Essentials of Oceanography, 12e **(Trujillo)**
Chapter 1 Introduction to Planet "Earth"

1.1 Matching Questions

Match the term or person with the appropriate phrase. Not all answers will be used.

A) led voyage that first circumnavigated the globe
B) established impermanent settlement in North America and the first Europeans to explore Iceland and Greenland
C) first European explorer to see the Pacific Ocean
D) first determination of Earth's circumference
E) mapped world with Roman knowledge showing latitude and longitude

1) Balboa
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

2) Eratosthenes
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
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OSLP: 7 The ocean is largely unexplored.

3) Magellan
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
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OSLP: 7 The ocean is largely unexplored.

4) Ptolemy
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
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OSLP: 7 The ocean is largely unexplored.

5) Vikings
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
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Answers: 1) C 2) D 3) A 4) E 5) B

Match the term with the appropriate phrase. Not all answers will be used.

A) composed mostly of iron and nickel with a liquefied metallic outer layer
B) contains minerals rich in iron and magnesium, between the crust and the core, and has the second largest volume according to the chemical classification
C) the Sun and the eight major planets revolving around it
D) gaseous and dusty space cloud (precursor to a solar system)
E) outermost portion of the Earth composed largely of the igneous rocks basalt and granite

6) core
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

7) crust
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
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8) mantle
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
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9) nebula
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

10) solar system
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
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Answers: 6) A 7) E 8) B 9) D 10) C

Match the term with the appropriate phrase. Not all answers will be used.

A) continental crust
B) crust and the uppermost mantle consisting of a solid rock layer
C) oceanic crust
D) plastic (capable of flow) portion of the upper mantle beneath the lithosphere
E) lower portion of the mantle that is rigid

11) asthenosphere
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

12) basalt
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

13) granite
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

14) lithosphere
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

15) mesosphere
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

Answers: 11) D 12) C 13) A 14) B 15) E

1.2 Multiple Choice Questions

1) The four principal ocean basins (plus an additional ocean) on Earth are the _____.
A) Atlantic, Arctic, Mediterranean, Southern, and Pacific Oceans
B) Atlantic, Pacific, Indian, Southern, and Arctic Oceans
C) Atlantic, Antarctic, Southern, Mediterranean, and Pacific Oceans
D) Antarctic, Caspian, Southern, Indian, and Pacific Oceans
E) Antarctic, Arctic, Indian, Pacific, and Southern Oceans
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

2) The largest of the ocean basins, which currently covers more than half of the ocean surface, is the _____.
A) Arctic Ocean
B) Atlantic Ocean
C) Indian Ocean
D) Pacific Ocean
E) Southern Ocean
Answer: D
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

3) The average depth of the world's oceans is approximately _____.
A) 11,022 meters (36,161 feet)
B) 840 meters (2,756 feet)
C) 3,682 meters (12,080 feet)
D) 2,172 meters (7,126 feet)
E) 5,280 meters (17,323 feet)
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

4) Which of the following is TRUE concerning the deepest part of the ocean?
A) The bottom of this trench has never been reached by a submersible.
B) The deepest part of the ocean is located in a trench off the coast of Japan.
C) The depth of this trench exceeds the height of Mount Everest.
D) The depth of this trench is estimated at 15,000 meters.
E) This trench is called the Philippine Trench.
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

5) The first humans from Western Hemisphere known to have developed the art of navigation were the _____.
A) Polynesians
B) Greeks
C) Vikings
D) Phoenicians
E) New Zealanders
Answer: D
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

6) The method of determining latitude in the Northern Hemisphere by measuring the angle between an observer's line of site to the North Star and line of site to the northern horizon was developed by _____.
A) Pytheas
B) Eratosthenes
C) Herodotus
D) Seneca
E) Ptolemy
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
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7) The first person we are aware of who determined the circumference of the Earth using trigonometry and the angle of sunlight at Alexandria, Egypt, was _____.
A) Pytheas
B) Eratosthenes
C) Herodotus
D) Seneca
E) Ptolemy
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
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8) Most of the explorations by northern and western Europeans during the Middle (Dark) Ages were undertaken by _____.
A) Italy
B) Portugal
C) Vikings of Scandinavia
D) France
E) Spain
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

9) The European "Age of Discovery" began with _____.
A) Christopher Columbus' discovery of the "New World"
B) Ferdinand Magellan's circumnavigation of the globe
C) Phoenician exploration of the Mediterranean
D) Polynesian colonization of Pacific Islands
E) Viking voyages to North America
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

10) The European "Age of Discovery" ended with _____.
A) Christopher Columbus' discovery of the "New World"
B) Ferdinand Magellan's circumnavigation of the globe
C) Phoenician exploration of the Mediterranean
D) Polynesian colonization of Pacific Islands
E) Viking voyages to North America
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
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OSLP: 7 The ocean is largely unexplored.

11) A tentative, testable statement about the general nature of a phenomenon is called a/an _____.
A) guess
B) law
C) observation
D) hypothesis
E) theory
Answer: D
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.4 What Is the Nature of Scientific Inquiry?
Essent'l Concept: 1.4 Describe the nature of scientific inquiry
Global Sci Out: 1

12) Plate tectonics and evolution, which are held with a high degree of confidence because of rigorous testing and verification, are examples of _____.
A) guesses
B) laws
C) observations
D) hypotheses
E) theories
Answer: E
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.4 What Is the Nature of Scientific Inquiry?
Essent'l Concept: 1.4 Describe the nature of scientific inquiry
Global Sci Out: 1

13) The Sun and the rest of the solar system formed about 5 billion years ago from a huge cloud of dust and gas called a _____.
A) nebula
B) solar system
C) protoplanet
D) quasar
E) supernova
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

14) The nebular hypothesis suggests that _____.
A) all bodies in the solar system formed from an enormous gas cloud
B) Earth's moon is an asteroid captured by the Earth's gravity
C) galaxies such as the Milky Way form independent of one another
D) the Earth was formed by a cosmic explosion, a "big bang"
E) the moon is derived from a protoplanet
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

15) The separation of the Earth into layers while it was molten was the result of the _____.
A) decrease in temperature downward toward the core
B) differing densities of the elements that make up the Earth
C) gravitational force created by the rotating Earth
D) initial collection of materials and their position in Earth
E) presence of water at Earth's surface
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

16) Oceanic crust is primarily _____.
A) basalt
B) carbonate sedimentary rocks
C) clay minerals
D) granite
E) siltstone
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

17) Which of the following statements regarding continental and oceanic crust is TRUE?
A) Continental crust and oceanic crust have equivalent densities.
B) Continental crust is thicker and denser than oceanic crust.
C) Continental crust is thinner and denser than oceanic crust.
D) Continental crust is thicker and less dense than oceanic crust.
E) Continental crust is thinner and less dense than oceanic crust.
Answer: D
Diff: 4
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

18) Earth's primordial atmosphere most likely included _____.
A) ammonia, oxygen, carbon dioxide, and water vapor
B) carbon dioxide, water vapor, sulfur dioxide, and methane
C) hydrogen, helium, and oxygen
D) nitrogen, ozone, and sulfur dioxide
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.6 How Were Earth's Atmosphere and Oceans Formed?
Essent'l Concept: 1.6 Explain how Earth's atmosphere and ocean were formed
OSLP: 4 The ocean made Earth habitable.

19) Current scientific knowledge indicates that the most likely origin of most of Earth's oceans was due to _____.
A) comets from outer space
B) release of liquid water from the core
C) water vapor released from volcanic outgassing
D) water-bearing minerals found in meteorites
Answer: C
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.6 How Were Earth's Atmosphere and Oceans Formed?
Essent'l Concept: 1.6 Explain how Earth's atmosphere and ocean were formed
OSLP: 4 The ocean made Earth habitable.

20) The mechanism by which populations evolve and new species develop is called _____.
A) adaptation
B) evolution
C) descent with modification
D) intelligent design
E) natural selection
Answer: E
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 4 The ocean made Earth habitable.

21) One of the reasons that free oxygen in our atmosphere is important to the development and maintenance of life on Earth is because oxygen _____.
A) combines with iron in volcanic rocks
B) can form ozone and block some UV radiation
C) is necessary for photosynthesis to occur
D) reduces atmospheric temperature
E) was very abundant in Earth's early atmosphere
Answer: B
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

22) Radioactive materials can sometimes be used to determine the _____.
A) origin of rocks
B) chemical composition of rocks
C) formation method
D) metamorphism
E) ages of rocks
Answer: E
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.8 How Old Is Earth?
Essent'l Concept: 1.8 Demonstrate an understanding of how old Earth is

23) Earth is about _____.
A) 6,000 years old
B) 4.6 billion years old
C) 4.6 million years old
D) 40 billion years old
E) 400,000 years old
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.8 How Old Is Earth?
Essent'l Concept: 1.8 Demonstrate an understanding of how old Earth is

24) Examine the five words and/or phrases and determine the relationship among the majority of words/phrases. Choose the one option that does not fit the pattern.
A) Mediterranean
B) Arctic
C) Atlantic
D) Indian
E) Pacific
Answer: A
Diff: 4
Bloom's Taxonomy: Applying/Analyzing
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

25) Examine the five words and/or phrases and determine the relationship among the majority of words/phrases. Choose the one option that does not fit the pattern.
A) Adriatic
B) Black
C) Caspian
D) Indian
E) Mediterranean
Answer: D
Diff: 4
Bloom's Taxonomy: Applying/Analyzing
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

26) Examine the five words and/or phrases and determine the relationship among the majority of words/phrases. Choose the one option that does not fit the pattern.
A) Eratosthenes
B) Herodotus
C) Ptolemy
D) Pytheas
E) Magellan
Answer: E
Diff: 4
Bloom's Taxonomy: Applying/Analyzing
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 1 The Earth has one big ocean with many features.

27) Examine the five words and/or phrases and determine the relationship among the majority of words/phrases. Choose the one option that does not fit the pattern.
A) Vasco de Gama
B) Ptolemy
C) Christopher Columbus
D) John Cabot
E) Ferdinand Magellan
Answer: B
Diff: 4
Bloom's Taxonomy: Applying/Analyzing
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 1 The Earth has one big ocean with many features.

28) Examine the five words and/or phrases and determine the relationship among the majority of words/phrases. Choose the one option that does not fit the pattern.
A) Observation
B) Hypothesis
C) Belief
D) Theory
E) Testing
Answer: C
Diff: 4
Bloom's Taxonomy: Applying/Analyzing
Section: 1.4 What Is the Nature of Scientific Inquiry?
Essent'l Concept: 1.4 Describe the nature of scientific inquiry
Global Sci Out: 1

29) Examine the five words and/or phrases and determine the relationship among the majority of words/phrases. Choose the one option that does not fit the pattern.
A) Atmosphere
B) Lithosphere
C) Asthenosphere
D) Mesosphere
E) Core
Answer: A
Diff: 4
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

30) Examine the five words and/or phrases and determine the relationship among the majority of words/phrases. Choose the one option that does not fit the pattern.
A) Granite
B) Asthenosphere
C) Continental crust
D) Basalt
E) Oceanic crust
Answer: B
Diff: 4
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

31) Examine the five words and/or phrases and determine the relationship among the majority of words/phrases. Choose the one option that does not fit the pattern.
A) Oxygen
B) Water vapor
C) Carbon dioxide
D) Methane
E) Ammonia
Answer: A
Diff: 4
Bloom's Taxonomy: Applying/Analyzing
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

32) Examine the five words and/or phrases and determine the relationship among the majority of words/phrases. Choose the one option that does not fit the pattern.
A) Autotrophs
B) Chemosynthesis
C) Photosynthesis
D) Heterotrophs
E) Plants
Answer: D
Diff: 4
Bloom's Taxonomy: Applying/Analyzing
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

33) Examine the five words and/or phrases and determine the relationship among the majority of words/phrases. Choose the one option that does not fit the pattern.
A) Devonian
B) Jurassic
C) Ordovician
D) Permian
E) Silurian
Answer: B
Diff: 4
Bloom's Taxonomy: Applying/Analyzing
Section: 1.8 How Old Is Earth?
Essent'l Concept: 1.8 Demonstrate an understanding of how old Earth is

34) The study of the structure of the sea floor and how the sea floor has changed through time is an example of _____ oceanography.
A) archaeological
B) biological
C) chemical
D) geological
E) physical
Answer: D
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.3 What Is Oceanography?
Essent'l Concept: 1.3 Explain why oceanography is considered an interdisciplinary science

35) The study of the transmission of light and sound in the oceans is an example of _____ oceanography.
A) archaeological
B) biological
C) chemical
D) geological
E) physical
Answer: E
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.3 What Is Oceanography?
Essent'l Concept: 1.3 Explain why oceanography is considered an interdisciplinary science

36) Our world ocean can be divided into four principal oceans plus an additional ocean, based on the _____ of the ocean basins and the _____ of the continents.
A) shape; position
B) position; latitude
C) size; shape
D) depth; elevation
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

37) Which of the following statements about the Pacific Ocean is TRUE?
A) The Pacific Ocean is about three times larger than the next largest ocean.
B) The Pacific Ocean covers more than two-thirds of the ocean surface area on Earth.
C) The Pacific Ocean is the second largest geographic feature on the planet.
D) The Pacific Ocean spans more than one-half of Earth's entire surface.
E) All of the continents could fit into the space occupied by the Pacific Ocean.
Answer: E
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

38) Which ocean covers more than half of the ocean surface area on Earth?
A) The Pacific Ocean
B) The Atlantic Ocean
C) The Indian Ocean
D) The Southern Ocean
E) The Antarctic Ocean
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

39) Which ocean is the single largest geographic feature on the planet?
A) The Pacific Ocean
B) The Atlantic Ocean
C) The Indian Ocean
D) The Southern Ocean
E) The Antarctic Ocean
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

40) Which ocean is the deepest ocean in the world?
A) The Pacific Ocean
B) The Atlantic Ocean
C) The Indian Ocean
D) The Southern Ocean
E) The Antarctic Ocean
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
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41) Which ocean's name comes from a word meaning peace?
A) The Pacific Ocean
B) The Atlantic Ocean
C) The Indian Ocean
D) The Arctic Ocean
E) The Antarctic Ocean
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

42) Which ocean is similar in size and average depth to the Indian Ocean?
A) The Pacific Ocean
B) The Atlantic Ocean
C) The Indian Ocean
D) The Arctic Ocean
E) The Southern Ocean
Answer: B
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

43) Which ocean is mostly, but not entirely, in the southern hemisphere?
A) The Pacific Ocean
B) The Atlantic Ocean
C) The Indian Ocean
D) The Arctic Ocean
E) The Antarctic Ocean
Answer: C
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.1 How Are Earth's Oceans Unique?
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OSLP: 1 The Earth has one big ocean with many features.

44) Which ocean is the shallowest ocean in the world?
A) The Pacific Ocean
B) The Atlantic Ocean
C) The Indian Ocean
D) The Arctic Ocean
E) The Antarctic Ocean
Answer: D
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
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45) Based on definition, it is more appropriate to consider which ocean as a sea?
A) The Pacific Ocean
B) The Atlantic Ocean
C) The Indian Ocean
D) The Arctic Ocean
E) The Antarctic Ocean
Answer: D
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
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46) Which ocean is actually a part of three other oceans?
A) The Pacific Ocean
B) The Atlantic Ocean
C) The Indian Ocean
D) The Arctic Ocean
E) The Southern Ocean
Answer: E
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
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47) Which of the following modern seven seas was also recognized by pre-15th century Europeans as one of their seven seas?
A) The Red Sea
B) The Mediterranean Sea
C) The Black Sea
D) The Caspian Sea
E) The Indian Ocean
Answer: E
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

48) Which ocean was considered by 14th century Europeans to be one of the seven seas?
A) The Pacific Ocean
B) The Atlantic Ocean
C) The Indian Ocean
D) The Arctic Ocean
Answer: C
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
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49) Archeological evidence suggests that boat technology was developed about _____ years ago.
A) 50,000
B) 5,000
C) 500,000
D) 4,000,000
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

50) Which of the following parts of Polynesia was populated last?
A) Easter Island
B) Fiji, Tonga, and Samoa
C) Marquesas
D) Hawaiian Islands
E) New Zealand
Answer: A
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
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OSLP: 7 The ocean is largely unexplored.

51) Which of the following parts of Polynesia was populated first?
A) Easter Island
B) Fiji, Tonga, and Samoa
C) Marquesas
D) Hawaiian Islands
E) New Zealand
Answer: B
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

52) The first recorded circumnavigation of Africa was made by the _____.
A) Phoenicians
B) Greeks
C) Chinese
D) Polynesians
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

53) Who is credited with being the first person to accurately determine Earth's circumference?
A) Eratosthenes
B) Erik Thorvaldson
C) Claudius Ptolemy
D) Christopher Columbus
E) Pytheas
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

54) Which of the following Vikings is credited with discovering Greenland?
A) Erik Thorvaldson
B) Bjarni Herjolfsson
C) Leif Eriksson
D) Thor Heyerdahl
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

55) Who of the following is thought to be the first Viking to have seen what is now called Newfoundland?
A) Erik Thorvaldson
B) Bjarni Herjolfsson
C) Leif Eriksson
D) Thor Heyerdahl
E) Prince Henry the Navigator
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

56) Who sailed from Europe around the tip of Africa to India and established a new trade route?
A) Giovanni Caboto
B) Ferdinand Magellan
C) Juan Sebastian del Caño
D) Vasco Nunez de Balboa
E) Vasco da Gama
Answer: E
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

57) Who is credited with being the first European to see the Pacific Ocean?
A) Ferdinand Magellan
B) Juan Sebastian del Caño
C) Vasco Nunez de Balboa
D) James Cook
E) Vasco da Gama
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

58) Who was killed in Hawaii during his last sea voyage after a skirmish with local people?
A) Prince Henry the Navigator
B) Giovanni Caboto
C) Ferdinand Magellan
D) James Cook
E) Vasco da Gama
Answer: D
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

59) Who was killed in the Philippines during his last sea voyage after a skirmish with local people?
A) Prince Henry the Navigator
B) Giovanni Caboto
C) Ferdinand Magellan
D) James Cook
E) Vasco da Gama
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

60) Who left Spain in September 1519 and became the first person to complete a circumnavigation of the globe when he returned to Spain three years later?
A) Giovanni Caboto
B) Ferdinand Magellan
C) Juan Sebastian del Caño
D) Vasco Nunez de Balboa
E) Vasco da Gama
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

61) Prior to 1768, which of the following claimed the most human lives at sea?
A) Scurvy
B) Contagious disease
C) Gunfire
D) Shipwreck
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 7 The ocean is largely unexplored.

62) Evidence suggests that the Sun and the rest of the solar system formed about five _____ years ago.
A) billion
B) million
C) thousand
D) trillion
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

63) Which of the following was true about the Protoearth?
A) Protoearth's size was smaller than today's Earth.
B) Protoearth had one large ocean.
C) Protoearth had early primitive life forms.
D) Protoearth's deep structure was homogeneous.
Answer: D
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

64) How did the Moon form?
A) The Moon formed due to the impact of a Mars-sized body with the Earth.
B) The Moon was captured by the gravitational pull of the Earth.
C) The Moon erupted from the Earth leaving a scar at the Pacific Ocean.
D) The Moon formed at the same time as the Earth due to simultaneous accretion.
Answer: A
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

65) What happened to the nebular gas that remained from the formation of the planets and their satellites?
A) It was blown away by the solar wind.
B) It condensed to form Earth's ocean.
C) It is about 10% of the modern earth atmosphere.
D) It escaped into the vacuum of space.
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

66) Earth is a layered sphere with the _____-density material found near the center of Earth and the _____- density material located near the surface.
A) highest; lowest
B) highest; highest
C) lowest; lowest
D) lowest; highest
Answer: A
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

67) Based on chemical composition, Earth consists of _____ layers
A) three
B) two
C) four
D) five
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

68) Based on physical properties, Earth consists of _____ layers
A) three
B) two
C) four
D) five
Answer: D
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

69) Oceanic crust is predominantly composed of the igneous rock called _____.
A) basalt
B) granite
C) anorthosite
D) peridotite
E) tonalite
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

70) Continental crust is predominantly composed of the igneous rock called _____.
A) basalt
B) granite
C) anorthosite
D) peridotite
E) tonalite
Answer: B
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

71) Isostatic adjustments are the result of the buoyancy of Earth's lithosphere as it floats on the _____ below which is denser and plastic like.
A) asthenosphere
B) mesosphere
C) outer core
D) inner core
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

72) Earth's initial atmosphere formed from _____.
A) leftover gases from the nebula
B) the Sun's solar wind
C) outgassing
D) comet vaporization
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.6 How Were Earth's Atmosphere and Oceans Formed?
Essent'l Concept: 1.6 Explain how Earth's atmosphere and ocean were formed
OSLP: 4 The ocean made Earth habitable.

73) Most of Earth's water was derived from _____.
A) leftover gases from the nebula
B) the Sun's solar wind
C) outgassing
D) comet vaporization
Answer: C
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.6 How Were Earth's Atmosphere and Oceans Formed?
Essent'l Concept: 1.6 Explain how Earth's atmosphere and ocean were formed
OSLP: 4 The ocean made Earth habitable.

74) Earth's second atmosphere formed from _____.
A) leftover gases from the nebula
B) the Sun's solar wind
C) outgassing
D) comet vaporization
Answer: C
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.6 How Were Earth's Atmosphere and Oceans Formed?
Essent'l Concept: 1.6 Explain how Earth's atmosphere and ocean were formed
OSLP: 4 The ocean made Earth habitable.

75) A cometary model of the formation of Earth's ocean must include the chemical difference between the _____ in comet ice and that in Earth's water.
A) hydrogen
B) oxygen
C) nitrogen
D) carbon
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.6 How Were Earth's Atmosphere and Oceans Formed?
Essent'l Concept: 1.6 Explain how Earth's atmosphere and ocean were formed
OSLP: 4 The ocean made Earth habitable.

76) Although Earth's oceans have existed since early in the formation of the planet, its _____ must have changed.
A) chemical composition
B) physical state
C) color distribution
D) textural makeup
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.6 How Were Earth's Atmosphere and Oceans Formed?
Essent'l Concept: 1.6 Explain how Earth's atmosphere and ocean were formed
OSLP: 4 The ocean made Earth habitable.

77) According to the fossil record on Earth, the earliest-known life-forms were primitive _____.
A) bacteria
B) plants
C) shells
D) reptiles
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

78) According to the fossil record on Earth, the earliest-known life-forms lived in sea floor rocks about 3.5 _____ years ago.
A) billion
B) million
C) trillion
D) thousand
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

79) The most likely place for the basic building blocks for the development of life to interact and produce life is in Earth's _____.
A) oceans
B) mantle
C) lithosphere
D) atmosphere
E) meteorites
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

80) Stanley Miller's 1952 experiment created _____ from the chemical ingredients thought to exist in Earth's early ocean.
A) simple organic compounds
B) complex organic molecules
C) Deoxyribonucleic acid (DNA)
D) primitive bacteria
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

81) The very earliest forms of life probably _____.
A) required an external food supply
B) manufactured their own food supply by photosynthesis
C) manufactured their own food supply by chemosynthesis
D) were similar to present-day anaerobic bacteria
Answer: A
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

82) The oldest fossilized remains of organisms are primitive _____ bacteria recovered from rocks formed on the sea floor about 3.5 billion years ago.
A) photosynthetic
B) chemosynthetic
C) heterotrophic
D) streptococcus
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

83) Earth's atmosphere became oxygen rich about 2.45 _____ years ago.
A) billion
B) million
C) trillion
D) thousand
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

84) The great oxidation event resulted in the massive die-off of which of the following?
A) Anaerobic bacteria
B) Blue-green algae
C) Dinosaurs
D) Land plants
Answer: A
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

85) Trilobites were dominant during which geologic period?
A) Jurassic
B) Permian
C) Devonian
D) Ordovician
E) Cambrian
Answer: E
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.8 How Old Is Earth?
Essent'l Concept: 1.8 Demonstrate an understanding of how old Earth is
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

1.3 Essay Questions

1) Distinguish between an **ocean** and a **sea**.
Answer: The world ocean is the large body of salt water that covers the majority of the earth's surface (roughly 71%). The world ocean is customarily divided into smaller ocean basins that are bordered by continents or latitude lines. One example is the Atlantic Ocean, which is bordered on the west by North and South America, to the east by Europe and Africa, to the north by the Arctic Circle (60°N), and to the south by the Antarctic Circle (60°S). In contrast, a sea is a smaller subdivision of the ocean surrounded by land such as the Black Sea in Eastern Europe.
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.1 How Are Earth's Oceans Unique?
Essent'l Concept: 1.1 Compare the characteristics of Earth's oceans
OSLP: 1 The Earth has one big ocean with many features.

2) List some of the major achievements of Captain James Cook.
Answer: Captain James Cook (1728-1779) was a British navigator and explorer who undertook three voyages of scientific discovery from 1768-1779. Cook explored the Southern Ocean around Antarctica in an attempt to find the continent. He also extensively explored the Pacific Ocean and mapped previously unknown island groups, including Hawaii. Cook initiated systematic sampling of subsurface water temperatures, measured winds and currents, and took soundings of bottom depths. Cook also used John Harrison's chronometer as a means of determining longitude at sea.
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 1 The Earth has one big ocean with many features.

3) Differentiate between a **hypothesis** and a **theory**.
Answer: A hypothesis is a stated relationship between observed phenomena that can be tested; in other words, it is a tentative explanation. A theory is a relationship between observed phenomena (variables) that has withstood repeated independent testing over time and has broad explanatory power for an observed pattern or process.
Diff: 2
Bloom's Taxonomy: Applying/Analyzing
Section: 1.4 What Is the Nature of Scientific Inquiry?
Essent'l Concept: 1.4 Describe the nature of scientific inquiry
Global Sci Out: 1

4) Contrast oceanic and continental crust.
Answer: Oceanic crust is thinner, denser, and darker in color than continental crust and is composed of the igneous rock, basalt. Continental crust is thicker, less dense, and lighter in color than oceanic crust, and its average composition is the igneous rock granite.
Diff: 2
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed
Global Sci Out: 1

5) Describe how the half-live of radioactive elements can be used to determine the age of rock through radiometric dating.
Answer: Most rocks on Earth contain small amounts of radioactive materials such as potassium, thorium, and uranium. Radioactive materials spontaneously decay into atoms of other elements. Each radioactive material has a characteristic half-life, which is the time required for one-half of the atoms in a sample to decay to atoms of other elements. The older a rock sample is the more radioactive material will have been converted to decay product(s). Instruments can accurately measure the amount of radioactive material and the amount of resulting decay product in a rock sample. By comparing the ratio of these two quantities, the age of a rock sample can be determined, which is referred to as radiometric age dating.
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

6) Discuss advances in oceanographic navigation occurring over the course of human history.
Answer: Early mariners used the Sun and moon, the nighttime stars, the behavior of marine organisms, various ocean properties to navigate. Early Polynesian navigators sailed to small islands located at great distances across the Pacific Ocean with the help of an ingenious device called a stick chart, a map that depicts the dominant pattern of ocean waves. European sailors determined latitude at sea by measuring the position of the Sun and stars using a sextant. It wasn't until the 1730s that determining longitude as sea was possible when John Harrison created chronometers, accurate clocks that were not effected by the swaying of the boat. Today, navigating at sea relies on the Global Positioning System (GPS) satellites that send continuous radio signals to the surface.
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.2 How Was Early Exploration of the Oceans Achieved?
Essent'l Concept: 1.2 Discuss how early exploration of the oceans was achieved
OSLP: 1 The Earth has one big ocean with many features.

7) Discuss the origin of the Solar System using the nebular hypothesis.
Answer: All bodies in the solar system formed from an enormous cloud composed mostly of hydrogen and helium, with only a small percentage of heaver elements. When this huge accumulation of gas and dust revolved around its center, it began to contract under its own gravity, becoming hotter and denser, eventually forming the Sun. As the matter that formed the Sun contracted, small amounts of it were left behind in swirling eddies. The material in these eddies was the beginning of the protoplanets and their orbiting satellites, which later consolidated into the present planets and their moons.
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

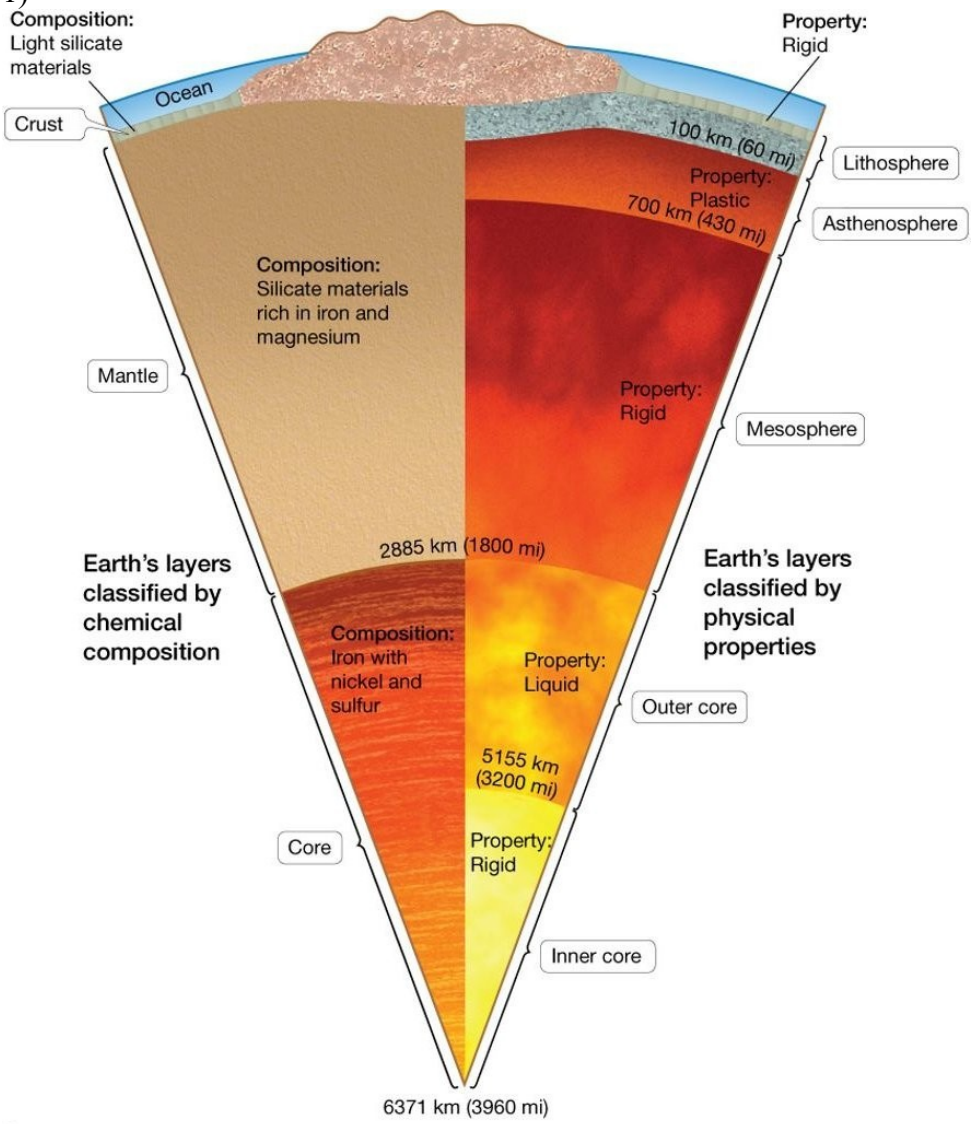
8) Discuss the origin of Earth's oceans and how is it related to the origin of our atmosphere.
Answer: The origin of the ocean is linked directly to the origin of the atmosphere. Earth's initial atmosphere was blown out to space by the Sun's solar wind. A second atmosphere was created by outgassing of water vapor (steam), with small amounts of carbon dioxide, hydrogen, and other gases. This water vapor was the primary source of water on Earth, including supplying the oceans with water. Not all water came from inside Earth. Other sources of water, such as asteroids, may have contributed to Earth's oceans as well.
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.6 How Were Earth's Atmosphere and Oceans Formed?
Essent'l Concept: 1.6 Explain how Earth's atmosphere and ocean were formed
OSLP: 4 The ocean made Earth habitable.

9) Describe Stanley Miller's landmark experiment. How did the results of this experiment change hypothesis regarding the evolution of life on Earth?
Answer: In 1952, Stanley Miller conducted a laboratory experiment where he exposed a mixture of carbon dioxide, methane, ammonia, hydrogen, and water (the components of the early atmosphere and ocean) to ultraviolet light (from the Sun) and an electrical spark (to imitate lightning) By the end of the first day, the mixture turned pink, and after a week it was a deep, muddy brown, indicating the formation of a large assortment of organic molecules, including amino acids—which are the basic components of life—and other biologically significant compounds. This demonstrated that organic molecules could have been produced in Earth's early oceans to become life's precursor molecules about 4 billion years ago.
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

10) Explain why the presence of free oxygen in our atmosphere marks an important step in the evolution of life on Earth.
Answer: Earth's atmosphere became oxygen rich about 2.5 billion years ago and fundamentally changed Earth's ability to support life. Increased atmospheric oxygen caused the ozone concentration in the upper atmosphere to build up, thereby shielding Earth's surface from ultraviolet radiation. This effectively eliminated the food supply for anaerobic bacteria. Oxygen is also highly reactive with organic matter. When anaerobic bacteria are exposed to oxygen and light, they are killed instantaneously. By 1.8 billion years ago, the atmosphere's oxygen content had increased to such a high level that it began causing the extinction of many anaerobic organisms. Because aerobic respiration releases nearly 20 times more energy than anaerobic respiration aerobic respiring organisms were able to thrive.
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Section: 1.7 Did Life Begin in the Oceans?
Essent'l Concept: 1.7 Discuss why life is thought to have originated in the oceans
OSLP: 5 The ocean supports a great diversity of life and ecosystems.

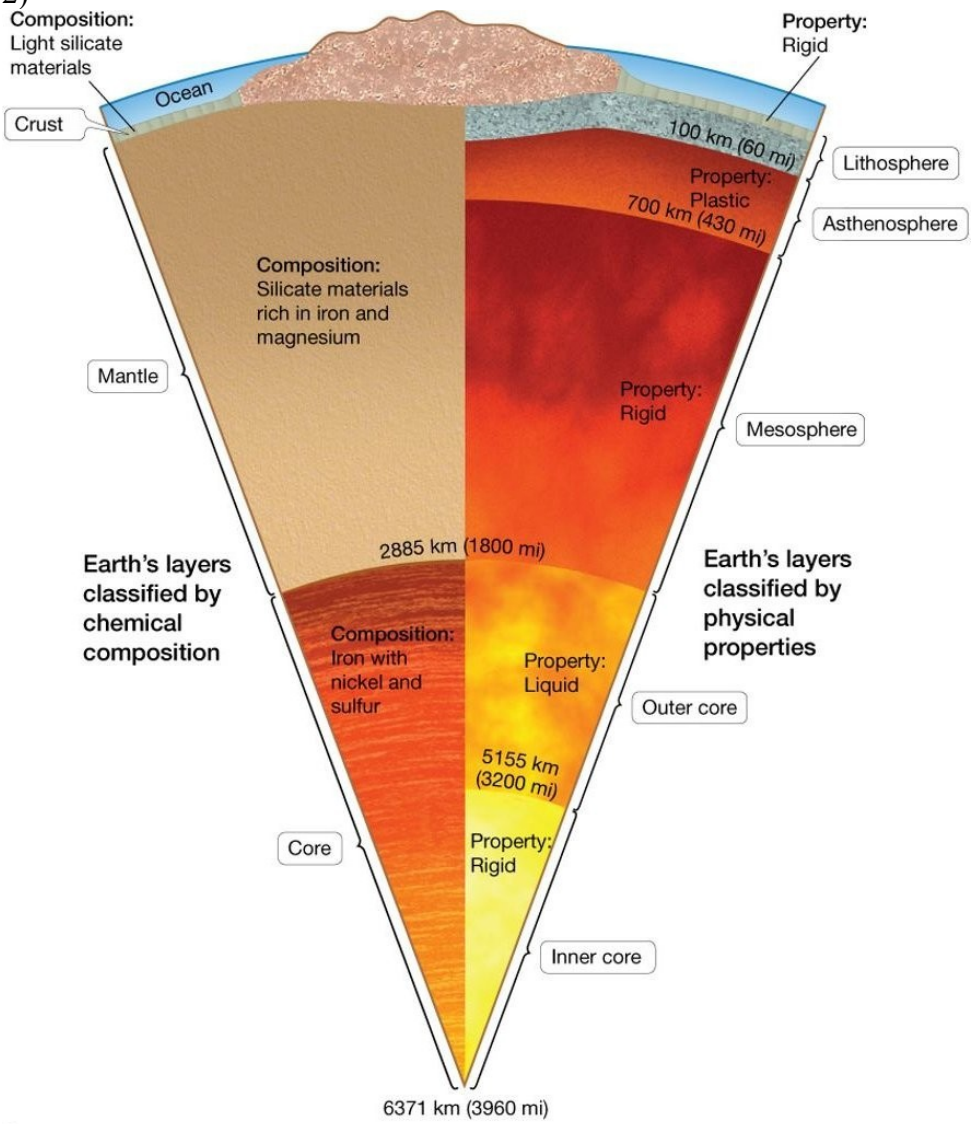
1.4 Visual Questions

1)



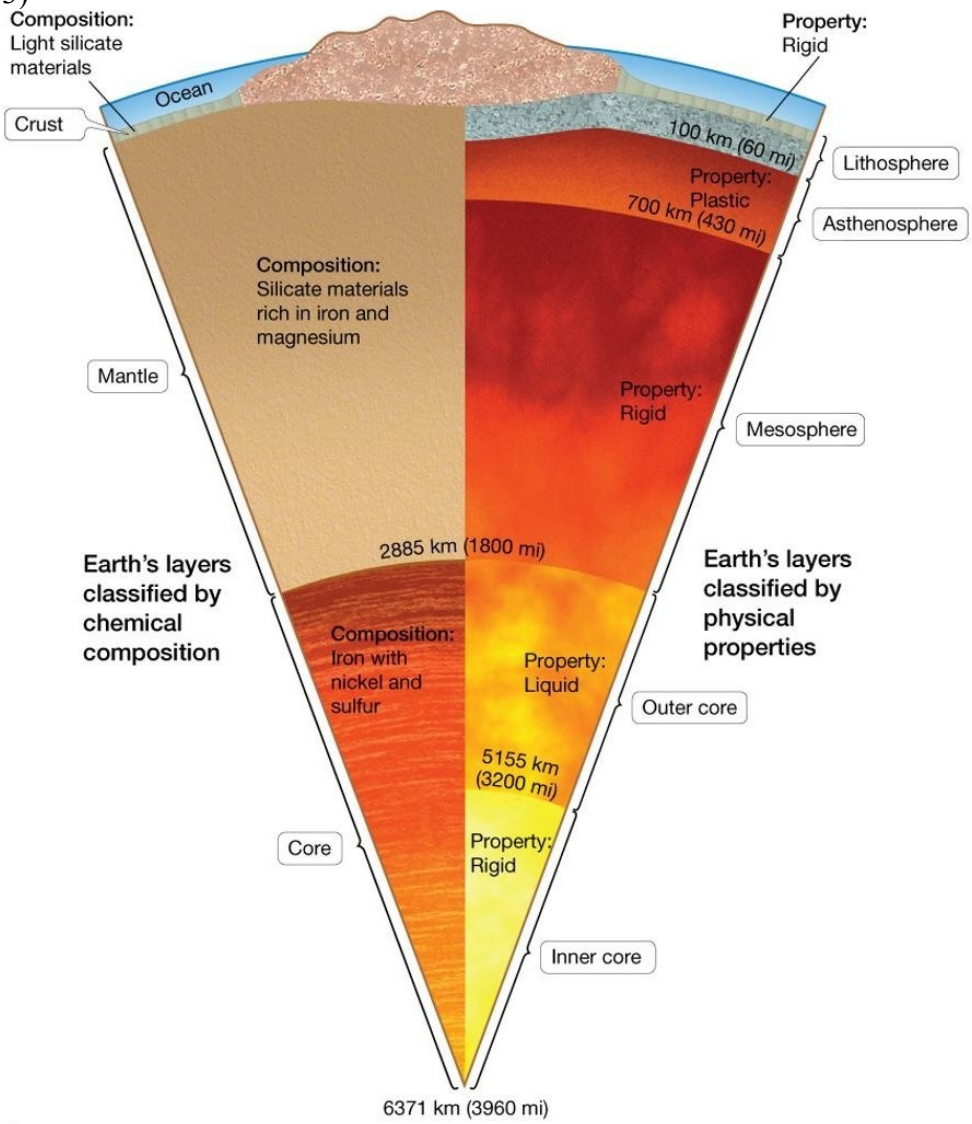
Which of the following is Earth's rigid layer that includes the crust plus the topmost portion of the mantle?
A) Asthenosphere
B) Inner core
C) Lithosphere
D) Mesosphere
E) Outer core
Answer: C
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

2)



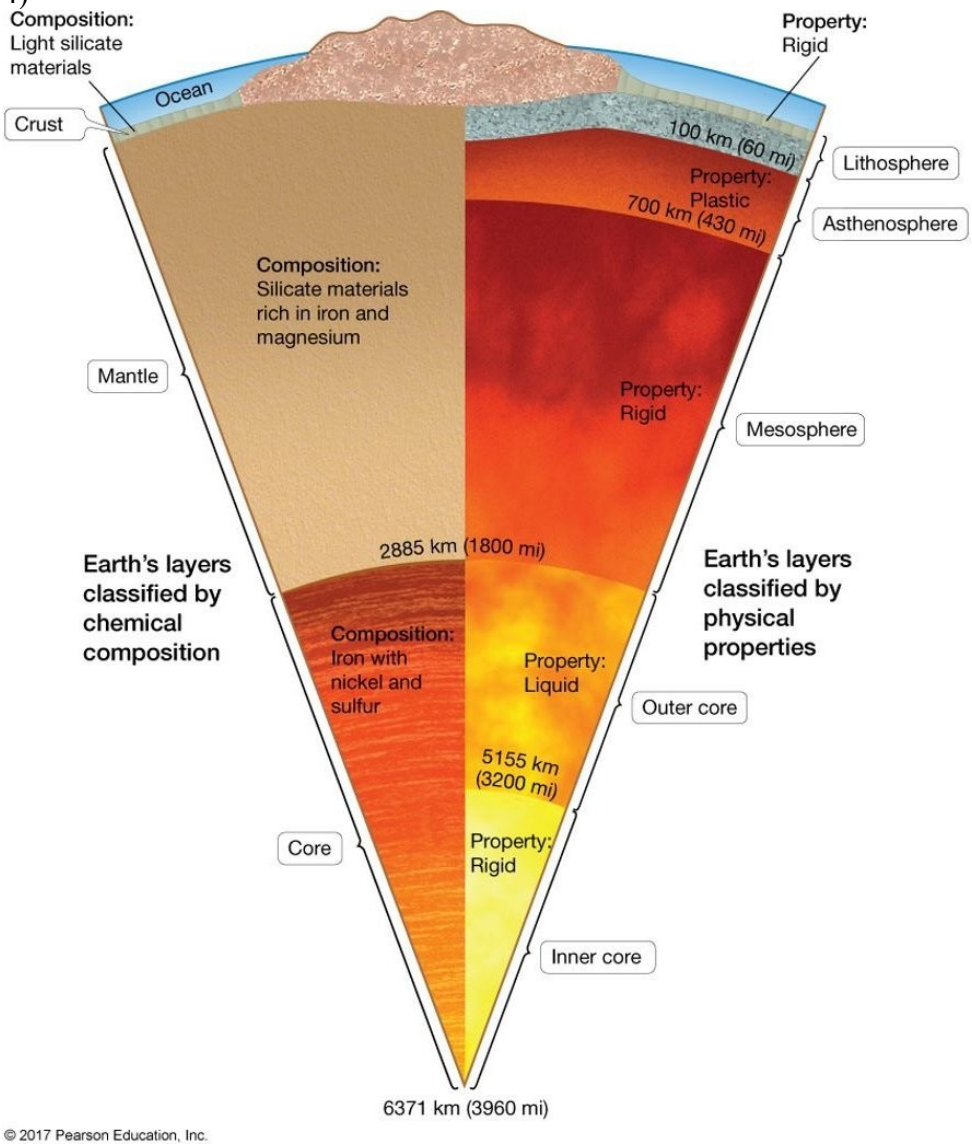
Which of the following represents Earth's plates that are involved in plate tectonic motion?
A) Asthenosphere
B) Inner core
C) Lithosphere
D) Mesosphere
E) Outer core
Answer: C
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

3)



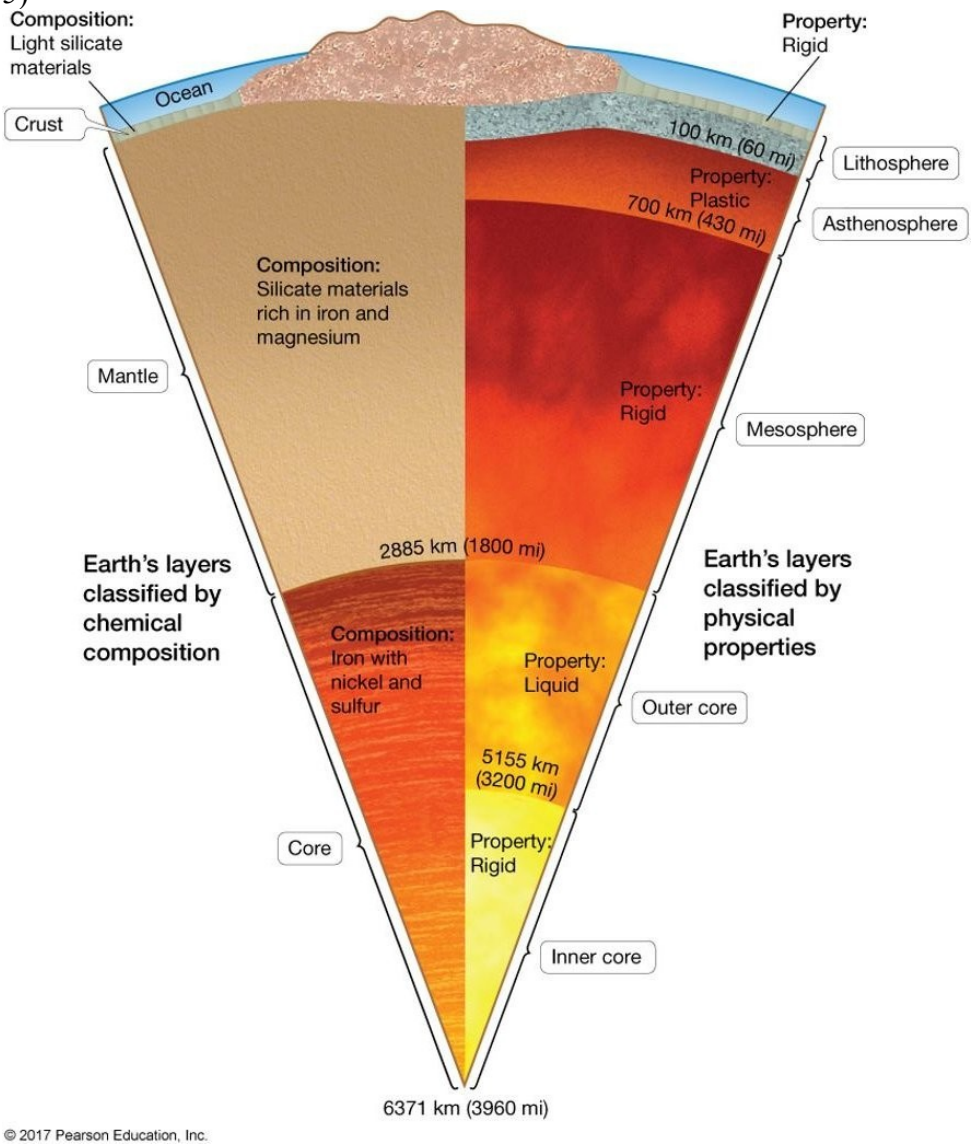
Which of the following is Earth's plastic layer, which flows when a gradual force is applied to it?
A) Asthenosphere
B) Inner core
C) Lithosphere
D) Mesosphere
E) Outer core
Answer: A
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

4)



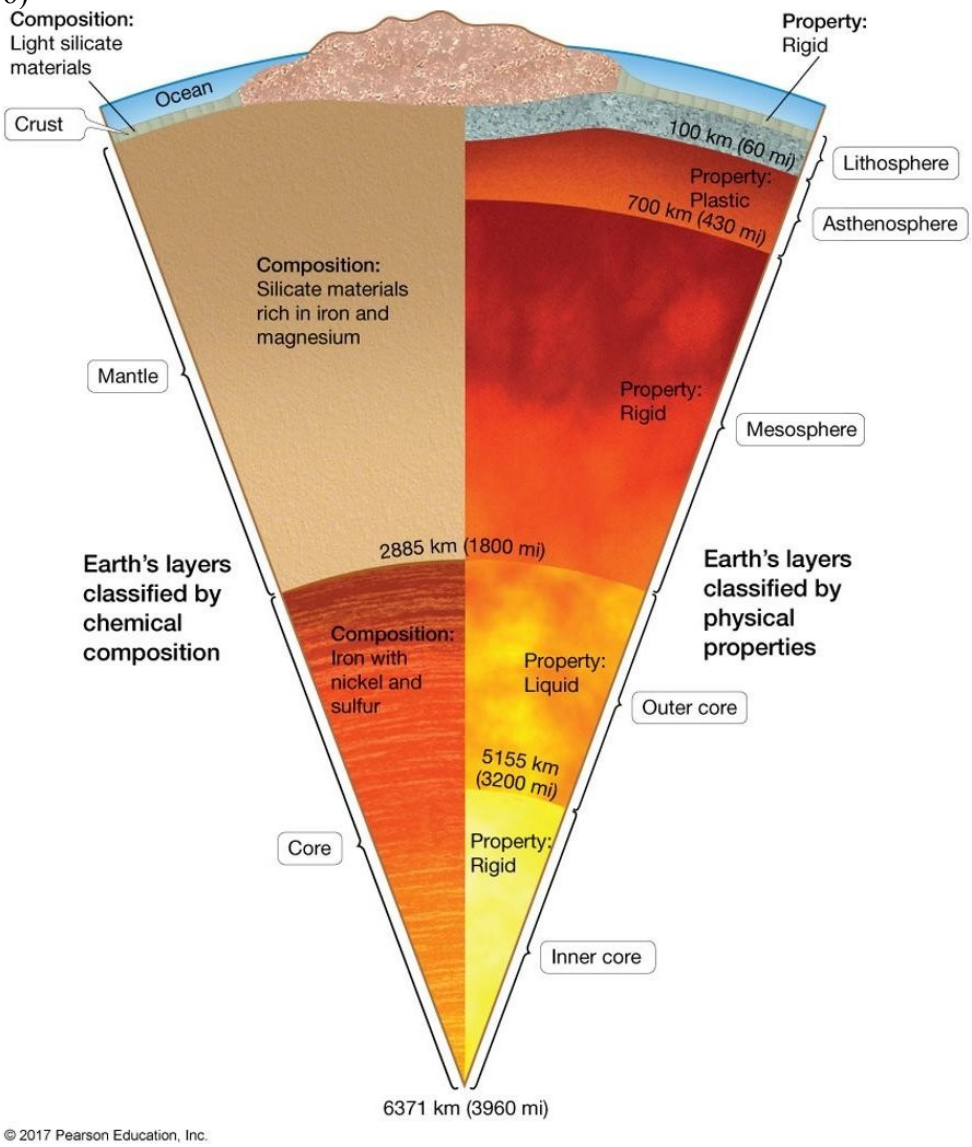
Which of the following is Earth's rigid layer that includes the middle and lower mantle?
A) Asthenosphere
B) Inner core
C) Lithosphere
D) Mesosphere
E) Outer core
Answer: D
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

5)



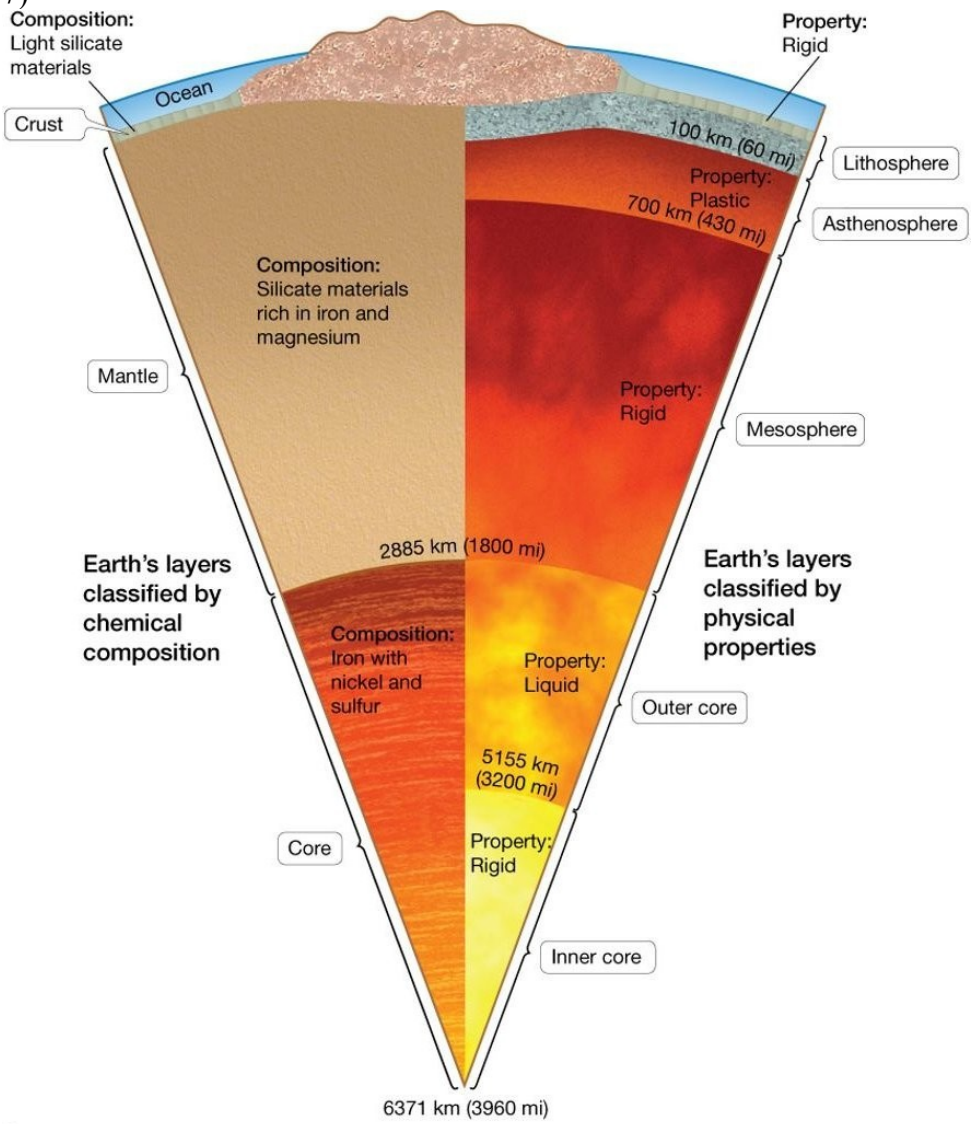
Which of the following is Earth's liquid iron-nickel layer?
A) Asthenosphere
B) Inner core
C) Lithosphere
D) Mesosphere
E) Outer core
Answer: E
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

6)



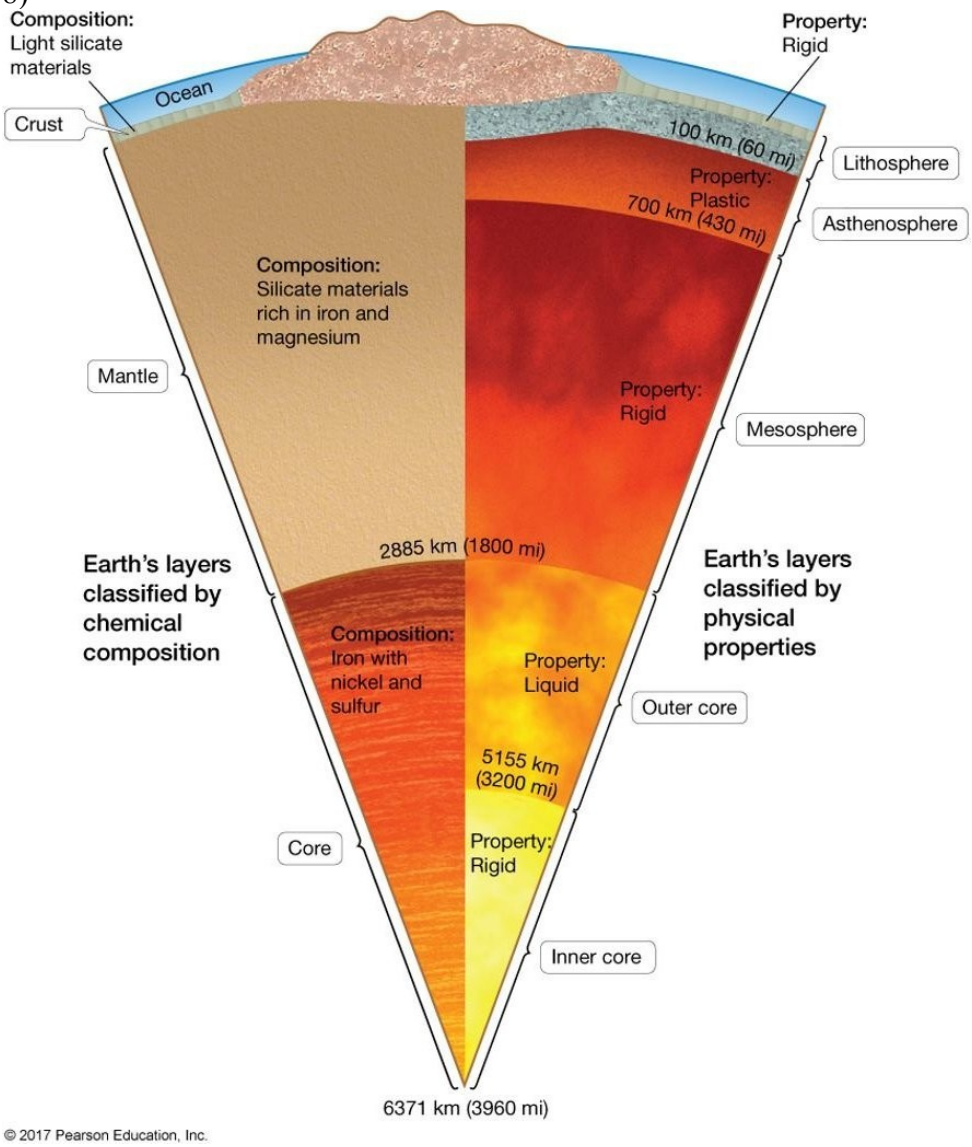
Which of the following is Earth's solid iron-nickel layer?
A) Asthenosphere
B) Inner core
C) Lithosphere
D) Mesosphere
E) Outer core
Answer: B
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

7)



Which of the following represents Earth's entire iron-nickel layer?
A) Asthenosphere
B) Core
C) Crust
D) Lithosphere
E) Mantle
Answer: B
Diff: 3
Bloom's Taxonomy: Applying/Analyzing
Section: 1.5 How Were Earth and the Solar System Formed?
Essent'l Concept: 1.5 Explain how Earth and the solar system were formed

8)



Which of the following represents Earth's low-density, mostly silicate layer?
A) Asthenosphere
B) Core
C) Crust
D) Lithosphere
E) Mantle
Answer: C
Diff: 3
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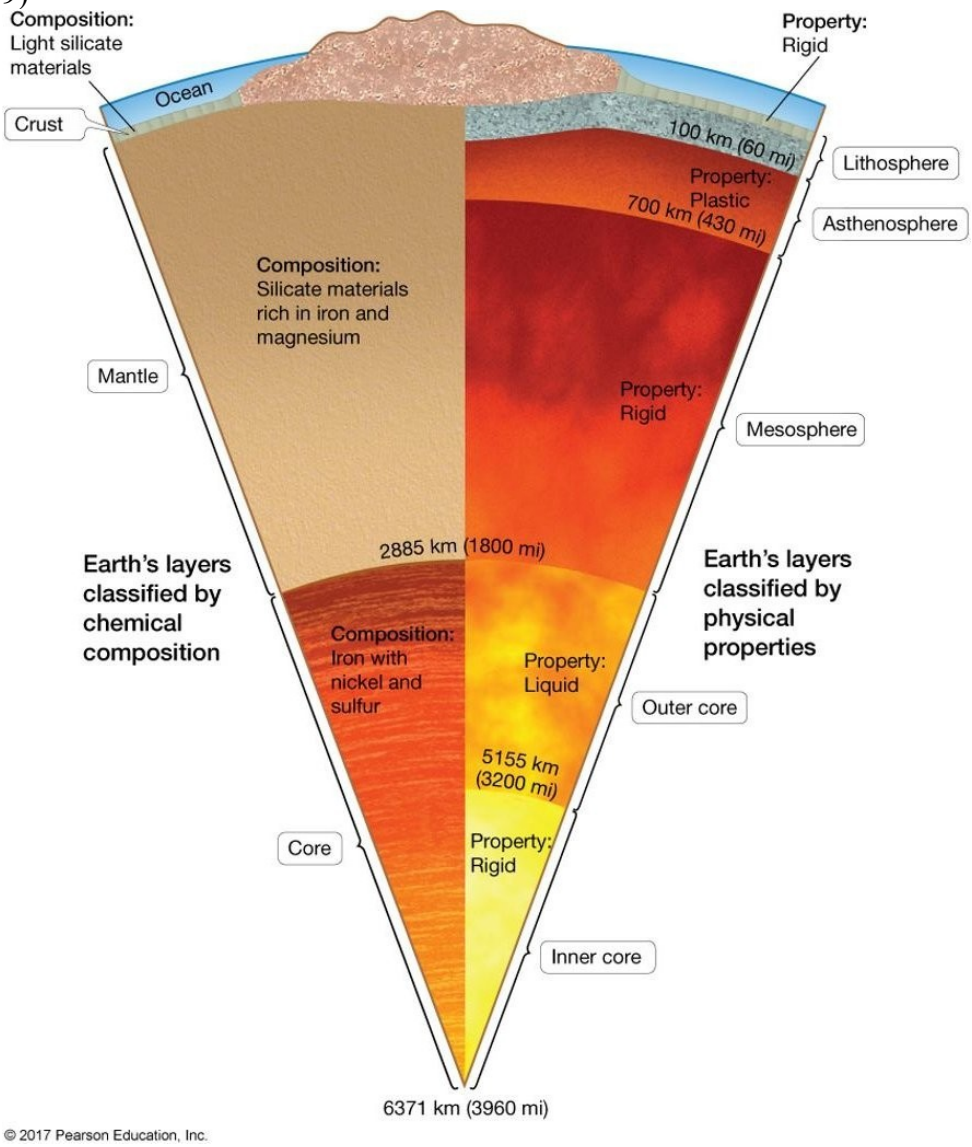
9)



Which of the following represents Earth's high-density, mostly iron-silicate layer?
A) Asthenosphere
B) Core
C) Crust
D) Lithosphere
E) Mantle
Answer: E
Diff: 3
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