

Exam

Name \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) Today, \_\_\_\_\_ is in about the same geographic position as during late Paleozoic time. 1) \_\_\_\_\_  
A) Australia B) Antarctica C) India D) South America

Answer: B

Explanation: A)  
B)  
C)  
D)

- 2) Deep-oceanic trenches are most abundant around the rim of the \_\_\_\_\_ ocean basin. 2) \_\_\_\_\_  
A) Pacific B) Atlantic C) Arctic D) Indian

Answer: A

Explanation: A)  
B)  
C)  
D)

- 3) The modern-day Red Sea is explained by plate tectonics theory because it is \_\_\_\_\_. 3) \_\_\_\_\_  
A) a tiny remnant of a once immense ocean that was closed as Africa moved Asia  
B) a rift zone that may eventually open into a major ocean if Arabia and Africa continue to separate  
C) the site of a transform fault along which Arabia is moving away from Africa  
D) a rare example of a two-continent subduction zone where the African continental plate is sinking under the Arabian continental plate

Answer: B

Explanation: A)  
B)  
C)  
D)

- 4) \_\_\_\_\_ first related the symmetrical magnetic patterns in seafloor basalts to seafloor spreading at a mid-ocean ridge. 4) \_\_\_\_\_  
A) Wegener and Wilson B) Evans and Novak  
C) Matthews and Marks D) Vine and Matthews

Answer: D

Explanation: A)  
B)  
C)  
D)

- 5) The late Paleozoic supercontinent is known as \_\_\_\_\_. 5) \_\_\_\_\_  
A) Panatopia B) Pangaea C) Pandomonia D) Pancakea

Answer: B

Explanation: A)  
B)  
C)  
D)

6) Which of the following energy sources is thought to drive the lateral motions of Earth's lithospheric plates? 6) \_\_\_\_\_

- A) gravitational attractive forces of the Sun and Moon
- B) swirling movements of the molten iron particles in the outer core
- C) electrical and magnetic fields localized in the inner core
- D) export of heat from deep in the mantle to the top of the asthenosphere

Answer: D

Explanation: A)  
B)  
C)  
D)

7) Linear, magnetic patterns associated with mid-ocean ridges are configured as \_\_\_\_\_. 7) \_\_\_\_\_

- A) normal and reversed magnetized strips roughly parallel to the ridge
- B) reversed magnetizations along the rift valleys and normal magnetizations along the ridge
- C) concentric circles about a rising plume of hot mantle rocks and magma
- D) normal and reversed magnetized strips roughly perpendicular to the ridge axis

Answer: A

Explanation: A)  
B)  
C)  
D)

8) \_\_\_\_\_ was never proposed as evidence supporting the existence of Pangaea. 8) \_\_\_\_\_

- A) Islands of Precambrian rocks along the Mid-Atlantic Ridge
- B) Similar fossils on different continents
- C) Late Paleozoic glacial features
- D) Geometrical fit between South America and Africa

Answer: A

Explanation: A)  
B)  
C)  
D)

9) Deep ocean trenches are surficial evidence for \_\_\_\_\_. 9) \_\_\_\_\_

- A) sinking of oceanic lithosphere into the mantle at a subduction zone
- B) transform faulting between an oceanic plate and a continental plate
- C) rifting beneath a continental plate and the beginning of continental drift
- D) rising of hot asthenosphere from deep in the mantle

Answer: A

Explanation: A)  
B)  
C)  
D)

- 10) The \_\_\_\_\_ is(are) a logical evolutionary analog of the African Rift Valleys ten million years from now. 10) \_\_\_\_\_
- A) Ural Mountains  
B) Red Sea  
C) San Andreas fault  
D) Peru-Chile trench
- Answer: B  
Explanation: A)  
B)  
C)  
D)
- 11) \_\_\_\_\_ was an ancient reptile that lived in South America and Africa during the late Paleozoic. 11) \_\_\_\_\_
- A) Mesosaurus  
B) Glossopteris  
C) Granopteris  
D) Monastarios
- Answer: A  
Explanation: A)  
B)  
C)  
D)
- 12) The continental drift hypothesis was rejected primarily because Alfred Wegener could not \_\_\_\_\_. 12) \_\_\_\_\_
- A) identify a mechanism capable of moving continents  
B) disprove competing theories that were more accepted by scientists  
C) find geologic similarities on different continents  
D) all of the above
- Answer: A  
Explanation: A)  
B)  
C)  
D)
- 13) Cooler, older, oceanic lithosphere sinks into the mantle at \_\_\_\_\_. 13) \_\_\_\_\_
- A) transform fault zones along divergent plate boundaries  
B) sites of long-lived, hot spot volcanism in the ocean basins  
C) rift zones along mid-ocean ridges  
D) subduction zones along convergent plate boundaries
- Answer: D  
Explanation: A)  
B)  
C)  
D)

14) Which one of the following is an important fundamental assumption underlying the plate tectonic theory? 14) \_\_\_\_\_

- A) Radioactive decay slows down at the extreme pressures of the inner core.
- B) Earth's ocean basins are very old and stable features.
- C) Earth's diameter has been essentially constant over time.
- D) Earth's magnetic field originates in the outer core.

Answer: C

Explanation: A)  
B)  
C)  
D)

15) The \_\_\_\_\_ is an example of an active, continent-continent collision. 15) \_\_\_\_\_

- A) westward movement of the South American plate over the Nazca plate
- B) Arabian Peninsula slamming into North Africa under the Red Sea
- C) northern movement of Baja California and a sliver of western California toward the Hawaiian Islands
- D) northward movement of India into Eurasia

Answer: D

Explanation: A)  
B)  
C)  
D)

16) Early results of the Deep Sea Drilling Project clearly justified the conclusion that \_\_\_\_\_. 16) \_\_\_\_\_

- A) Proterozoic rocks are found only as seamounts in the deepest parts of the ocean basins
- B) the youngest sediments were deposited directly on the oldest seafloor basalts
- C) the oceans have not always contained most of Earth's water
- D) the ocean basins are relatively young; most ocean basin rocks and sediments are Cretaceous or younger in age

Answer: D

Explanation: A)  
B)  
C)  
D)

17) New oceanic crust and lithosphere are formed at \_\_\_\_\_. 17) \_\_\_\_\_

- A) convergent boundaries by submarine eruptions and intrusions of basaltic magma
- B) divergent boundaries by submarine eruptions and intrusions of basaltic magma
- C) divergent boundaries by submarine eruptions and intrusions of rhyolitic magma
- D) convergent boundaries by submarine eruptions and intrusions of rhyolitic magma

Answer: B

Explanation: A)  
B)  
C)  
D)

- 18) The temperature below which magnetic material can retain a permanent magnetization is called the \_\_\_\_\_. 18) \_\_\_\_\_  
A) Vine temperature B) Darcy temperature  
C) Bullard point D) Curie point  
Answer: D  
Explanation: A)  
B)  
C)  
D)
- 19) A typical rate of seafloor spreading in the Atlantic Ocean is \_\_\_\_\_. 19) \_\_\_\_\_  
A) 0.1 inches per year B) 2 feet per year  
C) 20 feet per year D) 2 centimeters per year  
Answer: D  
Explanation: A)  
B)  
C)  
D)
- 20) Pull-apart rift zones are generally associated with a \_\_\_\_\_ plate boundary. 20) \_\_\_\_\_  
A) divergent B) transform  
C) convergent D) all plate boundaries  
Answer: A  
Explanation: A)  
B)  
C)  
D)
- 21) In the early part of the twentieth century, \_\_\_\_\_ argued forcefully for continental drift. 21) \_\_\_\_\_  
A) Karl Wagner B) Alfred Wegener  
C) Peter Rommel D) Bill Kohl  
Answer: B  
Explanation: A)  
B)  
C)  
D)
- 22) A very long-lived magma source located deep in the mantle is called a \_\_\_\_\_. 22) \_\_\_\_\_  
A) hot spot B) magma welt C) basalt spout D) melt well  
Answer: A  
Explanation: A)  
B)  
C)  
D)

- 23) A transform plate boundary is characterized by \_\_\_\_\_. 23) \_\_\_\_\_
- A) two converging oceanic plates meeting head-on and piling up into a mid-ocean ridge
  - B) a divergent boundary where the continental plate changes to an oceanic plate
  - C) a deep, vertical fault along which two plates slide past one another in opposite directions
  - D) stratovolcanoes on the edge of a plate and shield volcanoes on the adjacent plate
- Answer: C
- Explanation: A)  
B)  
C)  
D)
- 24) The volcanoes and deep valleys of east Africa are related to a \_\_\_\_\_. 24) \_\_\_\_\_
- A) continental collision zone between Africa and the Zagros Mountains along the southern margin of Eurasia
  - B) continental rift along which parts of the African continent are beginning to slowly separate
  - C) transform fault aligned with the Red Sea carrying the Arabian and African blocks in opposite directions
  - D) fault allowing Arabia to slip westward past east Africa and penetrate into Turkey
- Answer: B
- Explanation: A)  
B)  
C)  
D)
- 25) The Aleutian Islands occur at a \_\_\_\_\_. 25) \_\_\_\_\_
- A) transform boundary where North America has moved towards Alaska
  - B) convergent, continental margin with uplifted fault blocks, much like those of the Basin and Range Province
  - C) convergent boundary on a volcanic arc above a northward-subducting Pacific plate
  - D) divergent boundary where shield volcanoes are forming
- Answer: C
- Explanation: A)  
B)  
C)  
D)
- 26) Which of the following statements apply to the asthenosphere, but not the lithosphere? 26) \_\_\_\_\_
- A) deforms mainly by brittle fracturing and faulting
  - B) zone in the upper mantle that deforms by plastic flowage
  - C) cool, rigid layer of crust and upper mantle that forms the tectonic plates
  - D) partial melting of rising granitic plumes produces huge volumes of basaltic magma
- Answer: B
- Explanation: A)  
B)  
C)  
D)

- 27) All of the following are evidence supporting the theory of plate tectonics EXCEPT for \_\_\_\_\_. 27) \_\_\_\_\_
- A) changes in the Moon's orbit due to shifting plates
  - B) ocean floor drilling
  - C) paleomagnetism
  - D) hot spots

Answer: A

Explanation: A)  
B)  
C)  
D)

- 28) Which one of the following most accurately describes the volcanoes of the Hawaiian Islands? 28) \_\_\_\_\_
- A) shield volcanoes fed by a long-lived hot spot below the Pacific lithospheric plate
  - B) stratovolcanoes associated with a mid-Pacific transform fault
  - C) shield volcanoes associated with a mid-Pacific ridge and spreading center
  - D) stratovolcanoes associated with subduction and a convergent plate boundary

Answer: A

Explanation: A)  
B)  
C)  
D)

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Word Analysis. Examine the words and/or phrases for each question below and determine the relationship among the majority of words/phrases. Choose the option that does not fit the pattern.

- 29) a. slab pull                      b. mantle drag                      c. ridge push                      d. slab suction                      29) \_\_\_\_\_

Answer: B

Explanation:

- 30) A(n) \_\_\_\_\_ is a long-lived, stationary magma source deep in the mantle, well below the base of the lithosphere. 30) \_\_\_\_\_

Answer: hot spot

Explanation:

- 31) Rifting and normal faulting are characteristic of a(n) \_\_\_\_\_ plate boundary. 31) \_\_\_\_\_

Answer: divergent

Explanation:

- 32) \_\_\_\_\_, in the north Atlantic Ocean, is a volcanic island formed over a hot spot on a divergent plate boundary. 32) \_\_\_\_\_

Answer: Iceland

Explanation:

- 33) During the first two decades of the twentieth century, \_\_\_\_\_ was a vigorous proponent of continental drift. 33) \_\_\_\_\_

Answer: Alfred Wegener

Explanation:

Word Analysis. Examine the words and/or phrases for each question below and determine the relationship among the majority of words/phrases. Choose the option that does not fit the pattern.

34) a. Hawaii                      b. island arc                      c. volcanic arc                      d. subduction                      34) \_\_\_\_\_

Answer: A  
Explanation:

35) The San Andreas fault in California is a good example of a(n) \_\_\_\_\_ plate boundary.                      35) \_\_\_\_\_

Answer: transform  
Explanation:

36) Japan and the Aleutian Islands have formed from a(n) \_\_\_\_\_ to \_\_\_\_\_ convergent boundary.                      36) \_\_\_\_\_

Answer: ocean; ocean  
Explanation:

Word Analysis. Examine the words and/or phrases for each question below and determine the relationship among the majority of words/phrases. Choose the option that does not fit the pattern.

37) a. fossil evidence                      b. fit of the continents                      c. paleomagnetism                      d.                      37) \_\_\_\_\_  
paleoclimates

Answer: C  
Explanation:

38) The \_\_\_\_\_ today marks the location of the rift along which Africa separated from South America.                      38) \_\_\_\_\_

Answer: Mid-Atlantic Ridge  
Explanation:

Word Analysis. Examine the words and/or phrases for each question below and determine the relationship among the majority of words/phrases. Choose the option that does not fit the pattern.

39) a. oceanic ridge                      b. seafloor spreading                      c. arc volcanoes                      d. divergent                      39) \_\_\_\_\_

Answer: C  
Explanation:

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

40) As the South Atlantic basin widens by seafloor spreading, Africa and South America are moving closer together.                      40) \_\_\_\_\_

Answer: True      ☒ False  
Explanation:

41) Earth's radius and surface area are slowly increasing to accommodate the new oceanic crust being formed at mid-ocean ridges.                      41) \_\_\_\_\_

Answer: True      ☒ False  
Explanation:

42) Hawaii is the oldest island of the Hawaiian Island chain.                      42) \_\_\_\_\_

Answer: True      ☒ False  
Explanation:



- 43) The volcanoes of Hawaii are localized above a deep mantle hot spot; they are not part of the East Pacific oceanic ridge. 43) \_\_\_\_\_  
Answer: ☒ True ☐ False  
Explanation:
- 44) The rate of seafloor spreading is, on the average, about one meter per year. 44) \_\_\_\_\_  
Answer: ☐ True ☒ False  
Explanation:
- 45) During various times in the geologic past, the polarity of Earth's magnetic field has been reversed. 45) \_\_\_\_\_  
Answer: ☒ True ☐ False  
Explanation:
- 46) Iceland is a good example of an island arc, formed from an oceanic-oceanic plate collision. 46) \_\_\_\_\_  
Answer: ☐ True ☒ False  
Explanation:
- 47) The oldest rocks on the seafloor are much younger than the oldest rocks on the continents. 47) \_\_\_\_\_  
Answer: ☒ True ☐ False  
Explanation:
- 48) Wegener's continental drift hypothesis was weakened because a viable mechanism for moving the continents was lacking. 48) \_\_\_\_\_  
Answer: ☒ True ☐ False  
Explanation:
- 49) During the geologic past, the magnetic field poles have generally been very close to Earth's rotational poles. 49) \_\_\_\_\_  
Answer: ☒ True ☐ False  
Explanation:
- 50) In general, rocks of the continental crust are less dense than rocks of the oceanic crust. 50) \_\_\_\_\_  
Answer: ☒ True ☐ False  
Explanation:
- 51) The Himalayan Mountains are the tectonic product of a collision between India and Eurasia that began in Eocene time and still continues. 51) \_\_\_\_\_  
Answer: ☒ True ☐ False  
Explanation:
- 52) An extensive, late Paleozoic glaciation affected southern India, southern Africa and southeastern South America. 52) \_\_\_\_\_  
Answer: ☒ True ☐ False  
Explanation:
- 53) The oldest rocks of the oceanic crust are found in deep ocean trenches far away from active, mid-ocean ridges. 53) \_\_\_\_\_  
Answer: ☒ True ☐ False  
Explanation:

54) Seafloor spreading rates can be estimated if the geologic ages of the magnetic field reversals are independently known.

54) \_\_\_\_\_

Answer: ☒ True      False

Explanation:

MATCHING. Choose the item in column 2 that best matches each item in column 1.

Match the plate boundary with the appropriate phrase.

55) this boundary is normally devoid of volcanism

A) transform

55) \_\_\_\_\_

Answer: A

B) divergent

56) characterized by basaltic volcanism and seafloor spreading

C) convergent

56) \_\_\_\_\_

Answer: B

57) the west coast of South America

57) \_\_\_\_\_

Answer: C

58) plates are moving apart from one another

58) \_\_\_\_\_

Answer: B

59) the San Andreas fault

59) \_\_\_\_\_

Answer: A

60) where subduction zones occur

60) \_\_\_\_\_

Answer: C

61) the Mid-Atlantic Ridge

61) \_\_\_\_\_

Answer: B

62) where lithosphere is sinking into the mantle

62) \_\_\_\_\_

Answer: C

63) characterized by arcs of stratovolcanoes and deep-ocean trenches

63) \_\_\_\_\_

Answer: C

64) plates are sliding past one another horizontally

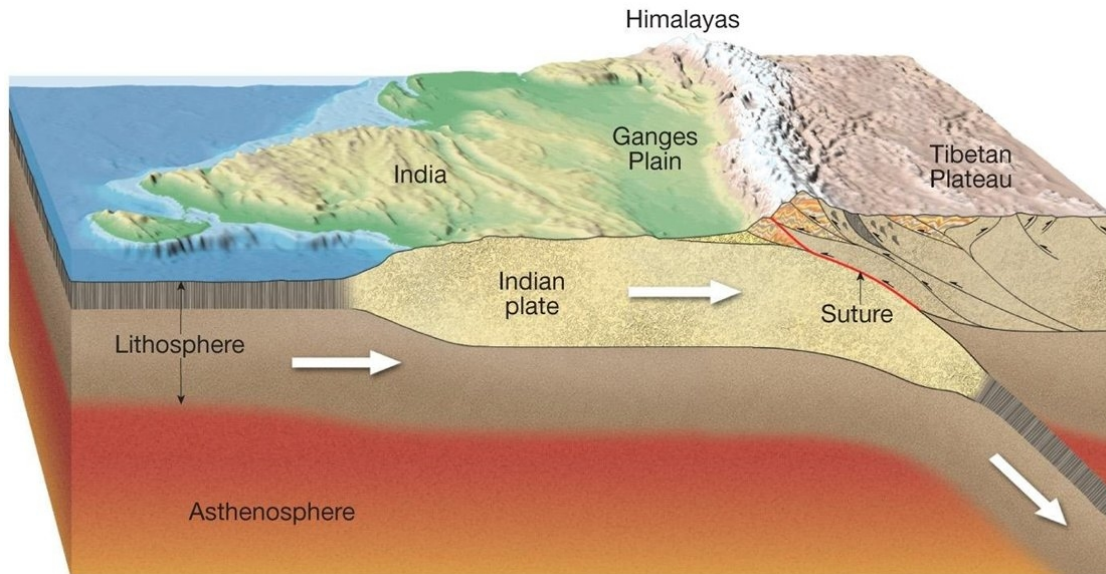
64) \_\_\_\_\_

Answer: A

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

Critical thinking and discussion questions. Use complete sentences, correct spelling, and the information presented in chapter 2 to answer the questions below.

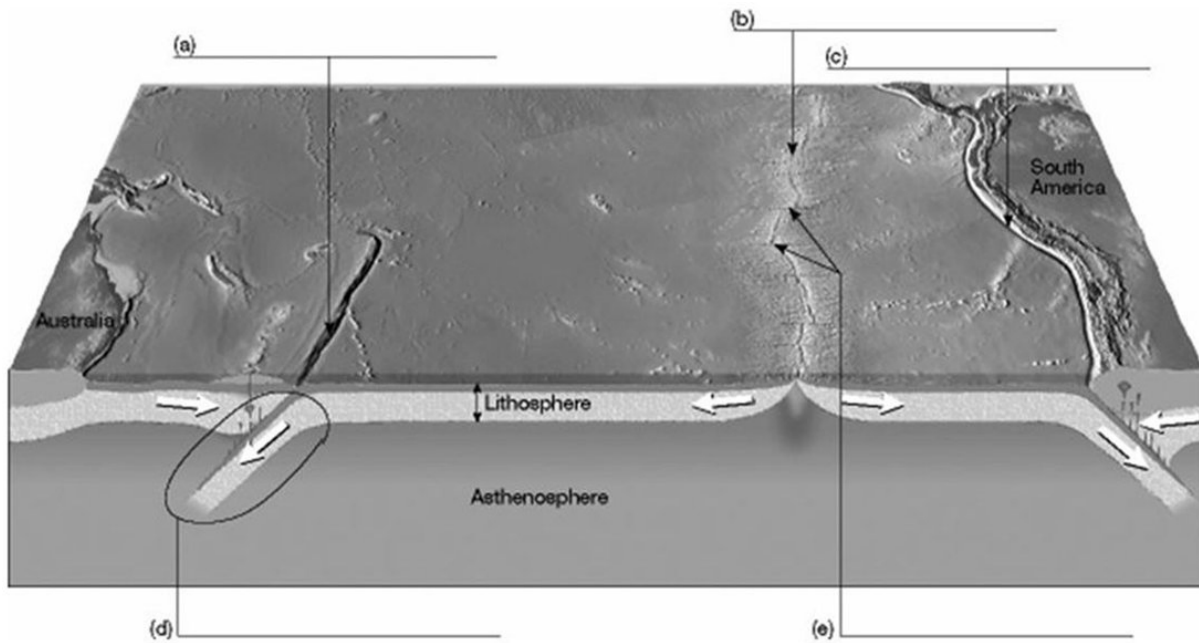
65) Describe exactly what type of plate boundary is illustrated below and explain your answer.



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Answer: This is an example of a continental-to-continental convergent plate boundary. The continental lithosphere is too buoyant for subduction to occur; therefore, the two plates collide and the crust is buckled, fractured, and thickened. Major mountain systems including the Alps, Himalayas, Appalachians, and the Urals formed during continental collisions.

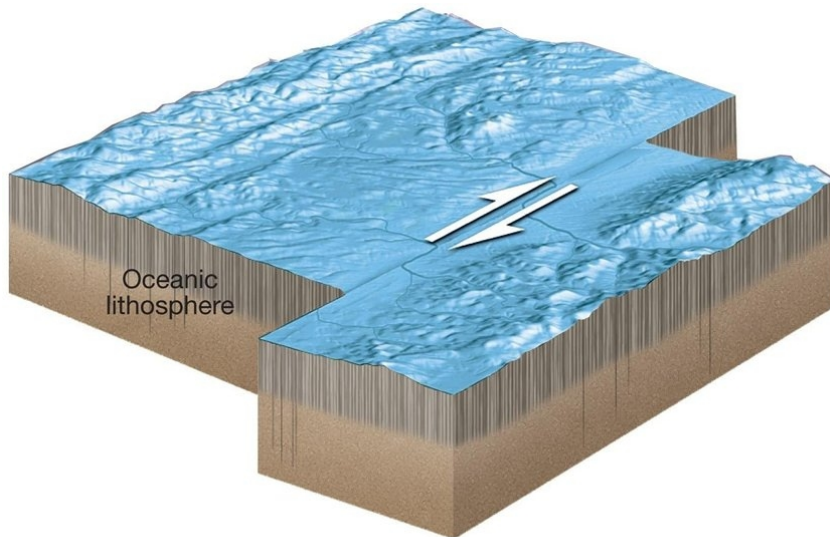
66) Fill in the blanks with the correct name of the feature that is labeled.



Answer: (a) oceanic trench  
 (b) oceanic ridge  
 (c) oceanic trench  
 (d) subduction zone  
 (e) transform faults

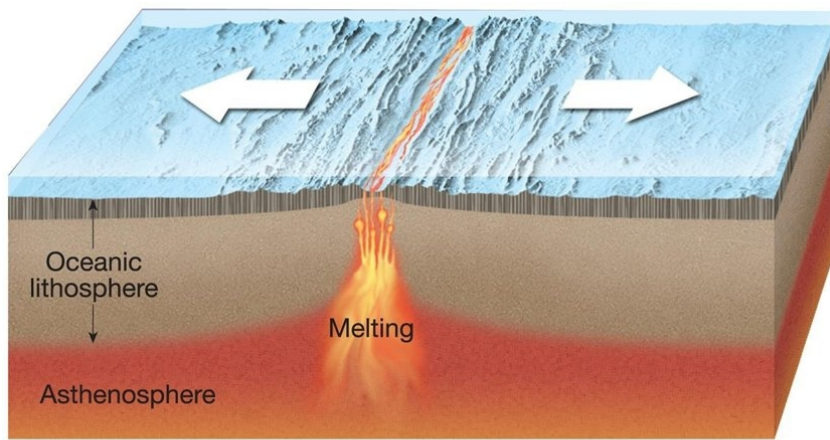
67) In the diagram below, match the letter of each illustration to the correct type of plate boundary.

A) convergent      B) transform      C) divergent



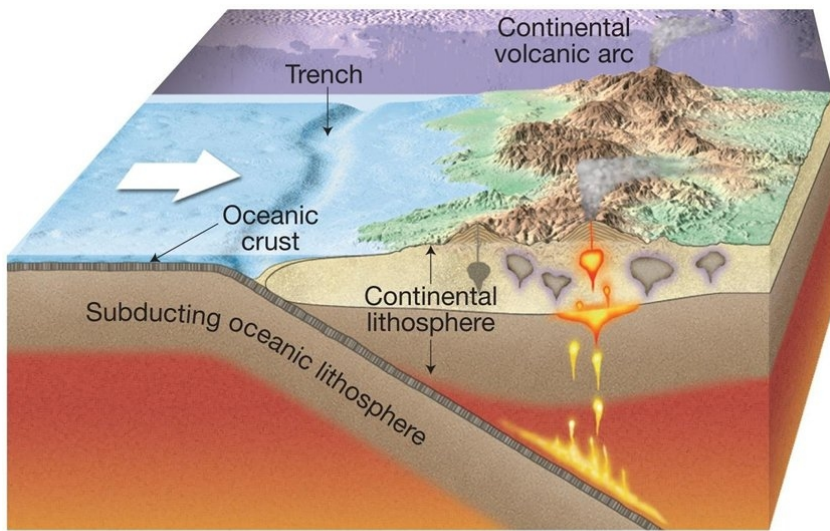
(a) \_\_\_\_\_

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(b) \_\_\_\_\_

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(c) \_\_\_\_\_

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Answer: (a) B, (b) C, (c) A

- 68) If you could time travel back to the 1920s and meet Alfred Wegener, who was the original proponent of the continental drift hypothesis, what could you tell him about our modern idea of plate tectonics? What would you tell him regarding the structure of the Earth's interior, what evidence exists for plate tectonics, what is the relationship between volcanoes and earthquakes to plate tectonics (specifics), and what are some (if any) of the problems we still have in explaining certain features of plate tectonics?

Answer: The Earth is divided into different layers. The outermost rocky layer (the lithosphere) is broken into plates of various sizes. There are multiple lines of evidence that support plate tectonics such as the ages of the seafloor proportional to the distance from the ridge, magnetic stripes of the oceanic floor parallel to oceanic ridges, and hotspots. The plate boundaries and earthquakes are closely linked. For instance, the region around the Peru-Chile trend experiences great earthquakes. Convection in the mantle is a process that still needs to be fully understood.

69) Although Alfred Wegener presented compelling evidence for his continental drift hypothesis (despite lacking a mechanism), why was the true nature of plate boundaries not determined until the 1960s?

Answer: It was only after WWII that oceanographers began exploring the ocean floor. Many features were discovered such as the Mid-Atlantic Ocean Ridge and the “stripe” signatures of normal and reverse polarity in the oceanic floor.

## Answer Key

Testname: C2

- 1) B
- 2) A
- 3) B
- 4) D
- 5) B
- 6) D
- 7) A
- 8) A
- 9) A
- 10) B
- 11) A
- 12) A
- 13) D
- 14) C
- 15) D
- 16) D
- 17) B
- 18) D
- 19) D
- 20) A
- 21) B
- 22) A
- 23) C
- 24) B
- 25) C
- 26) B
- 27) A
- 28) A
- 29) B
- 30) hot spot
- 31) divergent
- 32) Iceland
- 33) Alfred Wegener
- 34) A
- 35) transform
- 36) ocean; ocean
- 37) C
- 38) Mid-Atlantic Ridge
- 39) C
- 40) FALSE
- 41) FALSE
- 42) FALSE
- 43) TRUE
- 44) FALSE
- 45) TRUE
- 46) FALSE
- 47) TRUE
- 48) TRUE
- 49) TRUE
- 50) TRUE



Answer Key

Testname: C2

- 51) TRUE
- 52) TRUE
- 53) TRUE
- 54) TRUE
- 55) A
- 56) B
- 57) C
- 58) B
- 59) A
- 60) C
- 61) B
- 62) C
- 63) C
- 64) A
- 65) This is an example of a continental -to-continental convergent plate boundary. The continental lithosphere is too buoyant for subduction to occur; therefore, the two plates collide and the crust is buckled, fractured, and thickened. Major mountain systems including the Alps, Himalayas, Appalachians, and the Urals formed during continental collisions.
- 66) (a) oceanic trench  
(b) oceanic ridge  
(c) oceanic trench  
(d) subduction zone  
(e) transform faults
- 67) (a) B, (b) C, (c) A
- 68) The Earth is divided into different layers. The outermost rocky layer (the lithosphere) is broken into plates of various sizes. There are multiple lines of evidence that support plate tectonics such as the ages of the seafloor proportional to the distance from the ridge, magnetic stripes of the oceanic floor parallel to oceanic ridges, and hotspots. The plate boundaries and earthquakes are closely linked. For instance, the region around the Peru-Chile trend experiences great earthquakes. Convection in the mantle is a process that still needs to be fully understood.
- 69) It was only after WWII that oceanographers began exploring the ocean floor. Many features were discovered such as the Mid-Atlantic Ocean Ridge and the “stripe” signatures of normal and reverse polarity in the oceanic floor.