Natural Hazards, 4e **(Keller/DeVecchio)**
Chapter 2 Internal Structure of the Earth and Plate Tectonics

1) Which of the following is the correct order of the layers of the Earth from inside to outside?
A) inner core, outer core, crust, mantle
B) inner core, mantle, outer core, crust
C) crust, inner core, outer core, mantle
D) inner core, outer core, mantle, crust
E) mantle, inner core, crust, outer core
Answer: D
Diff: 1
Section: 2.1 Internal Structure of Earth
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.1 Describe the basic internal structure and processes of Earth.

2) Which of the following best describes the internal structure of the earth?
A) An orange, it has a thin peel with a solid, but watery inside.
B) A bowling ball, it is completely solid all the way through.
C) An egg, it is solid at the core, surrounded by liquid and then a hard outer shell.
D) A geode, it is hollow at the center with a strong, hard, outside layer.
E) A chocolate covered cherry, it is solid at the core surrounded by a liquid layer and semi-solid layer, then covered in a thin solid coating.
Answer: E
Diff: 2
Section: 2.1 Internal Structure of Earth
Bloom's Taxonomy: Analysis
Learning Outcome: 2.1 Describe the basic internal structure and processes of Earth.

3) What is the difference between the inner and outer core of the Earth?
A) The inner core is liquid and the outer core is solid.
B) The inner core is made from magma and the outer core is metal.
C) The inner core is solid and the outer core is liquid.
D) The inner core is cool and the outer core is hot.
E) The inner core is hot and the outer core is cool.
Answer: C
Diff: 1
Section: 2.1 Internal Structure of Earth
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.1 Describe the basic internal structure and processes of Earth.

4) Which of the following is **FALSE** about the mantle?
A) The mantle surrounds the outer core.
B) The mantle is composed of iron- and magnesium-rich rocks.
C) The density of the rocks in the mantle is higher than water.
D) The density of the rocks in the mantle is lower than the outer core.
E) The mantle is mostly liquid.
Answer: E
Diff: 1
Section: 2.1 Internal Structure of Earth
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.1 Describe the basic internal structure and processes of Earth.

5) What would be the correct relationship between the crust and the lithosphere?
A) The crust sits on top of the lithosphere.
B) The lithosphere sits on top of the crust.
C) The lithosphere and the crust are the same thing.
D) The lithosphere contains both the oceans and the continents, the crust only includes continents.
E) The lithosphere is liquid, whereas the crust is solid.
Answer: A
Diff: 1
Section: 2.1 Internal Structure of Earth
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.1 Describe the basic internal structure and processes of Earth.

6) Which of the following is **NOT** a significant source of the internal heat of the earth?
A) Original heat of formation of the planet
B) Heat generated by crystallization of the core
C) Heat from the Sun
D) Radioactive decay of elements scattered throughout the mantle
Answer: C
Diff: 1
Section: 2.1 Internal Structure of Earth
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.1 Describe the basic internal structure and processes of Earth.

7) The energy for plate tectonics comes from
A) the magnetic field of the earth.
B) heat from the sun.
C) gravity between the Earth and Moon.
D) ocean currents.
E) heat from the earth's core.
Answer: E
Diff: 1
Section: 2.1 Internal Structure of Earth
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.1 Describe the basic internal structure and processes of Earth.

8) Where are earthquakes usually the **LEAST** common?
A) Convergent plate boundaries
B) Divergent plate boundaries
C) Transform plate boundaries
D) Hotspots
E) Central region of tectonic plates
Answer: E
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

9) Which of the following is **TRUE** about plate tectonics?
A) Explains that continents drift around the globe, whereas the oceanic crust does not move over geologic time.
B) Explains that the earth's crust is split into plates that float on a completely molten mantle.
C) It is a controversial idea that most geologists now think is incorrect.
D) Explains that the earth's lithosphere is split into large pieces that move on top of a weak and hot layer called the asthenosphere.
Answer: D
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

10) The slow movement of the lithosphere is
A) caused by the gravitational attraction from the Moon.
B) a key feature in the theory of plate tectonics.
C) responsible for earthquakes but not volcanoes.
D) speeding up because of human-induced changes.
Answer: B
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

11) What would you **NOT** expect to see at locations where tectonic plates are sinking?
A) Earthquakes
B) Volcanoes
C) Magma
D) Undersea mountain range that wraps around the Earth like seams of a baseball
E) Subduction of oceanic lithosphere
Answer: D
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.3 Compare and contrast the different types of plate boundaries.

12) Which of the following statements is **TRUE** about a mid-ocean ridge?
A) It includes the deepest parts of the ocean basin.
B) It is located at a divergent boundary where tectonic plates move apart.
C) It is a place where old oceanic lithosphere is remelted.
D) It is a site of explosively erupting volcanoes.
E) It is a site of some of the world's largest and most devastating earthquakes.
Answer: B
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.3 Compare and contrast the different types of plate boundaries.

13) The Himalayas are associated with which of the following tectonic plate boundaries?
A) Ocean-continental convergence (subduction)
B) Ocean-ocean convergence (subduction)
C) Continent-continent convergence (collision)
D) Divergent
E) Transform
Answer: C
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.3 Compare and contrast the different types of plate boundaries.

14) Why aren't volcanoes associated with continent-continent convergence?
A) Both plates are too buoyant to sink into the asthenosphere.
B) The continental plate isn't hot enough to cause volcanoes.
C) Volcanoes are not associated with convergent plate boundaries.
D) Rising magma from melted plates can't break through continental crust.
E) Volcanoes only occur on islands in the ocean and not on land.
Answer: A
Diff: 2
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Application
Learning Outcome: 2.3 Compare and contrast the different types of plate boundaries.

15) If you wanted to draw the boundaries of tectonic plates on a world map, which of the following maps would give you the most complete information?
A) active volcanoes
B) mid-ocean ridges
C) earthquake distribution
D) edge of continental shelves
E) hotspots
Answer: C
Diff: 2
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Application
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

16) Which tectonic plate setting is associated with the following features: light to moderate earthquakes; nonexplosive volcanic eruptions; new oceanic lithosphere produced? Mid-Atlantic Ridge is a geographic example.
A) divergent plate boundary
B) convergent plate boundary (subduction zone)
C) convergent plate boundary (collision zone)
D) transform plate boundary
E) hotspot
Answer: A
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.3 Compare and contrast the different types of plate boundaries.

17) Which tectonic plate setting is associated with the following features: great earthquakes; explosive volcanic eruptions; oceanic plate sinks into mantle and remelts? Andes Mountains are a geographic example.
A) divergent plate boundary
B) convergent plate boundary (subduction zone)
C) convergent plate boundary (collision zone)
D) transform plate boundary
E) hotspot
Answer: B
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.3 Compare and contrast the different types of plate boundaries.

18) Which tectonic plate boundary is associated with the following features: major earthquakes; no volcanoes; large and high mountain chain is formed? Himalayan Mountains are a geographic example.
A) divergent plate boundary
B) convergent plate boundary (subduction zone)
C) convergent plate boundary (collision zone)
D) transform plate boundary
E) hotspot
Answer: C
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.3 Compare and contrast the different types of plate boundaries.

19) Which tectonic plate boundary is associated with the following features: strong to major earthquakes; no volcanoes; no mountain chain is formed? San Andreas fault is a geographic example.
A) divergent plate boundary
B) convergent plate boundary (subduction zone)
C) convergent plate boundary (collision zone)
D) transform plate boundary
E) hotspot
Answer: D
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.3 Compare and contrast the different types of plate boundaries.

20) The characteristic type of tectonic plate motion associated with a transform plate boundary is
A) plates move laterally past each other with horizontal motion.
B) plates move directly towards each other and one plate sinks deep into the mantle.
C) plates move directly towards each other and one plate slides beneath the other.
D) plates move directly away from each other.
Answer: A
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.3 Compare and contrast the different types of plate boundaries.

21) Tectonic plates move about as fast as
A) a car moves on a city street.
B) fingernails grow.
C) a swallow flies.
D) a tortoise walks.
E) hotspot.
Answer: B
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

22) Which tectonic plate setting is associated with the following features: volcanic eruptions; magma rises from deep in the mantle; can produce a chain of extinct volcanoes with increasing distance from the active volcano? Yellowstone National Park and Hawaiian islands are geographic examples.
A) divergent plate boundary
B) convergent plate boundary (subduction zone)
C) convergent plate boundary (collision zone)
D) transform plate boundary
E) hotspot
Answer: E
Diff: 1
Section: 2.3 A Detailed look at Seafloor Spreading
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

23) The Hawaiian Islands are an example of
A) two ocean plates converging.
B) two continental plates converging.
C) diverging plates.
D) hotspots.
E) transform plate boundary.
Answer: D
Diff: 1
Section: 2.3 A Detailed look at Seafloor Spreading
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

24) Which statement about the hotspot at Hawaii is **FALSE**?
A) A hotspot at Hawaii explains the presence of active volcanoes far from a tectonic plate boundary.
B) A hotspot is a localized zone of upwelling mantle rock located deep below the moving tectonic plate.
C) The age of volcanic rock in the Hawaiian Islands gets progressively older to the west.
D) Magnetic reversals are the primary cause for the hotspot at Hawaii.
Answer: D
Diff: 1
Section: 2.3 A Detailed look at Seafloor Spreading
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

25) What does paleomagnetism study?
A) magnetism of rocks when their magnetic properties formed
B) magnetism of rock formed during the Ice Age
C) magnetism of the Earth's core
D) magnetism of new magma
E) magnetism of the Earth's poles
Answer: A
Diff: 1
Section: 2.3 A Detailed look at Seafloor Spreading
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

26) What is the importance of magnetic reversals to the theory of plate tectonics?
A) It causes earthquakes.
B) It provides evidence for seafloor spreading.
C) It causes volcanic eruptions.
D) It is associated with mass extinction events.
E) It explains times of rapid change on the Earth's surface.
Answer: B
Diff: 2
Section: 2.3 A Detailed look at Seafloor Spreading
Bloom's Taxonomy: Application
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

27) Geologists tested the model of sea floor spreading by dating rocks from the ocean floor. The model successfully predicted that ocean rocks
A) get younger with increasing distance from a mid-ocean ridge.
B) get older with increasing distance from a mid-ocean ridge.
C) get older moving from south to north along the top of a mid-ocean ridge.
D) show no particular pattern of age with respect to the mid-ocean ridges.
Answer: B
Diff: 2
Section: 2.3 A Detailed look at Seafloor Spreading
Bloom's Taxonomy: Application
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

28) The youngest seafloor rocks are found
A) nearest to the mid-ocean ridges.
B) nearest to the continental shelves.
C) evenly distributed throughout the ocean.
D) underneath the continents.
E) where the ocean is the flattest.
Answer: A
Diff: 2
Section: 2.4 Pangaea and Present Continents
Bloom's Taxonomy: Application
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

29) Reversals of the earth's magnetic polarity
A) occur with a regular periodicity; the next one will happen in about 140 years.
B) have occurred randomly in the past and represent times when the south magnetic pole was swapped in location with the north magnetic pole.
C) have occurred randomly in the past and represent times when the earth turned upside-down
D) are a consequence of major earthquakes.
E) have not happened since the end of the Paleozoic.
Answer: B
Diff: 2
Section: 2.4 Pangaea and Present Continents
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

30) Marine magnetic anomalies are now known to have developed because
A) magnetic reversals were finally shown to be a consequence of variations in the orientation of the earth's magnetic field lines relative to the equator.
B) there are linear strips of iron ore embedded in the seafloor as a consequence of sea-floor spreading.
C) movement at convergent margins tends to distort the earth's magnetic field over broad distances.
D) different strips of seafloor formed at different times on an earth whose magnetic polarity occasionally reverses through geologic time.
E) movement of the continents relative to the magnetic field.
Answer: D
Diff: 2
Section: 2.3 A Detailed look at Seafloor Spreading
Bloom's Taxonomy: Application
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

31) The geographic distribution of the Mesosaurus, a small swimming reptile that lived during the late Paleozoic, shows that the reptile lived on the southwest coast of what is now Africa and the southeast coast of what is now South America. This provides evidence that
A) a land bridge once existed between Africa and South America.
B) the Atlantic Ocean was once much more shallow.
C) Africa and South America were once joined into one continent.
D) migration between Africa and South America was once possible.
E) the Earth was once much smaller in size.
Answer: C
Diff: 2
Section: 2.4 Pangaea and Present Continents
Bloom's Taxonomy: Application
Learning Outcome: 2.5 Outline how plate tectonics has changed the appearance of Earth's surface over time.

32) Where would you find ridge-push, a possible mechanism for driving the motion of tectonic plates?
A) Convergent boundary
B) Divergent boundary
C) Transform fault boundary
D) Hotspot
E) Between a continent and an ocean plate
Answer: B
Diff: 2
Section: 2.5 How Plate Tectonics Works: Putting It Together
Bloom's Taxonomy: Analysis
Learning Outcome: 2.6 Compare and contrast the two fundamental processes that drive plate tectonics.

33) All of the following are forces that may contribute to plate movements **EXCEPT**
A) convection currents within the asthenosphere.
B) centrifugal forces from the rotation of the Earth.
C) the gravitational pull of the Earth on the subducting slabs of oceanic lithosphere.
D) the gravitational pull of the Earth on plates away from the mid-ocean ridges.
Answer: B
Diff: 1
Section: 2.5 How Plate Tectonics Works: Putting It Together
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

34) Which of the following hazards would you expect to see at a divergent plate boundary?
A) moderate strength earthquakes; non-explosive volcanic eruptions; flooding if volcanoes erupt underwater such as in Iceland
B) large earthquakes; explosive volcanic eruptions; landslides and flooding due to long chain of volcanic mountains
C) large earthquakes; no volcanoes; landslides and flooding due to the large plateau of very high mountains
D) large earthquakes; no volcanoes; flooding if the plate boundary is hilly
Answer: A
Diff: 1
Section: 2.6 Plate Tectonics and Hazards
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.7 Link plate tectonic processes to natural hazards.

35) Which of the following hazards would you expect to see at a convergent plate boundary associated with a subduction zone?
A) moderate strength earthquakes; non-explosive volcanic eruptions; flooding if volcanoes erupt underwater such as in Iceland
B) large earthquakes; explosive volcanic eruptions; landslides and flooding due to long chain of volcanic mountains
C) large earthquakes; no volcanoes; landslides and flooding due to the large plateau of very high mountains
D) large earthquakes; no volcanoes; flooding if the plate boundary is hilly
Answer: B
Diff: 1
Section: 2.6 Plate Tectonics and Hazards
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.7 Link plate tectonic processes to natural hazards.

36) Which of the following hazards would you expect to see at a convergent plate boundary associated with a continent-continent collision zone?
A) moderate strength earthquakes; non-explosive volcanic eruptions; flooding if volcanoes erupt underwater such as in Iceland
B) large earthquakes; explosive volcanic eruptions; landslides and flooding due to long chain of volcanic mountains
C) large earthquakes; no volcanoes; landslides and flooding due to the large plateau of very high mountains
D) large earthquakes; no volcanoes; flooding if the plate boundary is hilly
Answer: C
Diff: 1
Section: 2.6 Plate Tectonics and Hazards
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.7 Link plate tectonic processes to natural hazards.

37) Which of the following hazards would you expect to see at a transform plate boundary?
A) moderate strength earthquakes; non-explosive volcanic eruptions; flooding if volcanoes erupt underwater such as in Iceland
B) large earthquakes; explosive volcanic eruptions; landslides and flooding due to long chain of volcanic mountains
C) large earthquakes; no volcanoes; landslides and flooding due to the large plateau of very high mountains
D) large earthquakes; no volcanoes; flooding if the plate boundary is hilly
Answer: D
Diff: 1
Section: 2.6 Plate Tectonics and Hazards
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.7 Link plate tectonic processes to natural hazards.

38) In California, Los Angeles is slowly moving toward San Francisco because the two cities are located on two different tectonic plates with a transform plate boundary in between.
Answer: TRUE
Diff: 1
Section: 2.1 Internal Structure of Earth
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.5 Outline how plate tectonics has changed the appearance of Earth's surface over time.

39) The asthenosphere layer of the Earth is completely liquid.
Answer: FALSE
Diff: 1
Section: 2.1 Internal Structure of Earth
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.1 Describe the basic internal structure and processes of Earth.

40) The Earth is composed of layers that have different properties.
Answer: TRUE
Diff: 1
Section: 2.1 Internal Structure of Earth
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.1 Describe the basic internal structure and processes of Earth.

41) The Earth's core is thought to be hollow.
Answer: FALSE
Diff: 1
Section: 2.1 Internal Structure of Earth
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.1 Describe the basic internal structure and processes of Earth.

42) The mantle is a layer of molten iron metal that surrounds the solid inner core.
Answer: FALSE
Diff: 1
Section: 2.1 Internal Structure of Earth
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.1 Describe the basic internal structure and processes of Earth.

43) Triple junctions are where three tectonic plates border each other.
Answer: TRUE
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

44) The boundaries of tectonic plates are defined by the location of ocean coastlines.
Answer: FALSE
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

45) Tectonic plates move completely continuously at speeds of several centimeters per year.
Answer: FALSE
Diff: 2
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Application
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

46) Earthquakes occur at all tectonic plate boundaries **EXCEPT** transform plate boundaries.
Answer: FALSE
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

47) Volcanism at transform plate boundaries is derived from melting of crustal rock.
Answer: FALSE
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

48) During subduction, one plate sinks under another tectonic plate.
Answer: TRUE
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.3 Compare and contrast the different types of plate boundaries.

49) Tectonic plates are actively separating at convergent plate boundaries and subduction zones.
Answer: FALSE
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.3 Compare and contrast the different types of plate boundaries.

50) Earth's magnetic field is produced from large amounts of magnetic minerals buried within the lower part of the crust.
Answer: FALSE
Diff: 1
Section: 2.3 A Detailed look at Seafloor Spreading
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

51) The oldest ocean crust will tend to occur at the greatest distances from the mid-ocean ridge.
Answer: TRUE
Diff: 2
Section: 2.3 A Detailed look at Seafloor Spreading
Bloom's Taxonomy: Application
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

52) Over geologic time New York City is moving farther away from London, England due to movement associated with the Mid-Atlantic Ridge.
Answer: TRUE
Diff: 2
Section: 2.3 A Detailed look at Seafloor Spreading
Bloom's Taxonomy: Application
Learning Outcome: 2.5 Outline how plate tectonics has changed the appearance of Earth's surface over time.

53) Pangaea refers to the enormous single ocean that was produced when all of the continents were assembled.
Answer: FALSE
Diff: 1
Section: 2.4 Pangaea and Present Continents
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.5 Outline how plate tectonics has changed the appearance of Earth's surface over time.

54) Reconstructing all of the continents into a single supercontinent called Pangaea helps to explain better evidence of ancient glaciation on several continents, especially in terms of ice flow directions.
Answer: TRUE
Diff: 1
Section: 2.4 Pangaea and Present Continents
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.5 Outline how plate tectonics has changed the appearance of Earth's surface over time.

55) Reconstructing all of the continents into a single supercontinent called Pangaea helps to explain better the occurrence of the same fossil plants and animals on different continents.
Answer: TRUE
Diff: 1
Section: 2.4 Pangaea and Present Continents
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.5 Outline how plate tectonics has changed the appearance of Earth's surface over time.

56) Slab pull seems to be a more important driving force for moving tectonic plates than ridge push.
Answer: TRUE
Diff: 1
Section: 2.5 How Plate Tectonics Works: Putting It Together
Bloom's Taxonomy: Knowledge
Learning Outcome: 2.6 Compare and contrast the two fundamental processes that drive plate tectonics.

57) Convergent plate boundaries generally represent a greater hazard to people than divergent or transform plate boundaries due to the threat of major earthquakes, explosive volcanic eruptions, tsunamis, and landslides (associated with the mountain chains).
Answer: TRUE
Diff: 2
Section: 2.6 Plate Tectonics and Hazards
Bloom's Taxonomy: Analysis
Learning Outcome: 2.7 Link plate tectonic processes to natural hazards.

58) Give a description of the lithosphere, crust, asthenosphere, and mantle and explain the relationships between them.
Answer: The crust is the outer rocky layer of Earth. The lithosphere (also called a tectonic plate) includes all of the crust and the upper part of the mantle; it is a relatively cool and brittle material. The asthenosphere is entirely within the mantle; it is a hot and weak layer that flows slowly. The mantle is mostly solid ultramafic igneous rock.
Diff: 2
Section: 2.1 Internal Structure of Earth
Bloom's Taxonomy: Analysis
Learning Outcome: 2.1 Describe the basic internal structure and processes of Earth.

59) Explain the concept of convection. Describe how convection may work in the mantle of the earth.
Answer: Convection is a circular pattern of circulation that probably operates down to depths deep in the mantle; there is hot rising mantle rock at mid-ocean ridges and cool descending mantle rock at subduction zones.
Diff: 1
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

60) Explain how the seafloor is produced. Why does the Earth **NOT** get any bigger or smaller over geologic time?
Answer: Seafloor is produced at mid-ocean ridges (divergent plate boundaries) and it is destroyed by melting at subduction zones (convergent plate boundaries). Because the production of new oceanic crust at mid-ocean ridges is similar to the amount destroyed at subduction zones, the Earth does not get any bigger or smaller over geologic time.
Diff: 2
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Application
Learning Outcome: 2.5 Outline how plate tectonics has changed the appearance of Earth's surface over time.

61) Explain why the location of volcanoes does **NOT** give a complete picture of the location of the plate boundaries.
Answer: Volcanoes are only associated with some of the tectonic plate boundaries (divergent and convergent (subduction)) as well as hotspots, which are not at a tectonic plate boundary. Volcanoes are not associated with transform plate boundaries or continental collision zones.
Diff: 2
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Application
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

62) If you were studying photographs of another planet, what features would you look for to determine whether or not plate tectonic activity is occurring or has ever occurred?
Answer: You might look for linear belts of mountain ranges, volcanoes, or trenches as well as linear fault zones. You might also look for evidence of continental (i.e., granitic) crust and oceanic (i.e., basaltic) crust, which should be at significantly different elevations due to their differences in density. Less dense continental crust should be at significantly higher elevations than denser oceanic crust.
Diff: 3
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Synthesis
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

63) Explain the importance of Paleomagnetism in understanding plate tectonics.
Answer: Paleomagnetic studies (studying the magnetism recorded in rock to understand the nature of Earth's magnetic field in the geologic past) were critical in developing the model of seafloor spreading, which was a precursor model to plate tectonic theory. Specifically paleomagnetic studies were essential in the discovery of magnetic reversals and marine magnetic anomalies, which are key elements of seafloor spreading.
Diff: 2
Section: 2.3 A Detailed look at Seafloor Spreading
Bloom's Taxonomy: Application
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

64) Describe how the Hawaiian Islands were formed and explain how they are evidence for tectonic plate motion.
Answer: The Hawaiian Islands were formed by a hotspot deep in the mantle; as the Pacific plate moved over the Hawaiian Islands' hotspot, a chain of volcanoes was produced.
Diff: 2
Section: 2.3 A Detailed look at Seafloor Spreading
Bloom's Taxonomy: Knowledge, Application
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

65) Describe the theory of continental drift and explain how it relates to plate tectonics.
Answer: Continental drift states that the continents have slowly moved over geologic time; the continents move because they are embedded in the lithosphere which moves as a result of plate tectonics.
Diff: 2
Section: 2.4 Pangaea and Present Continents
Bloom's Taxonomy: Comprehension, Application
Learning Outcome: 2.5 Outline how plate tectonics has changed the appearance of Earth's surface over time.

66) Describe the mechanisms of ridge-push and Slab-pull and explain which one is the more important process in driving plate tectonics.
Answer: In ridge-push there is a gravitational push (like a gigantic landslide) away from the mid-ocean ridge crest toward the subduction zone. Slab-pull occurs when the plate moves far from the ridge and cools, becoming denser. The weight of the dense down-going slab pulls on the entire tectonic plate. Calculations indicate that slab-pull is a more important process in driving plate tectonics.
Diff: 1
Section: 2.5 How Plate Tectonics Works: Putting It Together
Bloom's Taxonomy: Comprehension
Learning Outcome: 2.6 Compare and contrast the two fundamental processes that drive plate tectonics.

67) Explain where the magma for volcanoes at divergent plate boundaries comes from and how it rises to the surface. In this explanation, briefly describe how mantle convection is related to the motion of tectonic plates.
Answer: Hot molten rock from deep in Earth's mantle rises buoyantly toward the base of the lithosphere. Divergence of the oceanic plates along mid-ocean ridges causes some magma to leak out onto the seafloor and some magma below the seafloor to cool, creating new oceanic lithosphere to the edge of the plates. Over geologic time this newly formed oceanic lithosphere is eventually carried away from its source of heat at the divergent plate boundary and will cool. This represents a moving tectonic plate. Once the ocean lithosphere has cooled enough so that its density is similar to that of the underlying asthenosphere, it will be able to sink back down into the mantle at a subduction zone, completing the convection cell.
Diff: 2
Section: 2.2 Plate Tectonics
Bloom's Taxonomy: Application
Learning Outcome: 2.4 Explain the mechanisms of plate tectonics.

68) The Cascade Region of northwestern U.S. is home to a subduction zone. Describe the hazards that can occur in this area. For each hazard, explain how the hazards are caused in the subduction zone.
Answer: Convergent plate boundaries, where one plate dives beneath another, are areas particularly prone to natural hazards. Because of the tectonic plate convergence, pressure builds up and is released when earthquakes occur. As the downgoing plate melts, the magma feeds explosively erupting volcanoes. There is a chain of volcanic mountains, where there is increased precipitation and an abundance of high, steep slopes prone to landslides and flooding.
Diff: 2
Section: 2.6 Plate Tectonics and Hazards
Bloom's Taxonomy: Application
Learning Outcome: 2.7 Link plate tectonic processes to natural hazards.

69) Magnetic reversals have happened throughout most of the Earth's history. Explain how these magnetic reversals have been used as evidence for Seafloor Spreading.
Answer: Geologists have found that Earth's magnetic field has reversed itself many times in the geologic past, i.e., the north and south magnetic poles have swapped position. The timescale of magnetic reversals is used to explain marine magnetic anomalies (variations of high and low magnetic field strength symmetrical on either side of a mid-ocean ridge). Regions of high magnetic field strength (positive anomaly) are interpreted as basalt that formed at the mid-ocean ridge during a normal polarity event (magnetic poles in positions similar to today); regions of low magnetic field strength (negative anomaly) are interpreted as basalt that formed at the mid-ocean ridge during a reversed polarity event (magnetic poles in positions opposite to today).
Diff: 2
Section: 2.3 A Detailed look at Seafloor Spreading
Bloom's Taxonomy: Analysis
Learning Outcome: 2.2 Summarize the various lines of evidence that support the theory of plate tectonics.

70) Using concepts from plate tectonic theory, describe an area that should have many different types of geologic hazards and an area that should have few geologic hazards. NOTE: You do not have to give a specific geographic location, just give the general characteristics in terms of plate tectonic theory.
Answer: An area that is close to a tectonic plate boundary can have many different types of geologic hazards (e.g., earthquakes, volcanoes, mountains/landslides, and rivers/floods), whereas an area that is far from a tectonic plate boundary should have few geologic hazards.
Diff: 3
Section: 2.6 Plate Tectonics and Hazards
Bloom's Taxonomy: Evaluation
Learning Outcome: 2.7 Link plate tectonic processes to natural hazards.