Living with Earth: An Introduction to Environmental Geology **(Hudson)**
Chapter 2 Earth Systems

1) Which of the following planets is closest to the sun?
A) Earth
B) Venus
C) Jupiter
D) Mercury
E) Pluto
Answer: D

2) What is a nebula?
A) a vast cloud of dust and gases that contracted 4.5 billion years ago to form our solar system
B) rock fragments that collided together to form the Earth
C) planets that are composed mainly of gases
D) compounds of carbon, nitrogen, oxygen, silicon and iron
E) rocky fragments from outer space that have fallen to the Earth
Answer: A

3) The zone of plastic flow in the mantle is called:
A) asthenosphere.
B) Moho.
C) lithosphere.
D) crust.
E) inner core.
Answer: A

4) Granite is a rock that is a typical of the:
A) inner core.
B) oceanic crust.
C) continental crust.
D) mantle.
E) asthenosphere.
Answer: C

5) Basalt is a rock that is a typical of the:
A) inner core.
B) oceanic crust.
C) continental crust.
D) mantle.
E) asthenosphere.
Answer: B

6) The Earth's atmosphere is divided into four important layers based on:
A) pressure.
B) temperature.
C) presence of different types of bacteria.
D) composition.
E) different types of clouds.
Answer: B

Match the following characteristics to the regions within the geosphere.

A) lithosphere
B) Moho
C) asthenosphere
D) transition zone
E) core

7) Is the boundary between the crust and upper mantle.

8) Is composed of the crust and upper mantle.

9) Has an inner part that is solid and an outer part that is liquid.

10) Is a mantle layer in which earthquake waves change velocity.

11) Has been called the upper mantle's low velocity zone.

Answers: 7) B 8) A 9) E 10) D 11) C

12) What is the most abundant gas in the Earth's atmosphere today?
A) nitrogen
B) carbon dioxide
C) oxygen
D) helium
E) water vapor
Answer: A

13) Which gas was likely NOT a major part of the Earth's first atmosphere?
A) helium
B) hydrogen
C) methane
D) ammonia
E) oxygen
Answer: E

14) What is a volatile?
A) elements and compounds that vaporize easily
B) gases that cause the Earth's atmosphere to cool
C) molten rock that comes to the Earth's surface
D) the process in which organisms use sunlight to convert carbon dioxide and water into food and oxygen
E) the compositionally homogeneous part of the atmosphere
Answer: A

15) Which layer in the Earth's atmosphere creates the northern lights?
A) ozone layer
B) mesosphere
C) mesopause
D) thermosphere
E) stratosphere
Answer: D

16) Why is ozone important?
A) helps people by preventing ultraviolet radiation, which can cause skin cancer, from being too intense on Earth's surface
B) it can change gas molecules into charged particles
C) it can cool the Earth's surface
D) it provides key information about the Earth's second atmosphere
E) it is a characteristic gas in the exosphere
Answer: A

Match the following characteristics to the regions within the atmosphere.

A) stratosphere
B) troposphere
C) thermosphere
D) mesosphere

17) Is where most of the "action" takes place within the atmosphere. It is where life lives, weather happens, and most of the clouds appear.

18) is where most of the meteoroids headed toward Earth burn up

19) contains the "ozone layer"

20) contains the "ionosphere"

Answers: 17) B 18) D 19) A 20) C

21) Which component is part of the hydrosphere?
A) rivers
B) glacial ice
C) atmosphere
D) groundwater
E) all of the above
Answer: E

22) Earth is the only known place in our solar system where water can exist in all of its three phases–solid (ice), liquid, and gas (water vapor).
Answer: TRUE

23) Without the special planetary conditions that allow abundant water to be present in all its phases, life as we know it couldn't exist on Earth.
Answer: TRUE

24) Most water on the Earth is underground.
Answer: FALSE

25) The world's ocean does not have an influence on global climate.
Answer: FALSE

26) It takes a lot of solar radiation to appreciably warm the ocean, but once it's warm, it can retain its heat energy for a long time.
Answer: TRUE

27) Where are most of Earth's freshwater resources located?
A) oceans
B) ice caps and glaciers
C) groundwater
D) lakes
E) atmosphere
Answer: B

28) What is the water cycle?
A) an immense cloud of gas and interstellar debris that contained a lot of water
B) a process in which volatile components from the geosphere are transferred to the atmosphere
C) a cycle that describes how carbon dioxide reacts with calcium to form solid calcium carbonate
D) a cycle that describes how water moves among its reservoirs in the oceans, the atmosphere, on land, and below land's surface, in groundwater
E) a layer in the atmosphere where life lives, weather happens, and most of the clouds appear
Answer: D

29) Which component is part of the biosphere?
A) bacteria
B) algae
C) trees
D) people
E) all of the above
Answer: E

30) Which of the following could be considered a fossil?
A) dinosaur bones
B) shells
C) worm burrows
D) animal tracks
E) all of the above
Answer: E

31) When did life begin?
A) 4.5 billion years ago
B) sometime between 4.2 and 3.5 billion years ago
C) 100 years ago
D) 1 million years ago
E) 7000 years ago
Answer: B

32) What is natural selection?
A) principal mechanism behind evolutionary change in the biosphere
B) species that have died out and no longer exist
C) remains and indications of former life that are preserved in rocks
D) structures built from layer after layer of muddy sediment trapped by mats of bacteria
E) an advantageous trait that helps an organism live longer
Answer: A

Match the key observation to the observer.

A) Georges Cuvier
B) Charles Darwin
C) Jean Baptiste Lamarck
D) Nicolas Steno

33) demonstrated that "stones" that looked like shark's teeth were in fact fossils that represented life in former seas

34) recognized that some vertebrate fossils represented species that no longer existed

35) proposed that life changed from simple to more complex forms through interactions with the environment

36) proposed a "natural selection" theory that explains how species evolve

Answers: 33) D 34) A 35) C 36) B

37) Which of the following is an example of a mass extinction?
A) when a comet delivered water to create the ocean component of the Earth's hydrosphere
B) when mockingbirds, finches, tortoises, and iguanas developed distinct physical differences on the Galapagos Island
C) when dinosaurs died out 65 million years ago, perhaps the result of the impact of a large asteroid
D) when friction with gas molecules causes meteoroids to heat up as they pass through the mesosphere, creating bright, fast-moving "shooting stars"
E) a region in the Earth's crust above the transition zone and upward to the base of the crust where no life exists
Answer: C

38) What do we call the change in organisms over successive generations that lead to new forms and functions, even new species?
A) extinction
B) biosphere
C) photosynthetic stromatolites
D) evolution
E) heredity
Answer: D

39) What could cause a species to become extinct?
A) any event that causes significant, global-scale environmental changes in which the species cannot adapt
B) large asteroid impact
C) over-hunting of a species for food
D) decrease of biodiversity due to natural habitat destruction
E) all of the above
Answer: E

40) What is Steno's Law of Superposition?
A) In a stack of layers of sedimentary rocks, oil forms in hundreds to thousands of years.
B) Geologists can use fossils to correlate layers of sedimentary rocks across large distances.
C) In a stack of layers of sedimentary rocks, the oldest layer is the lowest.
D) Many incomplete sedimentary sequences of many different ages are exposed around the world.
E) "Stones" that looked like shark's teeth are fossils that represent life in former seas.
Answer: C

41) Which of the following is an absolute age determining method?
A) dating minerals using radioactive isotopes
B) using the law of superposition
C) using the law of fossil succession
D) using the geologic time scale
E) none of the above.
Answer: A

42) Which of the following could NOT be dated using the carbon-14 dating method?
A) carbonate shells
B) animal bones
C) quartz
D) charcoal
E) human bones
Answer: C

43) By applying Steno's Law of Superposition and Law of Fossil Succession, _____ dates can be obtained.
A) relative
B) ion
C) isotopic
D) radioactive
E) absolute
Answer: A

44) Elements that have the same number of protons but different numbers of neutrons are called:
A) isotopes.
B) ions.
C) helium.
D) half-life.
E) electrons.
Answer: A

Use the statement below to answer the question(s) that follow.

Uranium ^{238}U decays to lead ^{206}Pb with a half life of 4.5 billion years.

45) What does the statement mean to a geologist?
A) Half of the ^{238}U in a mineral will turn into ^{206}Pb in 4.5 billion years.
B) Half of the ^{238}U in a mineral will turn into ^{206}Pb in 2.25 billion years.
C) All of the ^{238}U in a mineral will turn into ^{206}Pb in 4.5 billion years.
D) ^{206}Pb will be extinct in 4.5 billion years.
E) ^{238}U will be extinct in 4.5 billion years.
Answer: A

46) Which isotope is the parent?
A) ^{206}Pb
B) ^{238}U
C) 4.5 billion
D) both ^{238}U and ^{206}Pb are parents
E) both ^{238}U and 4.5 billion years are termed "parents"
Answer: B

47) Which isotope is the daughter?
A) ^{206}Pb
B) ^{238}U
C) 4.5 billion
D) both ^{238}U and are daughters
E) both ^{206}Pb and 4.5 billion years are termed "daughters"
Answer: A

48) Define and describe each component of the geosphere. List at least one important property for each region that makes up the geosphere.

49) List and describe each component of the hydrosphere. Draw the water cycle in your answer.

50) Choose one major period of the Earth's history discussed in the chapter describe what happened during this time. Why do geologists divide Earth into different time periods? Is it useful?

51) Draw your own field outcrop that illustrates Steno's Law of Superposition and Law of Fossil Succession.

52) How much CO_2 is present in the Earth's atmosphere? If it is present in such small amounts, why does it have such a large impact on Earth's climate?

53) How do we know the Earth has a core/mantle/crust structure? List at least 3 sources of information.

54) The chapter describes 3 atmospheres that the Earth has had in the past. How did the atmosphere evolve over time? What controls the gases in the atmosphere (List at least 3)?