

Earth: An Introduction to Physical Geology, 12e (Tarbuck)
Chapter 2 Plate Tectonics: A Scientific Revolution Unfolds

2.1 Multiple-Choice Questions

1) Which scientist developed the idea of continental drift?

- A) Isaac Newton
- B) Charles Darwin
- C) Albert Einstein
- D) Alfred Wegener

Answer: D

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.2 - Continental Drift: An Idea Before Its Time

Focus/Concepts: 2.2

ESLI LO: 1.5 - Earth scientists use their understanding of the past to forecast Earth's future.

2) Which war was indirectly responsible for the development of the tools that made the theory of plate tectonics possible?

- A) World War I
- B) World War II
- C) Korean War
- D) Vietnam War

Answer: B

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.1 - From Continental Drift to Plate Tectonics

Focus/Concepts: 2.1

ESLI LO: 1.7 - Technological advances, breakthroughs in interpretation, and new observations continuously refine our understanding of Earth.

3) What is the name of the supercontinent proposed by Alfred Wegener?

- A) Pangaea
- B) Rodinia
- C) Amasia
- D) Nuna

Answer: A

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.2 - Continental Drift: An Idea Before Its Time

Focus/Concepts: 2.2

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

- 4) Although the jigsaw-puzzle fit of the southern continents was noted, opponents of continental drift argued that, even if continental displacement had occurred, a good fit between the continents today would be unlikely. What geologic evidence did they cite to support this claim?
- A) Deposition in river deltas had changed the longshore current, resulting in erosion.
 - B) The tensional stress of splitting sheared the continents beyond all repair.
 - C) Wave erosion and coastal deposition have changed the shape of the continents.
 - D) Fissure eruptions along continental margins had created new land.

Answer: C

Diff: 2

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 2 & 7

Section: 2.2 - Continental Drift: An Idea Before Its Time

Focus/Concepts: 2.2

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

- 5) Even before the proposal of continental drift, paleontologists recognized that some sort of land connection was needed to account for the identical fossil organisms found on multiple continents. Select the correct hypothesis or hypotheses these paleontologists developed.

- A) Sea level falling
- B) A chain of island stepping stones
- C) Floating debris used as rafts and sea level rising
- D) A transoceanic land bridge
- E) Island stepping stones, transoceanic land bridge, and floating debris used for rafts

Answer: E

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.2 - Continental Drift: An Idea Before Its Time

Focus/Concepts: 2.2

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

- 6) When the continents were assembled and mountain ranges were matched up, mountains in Scandinavia and the British Isles matched up perfectly with which North American mountain range?

- A) Rocky Mountains
- B) Appalachian Mountains
- C) Sierra Nevada Mountains
- D) Olympic Mountains

Answer: B

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.2 - Continental Drift: An Idea Before Its Time

Focus/Concepts: 2.2

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

7) When considering evidence of glaciation on the southern continents, why did Wegener reject the explanation that the entire planet had experienced a period of extreme cooling?

- A) Because the glacial debris was localized to a few small mountain valleys
- B) Because he knew the "glacial debris" was actually a misinterpreted landslide
- C) Because geologic evidence supported the existence of tropical swamps in the Northern Hemisphere
- D) Because the $^{16}\text{O}/^{18}\text{O}$ ratios in fossils supported an ice-free period

Answer: C

Diff: 2

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.2 - Continental Drift: An Idea Before Its Time

Focus/Concepts: 2.2

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

8) In which decade was the theory of plate tectonics developed?

- A) 1940s
- B) 1960s
- C) 1970s
- D) 1990s

Answer: B

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

9) In the mid-twentieth century, researchers dredging the seafloor could not find any materials older than _____.

- A) 10,000 years
- B) 1.2 million years
- C) 180 million years
- D) 1.5 billion years

Answer: C

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 2.4 - Earth's crust has two distinct types: continental and oceanic.

10) Which of the following is **not** one of the major tectonic plates on the Earth's surface?

- A) Juan de Fuca Plate
- B) North American Plate
- C) African Plate
- D) Pacific Plate

Answer: A

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

11) The lithosphere is composed of the _____ and the rigid part of the _____.

- A) outer core; inner core
- B) mantle; outer core
- C) crust; lower mantle
- D) crust; upper mantle

Answer: D

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

12) Which type of plate boundary accounts for the smallest percentage of all plate boundaries on the surface of the Earth?

- A) Convergent boundaries
- B) Divergent boundaries
- C) Transform boundaries

Answer: C

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

13) Continental crust is mainly composed of _____, whereas oceanic crust is mainly composed of _____.

- A) olivine; basalt
- B) limestone; gabbro
- C) granite; basalt
- D) gabbro; granite

Answer: C

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 2.4 - Earth's crust has two distinct types: continental and oceanic.

14) Why are the mid-ocean ridges higher in elevation than the surrounding ocean floor?

- A) The force of magma extruding from the fissure pushes the seafloor up.
- B) Warmer material near the ridge is less dense, so it is more buoyant on the mantle.
- C) The collision of the tectonic plates is forcing material higher.
- D) Thermal springs developing in stress fractures are depositing large volumes of material, increasing the height.

Answer: B

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.5 - Divergent Plate Boundaries and Seafloor Spreading

Focus/Concepts: 2.5

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

15) Continental rifting is occurring today in _____.

- A) western California (San Andreas Fault)
- B) between Minnesota and Wisconsin (mid-continent rift)
- C) the Pacific Northwest (Cascadia subduction zone)
- D) Ethiopia and Kenya (East African Rift valley)

Answer: D

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.5 - Divergent Plate Boundaries and Seafloor Spreading

Focus/Concepts: 2.5

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

16) At a _____, an oceanic plate will be forced beneath another plate because of differences in density.

- A) subduction zone
- B) continental rift
- C) transform boundary
- D) collision zone

Answer: A

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.7 - Landscapes result from the dynamic interplay between processes that form and uplift new crust and processes that destroy and depress the crust.

17) Think about what happens to the density of an oceanic plate as it ages and cools. How will the age and temperature of the subducting plate affect its angle of descent?

- A) Old, cool plates will have a shallow angle of descent.
- B) Old, warm plates will have a steeper angle of descent.
- C) Young, warm plates will have a shallow angle of descent.
- D) Young, cool plates will have a steeper angle of descent.

Answer: A

Diff: 2

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.7 - Landscapes result from the dynamic interplay between processes that form and uplift new crust and processes that destroy and depress the crust.

18) A _____ is a geographic low, which marks the location where oceanic lithosphere descends into the mantle.

- A) fold and thrust mountain
- B) deep-ocean trench
- C) seismic zone
- D) mid-ocean rift

Answer: B

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.7 - Landscapes result from the dynamic interplay between processes that form and uplift new crust and processes that destroy and depress the crust.

19) Which type of convergence will result in a continental volcanic arc?

- A) Oceanic-continental
- B) Oceanic-oceanic
- C) Continental-continental

Answer: A

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

20) Which type of convergence will result in a volcanic island arc?

- A) Oceanic-continental
- B) Oceanic-oceanic
- C) Continental-continental

Answer: A

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

21) Where are the majority of transform faults located?

- A) Southern California
- B) On the ocean floor offsetting segments of oceanic ridge
- C) Radiating from convergent boundaries as stress fractures
- D) Along mountain ranges that have been thrust up due to collision

Answer: B

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.7 - Transform Plate Boundaries

Focus/Concepts: 2.7

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

22) What is a mantle plume?

- A) The magma that rises up from the mantle at a divergent plate boundary
- B) Material rising up from a subducting plate going through partial melting
- C) A form of batholith composed of ferromagnesian materials
- D) An upwelling of hot material from the Earth's interior that is cylindrical in shape

Answer: D

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.9 - Testing the Plate Tectonics Model

Focus/Concepts: 2.9

ESLI LO: 4.2 - Earth, like other planets, is still cooling, though radioactive decay continuously generates heat.

23) _____ occurs when magnetic minerals in lavas align their magnetic fields with magnetic north, preserving a record of that pole's location at that moment in time.

- A) A mantle plume
- B) Paleomagnetism
- C) Magnetic reversal
- D) Seafloor spreading

Answer: B

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.9 - Testing the Plate Tectonics Model

Focus/Concepts: 2.9

ESLI LO: 4.3 - Earth's interior is in constant motion through the process of convection, with important consequences for the surface.

24) A typical rate of seafloor spreading in the Atlantic Ocean is _____.

- A) 2 meters per year
- B) 0.1 inches per year
- C) 20 feet per year
- D) 2 centimeters per year

Answer: D

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.5 - Divergent Plate Boundaries and Seafloor Spreading

Focus/Concepts: 2.5

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

25) All of the following offer additional evidence supporting the theory of plate tectonics except for _____.

- A) changes in the Moon's orbit due to shifting plates
- B) ocean floor sediment cores
- C) hot spots
- D) measurements of plate motions

Answer: A

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.9 - Testing the Plate Tectonics Model

Focus/Concepts: 2.9

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

26) Where is the top of the asthenosphere closest to Earth's surface?

- A) Along a mid-ocean ridge
- B) Above a deep mantle plume
- C) Along a transform fault
- D) Along a subduction zone

Answer: A

Diff: 2

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.5 - Divergent Plate Boundaries and Seafloor Spreading

Focus/Concepts: 2.5

ESLI LO: 4.3 - Earth's interior is in constant motion through the process of convection, with important consequences for the surface.

27) Which of the following statements best describes the tectonic setting for Mount St. Helens and the other Cascade volcanoes?

- A) A chain of young, active volcanoes built on a continental margin above a sinking slab of oceanic lithosphere
- B) A chain of old, inactive volcanoes built while western North America moved over a mantle plume
- C) Old, deeply eroded volcanoes built before the Pacific Ocean existed
- D) Young, deeply eroded, basaltic volcanoes built when western North America was over the present-day site of the Hawaiian hot spot

Answer: A

Diff: 2

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 2 & 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

28) How did researchers in the mid-twentieth century obtain ocean floor samples in order to determine the age of the seafloor?

- A) Satellite imagine images
- B) Deep-diving manned submersibles
- C) Hydraulic vacuum tubes
- D) Drilling ships

Answer: D

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.10 - How Is Plate Motion Measured?

Focus/Concepts: 2.10

ESLI LO: 1.3 - Earth science investigations take many different forms.

29) Samples from the seafloor around the Mid-Atlantic Ridge and the East Pacific Rise show that both areas have been creating new material in the last five million years. Samples from the East Pacific Rise show the five-million-year-old seafloor is three times as wide as similarly aged material from the Mid-Atlantic Ridge. What does this say about the rate of seafloor spreading in the East Pacific?

- A) The seafloor at both sites is growing at the same rate.
- B) The seafloor at the East Pacific Rise is growing more slowly.
- C) The seafloor at the Mid-Atlantic is growing more quickly.
- D) The seafloor at the Mid-Atlantic is growing more slowly.

Answer: D

Diff: 2

Bloom's Taxonomy: Applying/Analyzing

Global Sci Out: 2

Section: 2.10 - How Is Plate Motion Measured?

Focus/Concepts: 2.10

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

30) What two pieces of information would researchers need to have in order to calculate the rate of plate motion for seafloor spreading?

- A) Age of the continent and depth of the water
- B) Distance from the rift and age of seafloor sample
- C) Age of the seafloor sample and age of the continent
- D) Type of rock and distance from the rift

Answer: B

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.10 - How Is Plate Motion Measured?

Focus/Concepts: 2.10

ESLI LO: 1.3 - Earth science investigations take many different forms.

31) How can GPS receivers and satellites be used to monitor plate motion?

- A) GPS receivers are placed on landmasses to track their locations.
- B) Satellites send lasers to measure the distance to continents.
- C) GPS receivers send signals to each other to see if the units are getting closer together.
- D) Satellites track seafloor spreading.

Answer: C

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.10 - How Is Plate Motion Measured?

Focus/Concepts: 2.10

ESLI LO: 1.3 - Earth science investigations take many different forms.

32) How can the orientation of transform faults provide information about the direction of plate motion?

- A) Transform faults are oriented perpendicular to the direction of plate motion.
- B) Transform faults radiate out from the rift zone located in the center.
- C) Transform faults are parallel to the direction of plate motion.
- D) Transform faults are parallel to convergent boundaries.

Answer: C

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 2

Section: 2.10 - How Is Plate Motion Measured?

Focus/Concepts: 2.10

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

33) Which is denser: a 100-million-year-old oceanic lithosphere near a convergent boundary, a 15-million-year-old oceanic lithosphere near a rift, or the upper part of the asthenosphere?

- A) A 15-million-year-old oceanic lithosphere
- B) 100-million-year-old oceanic lithosphere
- C) Upper asthenosphere
- D) They all have the same density.

Answer: B

Diff: 2

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 2

Section: 2.11 - What Drives Plate Motions?

Focus/Concepts: 2.11

ESLI LO: 4.7 - Landscapes result from the dynamic interplay between processes that form and uplift new crust and processes that destroy and depress the crust.

34) What generates the heat necessary for convection in the Earth?

- A) Volcanic eruptions
- B) Friction between moving slabs
- C) Chemical reactions between geologic materials and hydrothermal fluids
- D) Decay of radioactive materials

Answer: D

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.11 - What Drives Plate Motions?

Focus/Concepts: 2.11

ESLI LO: 4.2 - Earth, like other planets, is still cooling, though radioactive decay continuously generates heat.

35) What is slab pull?

- A) Cold oceanic lithosphere is pulled below warmer asthenosphere.
- B) Cold continental lithosphere is pulled below warmer asthenosphere.
- C) Cold continental lithosphere is pulled below warmer oceanic lithosphere.
- D) Warmer oceanic lithosphere is pulled below colder asthenosphere.

Answer: A

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.11 - What Drives Plate Motions?

Focus/Concepts: 2.11

ESLI LO: 4.7 - Landscapes result from the dynamic interplay between processes that form and uplift new crust and processes that destroy and depress the crust.

36) Along which tectonic boundary is ridge push going to be most important in helping to drive plate motion?

- A) Convergent boundary
- B) Divergent boundary
- C) Transform boundary

Answer: B

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.11 - What Drives Plate Motions?

Focus/Concepts: 2.11

ESLI LO: 4.7 - Landscapes result from the dynamic interplay between processes that form and uplift new crust and processes that destroy and depress the crust.

37) Which factor contributes the most toward plate motion at a convergent boundary?

- A) Ridge push
- B) Mantle drag
- C) Slab pull
- D) Friction

Answer: C

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 2

Section: 2.11 - What Drives Plate Motions?

Focus/Concepts: 2.11

ESLI LO: 4.7 - Landscapes result from the dynamic interplay between processes that form and uplift new crust and processes that destroy and depress the crust.

38) In which layer of the Earth does the convection necessary for plate motion occur?

- A) Crust
- B) Mantle
- C) Outer core
- D) Inner core

Answer: B

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.11 - What Drives Plate Motions?

Focus/Concepts: 2.11

ESLI LO: 4.3 - Earth's interior is in constant motion through the process of convection, with important consequences for the surface.

39) Which model of convection describes how the interior is divided into several levels of convection cells?

- A) Layer cake model
- B) Whole-mantle convection
- C) Plume model
- D) Differentiation model

Answer: A

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.11 - What Drives Plate Motions?

Focus/Concepts: 2.11

ESLI LO: 4.3 - Earth's interior is in constant motion through the process of convection, with important consequences for the surface.

40) In the whole-mantle convection model, what feature balances the deeply descending lithosphere by transporting hot material toward the surface?

- A) Kimberlites
- B) Decompression melting
- C) Mantle plumes
- D) Rift zones

Answer: C

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.11 - What Drives Plate Motions?

Focus/Concepts: 2.11

ESLI LO: 4.3 - Earth's interior is in constant motion through the process of convection, with important consequences for the surface.

41) During what time period did scientists first notice the jigsaw puzzle fit of the southern continents?

- A) 1600s
- B) 1750s
- C) 1800s
- D) 1910s

Answer: A

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.2 - Continental Drift: An Idea Before Its Time

Focus/Concepts: 2.2

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

42) Which of the following best explains the global distribution of plant species, such as the *Glossopteris*, during the Mesozoic?

- A) Seeds were small, so they could be carried by the wind.
- B) Seeds were ingested by animals and later deposited in scat.
- C) The landmasses were joined and the plant had a large geographic extent.
- D) Oceans that transgressed on the continents carried the seeds to different locations.

Answer: C

Diff: 2

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.2 - Continental Drift: An Idea Before Its Time

Focus/Concepts: 2.2

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

43) Where is oceanic lithosphere thickest and why?

- A) Along oceanic ridges because it is newest there
- B) Furthest from the spreading center because the older oceanic crust is cooler
- C) In the middle of the tectonic plate as it has not been scraped off during subduction
- D) Close to the subduction zone boundary because continental material is added to it

Answer: B

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 2 & 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

44) The lithosphere is broken into _____ major plates and many minor plates.

- A) seven
- B) nine
- C) twelve
- D) fifteen

Answer: D

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

45) Which of the following statements regarding the global oceanic ridge system is correct?

- A) The ridge system marks the deepest locations on the Earth's surface.
- B) The ridge system marks the locations of most mantle plumes in the mantle.
- C) The ridge system is the longest topographic feature on the Earth's surface.
- D) The ridge system has an extensive submarine canyon system.

Answer: C

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.5 - Divergent Plate Boundaries and Seafloor Spreading

Focus/Concepts: 2.5

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

46) Another name for a _____ boundary is a destructive boundary.

- A) convergent
- B) divergent
- C) transform

Answer: A

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

47) Which of the following makes it possible for oceanic crust created at divergent boundaries to be carried to the sites of destruction at convergent boundaries?

- A) Transform boundaries that accommodate plate motion
- B) Seawater seeping into plate fractures to lubricate the rocks
- C) Magma plutons weighing the crust down at convergent boundaries, pulling the slab
- D) Alignment of magnetic fields in iron particles

Answer: A

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.7 - Transform Plate Boundaries

Focus/Concepts: 2.7

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

48) Which of the following plate boundaries is not usually associated with volcanism?

- A) Convergent
- B) Divergent
- C) Transform

Answer: C

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.7 - Transform Plate Boundaries

Focus/Concepts: 2.7

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

49) A convergent boundary is usually associated with which physical features?

- A) Rift valleys
- B) Volcanic arcs
- C) Horizontally displaced rocks
- D) Submarine trenches
- E) Volcanic arcs and submarine trenches

Answer: E

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

50) Which two continents did Wegener cite as having the best evidence of a close coastline fit?

- A) North America and Europe
- B) South America and Africa
- C) Europe and Africa
- D) India and Asia

Answer: B

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.2 - Continental Drift: An Idea Before Its Time

Focus/Concepts: 2.2

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

51) The _____ is a hotter, weaker region in the mantle that lies below the lithosphere and responds to forces by flowing.

- A) asthenosphere
- B) outer core
- C) inner core
- D) atmosphere
- E) crust

Answer: A

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

52) Which is least dense?

- A) Oceanic lithosphere
- B) Mantle
- C) Continental lithosphere
- D) Asthenosphere

Answer: C

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

53) _____ is the name of the process by which new seafloor is generated at mid-ocean ridges.

- A) Subduction
- B) Seafloor spreading
- C) Convection
- D) Melting

Answer: B

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.5 - Divergent Plate Boundaries and Seafloor Spreading

Focus/Concepts: 2.5

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

54) _____ and _____ drive water from the pores of a subducted oceanic plate, which leads to partial melting.

- A) Compression; tension
- B) Air; heat
- C) Heat; pressure
- D) Salt; oil

Answer: C

Diff: 2

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.7 - Landscapes result from the dynamic interplay between processes that form and uplift new crust and processes that destroy and depress the crust.

55) Lava solidifying during a period of reverse polarity will align the magnetic fields of its iron particles toward the _____ pole.

- A) East
- B) West
- C) North
- D) South

Answer: D

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.9 - Testing the Plate Tectonics Model

Focus/Concepts: 2.9

ESLI LO: 4.3 - Earth's interior is in constant motion through the process of convection, with important consequences for the surface.

2.2 True/False Questions

1) The majority of divergent plate boundaries are associated with oceanic ridges.

Answer: TRUE

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.5 - Divergent Plate Boundaries and Seafloor Spreading

Focus/Concepts: 2.5

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

2) Subduction zones will only develop between a continental plate and an oceanic plate.

Answer: FALSE

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

3) An oceanic plate that has been permeated by water before subduction will trigger melting sooner than a "dry" oceanic plate.

Answer: TRUE

Diff: 2

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.7 - Landscapes result from the dynamic interplay between processes that form and uplift new crust and processes that destroy and depress the crust.

4) The magnetic poles roughly correspond to the locations of the geographic poles.

Answer: TRUE

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.9 - Testing the Plate Tectonics Model

Focus/Concepts: 2.9

ESLI LO: 4.3 - Earth's interior is in constant motion through the process of convection, with important consequences for the surface.

2.3 Matching Questions

Match the tectonic boundary with its direction of motion.

- A) Two plates pull apart from each other
- B) Two plates slide past each other
- C) Two plates move toward each other

1) Convergent boundary

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

2) Divergent boundary

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

3) Transform boundary

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

Answers: 1) C 2) A 3) B

Match the tectonic boundary with the effect on the crust.

- A) Crust is being created
- B) Crust is being conserved
- C) Crust is being destroyed

4) Convergent boundary

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.5, 2.6 & 2.7

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

5) Divergent boundary

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.5, 2.6 & 2.7

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

6) Transform boundary

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.5, 2.6 & 2.7

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

Answers: 4) C 5) A 6) B

Match the tectonic boundary with the type of stress affecting it.

- A) Shear
- B) Compression
- C) Tension

7) Convergent boundary

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

8) Divergent boundary

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.5 - Divergent Plate Boundaries and Seafloor Spreading

Focus/Concepts: 2.5

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

9) Transform boundary

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.7 - Transform Plate Boundaries

Focus/Concepts: 2.7

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

Answers: 7) B 8) C 9) A

Match the convergent boundary with a real-world example.

- A) North American and Juan de Fuca plates
- B) Indian and Eurasian plates
- C) Pacific and Philippine plates

10) Oceanic-continental

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 2 & 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

11) Oceanic-oceanic

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 2 & 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

12) Continental-continental

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 2 & 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

Answers: 10) A 11) C 12) B

2.4 Essay Questions

1) Explain how geologists regarded the positions of the ocean basins and the continents prior to the advent of plate tectonics and how that perspective differs from how modern geologists regard those same features.

Answer: Prior to the 1960s, geologists viewed the ocean basins and continents as fixed features: they neither grew nor moved. They also believed both were incredibly old. However, after the development of the theory of plate tectonics in the 1960s, geologists realized that the continents do migrate across the globe, a process that changes the size and shape of the ocean basins. As a result, some ocean basins are much younger than was previously believed.

Diff: 3

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7 & 8

Section: 2.1 - From Continental Drift to Plate Tectonics

Focus/Concepts: 2.1

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

2) When continental drift was first proposed in 1912, geologists from one specific continent strongly opposed the idea. Which continent's geologists were against the idea, and why did they have difficulty accepting it? (Think about where the evidence for continental drift is very clear.)

Answer: Geologists from North America were strongly against the idea of continental drift. Part of the reason behind their reluctance was that the strongest evidence to support it was found in the southern continents (Africa, South America, and Australia), the geology of which was not as well known to North American scientists.

Diff: 2

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7 & 8

Section: 2.1 - From Continental Drift to Plate Tectonics

Focus/Concepts: 2.1

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

3) The acceptance of plate tectonics after the initial rejection of continental drift has been described as a scientific revolution. Explain why plate tectonics was so revolutionary and what tools were used to bring it about.

Answer: Scientists initially held onto the belief that the continents and ocean basins were fixed objects, both of which dated back to the earliest days of the Earth. When continental drift was proposed, which challenged this belief, scientists had difficulty accepting it because the evidence was not as clear outside the southern continents. After World War II, modern tools like sonar, ocean drilling, and magnetometers were used to gather evidence about the age and bathymetry of the seafloor. This evidence (seafloor spreading and paleomagnetism) was used to support continental drift and develop the modern theory of plate tectonics.

Diff: 3

Bloom's Taxonomy: Evaluating/Creating

Global Sci Out: 7 & 8

Section: 2.1 - From Continental Drift to Plate Tectonics, 2.8 - Testing the Plate Tectonics Model

Focus/Concepts: 2.1 & 2.8

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

4) Scientific research supports the existence of Alfred Wegener's proposed supercontinent, Pangaea, approximately 300 million years ago. Pangaea subsequently broke apart, and the pieces—our modern continents—migrated to the positions they occupy today. Based on your knowledge of the mechanics of tectonic motion, do you think there is a likelihood of another supercontinent forming? If so, where?

Answer: The break-up of Pangaea led to the creation of the Atlantic Ocean. The divergent plate boundary that exists today is still spreading, enlarging the basin and pushing North America, South America, Europe, and Africa farther apart. As this basin grows, the Pacific Ocean basin shrinks due to the convergent plate boundaries around the margins of the Pacific plate. Recent studies indicate that the North American and Eurasian continents will meet over the North Pole (<http://www.nature.com/nature/journal/v482/n7384/full/nature10800.html>), though it would be reasonable for students to suggest that the next supercontinent would form in the Northern Pacific.

Diff: 3

Bloom's Taxonomy: Evaluating/Creating

Global Sci Out: 2 & 8

Section: 2.9 - Testing the Plate Tectonics Model; 2.10 - How Is Plate Motion Measured?

Focus/Concepts: 2.9 & 2.10

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

5) Why would using the continental shelves to reassemble the continents provide a better fit than using the shorelines of the continents?

Answer: The shorelines are continuously eroded by waves or are being built out by longshore currents, fluvial deposition, and so on. These processes change the shapes of the continents over time. The continental shelves are currently several hundred feet below the erosive power of the waves, so they are left relatively untouched.

Diff: 2

Bloom's Taxonomy: Applying/Analyzing

Global Sci Out: 7 & 8

Section: 2.2 - Continental Drift: An Idea Before Its Time

Focus/Concepts: 2.2

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

6) Mesosaurus is a small freshwater reptile that existed in the Permian Period. It is only found in black shale deposits in eastern South America and southwestern Africa. If the Mesosaurus is an aquatic reptile and the continents are currently separated by an ocean, evaluate why the Mesosaurus would be used as strong evidence **in favor** of continental drift rather than as evidence **against** it.

Answer: First, Mesosaurus is a freshwater reptile. It would not have been able to survive the trip across the southern Atlantic Ocean. Second, if it were able to swim such great distances as to be able to cross an ocean, it would be reasonable to assume Mesosaurus remains would be more widespread.

Diff: 2

Bloom's Taxonomy: Evaluating/Creating

Global Sci Out: 2 & 8

Section: 2.2 - Continental Drift: An Idea Before Its Time

Focus/Concepts: 2.2

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

7) Which two aspects of continental drift were most objectionable to scientists of the early twentieth century? Why?

Answer:

- Mechanism for continental drift: Wegener proposed that gravitational forces from the Sun and Moon that produce tides could gradually move the continents. However, if those forces were strong enough to move continents, the Earth's rotation would also have ceased.

- Continental rocks versus oceanic rocks: Wegener proposed that the continental landmasses broke through the thinner oceanic crust like an ice breaker. However, there was no evidence at the time to suggest such a feat was possible without severe deformation of the continents.

Diff: 2

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7 & 8

Section: 2.3 - The Great Debate

Focus/Concepts: 2.3

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

8) Explain how the shapes of polar wandering paths for Europe and North America and the locations of those continents can be used to support the existence of Pangaea.

Answer: For the first 300 million years, the polar wandering paths for both continents were similar in shape and direction to the pole but were separated by several thousand miles. Starting in the middle of the Mesozoic, both paths began to converge on the North Pole. If these two continents are joined, these polar wandering paths overlap, supporting a unified supercontinent.

Diff: 3

Bloom's Taxonomy: Applying/Analyzing

Global Sci Out: 2 & 8

Section: 2.9 - Testing the Plate Tectonics Model

Focus/Concepts: 2.9

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

9) Lava lamps are commonly used to illustrate how convection cells in the mantle convey heat from the core to the exterior of the Earth. Explain how convection works, using a lava lamp as a proxy for the Earth.

Answer: The bulb at the base of the lamp warms the wax in the lamp. The thermal energy from the absorbed heat causes the atoms of the wax to move farther apart, making the wax less dense and allowing it to rise. Once at the top, the wax begins to cool, losing thermal energy. The atoms of wax move closer together, making the wax denser and forcing it to sink. Once the wax gets near the bulb again, it begins to warm again and the process starts all over.

Diff: 2

Bloom's Taxonomy: Applying/Analyzing

Global Sci Out: 2 & 8

Section: 2.11 - What Drives Plate Motions?

Focus/Concepts: 2.11

ESLI LO: 4.3 - Earth's interior is in constant motion through the process of convection, with important consequences for the surface.

10) Alfred Wegener provided several pieces of evidence supporting the idea that the planet's continents were once joined in a single landmass. List three of them.

Answer: Answers will vary but can include any three of the following:

- Jigsaw puzzle fit of the southern continents
- Matching fossils of multiple continents
- Matching mountain ranges across multiple continents
- Matching rock types across multiple continents
- Matching glacial debris on multiple continents

Diff: 2

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7 & 8

Section: 2.2 - Continental Drift: An Idea Before Its Time

Focus/Concepts: 2.2

ESLI LO: 1.6 - Earth scientists construct models of Earth and its processes that best explain the available geologic evidence.

11) How does the temperature of the lithosphere and that of the asthenosphere affect those layers' rigidities and responses when force is applied?

Answer: The lithosphere is cooler and more rigid, so will bend or break when force is applied. The asthenosphere is warmer and more pliable, so will flow when force is applied.

Diff: 2

Bloom's Taxonomy: Applying/Analyzing

Global Sci Out: 2 & 8

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

12) There is an expression in American society that it would only take one good earthquake and the state of California would sink into the ocean. Using what you know about plate boundaries, evaluate this statement.

Answer: The largest plate boundary in California is a transform boundary, which primarily moves horizontally, not vertically.

Diff: 2

Bloom's Taxonomy: Evaluating/Creating

Global Sci Out: 2 & 8

Section: 2.4 - The Theory of Plate Tectonics; 2.7 - Transform Plate Boundaries

Focus/Concepts: 2.7

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

13) If there is no compositional difference between two oceanic plates, what other factor will determine which plate will become the subducted one and why? (What other factor can control density?)

Answer: Temperature, which is a function of age. - Colder plates are denser and therefore will become the subducted plate.

Diff: 2

Bloom's Taxonomy: Applying/Analyzing

Global Sci Out: 2 & 8

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.7 - Landscapes result from the dynamic interplay between processes that form and uplift new crust and processes that destroy and depress the crust.

14) If new plate material is being created at divergent plate boundaries, is the Earth growing larger? Explain why or why not.

Answer: No. The Earth is remaining the same size because although new plate material is being created, old plate material is being destroyed at convergent boundaries.

Diff: 3

Bloom's Taxonomy: Remembering/Understanding

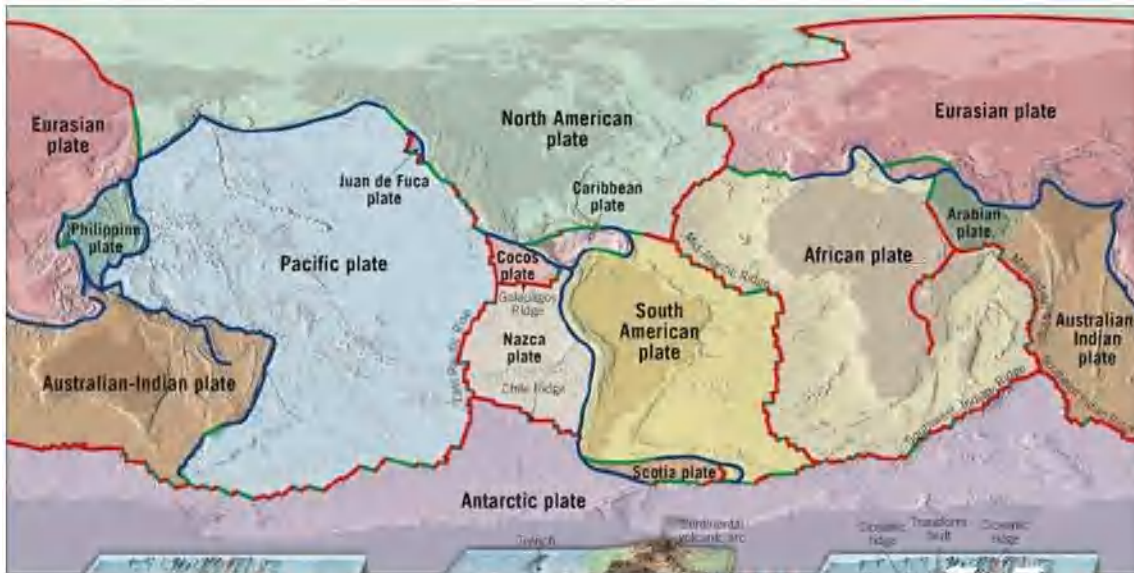
Global Sci Out: 2 & 8

Section: 2.5 - Divergent Plate Boundaries and Seafloor Spreading; 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.5 & 2.6

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

2.5 Visual Questions



Using the map provided, locate three continental plates and three oceanic plates. Match the correct label with the correct plate.

- A) Oceanic Plate
- B) Continental Plate

1) Pacific Plate

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

2) North American Plate

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

3) Nazca Plate

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

4) Philippine Plate

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

5) Eurasian Plate

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

6) African Plate

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

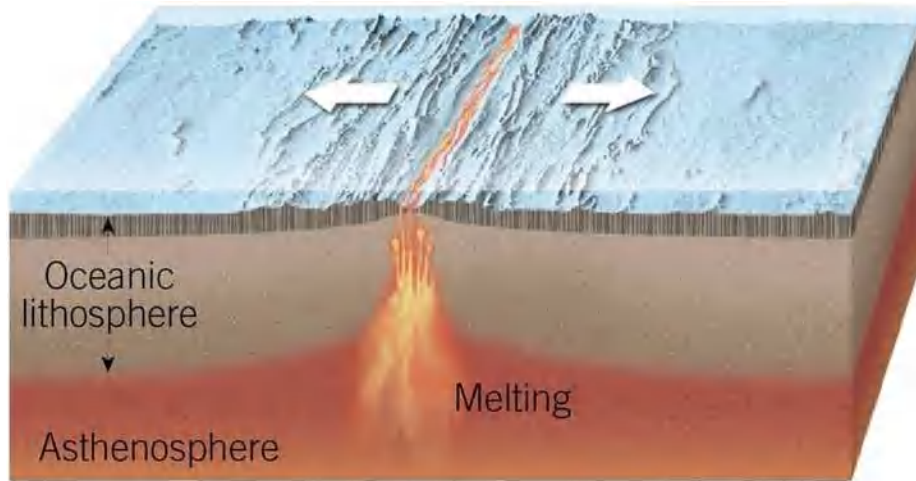
Section: 2.4 - The Theory of Plate Tectonics

Focus/Concepts: 2.4

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

Answers: 1) A 2) B 3) A 4) A 5) B 6) B

7)



Using the block diagram provided, explain how new plate material is created at a divergent plate boundary. Make sure your answer includes a discussion on the forces at work and the generation of magma beneath the rift.

Answer: Tensional stress pulls the plates apart, creating a rift between them. The creation of the rift means that there is not as much force (the weight of the overlying plates) pushing down on that part of the mantle, which results in decompression melting that generates magma. Magma is less dense than the surrounding rock and rises up, filling the gap between the two plates. However, the plates are still being pulled apart, so the new material is also pulled apart, with part of it adhering to each plate.

Diff: 2

Bloom's Taxonomy: Applying/Analyzing

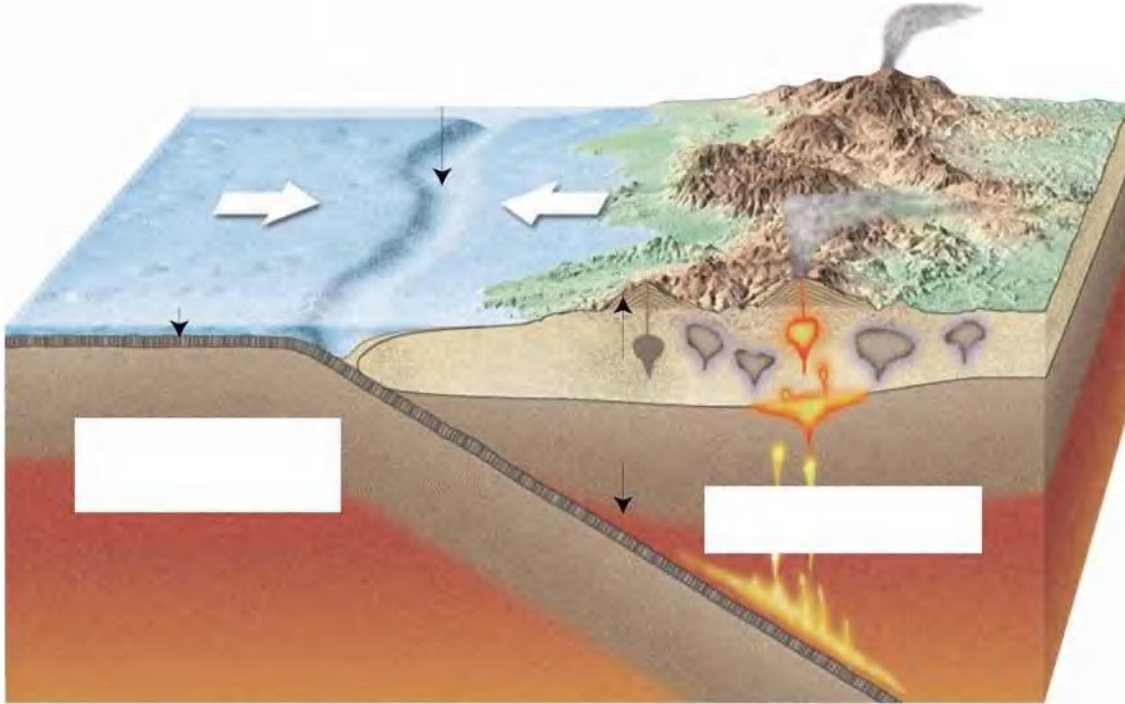
Global Sci Out: 2 & 8

Section: 2.5 - Divergent Plate Boundaries and Seafloor Spreading

Focus/Concepts: 2.5

ESLI LO: 4.5 - Many active geologic processes occur at plate boundaries.

Match the oceanic and continental lithospheres with their positions on the figure below.



- A) on the left
- B) on the right

8) Oceanic Plate

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

Global Sci Out: 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

9) Continental Plate

Diff: 1

Bloom's Taxonomy: Remembering/Understanding

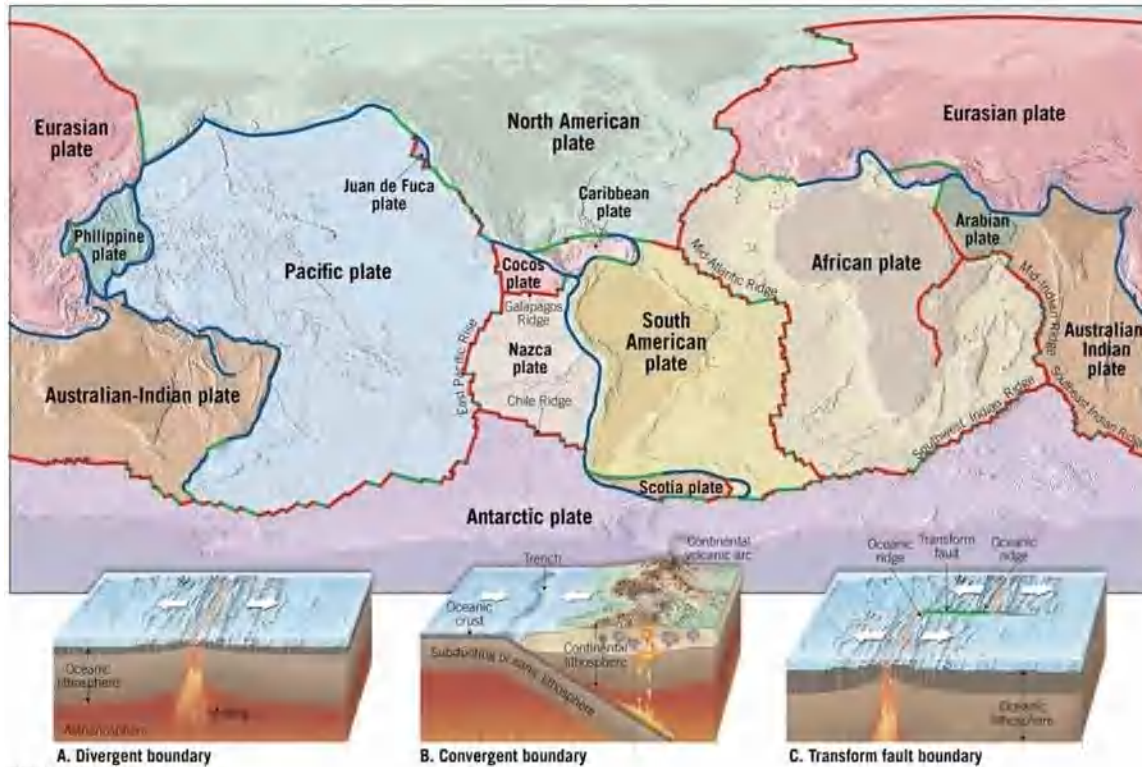
Global Sci Out: 7

Section: 2.6 - Convergent Plate Boundaries and Subduction

Focus/Concepts: 2.6

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

Answers: 8) A 9) B



Using the figure above, indicate which boundaries are convergent, divergent, and transform.

- A) Transform
- B) Divergent
- C) Convergent

10) Pacific/North American boundary

Diff: 1

Bloom's Taxonomy: Applying/Analyzing

Global Sci Out: 2 & 3

Section: 2.7 - Transform Plate Boundaries

Focus/Concepts: 2.7

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

11) Nazca/South American boundary

Diff: 1

Bloom's Taxonomy: Applying/Analyzing

Global Sci Out: 2 & 3

Section: 2.7 - Transform Plate Boundaries

Focus/Concepts: 2.7

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

12) Pacific/Antarctic boundary

Diff: 1

Bloom's Taxonomy: Applying/Analyzing

Global Sci Out: 2 & 3

Section: 2.7 - Transform Plate Boundaries

Focus/Concepts: 2.7

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

13) African/South American boundary

Diff: 1

Bloom's Taxonomy: Applying/Analyzing

Global Sci Out: 2 & 3

Section: 2.7 - Transform Plate Boundaries

Focus/Concepts: 2.7

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

14) Caribbean/North American boundary

Diff: 1

Bloom's Taxonomy: Applying/Analyzing

Global Sci Out: 2 & 3

Section: 2.7 - Transform Plate Boundaries

Focus/Concepts: 2.7

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

15) African/Eurasian boundary

Diff: 1

Bloom's Taxonomy: Applying/Analyzing

Global Sci Out: 2 & 3

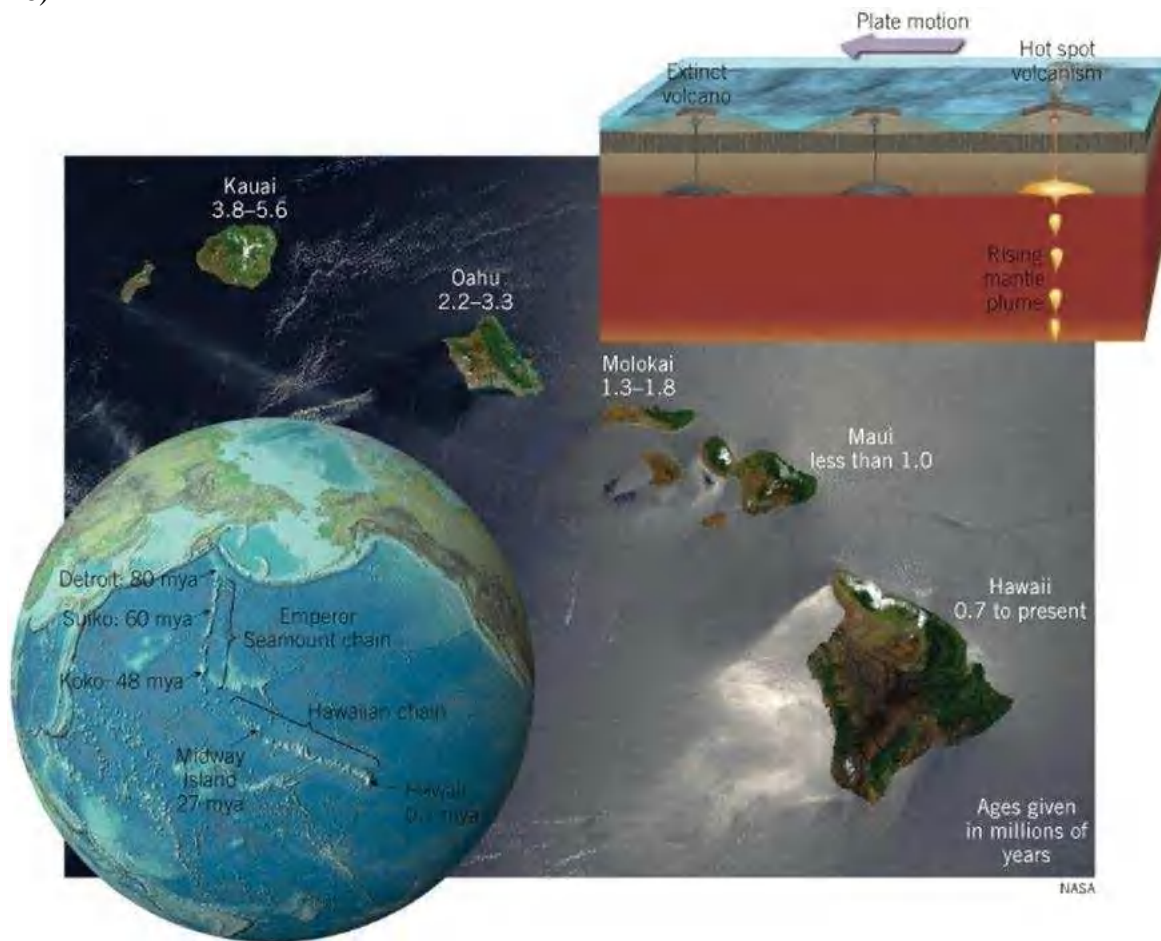
Section: 2.7 - Transform Plate Boundaries

Focus/Concepts: 2.7

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

Answers: 10) C 11) C 12) B 13) B 14) A 15) A

16)



The Hawaiian mantle plume has left a chain of volcanic islands and seamounts stretching back for ~70 million years. Although the mantle plume has remained relatively stationary, the Pacific plate above it has moved. Use the figure to answer the following question.

What direction was the Pacific plate moving between 65 and 43 million years ago?

- A) North
- B) Southeast
- C) East
- D) West
- E) Northwest

Answer: A

Diff: 2

Bloom's Taxonomy: Applying/Analyzing

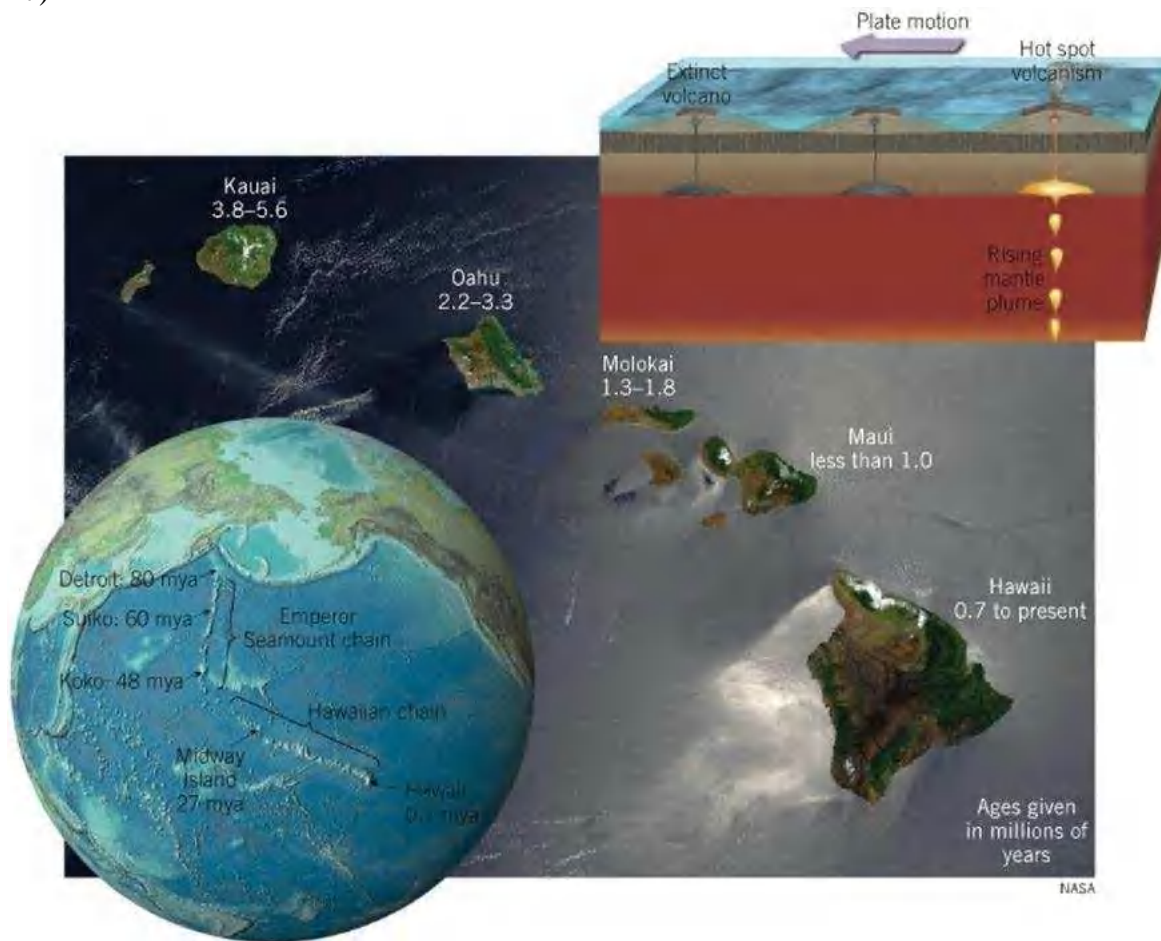
Global Sci Out: 2 & 3

Section: 2.9 - Testing the Plate Tectonics Model

Focus/Concepts: 2.9

ESLI LO: 4.3 - Earth's interior is in constant motion through the process of convection, with important consequences for the surface.

17)



The Hawaiian mantle plume has left a chain of volcanic islands and seamounts stretching back for ~70 million years. Although the mantle plume has remained relatively stationary, the Pacific Plate above it has moved. Use the figure below to answer the following question.

What direction has the Pacific plate been moving for the last 40 million years?

- A) Southeast
- B) North
- C) Northwest
- D) Northeast
- E) West

Answer: C

Diff: 2

Bloom's Taxonomy: Applying/Analyzing

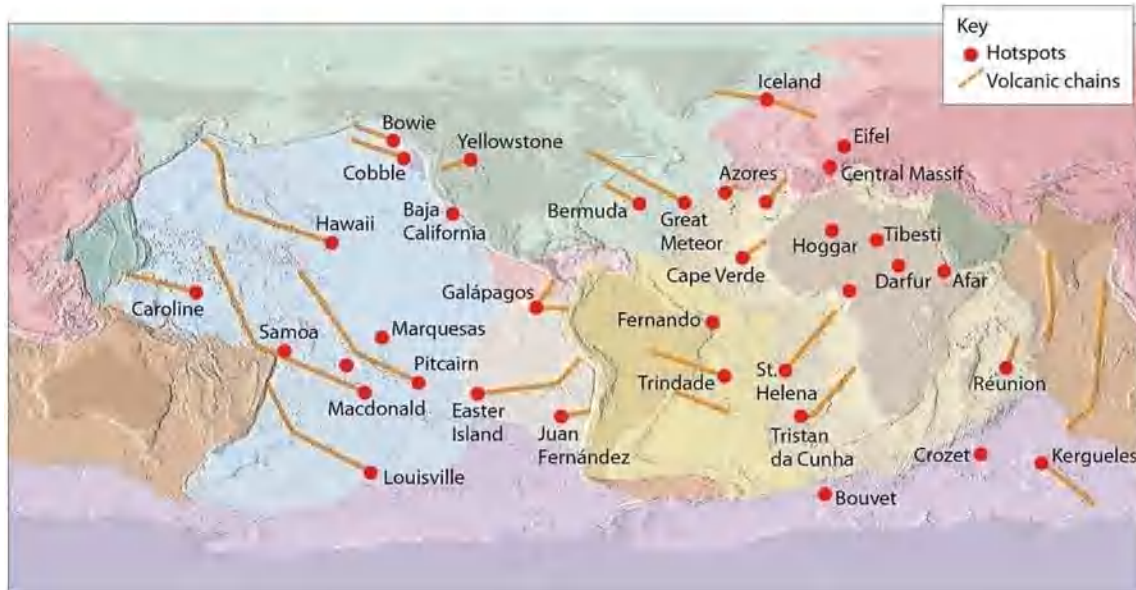
Global Sci Out: 2 & 3

Section: 2.9 - Testing the Plate Tectonics Model

Focus/Concepts: 2.9

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

18)



The Hawaiian mantle plume is a classic example of a long-lived mantle plume being used to demonstrate how the motion of a tectonic plate has changed over time. Which hot spot would be an even better indicator of the Pacific plate's motion over time?

- A) Cape Verde mantle plume
- B) Easter Island
- C) Yellowstone
- D) Caroline
- E) Pitcairn

Answer: E

Diff: 1

Bloom's Taxonomy: Applying/Analyzing

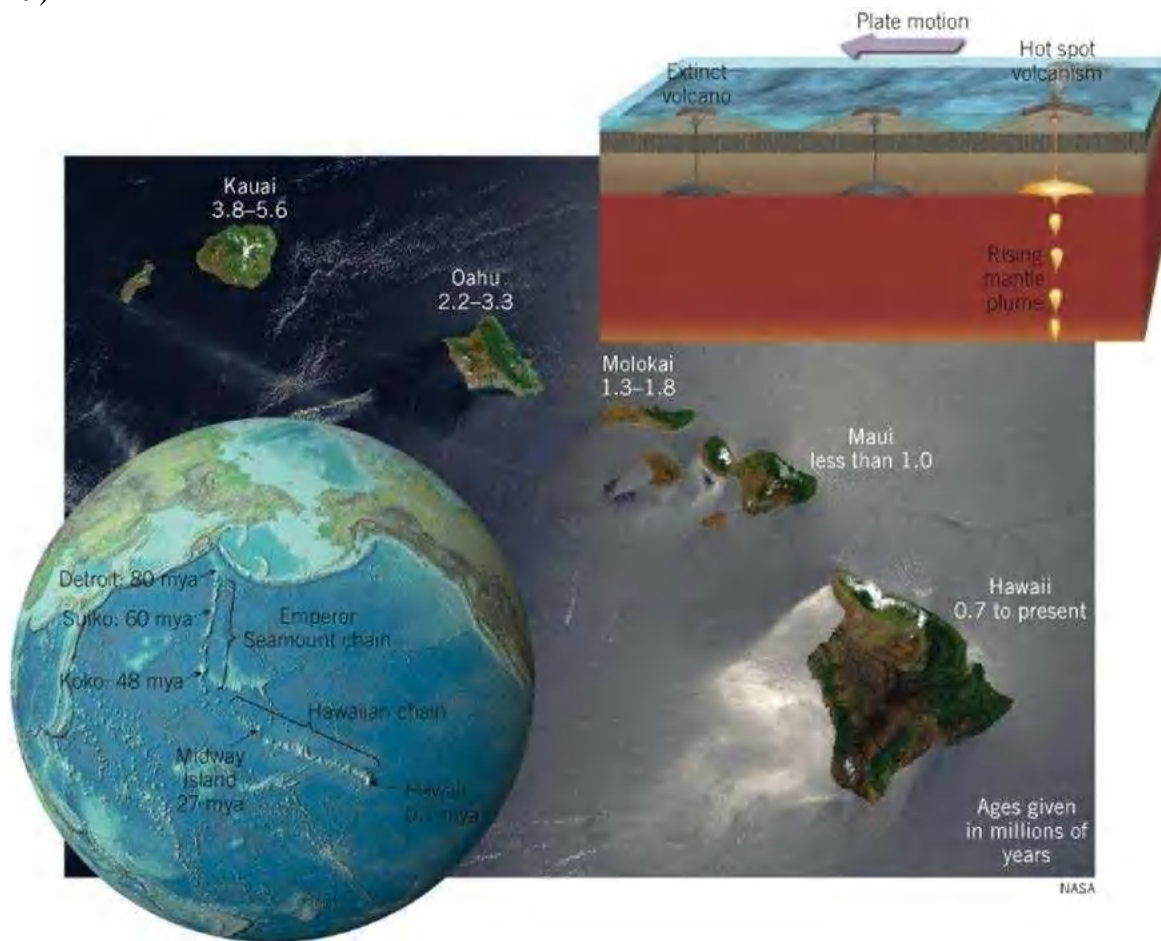
Global Sci Out: 2 & 3

Section: 2.9 - Testing the Plate Tectonics Model

Focus/Concepts: 2.9

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

19)



As the island of Hawaii continues to move away from the mantle plume, a new submarine volcano will be created. Off which coast would you expect the new submarine volcano to be forming?

- A) North coast
- B) Southwest coast
- C) Northeast coast
- D) Southeast coast

Answer: D

Diff: 2

Bloom's Taxonomy: Applying/Analyzing

Global Sci Out: 2 & 3

Section: 2.9 - Testing the Plate Tectonics Model

Focus/Concepts: 2.9

ESLI LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.