

Chapter 02 Internal Energy and Plate Tectonics

Multiple Choice Questions

1. The age of the Earth is about _____.
- A. 10 million years
 - B. 100 million years
 - C. 1000 million years
 - D. 460 million years
 - E. 4600 million years

Bloom's Level: 1. Remember

Section: Internal Sources of Energy

2. The heat that transformed the Earth early in its history came primarily from all but which of the following?
- A. impact energy
 - B. gravitational energy
 - C. magnetic energy
 - D. decay of radioactive elements

Bloom's Level: 1. Remember

Section: Internal Sources of Energy

3. The early differentiation of the Earth into a mantle and a core was created by

_____.

- A. gravitational accretion of iron-rich particles in the core, followed by silicate-rich particles in the mantle
- B. nuclear fission in the center of the Earth, which converted hydrogen and helium to iron
- C.

the buildup of heat and the melting of iron which was pulled by gravity to the center of the Earth

Bloom's Level: 1. Remember

Section: Earth History

4. The inner core is a 2450-km diameter _____ mass with temperatures up to 4300°C (7770°F).

- A. gaseous
- B. liquid
- C. solid

Bloom's Level: 1. Remember

Section: Internal Sources of Energy

5. As radioactive atoms decay, energy is _____.

- A. absorbed
- B. released
- C. neither absorbed nor released
- D. may be absorbed or released, depending on which isotope is involved in the decay

Bloom's Level: 1. Remember

Section: Internal Sources of Energy

6. All of the continents were once combined into a single supercontinent called

- A. Laurasia
- B. Gondwanaland
- C. Tethys
- D. Panthalassa
- E. Pangaea

Bloom's Level: 1. Remember

Section: Development of the Plate Tectonics Concept

7. Which of the following is NOT a basic tenet of plate tectonics?

- A. Melted asthenosphere flows upward as magma and cools to form new ocean floor lithosphere.
- B. The new lithosphere slowly moves laterally away from the zones of oceanic crust formation on top of the underlying asthenosphere (seafloor spreading).
- C. When the leading edge of a moving slab of oceanic lithosphere collides with another slab, the older, colder, denser slab turns downward and is pulled by gravity back into the asthenosphere (subduction), while the less-dense, more buoyant slab overrides it.
- D. The slab pulled into the asthenosphere begins the process of melting and moves into the liquid core.
- E. The slab pulled into the asthenosphere begins the process of reabsorption into the mantle.

Bloom's Level: 1. Remember

Section: Development of the Plate Tectonics Concept

8. The time needed for a typical atom in an oceanic plate to complete a plate-tectonic cycle is _____.

- A. about a hundred thousand years
- B. about a million years
- C. about 10 million years
- D.** in excess of 250 million years
- E.

Material does not recycle via tectonic processes

Bloom's Level: 1. Remember

Section: How We Understand the Earth

9. The most famous and outspoken of the early proponents of continental drift was _____.

- A. Plato, for whom "plate tectonics" was named
- B. Leonardo da Vinci
- C. William Smith
- D.** Alfred Wegener
- E. Immanuel Kant

Bloom's Level: 1. Remember

Section: Development of the Plate Tectonics Concept

10. In the _____, evidence abounded, mechanisms seemed plausible, and the plate tectonic theory was developed and widely accepted.

- A. mid-1930s
- B. mid-1940s
- C. mid-1950s
- D.** mid-1960s
- E. mid-1970s

Bloom's Level: 1. Remember

Section: Development of the Plate Tectonics Concept

11. After lava cools below the Curie point, which is about _____, atoms in iron-bearing minerals become magnetized in the direction of the Earth's magnetic field at that time and place.

- A. 50°C
- B. 250°C
- C. 550°C
- D. 850°C
- E. 1150°C

Bloom's Level: 1. Remember

Section: Magnetization of Volcanic Rocks

12. After lava cools below the _____ point, about 550°C, atoms in iron-bearing minerals become magnetized in the direction of the Earth's magnetic field at that time and place.

- A. magnetization
- B. critical
- C. triple
- D. Curie
- E. solidus

Bloom's Level: 1. Remember

Section: Magnetization of Volcanic Rocks

13. If sea-floor spreading occurs at a constant rate, the widths of magnetized seafloor strips have _____ ratios as the lengths of time between successive reversals of the Earth's magnetic field.

- A. opposite
- B. critical
- C. triple
- D. two to one
- E. the same

Bloom's Level: 1. Remember

Section: Magnetization Patterns on the Seafloors

14. The oldest rocks on the ocean floors are about _____ years in age.
- A. 50,000
 - B. one million
 - C. 200 million
 - D. 2 billion
 - E. 4.5 billion

Bloom's Level: 1. Remember

Section: Magnetization Patterns on the Seafloors

15. The hotspot-melting-through-lithosphere process forms lines of extinct volcanoes on the ocean floor, from youngest to oldest, _____.
- A. with random ages along the lines
 - B. in a direction pointing toward the sun
 - C. pointing at 90 degrees to the direction of plate movement
 - D. pointing in the opposite direction of plate movement
 - E. pointing in the direction of plate movement

Bloom's Level: 1. Remember

Section: Other Evidence of Plate Tectonics

16. The blanket of sediment on the sea floor is _____ toward the ocean margins.
- A. very thin at the volcanic ridges and thickens
 - B. very thick at the volcanic ridges and thins
 - C. thick at the volcanic ridges and thickens more
 - D. very thin at the volcanic ridges and is missing

Bloom's Level: 1. Remember

Section: Other Evidence of Plate Tectonics

17. Moving progressively away from the ridges, the ocean water depths increase systematically with seafloor age due to all but which of the following?

- A. cooling and contraction of the oceanic crust with a resultant increase in density
- B. isostatic down warping due to the weight of sediments deposited on the sea floor
- C. erosion of the older ocean floor by deep ocean currents
- D. conduction of heat away from the molten surface rocks

Bloom's Level: 1. Remember

Section: Other Evidence of Plate Tectonics

18. When oceanic lithosphere collides with another plate, the _____ in the process of subduction.

- A. older, colder plate goes beneath the younger, warmer plate
- B. younger, warmer plate goes beneath the older, colder plate
- C. plates both disappear downward
- D. plates pile up, forming mid-ocean ridges

Bloom's Level: 1. Remember

Section: Other Evidence of Plate Tectonics

19. The slide-past motions of long transform faults occur in all but which of the following?

- A. In the northeastern Pacific as the Queen Charlotte fault, located near a sparsely populated region of Canada.
- B. Along the San Andreas Fault in California with its famous earthquakes.
- C. At the southwestern edge of the Pacific Ocean where the Alpine fault cuts across the South Island of New Zealand.
- D. Where the Indian subcontinent touches Asia.

Bloom's Level: 1. Remember

Section: Plate Tectonics

20. The Pacific plate subducts along _____ edges and creates enormous earthquakes, such as the 1923 Tokyo seism.

- A. its southern and eastern
- B. its northern and eastern
- C. its southern and western
- D.** its northern and western
- E. all of its

Bloom's Level: 1. Remember

Section: Other Evidence of Plate Tectonics

21. The active triple junction in _____ Africa is geologically young, having begun about 25 million years ago.

- A. southwestern
- B. southeastern
- C.** northeastern
- D. western
- E. southern

Bloom's Level: 1. Remember

Section: Other Evidence of Plate Tectonics

22. The greatest earthquakes in the world occur _____.

- A.** where plates collide with each other
- B. where plates separate from one another
- C. where plates slide past each other
- D. in the interiors of individual plates

Bloom's Level: 1. Remember

Section: Plate Tectonics

True / False Questions

23. Recent work has suggested that the solid inner core may be spinning in the same direction as the surrounding Earth, only slower.

FALSE

Bloom's Level: 1. Remember

Section: The Layered Earth

24. The grand recycling of the upper few hundred kilometers of the Earth is called the tectonic cycle.

TRUE

Bloom's Level: 1. Remember

Section: The Grand Unifying Theory

25. The gigantic pieces of lithospheric plates diverging, sliding past, or colliding with each other are directly responsible for the vast majority of the earthquakes, volcanic eruptions, and mountains on Earth.

TRUE

Bloom's Level: 1. Remember

Section: The Layered Earth

26. In 1620, Francis Bacon of England noted the parallelism of the Atlantic coastlines of South America and Africa and suggested that these continents had once been joined.

TRUE

Bloom's Level: 1. Remember

Section: Development of the Plate Tectonics Concept

27. When data from the Earth's magnetic field locked inside seafloor rocks became widely understood, skeptics around the world were convinced that seafloor spreading occurs and that the concept of plate tectonics is valid.

TRUE

Bloom's Level: 1. Remember

Section: Magnetization Patterns on the Seafloors

28. The processes that reverse the polarity of the magnetic field are likely related to changes in the flow of the iron-rich liquid in the outer core.

TRUE

Bloom's Level: 1. Remember

Section: Magnetization Patterns on the Seafloors

29. The floor of the Atlantic Ocean is striped by parallel bands of magnetized rock that show alternating polarities in a pattern that is symmetrical and parallel to the mid-ocean spreading center.

TRUE

Bloom's Level: 1. Remember

Section: Magnetization Patterns on the Seafloors

30. Subducted slabs completely melt in the mantle and mix with the surrounding mantle.

FALSE

Bloom's Level: 1. Remember

Section: The Grand Unifying Theory

31. The greatest mountain ranges on Earth lie on the ocean bottoms and extend more than 40,000 miles.

TRUE

Bloom's Level: 1. Remember

Section: Other Evidence of Plate Tectonics

32. Hot spots have active volcanoes above them on the Earth's surface and moving plates carry the volcanoes away from their hot-spot source.

TRUE

Bloom's Level: 1. Remember

Section: Other Evidence of Plate Tectonics

33. The ages of former volcanoes decrease with their distance from their parent hot spot.

FALSE

Bloom's Level: 1. Remember

Section: Other Evidence of Plate Tectonics

34. Above the oceanic ridges, the ocean water depths are relatively deep in comparison to depths away from the ridges.

FALSE

Bloom's Level: 1. Remember

Section: Other Evidence of Plate Tectonics

35. Gravitational pull on a dense, down-going plate at a subduction zone (slab pull) is one of the forces that keeps the lithospheric plates moving.

TRUE

Bloom's Level: 1. Remember

Section: The Grand Unifying Theory

36. The rates of plate movement are comparable to those of human fingernail growth.

TRUE

Bloom's Level: 1. Remember

Section: The Grand Unifying Theory