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Chapter 02 Test Bank: Internal Energy and Plate Tectonics KEY

Multiple Choice Questions

1. Earth is about _____ years old.

A. 30,000 thousand
B. 50 million
C. 3,500 million
D. 13.5 billion
E. 4.5 billion

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Chapter: 02
Gradable: automatic
Section: Internal Sources of Energy
Topic: Internal Sources of Energy

2. The heat that transformed Earth early in its history came primarily from all but which of the following?

A. impact energy
B. gravitational energy
C. dark energy
D. the decay of radioactive elements

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Chapter: 02
Gradable: automatic
Section: Internal Sources of Energy
Topic: Internal Sources of Energy

3. The early differentiation of 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 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 Earth
D. the magnetic attraction between cations and anions of iron and nickel

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Chapter: 02
Gradable: automatic
Section: Earth History
Topic: Earth History

4. Earth's inner core is a 2,450-km diameter _____ mass with temperatures up to 4,300°C (7,770°F).

A. gaseous
B. liquid
C. solid
D. plasma-like

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Chapter: 02
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Section: Internal Sources of Energy
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5. As radioactive atoms decay, heat energy is _____.

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

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Chapter: 02
Gradable: automatic
Section: Internal Sources of Energy
Topic: 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

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Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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.

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Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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

A. about a hundred thousand
B. about a million
C. about 10 million
D. in excess of 250 million
E. less than 500

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Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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

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A. Plato
B. Leonardo da Vinci
C. William Smith
D. Alfred Wegener
E. Immanuel Kant

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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

A. mid-1880s
B. mid-1920s
C. mid-1940s
D. mid-1960s
E. mid-1980s

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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

A. 50°C
B. 250°C
C. 550°C
D. 850°C
E. 1,150°C

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Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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

A. Maxwell
B. critical
C. triple
D. Curie
E. solidus

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Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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 Earth's magnetic field.

A. opposite

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

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Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

14. The oldest rocks on the ocean floors are about _____ years in age.

A. 50,000
B. 45 million
C. 200 million
D. 2 billion
E. 4.5 billion

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Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

15. The hot-spot-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

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Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: 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

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Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: 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 warm surface rocks

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Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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

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

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: The Grand Unifying Theory
Topic: The Grand Unifying Theory

19. The principle of uniformitarianism, developed by James Hutton, implies that _____.

A. gravity results from the bending of space and time
B. the present provides almost no clues to understanding the past
C. geologic processes always occur at the same rate
D. natural laws are uniform through time and space
E. all hot spots formed early in Earth's history

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Chapter: 02
Gradable: automatic
Section: The Grand Unifying Theory
Topic: The Grand Unifying Theory

20. Which of the following accurately describes the state of the continents and ocean 65 million years ago?

A. Seafloor spreading had opened and connected the North and South Atlantic Ocean but North America and Eurasia were still partial connected.
B. All the major continents adjoined in a landmass called Pangaea and surrounded by the Tethys Sea.
C. The Iapetus Ocean was in the final stages of closing before the initial formation of Pangaea.
D. All the continents were roughly in the relative positions they hold today but were much closer together with smaller oceans in-between them.

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

21. Choose the most likely outcome if the large ice sheet on Greenland was to completely melt.

A. Greenland would slowly rise over thousands of years as isostatic rebound occurs.
B. Greenland would slowly sink over thousands of years due to an isostatic adjustment.
C. Greenland would rise hundreds of meters in just a few years as isostatic rebound occurs.
D. Greenland would sink by hundreds of meters in just a few years due to an isostatic adjustment.

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Chapter: 02
Gradable: automatic
Section: The Layered Earth
Topic: The Layered Earth

22. Which of the following concepts best explains why a mass of low-density material in the mantle rises?

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A. Buoyancy
B. Density
C. Uniformitarianism
D. Radiation
E. Strain

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Bloom's Level: 3. Apply
Chapter: 02
Gradable: automatic
Section: The Layered Earth
Topic: The Layered Earth

23. Our solar system formed _____.

A. as the Sun's gravity trapped planets from other solar systems as it passed by them
B. during the Big Bang as matter started to form as the temperature of the universe cooled
C. through collisions of matter within a rotating cloud of gas, ice, dust, and other solid debris
D. when the Milky Way's black hole expelled Hawking radiation to our current location
E. just after the Big Bang when two short-lived solar systems collided

Accessibility: Keyboard Navigation
Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Origin of the Sun and Planets
Topic: Origin of the Sun and Planets

24. Which statement accurately describes the planets of our solar system?

A. The four inner planets are smaller and rocky and the four outer planets are giant icy bodies composed mostly of hydrogen and helium.
B. The planets get progressively larger and rockier with increasing distance from the Sun.
C. The planets get progressively smaller and less rocky with increasing distance from the Sun.
D. The three inner plants are smaller planets composed of hydrogen and helium and the five outer plants are larger, mostly solid, and composed of iron and nickel.

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Origin of the Sun and Planets
Topic: Origin of the Sun and Planets

25. The solar radiation we receive on Earth is the result of _____.

A. the nuclear fusion of iron into hydrogen
B. the nuclear fusion of hydrogen into helium
C. nuclear fission as helium is split into hydrogen
D. nuclear fission as carbon is split into any number of smaller atoms
E. the oxidation of combustible material within the Sun's core

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Origin of the Sun and Planets
Topic: Origin of the Sun and Planets

26. The Moon is thought to have formed _____.

A. from material ejected during the t-tauri phase of the Sun's early history
B. when an early massive supervolcano ejected materials into orbit around Earth
C. after the impact of two comets somewhere between Earth and Venus

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D. after the impact of two protoplanets somewhere between Earth and Mars
E. from material that coalesced after an impact between Earth and a Mars-sized object

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Origin of the Sun and Planets
Topic: Origin of the Sun and Planets

27. Which of the following correctly lists the order the layers from the surface of Earth toward the center?

A. Lithosphere, asthenosphere, mesosphere, and the core
B. Mantle, crust, core, and the asthenosphere
C. Mesosphere, Lithosphere, asthenosphere, and the core
D. Asthenosphere, lithosphere, mesosphere, and the core
E. Asthenosphere, lithosphere, hydrosphere, and the core

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: The Layered Earth
Topic: The Layered Earth

28. A rock subjected to higher temperatures would be expected to behave _____.

A. in a less ductile manner
B. in a more brittle manner
C. in a more ductile manner
D. by being more resistant to stress

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Bloom's Level: 2. Understand
Chapter: 02
Gradable: automatic
Section: The Layered Earth
Topic: The Layered Earth

29. A rock smashed into many pieces by a scientist using a hammer is undergoing _____ deformation.

A. brittle
B. ductile
C. elastic
D. plastic

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Bloom's Level: 2. Understand
Chapter: 02
Gradable: automatic
Section: The Layered Earth
Topic: The Layered Earth

30. An isotope's half-life is equal to the time it takes _____.

A. nuclear fission to begin once the isotope first forms
B. a one gram mass of parent atoms to disintegrate into one gram mass of daughter atoms
C. half of the electrons in its outer most shell to be covalently bonded with oxygen
D. half of the neutrons to be converted into protons
E. half of the parent atoms to decay into daughter atoms

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Chapter: 02
Gradable: automatic
Section: Internal Sources of Energy
Topic: Internal Sources of Energy

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31. A rock with only 25% of the parent isotope left has been decaying for time equal to _____ half-lives.

A. two
B. one
C. three
D. four
E. five

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Bloom's Level: 3. Apply
Chapter: 02
Gradable: automatic
Section: Internal Sources of Energy
Topic: Internal Sources of Energy

32. If an oceanic trench formed along the East Coast of North America, the deepest earthquakes related to the subduction of the oceanic plate beneath North America would occur _____ the eastern coastline.

A. east of
B. along
C. west of
D. randomly all around

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Bloom's Level: 3. Apply
Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

True / False Questions

33. Earth's magnetic pole and rotational pole coincide.

FALSE

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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

TRUE

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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

TRUE

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Chapter: 02
Gradable: automatic
Section: Plate Tectonics

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Topic: Plate Tectonics

36. 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

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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

TRUE

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

38. 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

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

39. Parallel bands of magnetized rock that show alternating polarities stripe the floor of the Atlantic Ocean; the pattern is symmetrical and parallel with the spreading center.

TRUE

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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

FALSE

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: The Grand Unifying Theory
Topic: The Grand Unifying Theory

41. The greatest mountain ranges on Earth lie on the ocean bottoms and extend more than 65,000 km.

TRUE

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Chapter: 02
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Section: Plate Tectonics
Topic: Plate Tectonics

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

TRUE

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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

FALSE

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

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

FALSE

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: Plate Tectonics
Topic: Plate Tectonics

45. 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

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Bloom's Level: 1. Remember
Chapter: 02
Gradable: automatic
Section: The Grand Unifying Theory
Topic: The Grand Unifying Theory

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

TRUE

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Chapter: 02
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Section: The Grand Unifying Theory
Topic: The Grand Unifying Theory

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Chapter 02 Test Bank: Internal Energy and Plate Tectonics Summary

Category	*# of Questions*
Accessibility: Keyboard Navigation	46
Bloom's Level: 1. Remember	40
Bloom's Level: 2. Understand	2
Bloom's Level: 3. Apply	4
Chapter: 02	46
Gradable: automatic	46
Section: Earth History	1
Section: Internal Sources of Energy	6
Section: Origin of the Sun and Planets	4
Section: Plate Tectonics	25
Section: The Grand Unifying Theory	5
Section: The Layered Earth	5
Topic: Earth History	1
Topic: Internal Sources of Energy	6
Topic: Origin of the Sun and Planets	4
Topic: Plate Tectonics	25
Topic: The Grand Unifying Theory	5
Topic: The Layered Earth	5

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