportation to influence the outcomes of conflicts. His book, *The Influence of Sea Power upon History, 1660-1783*, was widely read in Great Britain, Germany, and the United States. Information can be found in the section *The First Scientific Experiments Were Undertaken by Governments*.

PTS: 1

9. The Norwegian Vikings began looking westward after French, Irish, and British strengthened their defenses against their raids.

ANS: T

The Vikings discovered and established colonies in Iceland and Greenland as they moved west. Once these areas were colonized, they eventually discovered parts of North America. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

10. Longitudinal lines run parallel to the equator.

ANS: F

Latitude lines are drawn parallel to the equator and to each other while longitude lines run from pole to pole. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

11. The Japan Marine Science and Technology Center (JAMSTAC) is acclaimed for launching both the deepest-diving manned and unmanned submersibles to date.

ANS: T

The Center is a consortium of Japanese industries and government agencies. The *Shinkai 6500* was launched in 1989 and is the deepest-diving manned submersible. *Kaiko*, the largest unmanned remote operated vehicle to date became operational in 1995. Information can be found in the section *Contemporary Oceanography Makes Use of Modern Technology*.

PTS: 1

12. Christopher Columbus was the first person to discover the "New World".

ANS: F

There is evidence that the Vikings visited North America 500 years prior to Columbus. In addition to the Viking's colonies, Native Americans had inhabited the continent for 11,000 years prior to Columbus' arrival. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

13. National pride, scientific curiosity, and various advancements in shipbuilding fueled the golden age of polar exploration much like the spread of commerce fueled the original golden age of exploration.

ANS: T

Courage and advancements in nutrition also motivated explorers to sail in search of the Earth's poles. In 1909, Robert E. Peary and Matthew Hensen of the United States reached the North Pole. Two years later, Norway's Roald Amundsen led a team to the South Pole. Information can be found in the section *Contemporary Oceanography Makes Use of Modern Technology*.

PTS: 1

14. By the year 2010, the Census of Marine Life project culminated 10 years of research by 2700 scientists from 80 different countries into a summary report.

ANS: T

Ten years after the Census of Marine Life began, a summary reporting the Global findings of 2700 scientists was used. Information can be found in the *Time line for the History of Marine Science, Table 2.1*.

PTS: 1                      DIF: Knowledge

15. The Polynesian colonies used a system of shells and bamboo to represent island positions for navigation.

ANS: T

It is thought that bamboo grids with shells attached were used by early oceanic navigators. Modern representations can be seen in Micronesian stick charts. Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

## ESSAY

1. Discuss the problems that occurred while trying to determine longitude. How was the longitude problem finally solved?

ANS:

Answer should include:

- Longitude lines are imaginary grid lines that run pole to pole used, along with latitude measurements, to determine location coordinates. They measure the angle of a particular location in reference to the prime meridian. They are always north and south measurements.
- The biggest issue with longitude is that it cannot be determined using celestial markers as with latitude. After setting a particular location as zero, longitude can be calculated using time. The Earth is 360 degrees in circumference, and completes a full rotation every 24 hours. Thus, every 15 degrees is equivalent to one hour of time.
- After it was determined that longitude could be found using time, another problem arose. In the early 18th century, clocks were propelled by a pendulum to keep accurate time. These clocks were not able to keep accurate time as they used pendulums which were useless on a rolling ship.
- John Harrison created a clock in 1728 that was able to keep accurate time while at sea. He called it a *chronometer*. It used a spring escapement instead of a pendulum, and this made it a good solution to the previously inferior clocks at sea.
- John Harrison built four chronometers total. The last model he made was only five seconds slow, which was an astonishing accomplishment for that time period.
- Eventually, John Harrison's clocks were able to be reproduced. This allowed Harrison to finally collect reward money for his invention. Captain Cook took one of Harrison's replicated clocks on his last two expeditions.

Information can be found in the section *Voyaging Combined with Science to Advance Ocean Studies*.

PTS: 1

DIF: Analysis

2. What was the first expedition devoted entirely to marine science? What new equipment was used on this expedition to facilitate more research? What information was acquired?

ANS:

Answer should include:

- The HMS *Challenger* expedition was the first voyage devoted to marine science. The idea for the expedition was conceived by Charles Wyville Thomson and his student John Murray. They were inspired by Charles Darwin's findings from the HMS *Beagle* expedition.
- The course that the *Challenger* voyaged was directed by a six-man team of scientists. This solely scientific expedition was different than previous hybrid expeditions that combined science with other voyage goals.
- The scientists used a steam powered winch that allowed them to obtain deep sea samples. On previous expeditions, deep sea samples were only able to be made by hand lowering meters of rope. This technology enabled the scientists to collect samples from waters as deep as 8,185 meters.
- The expedition made use of mechanical grabs and nets to collect specimens and water samples from the deep. Over the course of the trip, 151 trawls were conducted, and 77 water samples were collected.
- The information gathered on the *Challenger's* expedition was compiled into a fifty volume report. The scientists discovered 4,717 new specimens. Measurements were taken of the ocean's salinity, temperature, and water density. Ocean currents, meteorology, and sediment distribution were also recorded. They were even able to collect Manganese nodules with the use of the new equipment aboard the ship.

Information can be found in the section *The First Scientific Experiments Were Undertaken by Governments*.

PTS: 1

DIF: Knowledge

3. What was the significance of the Library of Alexandria? How did it obtain information? What happened to the library? Include relevant dates and famous people associated with the library.

ANS:

Answer should include:

- The Library of Alexandria was founded in the third century. It held the greatest collection of ancient writings at that time. Some say that it was a university of sorts because there was such an exchange of information.
- The library used laws to acquire original logs from ships that came into the harbor. The library copied the logs and returned the copies to the owners, while keeping the originals for the library. They collected information from land caravans in the same way.
- Traders quickly realized the competitive benefit of this information.
- The library existed for 600 years and had many librarians.
- Hypatia, the last librarian, was met with resistance from early Christians. They viewed this woman, a mathematician and a symbol of science, as a pagan. She was murdered in A.D. 415.
- The library itself was burned when Hypatia was killed. Over 700,000 scrolls were destroyed. The loss of knowledge was devastating to Europe.

Information can be found in the section *Understanding the Ocean Began with Voyaging for Trade and Exploration*.

PTS: 1

DIF: Knowledge

4. Compare and contrast the United States Exploring Expedition and the HMS *Challenger* expedition. How was each of these expeditions pioneering in their own right?

ANS:

Answer should include:

- The *Challenger* expedition was a purely science based voyage. It is reasonable to say that this voyage was influenced by its predecessors, but this ship was directed by scientists. The mission was to see if there was life below 549 meters.
- The *Challenger* had equipment that solved previous issues regarding sampling of the deep sea. This included a steam powered winch and a system of nets and grabs.
- The *Challenger* mission discovered 4,717 new species. At the end of the expedition, information, charts, and illustrations were compiled into a fifty volume report.
- The United States Exploring expedition was the first hybrid venture. Although science studied the ocean, it was primarily a naval voyage. The mission included showing the American flag, charting waters, observing, and, interestingly enough, disproving the theory that the Earth was hollow and could be entered into at the poles.
- The United States expedition explored the west coast of North America, and their findings were especially valuable when connected to the map of the Rocky Mountains.
- The United States expedition collected many specimens and artifacts that would later be housed in the Smithsonian. The voyage also collected enough information to generate a 19 volume report.
- Both expeditions had goals to pursue ocean science. This was not a common occurrence at their time. They collected samples and charted waters and their findings were immensely valuable to the world.

Information can be found in the section *The First Scientific Experiments Were Undertaken by Governments*.

PTS: 1

DIF: Evaluation



5. How was Captain James Cook able to study science, navigation, and international relations? Include information on his various expeditions.

ANS:

Answer should include:

- Captain Cook was considered the first marine scientist. He collected marine and terrestrial specimens in addition to samples from geological formations and the ocean floor.
- Captain Cook kept accurate and detailed records. His logbooks contained vast amount of information pertaining to his trips. The information was not exaggerated so the logbooks were very reliable. In addition to the information in his logbooks, Captain Cook made precise charts of the regions he traveled. These charts were even used in World War II.
- Captain Cook interpreted natural history, anthropology, and oceanography along his voyages.
- The HMS *Endeavour* sailed in 1768 to assert British presence in the South Seas. Captain Cook initiated contact and affable relations with native chiefs.
- During the HMS *Endeavour* scientific observations were conducted aboard as well. The movement of Venus across the sun was measured. This allowed earlier calculations of planetary orbits to be confirmed.
- Due to his leadership on the *Endeavour* voyage, Cook was given command of the HMS *Resolution* and *Adventure*. Captain Cook charted many new islands including Tonga and Easter Island. He also discovered new islands like New Caledonia and South Georgia.
- While leading the *Resolution* and *Adventure*, he became the first to circumnavigate the globe at high latitudes. He sailed at 71° South latitude.
- Captain Cook's final expeditions were aboard the HMS *Resolution* and *Discovery*. The goal of these particular expeditions was to find a northwest passage around Canada and Alaska or conversely a northeast passage above Siberia.
- Cook charted the west coast of North America.
- Captain Cook's discovered the Hawaiian islands in the course of his last expedition. He initiated contact with the chief. Captain Cook returned to Hawaii on his return voyage after trying to find a northwest passage. Cook angered the Hawaiians somehow and they killed Cook along with others.

Information can be found in the section *Voyaging Combined with Science to Advance Ocean Studies*.

PTS: 1

DIF: Knowledge