Essentials of Oceanography 9th edition Garrison Test Bank

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Name:_____ Class:_____ Date:_____

Chapter 01 - An Ocean World

1. About what percentage(%) of water on or near Earth's surface is contained in the ocean?
   a. 30
   b. 67
   c. 71
   d. 97

ANSWER: d

2. The average land elevation is approximately ____.
   a. 200 meters (650 feet)
   b. 760 meters (2,500 feet)
   c. 840 meters (2,756 feet)
   d. 3,700 meters (12,000 feet)

ANSWER: c

3. Which is true regarding the world ocean?
   a. It plays a minor role in the weather and the shape of Earth’s landmasses.
   b. It does not influence the way organisms live on land.
   c. It dramatically influences weather, nurtures life, and provides crucial natural resources.
   d. It has an average depth that represents over half of Earth's radius.

ANSWER: c

4. The ocean accounts for only slightly more than what percentage (%) of Earth’s mass?
   a. 0.02
   b. 0.20
   c. 0.8
   d. 1.3

ANSWER: a

5. The field of marine science involves ____.
   a. building oil platforms, ships, harbors, and other structures that enable us to use the ocean wisely
   b. making observations, asking questions, and forming hypotheses
   c. scientifically studying the ocean, its associated life-forms, and its bordering lands
   d. testing hypotheses by controlled experiments

ANSWER: c

6. When using the scientific method, scientific theories must be ____.
   a. tested and consistently supported by observations or experiments
   b. verified by the leading authorities in the field
   c. consistent with previous, universally accepted scientific concepts
   d. consistent with the fact that the ocean is of great age

ANSWER: a

7. Scientists believe that answers to our questions about nature are ____.
   a. always questionable

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b. sometimes correct, but mostly wrong
c. ultimately knowable
d. extremely simple if you look in the right places

ANSWER: c

8. Which statement is most consistent with the scientific method?
a. Hypotheses cannot be revised after they are proposed.
b. Hypotheses are tested through observations and controlled experiments.
c. Scientific laws always arise fully formed and in correlating groups.
d. Theories cannot be modified after they are tested.

ANSWER: b

9. Most of the observable matter in the universe consists of ____.
a. water molecules
b. planets and planet-like bodies
c. dust and debris
d. hydrogen and helium

ANSWER: d

10. New planets formed in a cloud of dust and debris surrounding our young sun through a process known as ____.
a. supernova
b. oxygen revolution
c. accretion
d. cataclysmic expansion of energy and matter

ANSWER: c

11. The death of a star is characterized by a massive release of energy called a ____.
a. nebula
b. protostar
c. supernova
d. comet

ANSWER: c

12. Stars spend their lives changing hydrogen and helium to ____.
a. carbon, oxygen, silicon, and iron
b. nitrogen and oxygen
c. water and carbon dioxide
d. ammonia and methane

ANSWER: a

13. By which process do stars (such as our sun) generate light and heat?
a. Accretion
b. Oxygen revolution
c. Density stratification

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d. Nuclear fusion

ANSWER: d

14. What is the clumping of smaller particles into large masses?
    a. Accretion
    b. Nuclear fusion
    c. Density stratification
    d. Oxygen revolution

ANSWER: a

15. Oxygen first began to accumulate in Earth's atmosphere as a result of ____.
    a. biosynthesis
    b. cellular respiration
    c. methane synthesis
    d. photosynthesis

ANSWER: d

16. Earth's inner core is primarily made of ____.
    a. magnesium and sodium
    b. water and nitrogen
    c. iron and nickel
    d. silicon and oxygen

ANSWER: c

17. What would a visitor approaching Earth from space have seen 4.4 billion years ago?
    a. A blue planet; 71% of its surface is covered by water
    b. A hot, vapor-shrouded sphere blanketed by lightning-stroked clouds
    c. A supercontinent breaking apart into smaller pieces
    d. A landscape dominated by continents with small bodies of water dispersed throughout

ANSWER: b

18. Volcanic venting of volatile substances including water vapor is called ____.
    a. outgassing
    b. fissure
    c. fusion
    d. condensation

ANSWER: a

19. The water for the Earth's ocean originated from ____.
    a. water vapor produced by cellular respiration in early living organisms
    b. radioactive heating of Earth's interior and the impacts of meteorites
    c. capture of water molecules in space by Earth's gravity
    d. volcanic gases and the impact of icy comets and asteroids

ANSWER: d

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20. During its initial formation by the accretion of particles, the young Earth was ____.
    a. shrouded in a thick atmosphere
    b. stratified with a core, mantle, and crust
    c. likely chemically homogenous throughout
    d. completely covered by an ocean

ANSWER: c

21. The primary physical process responsible for the formation of Earth's layers—the inner and outer core, mantle, and crust—is ____.
    a. density stratification
    b. radioactive decay
    c. outgassing
    d. mass layering

ANSWER: a

22. Although the first regular ocean traders were probably the Cretans or the Phoenicians, the first direct evidence of voyaging (traveling the ocean for a specific purpose) comes from ____.
    a. ancient maps left by Polynesian people
    b. Eratosthenes's latitudinal and longitudinal maps
    c. records of trade in the Mediterranean Sea
    d. James Cook's accurate charts of New Zealand, Australia, and the Great Barrier Reef

ANSWER: c

23. Who was the first person to estimate the size of the Earth within approximately 8% of its true size, based on the geometric observations of travelers?
    a. Captain James Cook of the British Royal Navy
    b. Eratosthenes of Cyrene
    c. U.S. naval officer Matthew Maury
    d. The Polynesians

ANSWER: b

24. Which statement is true regarding latitude and longitude?
    a. Longitudinal lines are drawn parallel to the equator, while latitudinal lines are drawn from pole to pole.
    b. Latitude and longitude comprise a system of imaginary lines dividing Earth's surface into a grid.
    c. The first latitude and longitude lines were evenly spaced like they are today.
    d. Zero degrees latitude is the prime meridian, and zero degrees longitude is the equator.

ANSWER: b

25. What did the Polynesians use to navigate among the islands in the Pacific Ocean?
    a. The compass invented by the Chinese to map the interior of their continent
    b. Detailed maps with latitude and longitude lines marking the path of previous expeditions
    c. Maritime records obtained from the Library of Alexandria that included weather data
    d. Subtle directional clues based on wind and wave patterns, the sun, moon, and stars, and marine organisms

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ANSWER: d

26. The cousin of which scientist worked out the first rough chart of the Gulf Stream?
    a. Charles Darwin
    b. Edward Forbes
    c. John Murray
    d. Benjamin Franklin

ANSWER: d

27. The word "oceanography" was first coined in association with ____.
    a. Cook's third voyage
    b. the *Challenger* expedition
    c. the founding of the Library of Alexandria
    d. Captain James Cook's first voyage

ANSWER: b

28. Which voyage was the first expedition devoted purely to marine science?
    a. Matthew Maury's oceanographic work as a U.S. naval officer
    b. *Challenger* expedition
    c. Benjamin Franklin's first voyage across the Atlantic to take up his post as American Ambassador to France
    d. Captain Cook's voyage to Tahiti in the ship *Endeavour*

ANSWER: b

29. Who was the first person to compile a picture of the large-scale wind and current systems?
    a. Benjamin Franklin
    b. Matthew Maury
    c. Eratosthenes of Cyrene
    d. Wyville Thomson

ANSWER: b

30. Who was the first to provide a rough chart of an ocean current, specifically, the Gulf Stream?
    a. Edward Forbes
    b. Tim Folger
    c. Benjamin Franklin
    d. Captain James Cook

ANSWER: b

31. Who would be most likely to receive the title of "first marine scientist"?
    a. Matthew Maury
    b. Captain James Cook
    c. Christopher Columbus
    d. Wyville Thompson

ANSWER: b

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32. What was one accomplishment of Captain James Cook?
    a. He was the first to circumnavigate the world.
    b. He was the first to land on the coast of Antarctica.
    c. He was the first European to explore the South Pacific.
    d. He mapped the coasts of Australia and New Zealand.

ANSWER: d

33. What was the most important outcome of Matthew Maury's work?
    a. The discovery of the Hawai'ian Islands
    b. The formulation of a working hypothesis for the formation of coral reefs
    c. The invention of a chronometer for the determination of longitude
    d. The charting of ocean currents, which shortened sailors' travel time significantly

ANSWER: d

34. The Challenger expedition (1872–1876) was a unique and historic voyage. Why?
    a. It is the longest continuous scientific oceanographic expedition on record.
    b. Its scientists developed the first reliable navigational charts to indicate current and wind patterns.
    c. It was the first expedition to use an echo sounder to study the seafloor.
    d. It proved the hypothesis that life could not exist in the deep sea.

ANSWER: a

35. Who was an Edinburgh professor who thought that no life existed in the deep sea because of high pressure and lack of light?
    a. Matthew Maury
    b. James cook
    c. Edward Forbes
    d. Charles Wyville Thomson

ANSWER: c

36. What did the German Meteor expedition discover during their 1925 crisscross across the South Atlantic for two years?
    a. A completely flat ocean floor
    b. The deepest part of the ocean's deepest trench
    c. A varied and often extremely rugged bottom profile
    d. Evidence for seafloor spreading and plate tectonics

ANSWER: c

37. *Glomar Challenger* is known mainly for ____.
    a. being the first modern scientific survey ship to circumnavigate the globe
    b. being the first nuclear-powered scientific research vessel
    c. being owned and operated simultaneously by four governmental agencies
    d. taking the first complete cores of seafloor sediments

ANSWER: d

38. The first scientific expedition to use an echo sounder was the ____.

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a. *Challenger* expedition
b. *Meteor* expedition
c. United States *Exploring* expedition
d. voyage of *Trieste*

ANSWER: b

39. Who trapped his ship in pack ice to explore the Arctic?
a. Forbes
b. Wilkes
c. Thomson
d. Nansen

ANSWER: d

40. What device bounces sound waves off the ocean bottom to study the depth and contours of the seafloor?
a. Echo sounder
b. Satellite
c. Bathyscaphe
d. Submersible

ANSWER: a

41. What type of information about the ocean are satellites most likely to give scientists?
a. Sea surface temperature
b. PH of the ocean in different locations
c. Sea floor bathymetry
d. Sea floor sedimentation rate

ANSWER: a

42. The ocean holds more than 97% of Earth's water.
a. True
b. False

ANSWER: True

43. The average land elevation on Earth is greater than the average depth of the ocean.
a. True
b. False

ANSWER: False

44. The ocean provides a variety of resources ranging from food and water to energy, construction materials, and life-saving pharmaceuticals.
a. True
b. False

ANSWER: True

45. The atoms that formed the Earth and the ocean were formed within stars billions of years ago.

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a. True
b. False

ANSWER: True

46. Marine science draws on information from the disciplines of geology, biology, chemistry, physics, and engineering.
a. True
b. False

ANSWER: True

47. Scientific hypotheses are never revised or updated.
a. True
b. False

ANSWER: False

48. Nuclear fusion in stars converts hydrogen and helium into heavier elements such as carbon, oxygen, silicon, and iron in stars.
a. True
b. False

ANSWER: True

49. Gravity was important in the formation of our planet because it pulled dense metals such as iron and nickel inward, forming Earth's core.
a. True
b. False

ANSWER: True

50. The ancestors of invertebrates produced enough oxygen to oxidize minerals dissolved in the ocean and surface sediments through a process called respiration.
a. True
b. False

ANSWER: False

51. Humans spread to nearly all of the inhabitable areas of Earth after the European voyages of discovery in the late 1400s and early 1500s.
a. True
b. False

ANSWER: False

52. The Library of Alexandria was an important warehouse for written knowledge relating to trade, natural wonders, artistic achievements, and other items of interest to seafarers.
a. True
b. False

ANSWER: True

53. Eratosthenes was a scientist who was interested in the size of Earth and used methods of geometry to determine the circumference of our planet.

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a. True
b. False

ANSWER: True

54. Latitude lines run from pole to pole.
a. True
b. False

ANSWER: False

55. Captain Cook proved that no Arctic continent existed.
a. True
b. False

ANSWER: False

56. What is meant by a “single world ocean"?

ANSWER: The ocean comprises about 71% of the surface of Earth and exists as a single large continuous mass of water. The ocean has very few dependable, natural, and permanent divisions. The artificial compartments we generally refer to as oceans (i.e., Pacific, Atlantic, or Indian Ocean) or seas are based on either the position of the continents or on imaginary boundaries or lines such as the equator.

57. Describe the general steps involved in the scientific method.

ANSWER: The scientific method starts with a question or a desire to understand something that has been observed or measured. A working hypothesis is formed to explain the observation tentatively. This hypothesis is tested—and either verified or disproved—with controlled experiments and further observations. A hypothesis that is consistently supported by observation or experiment is advanced to the status of theory, a statement that explains the observations. Theories can evolve into larger constructs, known as laws, which summarize the observations.

58. Describe the basic processes and timeline that led to the formation of Earth and its ocean and atmosphere.

ANSWER: Earth formed about 4.6 billion years ago through the accretion of smaller particles orbiting in our newly-formed solar system. Earth was initially molten and layers only formed once the planet began to cool. Density stratification allowed the least dense elements to escape to Earth’s surface and atmosphere, while the denser elements sank to form the internal layers of Earth, the mantle and core. The ocean and the atmosphere formed together as the planet cooled sometime between 4.4 and 3.8 billion years ago. The ocean formed as water vapor trapped in Earth’s outer layers escaped to the surface via volcanic activity, a process called outgassing. This vapor cooled and condensed to form an ocean.

59. Briefly describe the formation of our density stratified Earth.

ANSWER: At the time of its formation, Earth was composed of a homogenous mixture of aggregated materials formed from the disc of gas and small particles orbiting the newly formed Sun. Heat from asteroid impacts, gravitational compression, and radioactive decay heated the Earth’s interior and caused it to melt partially. This allowed dense iron and nickel to fall toward the center to form the core, while less dense silicates moved outward to form the crust and mantle. Friction generated by this movement heated the Earth even more. The result of density stratification is evident in the formation of the inner and outer core, the mantle, and the crust.

60. Using specific examples, describe how advances in navigation and voyaging relate to the advent of marine science.

ANSWER: Early exploration of the ocean was primarily for economic and political reasons.

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The Polynesians and Europeans quickly discovered that the ocean was a vast expanse that was both wondrous and plentiful. In the mid to late 1700s, Captain James Cook was the first to use the knowledge the voyagers before him had compiled and applied this information to the study of the ocean. Cook was both an explorer and a scientist; within 100 years of his first voyage in 1768, the first fully organized, scientific expedition was launched (*Challenger* expedition in 1872). Economists, traders, explorers, and scientists learned very early on that an understanding of the ocean could better all of their interests. Governments quickly realized there were great profits to be had from the natural resources in the ocean and started investing in oceanographic exploration.

61. Examine "The World" chart from the third century B.C.E. (Figure 1.12) where Eratosthenes drew latitude and longitude lines through important places rather than spacing them at regular intervals as we do today. Briefly describe the misconceptions the Alexandrians had of the world.

ANSWER: The Alexandrian perception of the world is reflected in the size of the continents and oceans on the chart. Continents comprise a large percentage of the world, whereas the ocean is only a small percentage. Today, we know that the ocean covers approximately 71% of Earth's surface. Alexandrians also placed themselves at the center of the world as evidenced by the longitude line that Eratosthenes drew through Alexandria. It's difficult to consider Alexandria the center of the world when many continents (North America, South America, Africa, etc.) are missing.

62. Describe the contributions made by Matthew Maury that improved our understanding of ocean science.

ANSWER: Matthew Maury was, perhaps, the first person to be engaged in full-time oceanographic work. A U.S. naval officer, he was interested in exploiting winds and currents for commercial and naval purposes. Working in the Navy's Depot of Charts and Instruments, he was able to study ships' logs with their many regular readings of temperature and wind direction and compiled this information into coherent wind and current charts. These analyses allowed him to produce a set of directions for sailing great distances more efficiently.

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