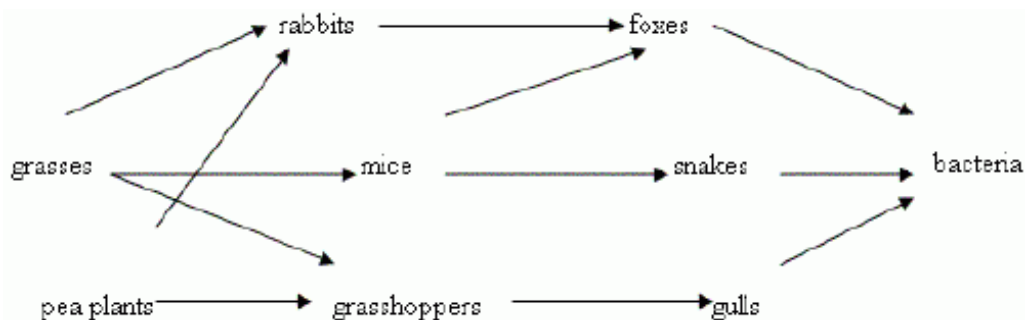


Name: \_\_\_\_\_

Date: \_\_\_\_\_

- 1) Which of the following is an abiotic factor?
  - A. cat
  - B. dog
  - C. person
  - D. weather
- 2) You want to design an experiment that tests the influence of abiotic factors on plant growth. Which abiotic factor would you test?
  - A. acidity of the soil
  - B. insects infecting the plant
  - C. species of plants grown
  - D. plant height
- 3) What is the purpose of including a control in a scientific investigation? To provide:
  - A. a basis for comparison
  - B. a correction for experimental errors
  - C. a preliminary trial of the methods
  - D. an opportunity for repetition of the experiment
- 4) Andrew did a study on the relationship between the age of trees and the number of sparrow nest sites. He hypothesized that he would find more nests in older trees than he would in younger trees. He found 355 sparrow nesting sites in trees over 50 years old and no nests in trees less than 50 years old. Andrew's conclusion was 'Sparrows never nest in trees under 50 years old.' Which of the following statements best describes Andrew's conclusion?
  - A. The statement is invalid because Andrew did not examine every sparrow nesting site worldwide
  - B. The statement is invalid because it is difficult to determine the exact age of a tree without killing it
  - C. The statement is valid because Andrew did not find any nests in trees less than 50 years old
  - D. The statement is valid because Andrew had a large sample size
  - E. The statement is valid because Andrew's hypothesis matched his conclusion
- 5) Which of the following is a question that cannot be answered by science?
  - A. What is the effect of fires on an ecosystem?
  - B. What abiotic factors in an ecosystem are affected by a fire?
  - C. What steps can be taken to restore an ecosystem that has been destroyed by fire?
  - D. What regulations are necessary to stop displaced animals from ruining private property?
- 6) Use the diagram below to answer the following question.



What would happen if the bacteria were taken out of the food web?

- A. Foxes would over populate and kill off the rabbits
  - B. Dead plants and animals would not decompose
  - C. The number of gulls would decrease
  - D. Snakes and foxes would eat all of the mice
  - E. Snakes would get sick and die
- 7) Joseph wanted to analyze the relationship between biotic and abiotic factors in a forest meadow. Which of the following would be suitable subjects for study?

- A. The relationship between rabbit feeding habits and number of clover plants
- B. The relationship between number of aspen trees and sparrow nests
- C. The relationship between rainfall and stream volume
- D. The relationship between length of day and average daytime temperature
- E. The relationship between soil type and vegetation types

8) In an investigation on potato bug habitat sites, Graciella's hypothesis was 'There will be more potato bugs found in moist, dark areas than will be found in dry, dark areas.' When Graciella collected data she found 172 potato bugs under rocks in dry, dark areas and 42 potato bugs under rocks in moist, dark areas.

Graciella's conclusion, based on her data, was that more potato bugs are found in dry, dark areas than are found in moist, dark areas. Which of the following statements about her conclusion is right?

- A. The conclusion is invalid because it disagrees with the hypothesis
- B. The conclusion is invalid because potato bugs prefer moist environments
- C. The conclusion is valid because there were significantly more potato bugs found in dry, dark areas than moist, dark areas
- D. The conclusion is valid because invertebrates prefer dry, dark areas
- E. The experiment is a failure because the hypothesis was wrong

9) A farmer wants to know how to get more ears of corn from his land. His field is fenced and he has planted his plants as close together as possible. You are going to conduct an experiment to help him.

You decide to plant 10m corn seeds in 10 different pots. You water 5 plants with 100 ml of water a day and 5 plants with 1000 ml of water a day.

Which of the following hypothesis are you testing with your experiment?

- A. If you fertilize the plant more than you will get more corn
- B. If you water the plant more then you will get more corn
- C. If you spread out the plants more you will get more corn
- D. If you give the plant more light you will get more corn

10) Which would be the most beneficial to help scientists make recommendations to successfully restore an area damaged by fire?

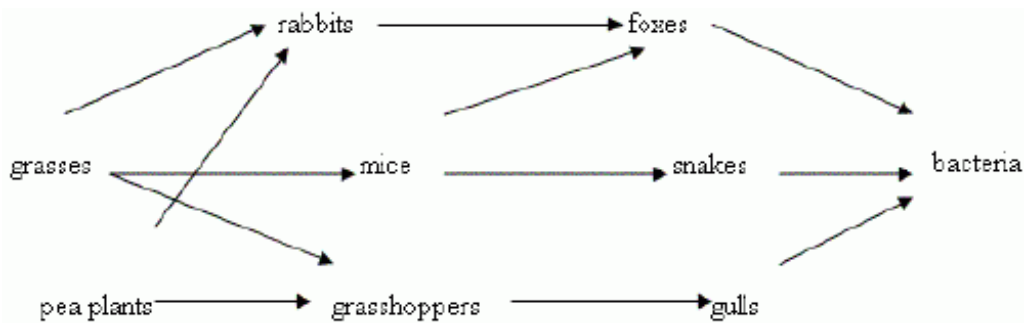
- A. Research ways to predict and control lightning strikes within the area.
- B. Perform a long term study of climate and weather patterns in the area.
- C. Research successful restoration projects for areas similar to the one that was destroyed.
- D. Perform a survey of local residents to determine their preference on how the area should be restored.

11) In an investigation on potato bug habitat sites, Graciella's hypothesis was 'There will be more potato bugs found in moist, dark areas than will be found in dry, dark areas.' When Graciella collected data she found 172 potato bugs under rocks in dry, dark areas and 42 potato bugs under rocks in moist, dark areas.

What variable was Graciella testing?

- A. The relative moisture level of the potato bug habitat
- B. The relative light level of the potato bug habitat
- C. Potato bug preference for hiding under rocks versus other habitat options
- D. The relationship between light levels and moisture content in potato bug habitats
- E. Where potato bugs live

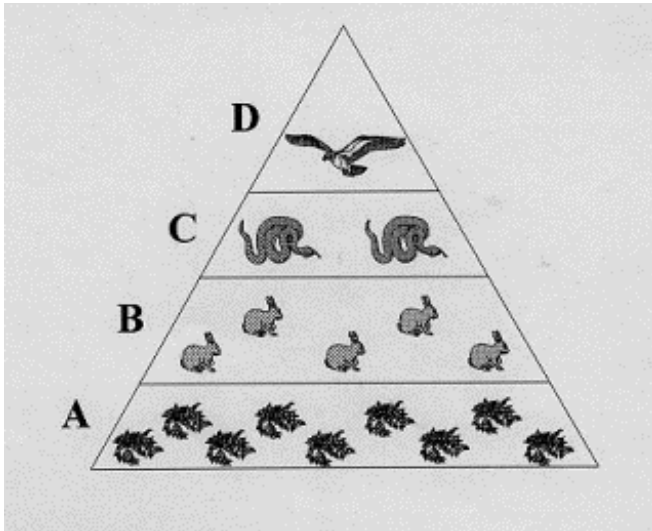
12) Use the diagram below to answer the following question.



What would happen if the mice were taken out of this food web?

- A. The food web would collapse
- B. There would be less grass for the rabbits
- C. The gull population would get smaller
- D. The snake population would get smaller
- E. The fox population would increase

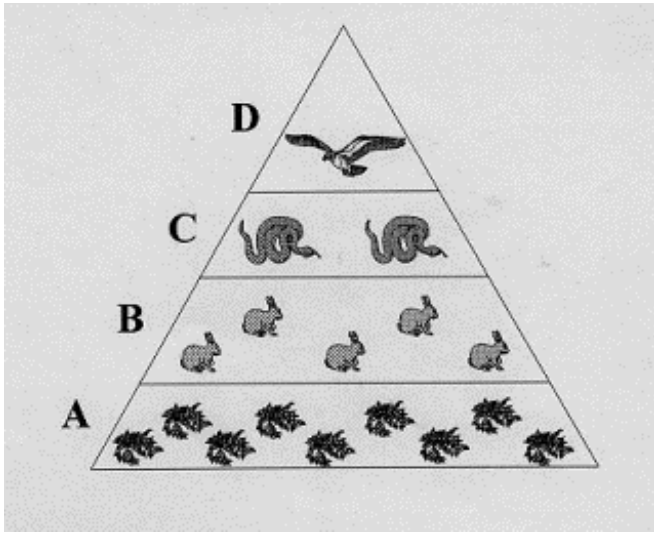
13) Use the chart to answer the following question:



What causes the decrease in organisms as you move up the pyramid?

- A. Organisms in the upper levels eat more than organisms in the lower levels
  - B. Organisms in the upper levels eat less than organisms in the lower levels
  - C. Each level loses energy due to growth, activity and heat loss, so less energy is available for each level up the pyramid
  - D. The lower levels depend on a steady source of sunlight, while the upper levels have no need for sunlight
- 14) A hillside covered with grasses, shrubs and trees is ignited by lightning. The fire destroys most of the vegetation on the hillside and the soil begins to erode away. The animal species that lived in the area migrate downhill into an area populated with homes. Local residents begin to complain about their yards being destroyed by the displaced animals. Local scientists are asked to come in and make recommendations to resolve the problem and to come up with a restoration plan for the hillside area.  
What could scientists tell the local people?
- A. Major changes in abiotic factors of an ecosystem affect many other parts of the ecosystem.
  - B. Fire destroys all of the abiotic factors in an ecosystem.
  - C. Better safeguards should be made to stop lightning-caused fires from affecting surrounding ecosystems.
  - D. A change in an ecosystem usually affects the factors of that ecosystem and not of other ecosystems.
- 15) A farmer checks some of the abiotic factors of her soil by performing tests and analyzing measurements for temperature ranges, water availability and the amounts of certain nutrients before planting her crops. Why is it important for the farmer to be able to use these tests?
- A. She has to do these tests because they are required by law.
  - B. She shouldn't use them because they should only be used by trained scientists.
  - C. She uses these tests to increase the price of the produce that she sells.
  - D. She uses these tests to increase the success of her crops.
- 16) The reduced level of oxygen in the lake would determine which of the following?
- A. the number of birds living around the lake
  - B. the amount of run-off reaching the lake
  - C. the amount of sunlight reaching the lake
  - D. the kinds of fish living in the lake
- 17) Why does a town in the desert rarely experience early morning fog as compared to a town along the coast?
- A. There is less rainfall in the desert.
  - B. Temperatures vary more in the desert.
  - C. There is less water vapor in the desert air.
  - D. There are fewer plants in the desert.
- 18) A rancher moved his herd of cattle to a mountain range pasture. Which example below indicated he exceeded the carrying capacity of that range?
- A. The herd grew and prospered
  - B. The range became overgrazed and barren
  - C. The range became green and fertile
  - D. Too many people rode the cattle and caused back problems
  - E. The cows had more than one calf

19) Use the chart to answer the following question:



The rabbits in this example occupy which level of the food pyramid?

- A. producers
  - B. primary consumers
  - C. secondary consumers
  - D. tertiary consumers
- 20) A farmer wants to know how to get more ears of corn from his land. His field is fenced and he has planted his plants as close together as possible. You are going to conduct an experiment to help him.
- You decide to plant 10m corn seeds in 10 different pots. You water 5 plants with 100 ml of water a day and 5 plants with 1000 ml of water a day.
- Which of the following is a research question about the farmer's problem?
- A. How tall can a corn stalk grow?
  - B. How do you keep the deer from eating the corn?
  - C. How can you get more plants on his land?
  - D. How can you get more ears per corn plant?
- 21) Two classifications of all the different species in a lake are made. In one system, the organisms are classified by food chains. In the other, the organisms are classified by structural relationships. Which of the following statements is most reasonable?
- A. A system based on structural relationships is more accurate than one based on the food chain
  - B. One system of classification is more useful than the other
  - C. One system is correct; the other is incorrect
  - D. Both systems may be correct and useful depending on the kind of problem being investigated
- 22) The heath hen, an extinct small wild fowl, was a relative of the prairie chicken. Which of the following **most likely** caused extinction of the heath hen?
- A. overhunting
  - B. stable climate
  - C. plentiful food supply
  - D. abundant nesting sites
- 23) Consider the following statement:
- "One thousand acres of rainforest are destroyed daily. As the rainforest is destroyed, hundreds of unidentified species are destroyed. We must stop rainforest destruction immediately to preserve biodiversity. It is wrong to destroy rainforests."
- Consider the phrase "We must stop rainforest destruction immediately to preserve biodiversity. It is wrong to destroy rainforests." Is the phrase a statement that science makes?
- A. Yes because biodiversity is important to maintain healthy ecosystems
  - B. Yes because immediate action is required to save rainforests
  - C. No because it is a value judgment
  - D. No because rainforests do not have much biodiversity
- 24) How have scientists helped prevent the extinction of the desert tortoise in Utah?
- A. Scientists have informed people of locations of tortoise habitat and argued for their protection.

- B. Scientists have passed laws that protect the tortoise.
- C. Scientists have just stirred up the fight.
- D. Scientists have encouraged people to not worry about the tortoises because they will migrate to a safer habitat.

25) Polar bears have low reproduction rates. How might this affect their likelihood of becoming extinct?

- A. They will be more likely to become extinct because it takes a relatively long time for them to replenish their population
- B. They will be more likely to become extinct because there is not enough food in their habitat to support their young
- C. They will be less likely to become extinct because the females are very protective of the few young that they have
- D. They will be less likely to become extinct because reproduction rates have nothing to do with a species' likelihood of becoming extinct

26) As settlers moved into Utah, natural predators such as bears, wolves, and cougars were killed or driven from the area. With the decrease of predator population the deer population exploded. Which of the following best describes an ecological reason for hunting?

- A. It promotes physical activity
- B. It allows people another sources of food
- C. It replaces the function of large predators
- D. It replaces the function of the producers
- E. It provides more food for the deer

27)

BIOME ONE	BIOME TWO	BIOME THREE	BIOME FOUR
<ul style="list-style-type: none"> <li>• Slow growth rate</li> <li>• Low species diversity</li> <li>• Low biomass</li> <li>• 0-25 cm average rainfall per year</li> </ul>	<ul style="list-style-type: none"> <li>• Rapid growth rate</li> <li>• Highest species diversity</li> <li>• High biomass</li> <li>• 80-120 cm average rainfall per year</li> <li>• Nutrients in vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>• 80-120 cm average rainfall per year</li> <li>• Dominated by leaf dropping trees</li> <li>• Nutrient rich soil</li> <li>• Medium biomass and species diversity</li> </ul>	<ul style="list-style-type: none"> <li>• 25-75 cm average rainfall per year</li> <li>• Nutrient rich soil</li> <li>• Dominated by grasses, sedges</li> <li>• Medium biomass and species diversity</li> </ul>

Consider the table above.

What is the major abiotic difference between Biomes Three and Four?

- A. Average temperature
- B. Average rainfall
- C. Types of plants growing in the biome
- D. Soil type

28) Cutthroat trout are native to Yellowstone Lake. Lake trout were added to the lake several decades ago. Lake trout eat the Cutthroat's food and their young. Lake trout populations are increasing while Cutthroat trout are becoming rare. Which of the following best explains why Cutthroat trout may become extinct?

- A. Their natural habitat was destroyed
- B. Man made chemicals polluted Yellowstone Lake
- C. Excessive fishing reduced their population
- D. An introduced species (non-native) is taking over their habitat

29) The Kirtland Warbler nests only in 6- to 15- year-old jack pine trees. Why does this behavior increase their likelihood of going extinct?

- A. If something were to happen to their limited nesting area they would be unable to reproduce
- B. If something were to happen to their food supply, their specialized feeding habits would make it very difficult for them to find food
- C. If something were to happen to their migratory route, their fixed migratory pattern would be disrupted and they would not be able to migrate
- D. If something were to happen to their food web, the biodiversity of the area would decrease

30) The human population in St. George, Utah and the surrounding desert area is increasing very rapidly. What has allowed the growth to increase so rapidly in the desert?

- A. Scientists have developed ways to move and store water.
- B. Scientists have identified protected areas for the desert tortoise.
- C. Currently humans can live farther from big cities like Salt Lake City and Las Vegas.
- D. Climate changes have made the southern Utah desert a more desirable place to live.

31) Consider the claim 'Biodiversity is essential to maintain a functioning ecosystem.' What would be at least one thing that would have to happen for this claim to be called a theory?

- A. It would have to be supported by a lot of data that had been tested repeatedly
- B. The claim would have to be proven to be true by the scientific community
- C. Ecosystems would have to depend on biodiversity
- D. Science would have to start accepting new theories

32) Scientists invented radio collars that could be attached to wild animals to track their movements. How does this technology help us maintain biodiversity and avoid extinction?

- A. The size of territory the animal needs for survival can be documented.
- B. The animals can be located and saved from hunters at any time.
- C. The animals can be trained to stay out of some areas and go into others.
- D. The radio collars can help many species reproduce.

33) Rachel Carson, a writer of the 1960's, condemned the use of the chemical DDT which was being used to kill crop eating insects. She pointed out that this chemical accumulated in the food chain and harmed many unintended organisms such as birds.

How has her book contributed to the protection of Earth's diversity of life?

- A. Her work was used to help save predatory birds.
- B. Her work resulted in the elimination of many harmful insects.
- C. Her work helped develop new insecticides.
- D. Money earned from the sale of her book built new wetlands.

34) Consider the following statement:

"One thousand acres of rainforest are destroyed daily. As the rainforest is destroyed, hundreds of unidentified species are destroyed. We must stop rainforest destruction immediately to preserve biodiversity. It is wrong to destroy rainforests."

Which of the following questions would help evaluate the scientific accuracy of the statement?

- A. Why is it important to preserve the biodiversity housed in the world's rainforests?
- B. Who is destroying the rainforest?
- C. Where was the statement published?
- D. How has the United States contributed to rainforest destruction?

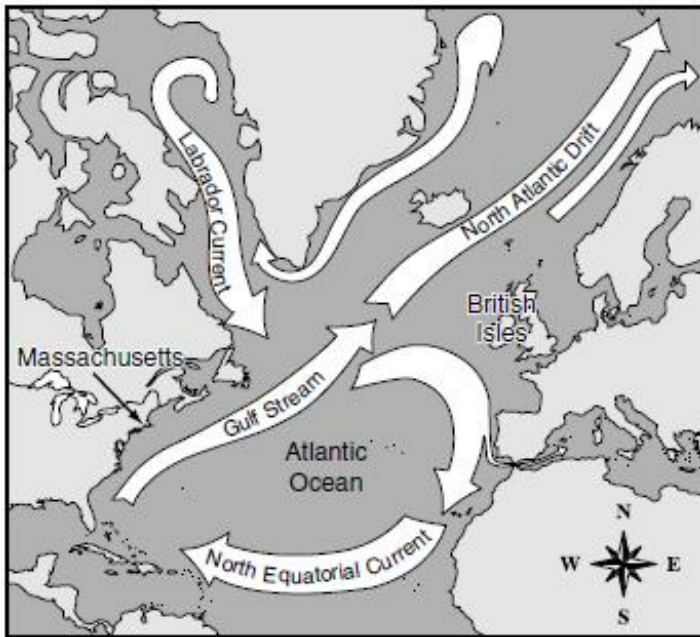
35) Which biome has the greatest number of plant and animal species in a given area?

- A. Coniferous forest
- B. Tropical rain forest
- C. Desert
- D. Grassland

36) Studies about rainforest destruction raise the question, 'Is it right that starving people destroy rainforests to provide food for their families?' How can science be used to answer this question?

- A. Science can gather data to prove that biodiversity is more important than individual people therefore people do not have the right to destroy rainforests
- B. Science can gather data to show that starving people have no other way to feed their families therefore they have the right to destroy rainforests
- C. Science can gather data that will help people make a decision about rainforest destruction but it cannot, by itself, answer the question
- D. Science cannot be used to answer the question

37) The map below shows Atlantic Ocean currents.



Surface currents in the ocean affect the climate of the land areas nearby. Which of the currents **most** affects the climate of Massachusetts and its surrounding states?

- A. Gulf Stream
- B. Labrador Current
- C. North Atlantic Drift
- D. North Equatorial Current

38) Consider the following statement:

"One thousand acres of rainforest are destroyed daily. As the rainforest is destroyed, hundreds of unidentified species are destroyed. We must stop rainforest destruction immediately to preserve biodiversity. It is wrong to destroy rainforests."

Which piece of data would help evaluate the scientific accuracy of the statement?

- A. The number of new species identified annually in the world's rainforests.
- B. The number of industries who own rainforest property
- C. The number of plants living in rainforests
- D. The number of animals living in rainforests

39)

BIOME ONE	BIOME TWO	BIOME THREE	BIOME FOUR
<ul style="list-style-type: none"> <li>• Slow growth rate</li> <li>• Low species diversity</li> <li>• Low biomass</li> <li>• 0-25 cm average rainfall per year</li> </ul>	<ul style="list-style-type: none"> <li>• Rapid growth rate</li> <li>• Highest species diversity</li> <li>• High biomass</li> <li>• 80-120 cm average rainfall per year</li> <li>• Nutrients in vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>• 80-120 cm average rainfall per year</li> <li>• Dominated by leaf dropping trees</li> <li>• Nutrient rich soil</li> <li>• Medium biomass and species diversity</li> </ul>	<ul style="list-style-type: none"> <li>• 25-75 cm average rainfall per year</li> <li>• Nutrient rich soil</li> <li>• Dominated by grasses, sedges</li> <li>• Medium biomass and species diversity</li> </ul>

Consider the table above.

Which of the following statements about Biome Two is an inference?

- A. Biome Two has the greatest biodiversity
- B. Biome Two receives a lot of precipitation
- C. Biome Two is a tropical rain forest

D. Biome Two's nutrients are stored in the plants

40)

BIOME ONE	BIOME TWO	BIOME THREE	BIOME FOUR
<ul style="list-style-type: none"> <li>● Slow growth rate</li> <li>● Low species diversity</li> <li>● Low biomass</li> <li>● 0-25 cm average rainfall per year</li> </ul>	<ul style="list-style-type: none"> <li>● Rapid growth rate</li> <li>● Highest species diversity</li> <li>● High biomass</li> <li>● 80-120 cm average rainfall per year</li> <li>● Nutrients in vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>● 80-120 cm average rainfall per year</li> <li>● Dominated by leaf dropping trees</li> <li>● Nutrient rich soil</li> <li>● Medium biomass and species diversity</li> </ul>	<ul style="list-style-type: none"> <li>● 25-75 cm average rainfall per year</li> <li>● Nutrient rich soil</li> <li>● Dominated by grasses, sedges</li> <li>● Medium biomass and species diversity</li> </ul>

Consider the table above.

In which biome would you be most likely to find a cactus?

- A. Biome One
- B. Biome Two
- C. Biome Three
- D. Biome Four

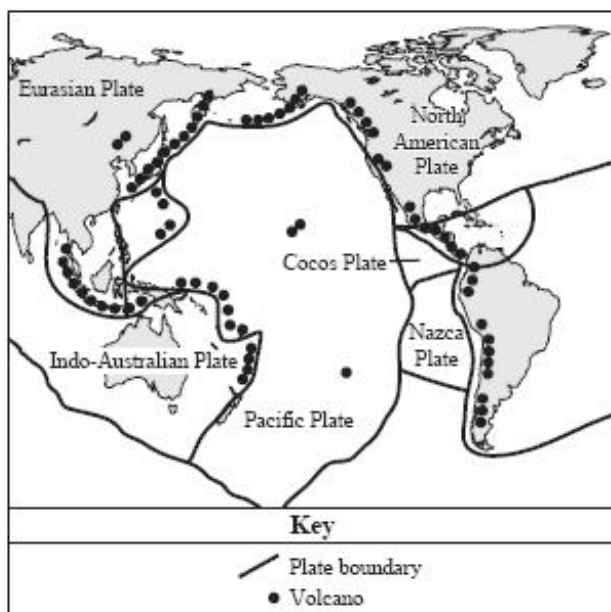
41) Extinctions have occurred since life began. Why are scientists concerned about plants and animals going extinct?

- A. Scientists care more about plants and animals now than they did in the past
- B. Current extinction rates are much higher than natural extinction rates
- C. Extinctions cause meteorites to strike the Earth and scientist do not want that to happen
- D. Extinctions are not a natural part of life; healthy ecosystems do not have extinctions

42) In which biome is the growing season the shortest?

- A. Deciduous forest
- B. Tropical rain forest
- C. Desert
- D. Grassland

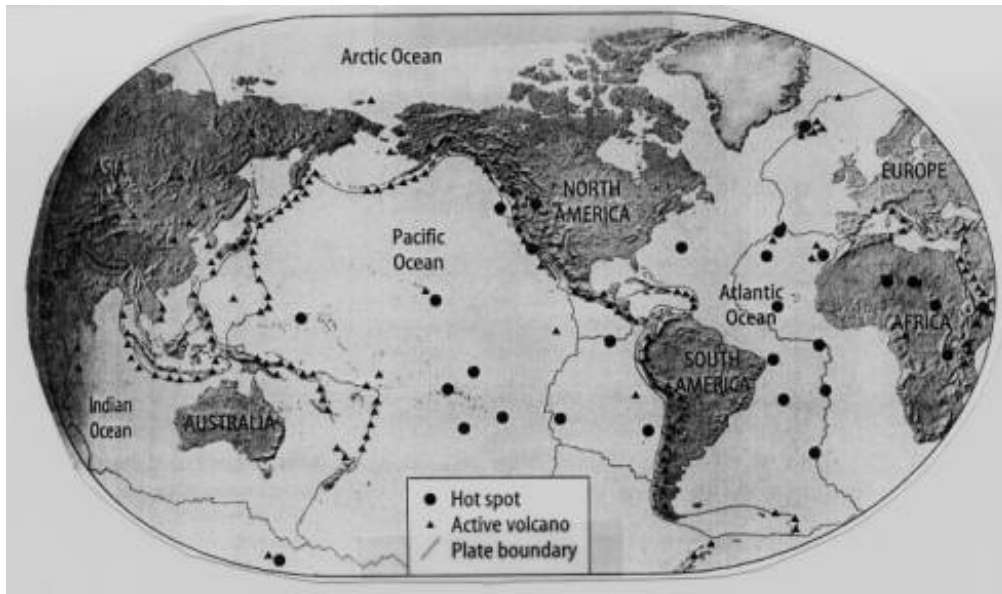
43) On the map below, dark circles indicate the positions of volcanoes in the "Ring of Fire" in and around the Pacific Ocean. Dark lines indicate tectonic plate boundaries of Earth's crust.



According to this map, which of the following describes where volcanoes are **most likely** to form in the Ring of Fire?

- A. Volcanoes form in the middle of a tectonic plate.
- B. Volcanoes form below the surface of tectonic plates.
- C. Volcanoes form where tectonic plates meet other plates.
- D. Volcanoes form where earthquakes are least likely to occur.

44) Use the map to answer the following question.



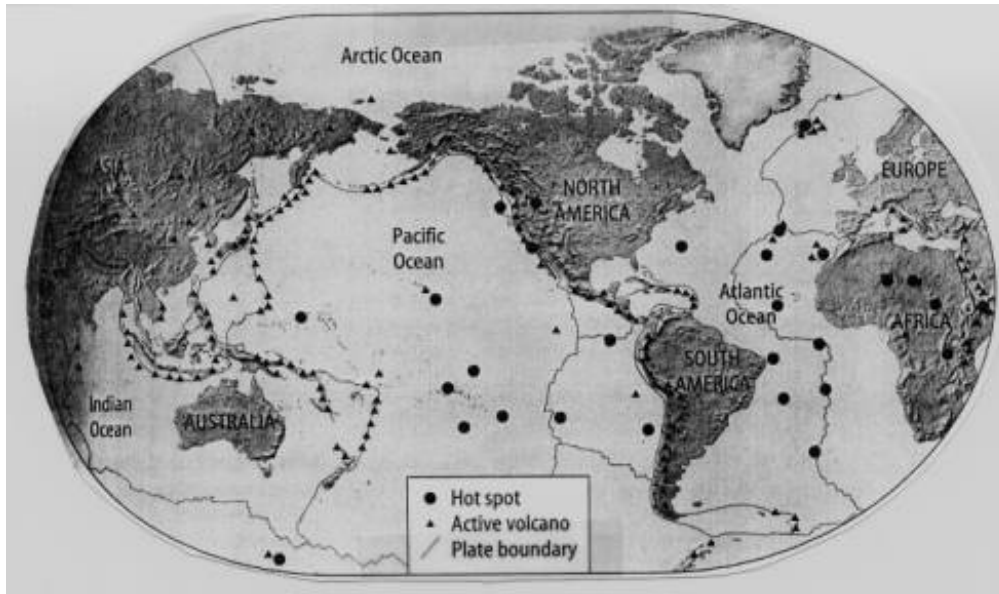
Which symbol on the map show evidence of plate movement?

- A. hot spot
  - B. active volcano
  - C. plate boundary
  - D. lines
- 45) Consider the following three pieces of data.
- I. The continents on Earth fit together like a puzzle.
  - II. The same plant fossils are found on many different continents.
  - III. Climate data indicates that some continents in the Arctic once were tropical and warm.
- Which of the following best describes the relationship between the above statements?
- A. They are evidence for continental drift.
  - B. They describe major areas of geologic studies.
  - C. They help to explain why the plates on Earth move.
  - D. There is no relationship because they are separate areas of science.
- 46) Which of the following discoveries caused science to re-evaluate its opinion of Wagner's hypothesis about continental drift?
- A. Sea floor spreading in the Atlantic Ocean
  - B. Valley and delta land forms on Mars
  - C. The coastlines of Africa and South America have similar fossils
  - D. The global rate of volcanic activity has changed over time
- 47) The earth's crust is broken into pieces called plates. These plates interact with each other at boundaries. Which of the following is the best data to use when classifying plate boundaries?
- A. The length of the boundary between the two plates.
  - B. The size of the two plates that meet at a boundary.
  - C. The motion of the two plates relative to each other at the boundary.
  - D. The speed at which the two plates are moving as they meet at a boundary.
- 48) Wegener's theory of continental drift was not accepted until the mid-1900's. Which of the following are technological advances that led to the acceptance of this theory and laid the ground work for plate tectonics?
- A. Sonar and magnetometers mapped the ocean floor and detected magnetic striping.
  - B. Satellites created communication networks for scientists on other continents.
  - C. Computer systems were used to simulate tectonic patterns on other planets.
  - D. Seismometers were developed to accurately measure volcanic activity.
- 49) Alfred Wegener proposed that 200 million years ago, continents broke apart from the supercontinent Pangaea and have drifted apart over time. This idea is known as continental drift.
- Which of the following is the best fossil evidence for continental drift?
- A. Fossils of the same land dwelling animals were found on widely separated continents.
  - B. Fossils of the same ocean dwelling organisms were found in different oceans.
  - C. Fossils of the same warm climate organisms were found on continents with warm climates.
  - D. Fossils of the same freshwater organisms were found on areas with abundant freshwater.

50) If science accepts the conclusion that continents have drifted, what are they assuming is true?

- A. Gravity works the same on Earth as it does on other planets and stars in the universe
- B. Convection currents worked in the past the same way they work now
- C. The world's climate has changed a lot over time
- D. Carbon dating is an accurate way to measure age

51) Use the map to answer the following question.



Where are the most volcanoes located?

- A. Atlantic Ocean
- B. Pacific Ocean
- C. African Continent
- D. Asian Continent

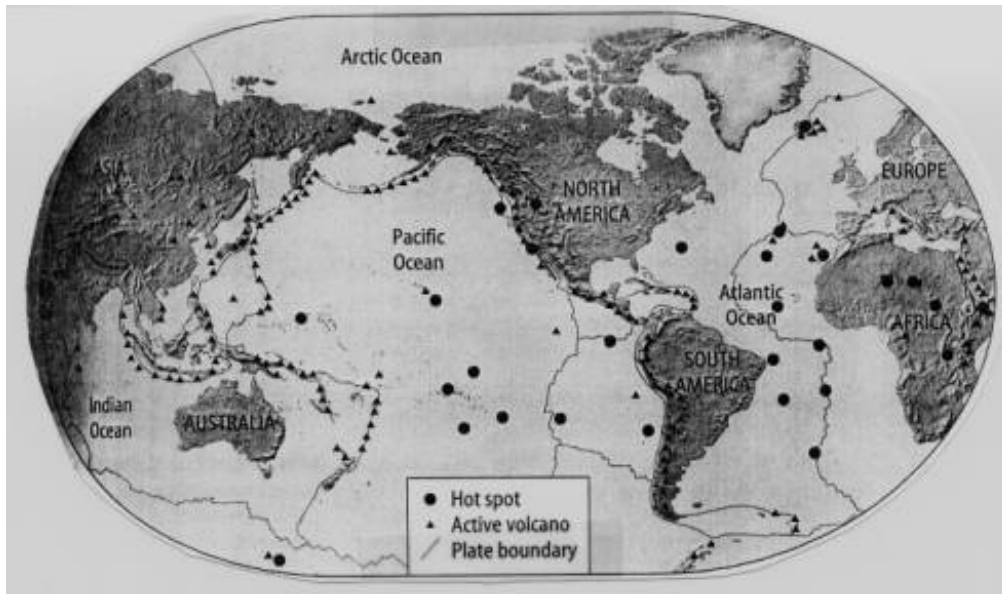
52) What kind of evidence do scientists use to locate boundaries of plates and interpret what type of boundary is present?

- A. matching fossil records
- B. similar rock layers
- C. distribution of earthquakes and volcanoes
- D. the way the continental coastlines fit together like a puzzle

53) How has technology changed scientists' understanding of sea floor spreading and how it is evidence of plate tectonics?

- A. Earthquakes are evidence of changes in the ocean floor.
- B. The measurement of the weight of the ocean gave evidence of sea floor spreading.
- C. The ocean floor was mapped and studied using sonar and magnetometers.
- D. Scientists used computer measurements of volcanic activity to give details of the ocean floor.

54) Use the map to answer the following question.



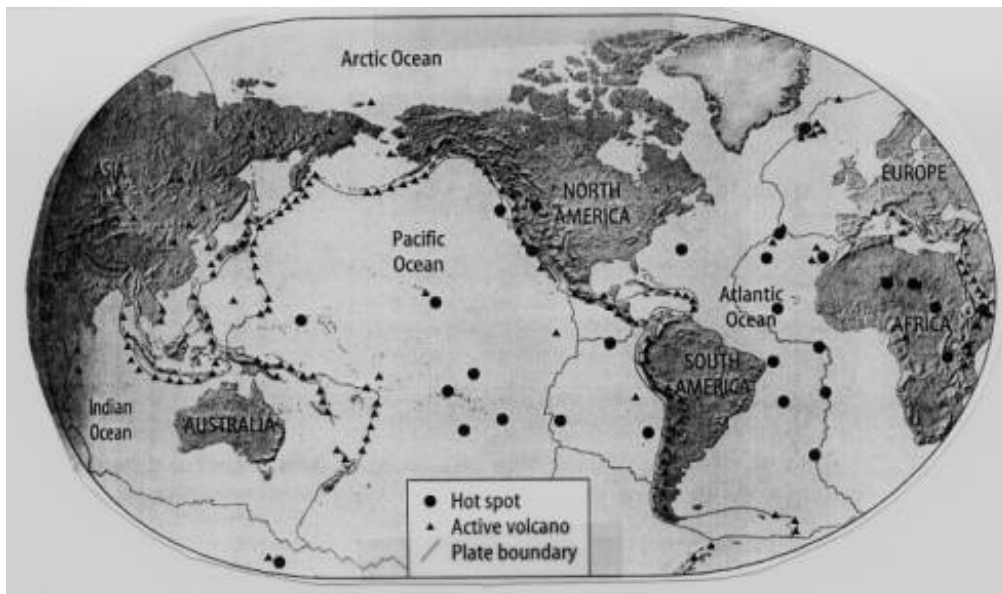
Why are there more volcanoes where ocean and land meet?

- A. Wave action on land plate
- B. Ocean plate pulling away from land plate
- C. Land plate moving past ocean plate
- D. Ocean plate colliding with land plate

55) Where are earthquakes most likely to occur on Earth?

- A. They are spread evenly around the globe
- B. On plate boundaries
- C. On continents
- D. On the sea floor
- E. In mountains

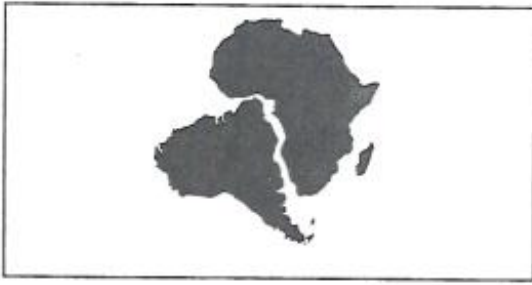
56) Use the map to answer the following question.



What type of plate boundary is located on the west side of Africa?

- A. Convergent
- B. Divergent
- C. Transform
- D. Strike/Slip

- 57) The maps below show the positions of two continents at two different times.



The movement of the two continents as shown may **best** be explained by

- A. volcanic eruptions.
  - B. magnetic changes.
  - C. coastal flooding.
  - D. plate tectonics.
- 58) What kind of movement on a plate boundary causes mountain building?
- A. Divergent movement
  - B. Convergent movement
  - C. Transform movement
  - D. Biome movement
- 59) Which of the following explains the role of Alfred Wegener's hypothesis of continental drift and the development of the theory of plate tectonics?
- A. Wegener's is the only scientist who worked on the continental drift hypothesis.
  - B. A hypothesis usually has more evidence than a theory does.
  - C. Wegener's hypothesis was contradicted by recent scientific information.
  - D. Evidence over the years has filled in the gaps in the continental drift hypothesis.
- 60) (1) The study of seismic (earthquake) waves has provided most of what we know about the interior of the earth. (2) The seismic waves change direction and speed as they encounter different materials. (3) With this information, scientists have been able to subdivide the Earth into layers.
- (4) The composition of the Earth is also supported by data from the study of meteorites. (5) Meteorites are pieces of asteroids that have broken off and enter Earth's atmosphere. (6) The meteorites have a similar composition to what is believed to be in the earth's interior. (7) It is also thought that the asteroids the meteorites broke off from were formed at the same time and in the same way as the planets in the solar system.
- Which sentences provide evidence for the internal structure of the earth?
- A. 1 and 3
  - B. 2 and 6
  - C. 4 and 7
  - D. 3 and 5
- 61) If a person wanted to raise doubts about Wegner's theory of plate tectonics, what kind of evidence would the person need to provide?
- A. Fossil evidence showing similar types of organisms on different continents.
  - B. The close relationship between plate boundaries and volcanic activity.
  - C. Studies of rocks on the ocean floor showing that some rocks are younger than others.
  - D. Deep ocean studies showing no zones of movement on the ocean floor.
- 62) A dormant volcano in Indonesia erupted and ejected an incredible amount of gas and dust into the atmosphere in the early 1800's. This gas and dust caused weather extremes, crop failure and major climatic change worldwide for over a year following the eruption. The link between these changes and the volcano's eruption were not understood for years. What is this an example of?
- A. Understanding the results of volcanic eruptions can explain why crops fail.

- B. All volcanoes are destructive and have negative effects worldwide.  
 C. The causes of volcanic eruptions describe why climates will change around the volcano.  
 D. Studying the effects of volcanic eruptions can help scientists determine their impact on human life.
- 63) The governments of communities that live near active volcanoes often debate regulations about how close to the volcano people and businesses should be allowed to build. What is the role of science in the decision making process of these governments?
- A. Scientists should pass regulations prohibiting people from building close to volcanoes.  
 B. Scientific data can be used to provide information regarding volcanoes for the community.  
 C. Scientific data should be rejected as it could bias the government's decisions.  
 D. Scientific data is not easily understood and therefore would not help in the process.
- 64) Heat from deep in Earth's interior is transferred to its crust by which process?
- A. conduction in the ocean  
 B. convection in the mantle  
 C. radiation from the solid core  
 D. evaporation at mid-ocean ridges
- 65) (1)The study of seismic (earthquake) waves has provided most of what we know about the interior of the earth. (2) The seismic waves change direction and speed as they encounter different materials. (3) With this information, scientists have been able to subdivide the Earth into layers. (4)The composition of the Earth is also supported by data from the study of meteorites. (5) Meteorites are pieces of asteroids that have broken off and enter Earth's atmosphere. (6) The meteorites have a composition similar to Earth's interior. (7) It is also thought that the asteroids the meteorites broke off from were formed at the same time and in the same way as the planets in the solar system.  
 Which sentence is an inference?
- A. 1  
 B. 3  
 C. 5  
 D. 7
- 66) Consider the following statement: "The movement of materials in the mantle by convection causes the movement of the tectonic plates."  
 Which of the following best describes this statement?
- A. It is a fact.  
 B. It is a guess.  
 C. It is an inference.  
 D. It is an observation.
- 67) Which of the following processes describes the interactions between plates that cause volcanoes?
- A. Two continental crusts pushing up against each other, forming volcanic cones.  
 B. Continental crust sinking into the mantle and melting, coming back up as volcanoes.  
 C. Oceanic crust subducting below continental crust, then melting and rising to the surface.  
 D. Oceanic crust pushing against oceanic crust causing underwater volcanic peaks.
- 68) What data would a scientist need to support the inference that a massive earthquake will level most structures along the Wasatch Front?
- A. A historical pattern of strong earthquakes along plate boundaries.  
 B. Recent evidence that strong earthquakes occur along major fault zones.  
 C. Weather patterns changing from drought conditions to flood conditions.  
 D. Documented evidence of farm animals acting peculiar.
- 69) If a person wanted to raise doubts about Wegner's theory of plate tectonics, what kind of evidence would the person need to provide?
- A. Fossil evidence showing similar types of organisms on different continents.  
 B. The close relationship between plate boundaries and volcanic activity.  
 C. Studies of rocks on the ocean floor showing that some rocks are younger than others.  
 D. Deep ocean studies showing no zones of movement on the ocean floor.
- 70) Three science students provide a brief statement about convection:  
 Science Student 1: Ocean water has convection currents. One example is that ocean water is heated by hydrothermal vents, becomes less dense and rises. As it reaches areas of lower temperature water, it cools, increases in density and sinks.  
 Science Student 2: The atmosphere near the earth's surface is heated, becomes less dense and rises. As the air rises, it expands and cools. When it cools, the air increases in density and sinks.  
 Science Student 3: Magma in the mantle is moved by convection. It is theorized that the internal heat of the earth causes the magma to rise to the top of the mantle. As it rises, it cools, density increases and the magma sinks again towards the core.  
 Which of the following best describes the relationship between the three statements above?
- A. Convection can only be studied in the mantle, atmosphere and oceans.

- B. Convection is completely different in relation to each earth system.
- C. Convection is a topic that many science students find interesting to study.
- D. Convection is a scientific principle that occurs in all Earth's spheres.

71) Which statement **best** explains why earthquakes occur more frequently in California than in Utah?

- A. The rock found in California is igneous, but the rock found in Utah is sedimentary.
- B. California is located on the boundary of two crustal plates, but Utah is not.
- C. The rock under California is soft, but the rock under Utah is hard.
- D. California is located on a continental plate, but Utah is not.

72) What data would a scientist need to support the inference that a massive earthquake will level most structures along the Wasatch Front?

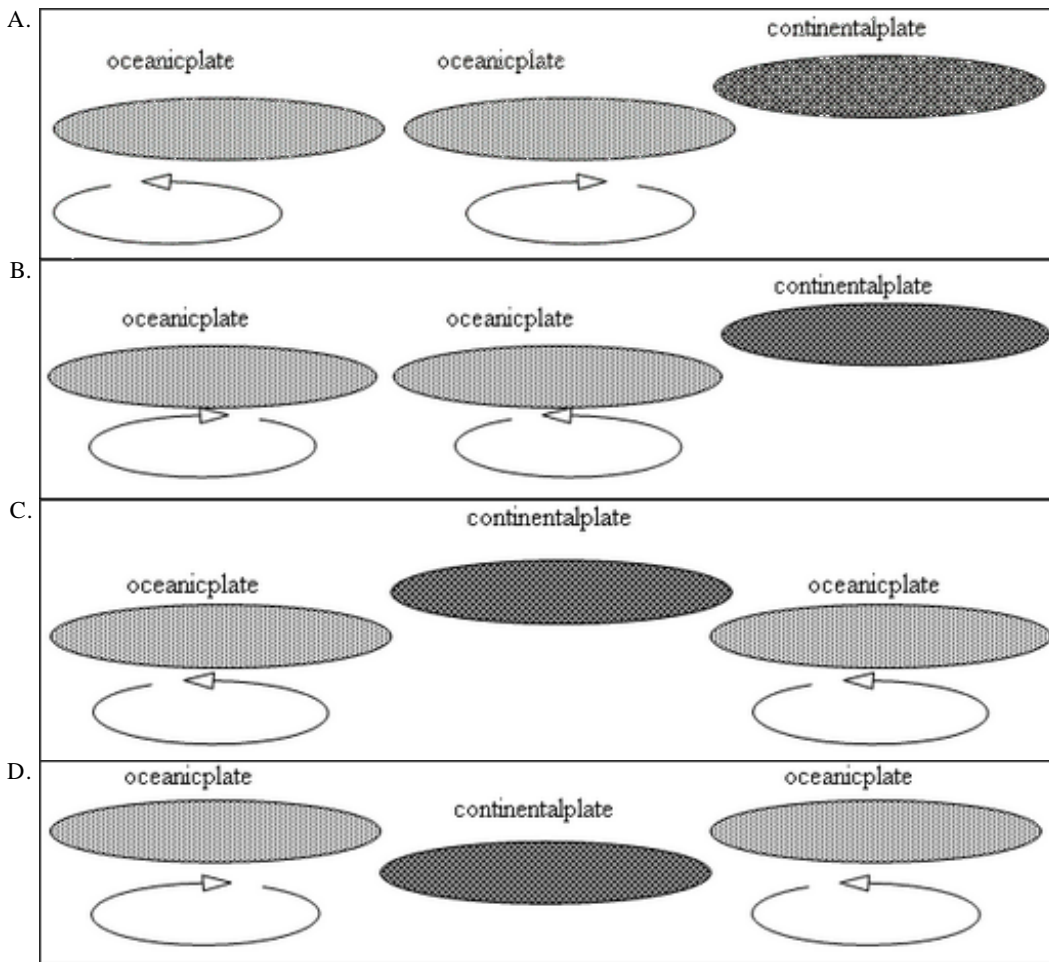
What data would a scientist need to support the inference that a massive earthquake will level most structures along the Wasatch Front?

- A. A historical pattern of strong earthquakes along plate boundaries.
- B. Recent evidence that strong earthquakes occur along major fault zones.
- C. Weather patterns changing from drought conditions to flood conditions.
- D. Documented evidence of farm animals acting peculiar.

73) Ocean vents are caused by small cracks in the oceanic crust. Upwelling caused by ocean vents results in changes in the number of organisms near the vent. Why does this happen?

- A. The nutrient content is higher around the vents.
- B. Ocean organisms enjoy the warmer water around the vents.
- C. Wave actions caused by the vents help the area stay unpolluted.
- D. Ocean vents provide areas for more organisms to hide from predators.

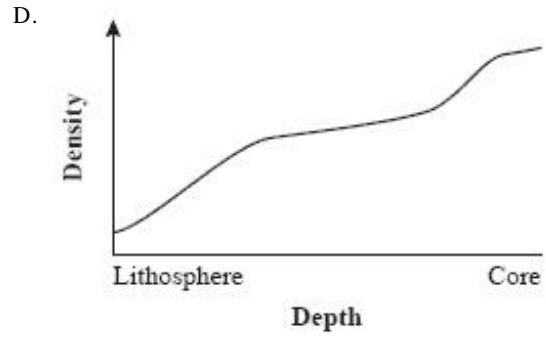
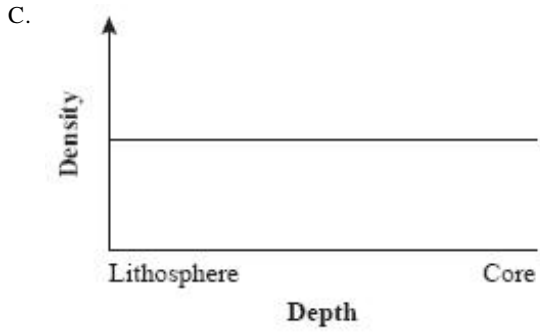
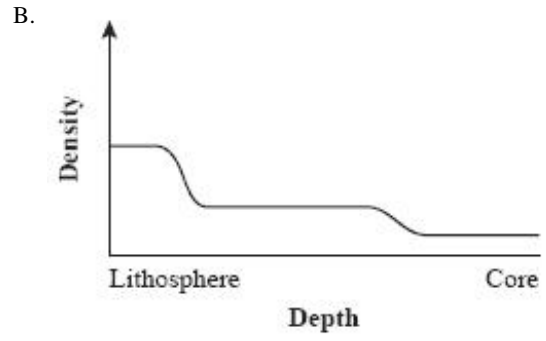
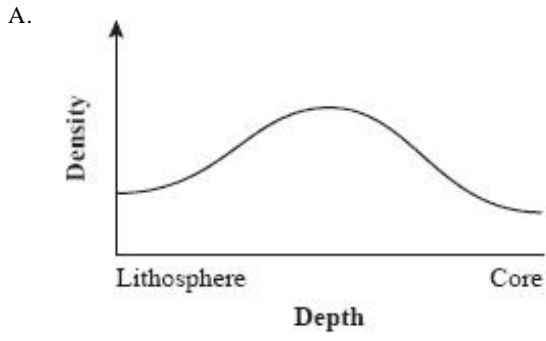
74) Which of the following models best illustrates the movement of Earth's crust over geologic time? (Arrows indicate direction of convection currents.)



75) What is the best alternative hypothesis for how plate interactions change Earth's climate?

- A. Heat from volcanic eruptions at plate boundaries causes atmospheric temperatures to increase.
- B. Friction between moving plates causes the temperature of the oceans to rise dramatically.
- C. The gravitational pull of the moon forces the plates to move more rapidly away from each other.
- D. Plate motion causes the continents on the earth to shrink.

76) Which graph **best** represents the relationship between density and depth of material below Earth's surface?



## EarthT2

### !!!!!!!ANSWER KEY!!!!!!!

(Do not photo copy)

76 Question(s)

Test ID: 298292

1) Which of the following is an abiotic factor?

- A. cat
- B. dog
- C. person
- ✓ weather

[SC:ES:2:2 - ILOs ESS, B, C, & P:3]

2) You want to design an experiment that tests the influence of abiotic factors on plant growth. Which abiotic factor would you test?

- ✓ acidity of the soil
- B. insects infecting the plant
- C. species of plants grown
- D. plant height

[SC:ES:2:2 - ILOs ESS, B, C, & P:1]

3) What is the purpose of including a control in a scientific investigation? To provide:

- ✓ a basis for comparison
- B. a correction for experimental errors
- C. a preliminary trial of the methods
- D. an opportunity for repetition of the experiment

[ILOs ESS, B, C, & P:1 - SC:ES:2:2]

4) Andrew did a study on the relationship between the age of trees and the number of sparrow nest sites. He hypothesized that he would find more nests in older trees than he would in younger trees. He found 355 sparrow nesting sites in trees over 50 years old and no nests in trees less than 50 years old. Andrew's conclusion was 'Sparrows never nest in trees under 50 years old.' Which of the following statements best describes Andrew's conclusion?

- ✓ The statement is invalid because Andrew did not examine every sparrow nesting site worldwide
- B. The statement is invalid because it is difficult to determine the exact age of a tree without killing it
- C. The statement is valid because Andrew did not find any nests in trees less than 50 years old
- D. The statement is valid because Andrew had a large sample size
- E. The statement is valid because Andrew's hypothesis matched his conclusion

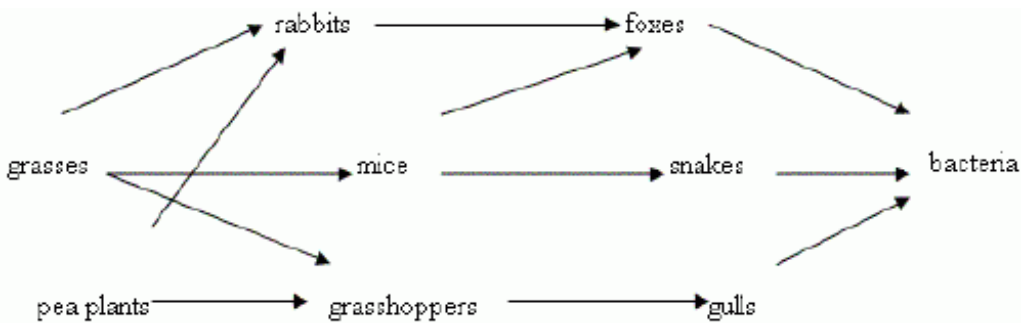
[SC:ES:2:2 - ILOs ESS, B, C, & P:4]

5) Which of the following is a question that cannot be answered by science?

- A. What is the effect of fires on an ecosystem?
- B. What abiotic factors in an ecosystem are affected by a fire?
- C. What steps can be taken to restore an ecosystem that has been destroyed by fire?
- ✓ What regulations are necessary to stop displaced animals from ruining private property?

[SC:ES:2:2 - ILOs ESS, B, C, & P:6]

6) Use the diagram below to answer the following question.



What would happen if the bacteria were taken out of the food web?

- A. Foxes would over populate and kill off the rabbits

- ✓ Dead plants and animals would not decompose
- C. The number of gulls would decrease
- D. Snakes and foxes would eat all of the mice
- E. Snakes would get sick and die

[SC:ES:2:2 - ILOs ESS, B, C, & P:1]

- 7) Joseph wanted to analyze the relationship between biotic and abiotic factors in a forest meadow. Which of the following would be suitable subjects for study?
- A. The relationship between rabbit feeding habits and number of clover plants
  - B. The relationship between number of aspen trees and sparrow nests
  - C. The relationship between rainfall and stream volume
  - D. The relationship between length of day and average daytime temperature
  - ✓ The relationship between soil type and vegetation types

[SC:ES:2:2 - ILOs ESS, B, C, & P:1]

- 8) In an investigation on potato bug habitat sites, Graciella's hypothesis was 'There will be more potato bugs found in moist, dark areas than will be found in dry, dark areas.' When Graciella collected data she found 172 potato bugs under rocks in dry, dark areas and 42 potato bugs under rocks in moist, dark areas.

Graciella's conclusion, based on her data, was that more potato bugs are found in dry, dark areas than are found in moist, dark areas. Which of the following statements about her conclusion is right?

- A. The conclusion is invalid because it disagrees with the hypothesis
- B. The conclusion is invalid because potato bugs prefer moist environments
- ✓ The conclusion is valid because there were significantly more potato bugs found in dry, dark areas than moist, dark areas
- D. The conclusion is valid because invertebrates prefer dry, dark areas
- E. The experiment is a failure because the hypothesis was wrong

[SC:ES:2:2 - ILOs ESS, B, C, & P:4]

- 9) A farmer wants to know how to get more ears of corn from his land. His field is fenced and he has planted his plants as close together as possible. You are going to conduct an experiment to help him.

You decide to plant 10m corn seeds in 10 different pots. You water 5 plants with 100 ml of water a day and 5 plants with 1000 ml of water a day.

Which of the following hypothesis are you testing with your experiment?

- A. If you fertilize the plant more than you will get more corn
- ✓ If you water the plant more then you will get more corn
- C. If you spread out the plants more you will get more corn
- D. If you give the plant more light you will get more corn

[SC:ES:2:2 - ILOs ESS, B, C, & P:1]

- 10) Which would be the most beneficial to help scientists make recommendations to successfully restore an area damaged by fire?

- A. Research ways to predict and control lightning strikes within the area.
- B. Perform a long term study of climate and weather patterns in the area.
- ✓ Research successful restoration projects for areas similar to the one that was destroyed.
- D. Perform a survey of local residents to determine their preference on how the area should be restored.

[ILOs ESS, B, C, & P:5 - SC:ES:2:2]

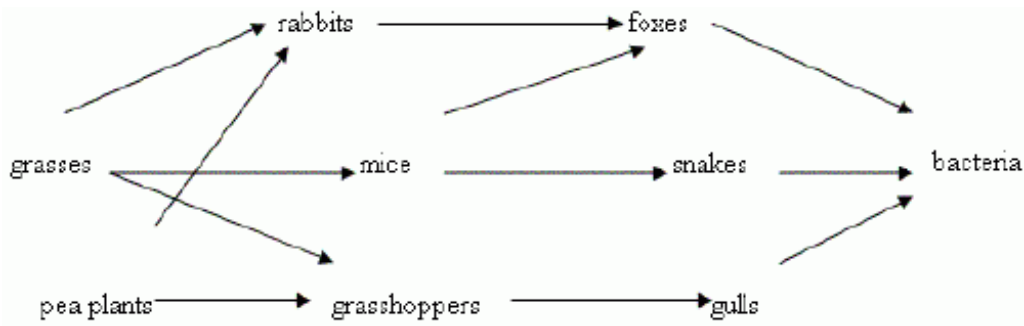
- 11) In an investigation on potato bug habitat sites, Graciella's hypothesis was 'There will be more potato bugs found in moist, dark areas than will be found in dry, dark areas.' When Graciella collected data she found 172 potato bugs under rocks in dry, dark areas and 42 potato bugs under rocks in moist, dark areas.

What variable was Graciella testing?

- ✓ The relative moisture level of the potato bug habitat
- B. The relative light level of the potato bug habitat
- C. Potato bug preference for hiding under rocks versus other habitat options
- D. The relationship between light levels and moisture content in potato bug habitats
- E. Where potato bugs live

[SC:ES:2:2 - ILOs ESS, B, C, & P:1]

12) Use the diagram below to answer the following question.

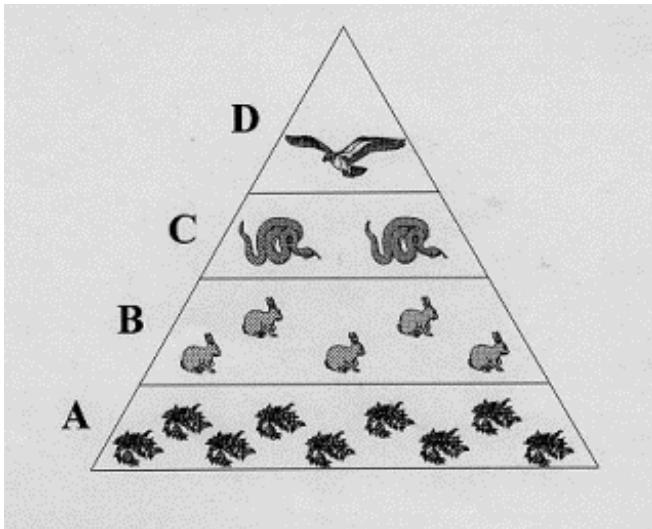


What would happen if the mice were taken out of this food web?

- A. The food web would collapse
- B. There would be less grass for the rabbits
- C. The gull population would get smaller
- ✓ D. The snake population would get smaller
- E. The fox population would increase

[ILOs ESS, B, C, & P:1 - SC:ES:2:2]

13) Use the chart to answer the following question:



What causes the decrease in organisms as you move up the pyramid?

- A. Organisms in the upper levels eat more than organisms in the lower levels
- B. Organisms in the upper levels eat less than organisms in the lower levels
- ✓ C. Each level loses energy due to growth, activity and heat loss, so less energy is available for each level up the pyramid
- D. The lower levels depend on a steady source of sunlight, while the upper levels have no need for sunlight

[SC:ES:2:2 - ILOs ESS, B, C, & P:3]

14) A hillside covered with grasses, shrubs and trees is ignited by lightning. The fire destroys most of the vegetation on the hillside and the soil begins to erode away. The animal species that lived in the area migrate downhill into an area populated with homes. Local residents begin to complain about their yards being destroyed by the displaced animals. Local scientists are asked to come in and make recommendations to resolve the problem and to come up with a restoration plan for the hillside area.

What could scientists tell the local people?

- ✓ A. Major changes in abiotic factors of an ecosystem affect many other parts of the ecosystem.
- B. Fire destroys all of the abiotic factors in an ecosystem.
- C. Better safeguards should be made to stop lightning-caused fires from affecting surrounding ecosystems.
- D. A change in an ecosystem usually affects the factors of that ecosystem and not of other ecosystems.

[ILOs ESS, B, C, & P:5 - SC:ES:2:2]

15) A farmer checks some of the abiotic factors of her soil by performing tests and analyzing measurements for temperature ranges, water availability and the amounts of certain nutrients before planting her crops. Why is it important for the farmer to be able to use these tests?

- A. She has to do these tests because they are required by law.
- B. She shouldn't use them because they should only be used by trained scientists.

C. She uses these tests to increase the price of the produce that she sells.

✓ She uses these tests to increase the success of her crops.

[SC:ES:2:2 - ILOs ESS, B, C, & P:6]

16) The reduced level of oxygen in the lake would determine which of the following?

A. the number of birds living around the lake

B. the amount of run-off reaching the lake

C. the amount of sunlight reaching the lake

✓ the kinds of fish living in the lake

[ILOs ESS, B, C, & P:1 - SC:ES:2:2]

17) Why does a town in the desert rarely experience early morning fog as compared to a town along the coast?

A. There is less rainfall in the desert.

B. Temperatures vary more in the desert.

✓ There is less water vapor in the desert air.

D. There are fewer plants in the desert.

[SC:ES:2:2 - ILOs ESS, B, C, & P:3]

18) A rancher moved his herd of cattle to a mountain range pasture. Which example below indicated he exceeded the carrying capacity of that range?

A. The herd grew and prospered

✓ The range became overgrazed and barren

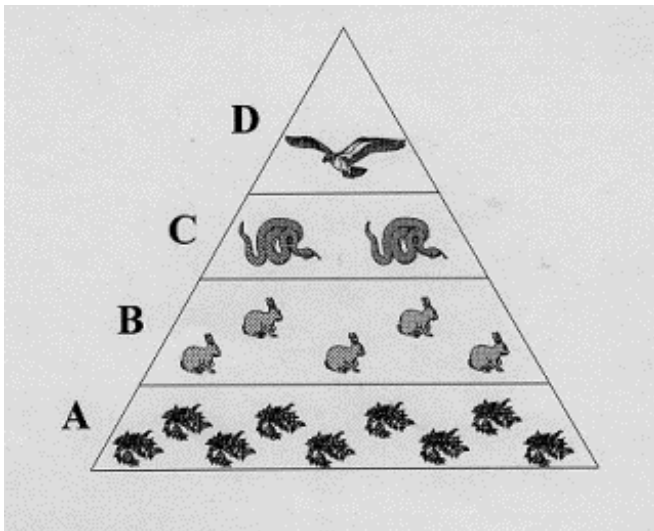
C. The range became green and fertile

D. Too many people rode the cattle and caused back problems

E. The cows had more than one calf

[SC:ES:2:2 - ILOs ESS, B, C, & P:4]

19) Use the chart to answer the following question:



The rabbits in this example occupy which level of the food pyramid?

A. producers

✓ primary consumers

C. secondary consumers

D. tertiary consumers

[SC:ES:2:2 - ILOs ESS, B, C, & P:3]

20) A farmer wants to know how to get more ears of corn from his land. His field is fenced and he has planted his plants as close together as possible. You are going to conduct an experiment to help him.

You decide to plant 10m corn seeds in 10 different pots. You water 5 plants with 100 ml of water a day and 5 plants with 1000 ml of water a day.

Which of the following is a research question about the farmer's problem?

A. How tall can a corn stalk grow?

B. How do you keep the deer from eating the corn?

C. How can you get more plants on his land?

✓ How can you get more ears per corn plant?

[SC:ES:2:2 - ILOs ESS, B, C, & P:1]

- 21) Two classifications of all the different species in a lake are made. In one system, the organisms are classified by food chains. In the other, the organisms are classified by structural relationships. Which of the following statements is most reasonable?
- A. A system based on structural relationships is more accurate than one based on the food chain
  - B. One system of classification is more useful than the other
  - C. One system is correct; the other is incorrect
  - D. Both systems may be correct and useful depending on the kind of problem being investigated

[ILOs ESS, B, C, & P:6 - SC:ES:2:3]

- 22) The heath hen, an extinct small wild fowl, was a relative of the prairie chicken. Which of the following **most likely** caused extinction of the heath hen?
- A. overhunting
  - B. stable climate
  - C. plentiful food supply
  - D. abundant nesting sites

[ILOs ESS, B, C, & P:3:a - SC:ES:2:3:C]

- 23) Consider the following statement:

"One thousand acres of rainforest are destroyed daily. As the rainforest is destroyed, hundreds of unidentified species are destroyed. We must stop rainforest destruction immediately to preserve biodiversity. It is wrong to destroy rainforests."

Consider the phrase "We must stop rainforest destruction immediately to preserve biodiversity. It is wrong to destroy rainforests." Is the phrase a statement that science makes?

- A. Yes because biodiversity is important to maintain healthy ecosystems
- B. Yes because immediate action is required to save rainforests
- C. No because it is a value judgment
- D. No because rainforests do not have much biodiversity

[ILOs ESS, B, C, & P:6 - SC:ES:2:3]

- 24) How have scientists helped prevent the extinction of the desert tortoise in Utah?

- A. Scientists have informed people of locations of tortoise habitat and argued for their protection.
- B. Scientists have passed laws that protect the tortoise.
- C. Scientists have just stirred up the fight.
- D. Scientists have encouraged people to not worry about the tortoises because they will migrate to a safer habitat.

[SC:ES:2:3 - ILOs ESS, B, C, & P:6]

- 25) Polar bears have low reproduction rates. How might this affect their likelihood of becoming extinct?

- A. They will be more likely to become extinct because it takes a relatively long time for them to replenish their population
- B. They will be more likely to become extinct because there is not enough food in their habitat to support their young
- C. They will be less likely to become extinct because the females are very protective of the few young that they have
- D. They will be less likely to become extinct because reproduction rates have nothing to do with a species' likelihood of becoming extinct

[ILOs ESS, B, C, & P:3 - SC:ES:2:3]

- 26) As settlers moved into Utah, natural predators such as bears, wolves, and cougars were killed or driven from the area. With the decrease of predator population the deer population exploded. Which of the following best describes an ecological reason for hunting?

- A. It promotes physical activity
- B. It allows people another sources of food
- C. It replaces the function of large predators
- D. It replaces the function of the producers
- E. It provides more food for the deer

[SC:ES:2:3 - ILOs ESS, B, C, & P:3]

27)

BIOME ONE	BIOME TWO	BIOME THREE	BIOME FOUR
<ul style="list-style-type: none"> <li>● Slow growth rate</li> <li>● Low species diversity</li> <li>● Low biomass</li> <li>● 0-25 cm average rainfall per year</li> </ul>	<ul style="list-style-type: none"> <li>● Rapid growth rate</li> <li>● Highest species diversity</li> <li>● High biomass</li> <li>● 80-120 cm average rainfall per year</li> <li>● Nutrients in vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>● 80-120 cm average rainfall per year</li> <li>● Dominated by leaf dropping trees</li> <li>● Nutrient rich soil</li> <li>● Medium biomass and species diversity</li> </ul>	<ul style="list-style-type: none"> <li>● 25-75 cm average rainfall per year</li> <li>● Nutrient rich soil</li> <li>● Dominated by grasses, sedges</li> <li>● Medium biomass and species diversity</li> </ul>

Consider the table above.

What is the major abiotic difference between Biomes Three and Four?

- A. Average temperature
- ✓ Average rainfall
- C. Types of plants growing in the biome
- D. Soil type

[SC:ES:2:3 - ILOs ESS, B, C, & P:1]

28) Cutthroat trout are native to Yellowstone Lake. Lake trout were added to the lake several decades ago. Lake trout eat the Cutthroat's food and their young. Lake trout populations are increasing while Cutthroat trout are becoming rare. Which of the following best explains why Cutthroat trout may become extinct?

- A. Their natural habitat was destroyed
- B. Man made chemicals polluted Yellowstone Lake
- C. Excessive fishing reduced their population
- ✓ An introduced species (non-native) is taking over their habitat

[ILOs ESS, B, C, & P:4 - SC:ES:2:3]

29) The Kirtland Warbler nests only in 6- to 15- year-old jack pine trees. Why does this behavior increase their likelihood of going extinct?

- ✓ If something were to happen to their limited nesting area they would be unable to reproduce
- B. If something were to happen to their food supply, their specialized feeding habits would make it very difficult for them to find food
- C. If something were to happen to their migratory route, their fixed migratory pattern would be disrupted and they would not be able to migrate
- D. If something were to happen to their food web, the biodiversity of the area would decrease

[SC:ES:2:3 - ILOs ESS, B, C, & P:3]

30) The human population in St. George, Utah and the surrounding desert area is increasing very rapidly. What has allowed the growth to increase so rapidly in the desert?

- ✓ Scientists have developed ways to move and store water.
- B. Scientists have identified protected areas for the desert tortoise.
- C. Currently humans can live farther from big cities like Salt Lake City and Las Vegas.
- D. Climate changes have made the southern Utah desert a more desirable place to live.

[SC:ES:2:3 - ILOs ESS, B, C, & P:5]

31) Consider the claim 'Biodiversity is essential to maintain a functioning ecosystem.' What would be at least one thing that would have to happen for this claim to be called a theory?

- ✓ It would have to be supported by a lot of data that had been tested repeatedly
- B. The claim would have to be proven to be true by the scientific community
- C. Ecosystems would have to depend on biodiversity
- D. Science would have to start accepting new theories

[ILOs ESS, B, C, & P:6 - SC:ES:2:3]

32) Scientists invented radio collars that could be attached to wild animals to track their movements. How does this technology help us maintain biodiversity and avoid extinction?

- ✓ The size of territory the animal needs for survival can be documented.
- B. The animals can be located and saved from hunters at any time.
- C. The animals can be trained to stay out of some areas and go into others.
- D. The radio collars can help many species reproduce.

[ILOs ESS, B, C, & P:5 - SC:ES:2:3]

- 33) Rachel Carson, a writer of the 1960's, condemned the use of the chemical DDT which was being used to kill crop eating insects. She pointed out that this chemical accumulated in the food chain and harmed many unintended organisms such as birds.

How has her book contributed to the protection of Earth's diversity of life?

- A. Her work was used to help save predatory birds.
- B. Her work resulted in the elimination of many harmful insects.
- C. Her work helped develop new insecticides.
- D. Money earned from the sale of her book built new wetlands.

[ILOs ESS, B, C, & P:5 - SC:ES:2:3]

- 34) Consider the following statement:

"One thousand acres of rainforest are destroyed daily. As the rainforest is destroyed, hundreds of unidentified species are destroyed. We must stop rainforest destruction immediately to preserve biodiversity. It is wrong to destroy rainforests."

Which of the following questions would help evaluate the scientific accuracy of the statement?

- A. Why is it important to preserve the biodiversity housed in the world's rainforests?
- B. Who is destroying the rainforest?
- C. Where was the statement published?
- D. How has the United States contributed to rainforest destruction?

[SC:ES:2:3 - ILOs ESS, B, C, & P:6]

- 35) Which biome has the greatest number of plant and animal species in a given area?

- A. Coniferous forest
- B. Tropical rain forest
- C. Desert
- D. Grassland

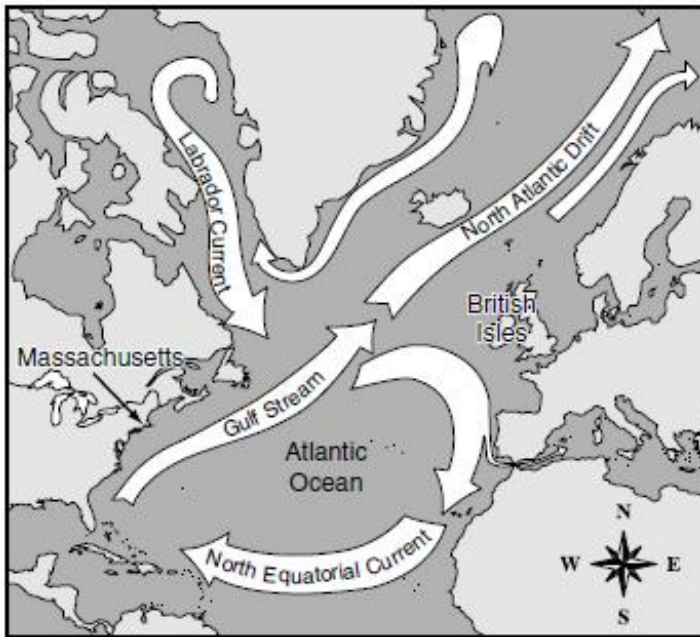
[SC:ES:2:3 - ILOs ESS, B, C, & P:3]

- 36) Studies about rainforest destruction raise the question, 'Is it right that starving people destroy rainforests to provide food for their families?' How can science be used to answer this question?

- A. Science can gather data to prove that biodiversity is more important than individual people therefore people do not have the right to destroy rainforests
- B. Science can gather data to show that starving people have no other way to feed their families therefore they have the right to destroy rainforests
- C. Science can gather data that will help people make a decision about rainforest destruction but it cannot, by itself, answer the question
- D. Science cannot be used to answer the question

[ILOs ESS, B, C, & P:6 - SC:ES:2:3]

37) The map below shows Atlantic Ocean currents.



Surface currents in the ocean affect the climate of the land areas nearby. Which of the currents **most** affects the climate of Massachusetts and its surrounding states?

- ✓ A. Gulf Stream
- B. Labrador Current
- C. North Atlantic Drift
- D. North Equatorial Current

[SC:ES:2:3 - ILOs ESS, B, C, & P:3]

38) Consider the following statement:

"One thousand acres of rainforest are destroyed daily. As the rainforest is destroyed, hundreds of unidentified species are destroyed. We must stop rainforest destruction immediately to preserve biodiversity. It is wrong to destroy rainforests."

Which piece of data would help evaluate the scientific accuracy of the statement?

- ✓ A. The number of new species identified annually in the world's rainforests.
- B. The number of industries who own rainforest property
- C. The number of plants living in rainforests
- D. The number of animals living in rainforests

[SC:ES:2:3 - ILOs ESS, B, C, & P:4]

39)

BIOME ONE	BIOME TWO	BIOME THREE	BIOME FOUR
<ul style="list-style-type: none"> <li>• Slow growth rate</li> <li>• Low species diversity</li> <li>• Low biomass</li> <li>• 0-25 cm average rainfall per year</li> </ul>	<ul style="list-style-type: none"> <li>• Rapid growth rate</li> <li>• Highest species diversity</li> <li>• High biomass</li> <li>• 80-120 cm average rainfall per year</li> <li>• Nutrients in vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>• 80-120 cm average rainfall per year</li> <li>• Dominated by leaf dropping trees</li> <li>• Nutrient rich soil</li> <li>• Medium biomass and species diversity</li> </ul>	<ul style="list-style-type: none"> <li>• 25-75 cm average rainfall per year</li> <li>• Nutrient rich soil</li> <li>• Dominated by grasses, sedges</li> <li>• Medium biomass and species diversity</li> </ul>

Consider the table above.

Which of the following statements about Biome Two is an inference?

- A. Biome Two has the greatest biodiversity
- B. Biome Two receives a lot of precipitation
- ✓ C. Biome Two is a tropical rain forest
- D. Biome Two's nutrients are stored in the plants

[SC:ES:2:3 - ILOs ESS, B, C, & P:1]

40)

BIOME ONE	BIOME TWO	BIOME THREE	BIOME FOUR
<ul style="list-style-type: none"> <li>• Slow growth rate</li> <li>• Low species diversity</li> <li>• Low biomass</li> <li>• 0-25 cm average rainfall per year</li> </ul>	<ul style="list-style-type: none"> <li>• Rapid growth rate</li> <li>• Highest species diversity</li> <li>• High biomass</li> <li>• 80-120 cm average rainfall per year</li> <li>• Nutrients in vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>• 80-120 cm average rainfall per year</li> <li>• Dominated by leaf dropping trees</li> <li>• Nutrient rich soil</li> <li>• Medium biomass and species diversity</li> </ul>	<ul style="list-style-type: none"> <li>• 25-75 cm average rainfall per year</li> <li>• Nutrient rich soil</li> <li>• Dominated by grasses, sedges</li> <li>• Medium biomass and species diversity</li> </ul>

Consider the table above.

In which biome would you be most likely to find a cactus?

- ✓ A. Biome One
- B. Biome Two
- C. Biome Three
- D. Biome Four

[SC:ES:2:3 - ILOs ESS, B, C, & P:1]

41) Extinctions have occurred since life began. Why are scientists concerned about plants and animals going extinct?

- A. Scientists care more about plants and animals now than they did in the past
- ✓ B. Current extinction rates are much higher than natural extinction rates
- C. Extinctions cause meteorites to strike the Earth and scientist do not want that to happen
- D. Extinctions are not a natural part of life; healthy ecosystems do not have extinctions

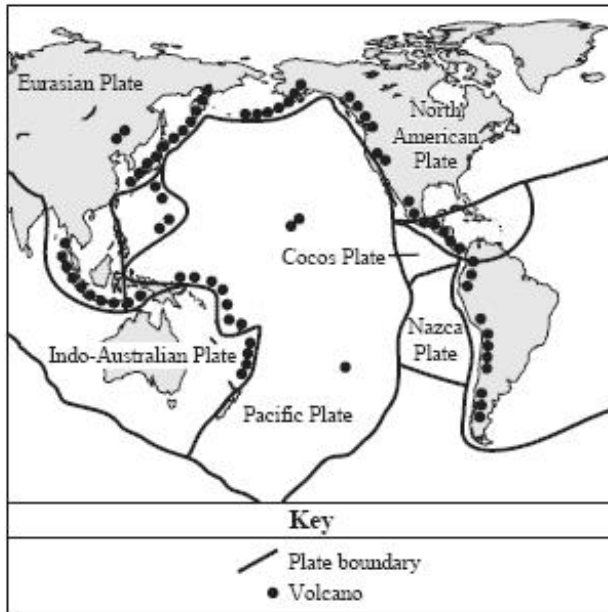
[ILOs ESS, B, C, & P:3 - SC:ES:2:3]

42) In which biome is the growing season the shortest?

- A. Deciduous forest
- B. Tropical rain forest
- ✓ C. Desert
- D. Grassland

[SC:ES:2:3 - ILOs ESS, B, C, & P:3]

- 43) On the map below, dark circles indicate the positions of volcanoes in the "Ring of Fire" in and around the Pacific Ocean. Dark lines indicate tectonic plate boundaries of Earth's crust.

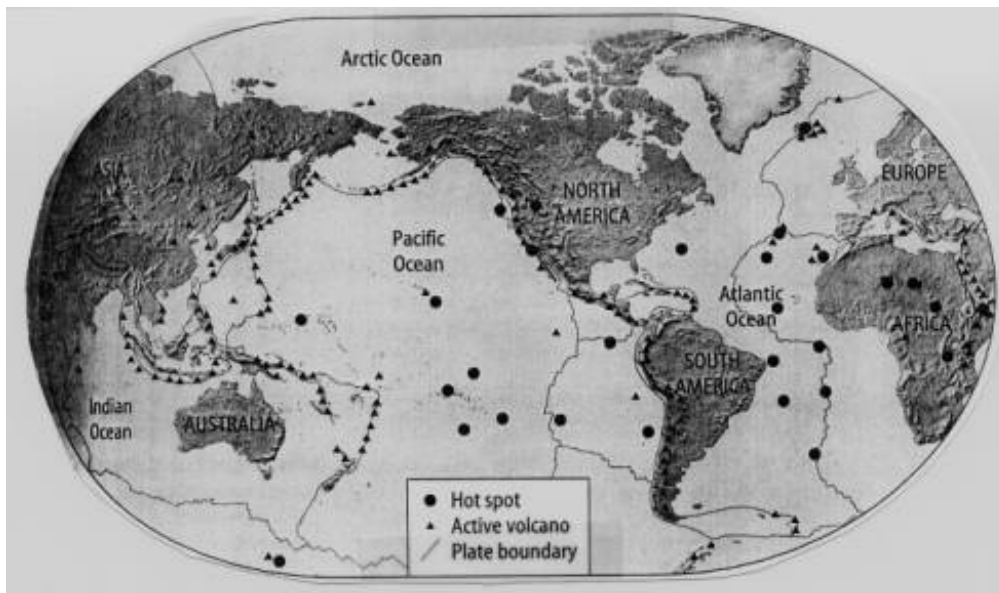


According to this map, which of the following describes where volcanoes are **most likely** to form in the Ring of Fire?

- A. Volcanoes form in the middle of a tectonic plate.
- B. Volcanoes form below the surface of tectonic plates.
- ✓ C. Volcanoes form where tectonic plates meet other plates.
- D. Volcanoes form where earthquakes are least likely to occur.

[ILOs ESS, B, C, & P:1 - SC:ES:3:1:C]

- 44) Use the map to answer the following question.



Which symbol on the map show evidence of plate movement?

- ✓ A. hot spot
- B. active volcano
- C. plate boundary
- D. lines

[ILOs ESS, B, C, & P:3 - SC:ES:3:1]

- 45) Consider the following three pieces of data.
- I. The continents on Earth fit together like a puzzle.
  - II. The same plant fossils are found on many different continents.
  - III. Climate data indicates that some continents in the Arctic once were tropical and warm.
- Which of the following best describes the relationship between the above statements?

- ✓ A. They are evidence for continental drift.

- B. They describe major areas of geologic studies.
- C. They help to explain why the plates on Earth move.
- D. There is no relationship because they are separate areas of science.

[SC:ES:3:1 - ILOs ESS, B, C, & P:6]

46) Which of the following discoveries caused science to re-evaluate its opinion of Wagner's hypothesis about continental drift?

- ✓ A. Sea floor spreading in the Atlantic Ocean
- B. Valley and delta land forms on Mars
- C. The coastlines of Africa and South America have similar fossils
- D. The global rate of volcanic activity has changed over time

[ILOs ESS, B, C, & P:3 - SC:ES:3:1]

47) The earth's crust is broken into pieces called plates. These plates interact with each other at boundaries. Which of the following is the best data to use when classifying plate boundaries?

- A. The length of the boundary between the two plates.
- B. The size of the two plates that meet at a boundary.
- ✓ C. The motion of the two plates relative to each other at the boundary.
- D. The speed at which the two plates are moving as they meet at a boundary.

[SC:ES:3:1 - ILOs ESS, B, C, & P:4]

48) Wegener's theory of continental drift was not accepted until the mid-1900's. Which of the following are technological advances that led to the acceptance of this theory and laid the ground work for plate tectonics?

- ✓ A. Sonar and magnetometers mapped the ocean floor and detected magnetic striping.
- B. Satellites created communication networks for scientists on other continents.
- C. Computer systems were used to simulate tectonic patterns on other planets.
- D. Seismometers were developed to accurately measure volcanic activity.

[ILOs ESS, B, C, & P:5 - SC:ES:3:1]

49) Alfred Wegener proposed that 200 million years ago, continents broke apart from the supercontinent Pangaea and have drifted apart over time. This idea is known as continental drift. Which of the following is the best fossil evidence for continental drift?

- ✓ A. Fossils of the same land dwelling animals were found on widely separated continents.
- B. Fossils of the same ocean dwelling organisms were found in different oceans.
- C. Fossils of the same warm climate organisms were found on continents with warm climates.
- D. Fossils of the same freshwater organisms were found on areas with abundant freshwater.

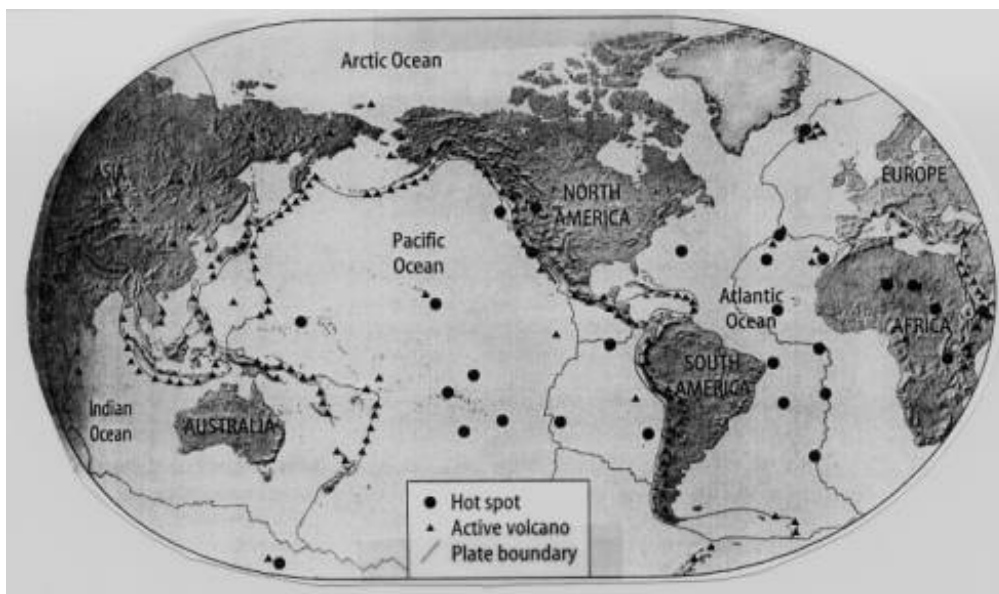
[ILOs ESS, B, C, & P:4 - SC:ES:3:1]

50) If science accepts the conclusion that continents have drifted, what are they assuming is true?

- A. Gravity works the same on Earth as it does on other planets and stars in the universe
- ✓ B. Convection currents worked in the past the same way they work now
- C. The world's climate has changed a lot over time
- D. Carbon dating is an accurate way to measure age

[SC:ES:3:1 - ILOs ESS, B, C, & P:6]

51) Use the map to answer the following question.



Where are the most volcanoes located?

- A. Atlantic Ocean
- ✓ B. Pacific Ocean
- C. African Continent
- D. Asian Continent

[SC:ES:3:1 - ILOs ESS, B, C, & P:1]

52) What kind of evidence do scientists use to locate boundaries of plates and interpret what type of boundary is present?

- A. matching fossil records
- B. similar rock layers
- ✓ C. distribution of earthquakes and volcanoes
- D. the way the continental coastlines fit together like a puzzle

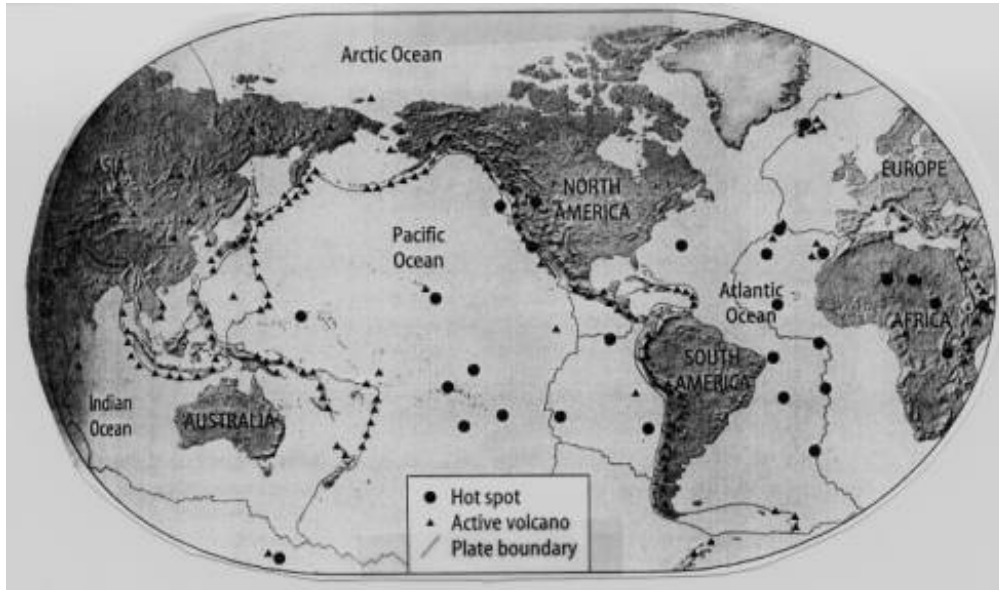
[ILOs ESS, B, C, & P:3 - SC:ES:3:1]

53) How has technology changed scientists' understanding of sea floor spreading and how it is evidence of plate tectonics?

- A. Earthquakes are evidence of changes in the ocean floor.
- B. The measurement of the weight of the ocean gave evidence of sea floor spreading.
- ✓ C. The ocean floor was mapped and studied using sonar and magnetometers.
- D. Scientists used computer measurements of volcanic activity to give details of the ocean floor.

[SC:ES:3:1 - ILOs ESS, B, C, & P:5]

54) Use the map to answer the following question.



Why are there more volcanoes where ocean and land meet?

- A. Wave action on land plate
- B. Ocean plate pulling away from land plate
- C. Land plate moving past ocean plane
- ✓ D. Ocean plate colliding with land plate

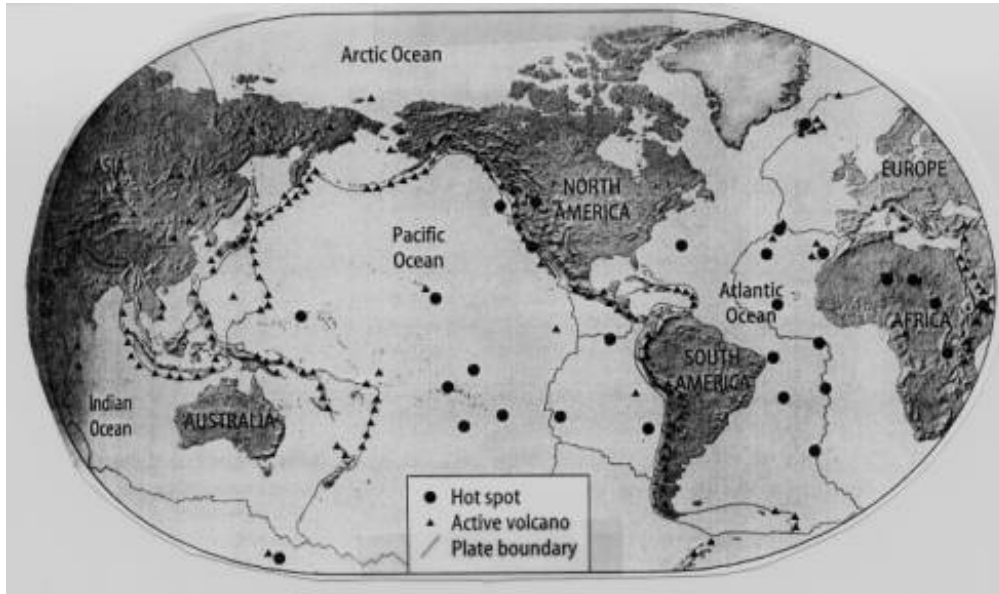
[SC:ES:3:1 - ILOs ESS, B, C, & P:3]

55) Where are earthquakes most likely to occur on Earth?

- A. They are spread evenly around the globe
- ✓ B. On plate boundaries
- C. On continents
- D. On the sea floor
- E. In mountains

[SC:ES:3:1 - ILOs ESS, B, C, & P:3]

56) Use the map to answer the following question.

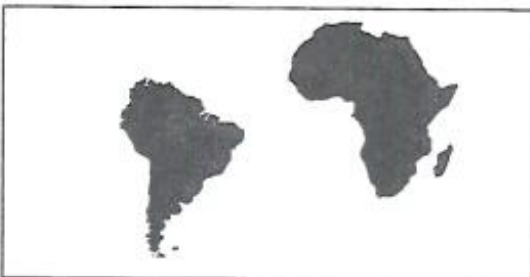


What type of plate boundary is located on the west side of Africa?

- A. Convergent
- B. Divergent
- ✓ C. Transform
- D. Strike/Slip

[SC:ES:3:1 - ILOs ESS, B, C, & P:3]

57) The maps below show the positions of two continents at two different times.



The movement of the two continents as shown may **best** be explained by

- A. volcanic eruptions.
- B. magnetic changes.
- C. coastal flooding.
- ✓ D. plate tectonics.

[SC:ES:3:1:D - ILOs ESS, B, C, & P:3:a]

58) What kind of movement on a plate boundary causes mountain building?

- A. Divergent movement
- ✓ B. Convergent movement
- C. Transform movement
- D. Biome movement

[SC:ES:3:1 - ILOs ESS, B, C, & P:3]

59) Which of the following explains the role of Alfred Wegener's hypothesis of continental drift and the development of the theory of plate tectonics?

- A. Wegener's is the only scientist who worked on the continental drift hypothesis.
- B. A hypothesis usually has more evidence than a theory does.
- C. Wegener's hypothesis was contradicted by recent scientific information.
- ✓ Evidence over the years has filled in the gaps in the continental drift hypothesis.

[SC:ES:3:1 - ILOs ESS, B, C, & P:5]

60) (1) The study of seismic (earthquake) waves has provided most of what we know about the interior of the earth. (2) The seismic waves change direction and speed as they encounter different materials. (3) With this information, scientists have been able to subdivide the Earth into layers.

(4) The composition of the Earth is also supported by data from the study of meteorites. (5) Meteorites are pieces of asteroids that have broken off and enter Earth's atmosphere. (6) The meteorites have a similar composition to what is believed to be in the earth's interior. (7) It is also thought that the asteroids the meteorites broke off from were formed at the same time and in the same way as the planets in the solar system.

Which sentences provide evidence for the internal structure of the earth?

- A. 1 and 3
- ✓ 2 and 6
- C. 4 and 7
- D. 3 and 5

[ILOs ESS, B, C, & P:6 - SC:ES:3:2]

61) If a person wanted to raise doubts about Wegner's theory of plate tectonics, what kind of evidence would the person need to provide?

- A. Fossil evidence showing similar types of organisms on different continents.
- B. The close relationship between plate boundaries and volcanic activity.
- C. Studies of rocks on the ocean floor showing that some rocks are younger than others.
- ✓ Deep ocean studies showing no zones of movement on the ocean floor.

[ILOs ESS, B, C, & P:4 - SC:ES:3:2]

62) A dormant volcano in Indonesia erupted and ejected an incredible amount of gas and dust into the atmosphere in the early 1800's. This gas and dust caused weather extremes, crop failure and major climatic change worldwide for over a year following the eruption. The link between these changes and the volcano's eruption were not understood for years. What is this an example of?

- A. Understanding the results of volcanic eruptions can explain why crops fail.
- B. All volcanoes are destructive and have negative effects worldwide.
- C. The causes of volcanic eruptions describe why climates will change around the volcano.
- ✓ Studying the effects of volcanic eruptions can help scientists determine their impact on human life.

[SC:ES:3:2 - ILOs ESS, B, C, & P:5]

63) The governments of communities that live near active volcanoes often debate regulations about how close to the volcano people and businesses should be allowed to build. What is the role of science in the decision making process of these governments?

- A. Scientists should pass regulations prohibiting people from building close to volcanoes.
- ✓ Scientific data can be used to provide information regarding volcanoes for the community.
- C. Scientific data should be rejected as it could bias the government's decisions.
- D. Scientific data is not easily understood and therefore would not help in the process.

[SC:ES:3:2 - ILOs ESS, B, C, & P:5]

64) Heat from deep in Earth's interior is transferred to its crust by which process?

- A. conduction in the ocean
- ✓ convection in the mantle
- C. radiation from the solid core
- D. evaporation at mid-ocean ridges

[ILOs ESS, B, C, & P:3:a - SC:ES:3:2:A]

65) (1)The study of seismic (earthquake) waves has provided most of what we know about the interior of the earth. (2) The seismic waves change direction and speed as they encounter different materials. (3) With this information, scientists have been able to subdivide the Earth into layers. (4)The composition of the Earth is also supported by data from the study of meteorites. (5) Meteorites are pieces of asteroids that have broken off and enter Earth's atmosphere. (6) The meteorites have a composition similar to Earth's interior. (7) It is also thought that the asteroids the meteorites broke off from were formed at the same time and in the same way as the planets in the solar system.

Which sentence is an inference?

- A. 1

- B. 3
- C. 5
- ✓ 7

[ILOs ESS, B, C, & P:1 - SC:ES:3:2]

- 66) Consider the following statement: “The movement of materials in the mantle by convection causes the movement of the tectonic plates.”  
Which of the following best describes this statement?

- A. It is a fact.
- B. It is a guess.
- ✓ C. It is an inference.
- D. It is an observation.

[SC:ES:3:2 - ILOs ESS, B, C, & P:1]

- 67) Which of the following processes describes the interactions between plates that cause volcanoes?

- A. Two continental crusts pushing up against each other, forming volcanic cones.
- B. Continental crust sinking into the mantle and melting, coming back up as volcanoes.
- ✓ C. Oceanic crust subducting below continental crust, then melting and rising to the surface.
- D. Oceanic crust pushing against oceanic crust causing underwater volcanic peaks.

[SC:ES:3:2 - ILOs ESS, B, C, & P:3]

- 68) What data would a scientist need to support the inference that a massive earthquake will level most structures along the Wasatch Front?

- A. A historical pattern of strong earthquakes along plate boundaries.
- ✓ B. Recent evidence that strong earthquakes occur along major fault zones.
- C. Weather patterns changing from drought conditions to flood conditions.
- D. Documented evidence of farm animals acting peculiar.

[ILOs ESS, B, C, & P:4 - SC:ES:3:2]

- 69) If a person wanted to raise doubts about Wegner’s theory of plate tectonics, what kind of evidence would the person need to provide?

- A. Fossil evidence showing similar types of organisms on different continents.
- B. The close relationship between plate boundaries and volcanic activity.
- C. Studies of rocks on the ocean floor showing that some rocks are younger than others.
- ✓ D. Deep ocean studies showing no zones of movement on the ocean floor.

[ILOs ESS, B, C, & P:4 - SC:ES:3:2]

- 70) Three science students provide a brief statement about convection:  
Science Student 1: Ocean water has convection currents. One example is that ocean water is heated by hydrothermal vents, becomes less dense and rises. As it reaches areas of lower temperature water, it cools, increases in density and sinks.  
Science Student 2: The atmosphere near the earth’s surface is heated, becomes less dense and rises. As the air rises, it expands and cools. When it cools, the air increases in density and sinks.  
Science Student 3: Magma in the mantle is moved by convection. It is theorized that the internal heat of the earth causes the magma to rise to the top of the mantle. As it rises, it cools, density increases and the magma sinks again towards the core.  
Which of the following best describes the relationship between the three statements above?

- A. Convection can only be studied in the mantle, atmosphere and oceans.
- B. Convection is completely different in relation to each earth system.
- C. Convection is a topic that many science students find interesting to study.
- ✓ D. Convection is a scientific principle that occurs in all Earth’s spheres.

[ILOs ESS, B, C, & P:6 - SC:ES:3:2]

- 71) Which statement **best** explains why earthquakes occur more frequently in California than in Utah?

- A. The rock found in California is igneous, but the rock found in Utah is sedimentary.
- ✓ B. California is located on the boundary of two crustal plates, but Utah is not.
- C. The rock under California is soft, but the rock under Utah is hard.
- D. California is located on a continental plate, but Utah is not.

[ILOs ESS, B, C, & P:3:a - SC:ES:3:2:D]

- 72) What data would a scientist need to support the inference that a massive earthquake will level most structures along the Wasatch Front?  
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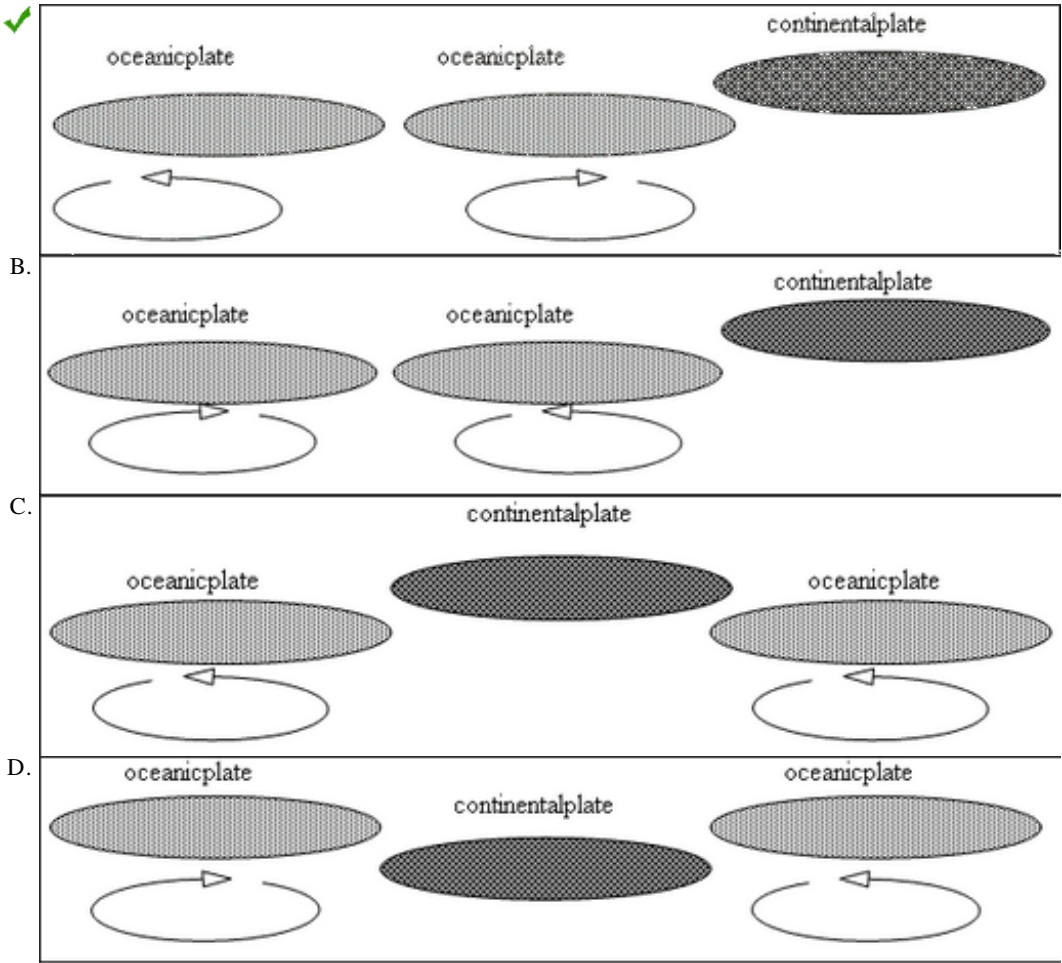
[ILOs ESS, B, C, & P:4 - SC:ES:3:2]

73) Ocean vents are caused by small cracks in the oceanic crust. Upwelling caused by ocean vents results in changes in the number of organisms near the vent. Why does this happen?

- ✓ The nutrient content is higher around the vents.
- B. Ocean organisms enjoy the warmer water around the vents.
- C. Wave actions caused by the vents help the area stay unpolluted.
- D. Ocean vents provide areas for more organisms to hide from predators.

[ILOs ESS, B, C, & P:3 - SC:ES:3:2]

74) Which of the following models best illustrates the movement of Earth's crust over geologic time? (Arrows indicate direction of convection currents.)



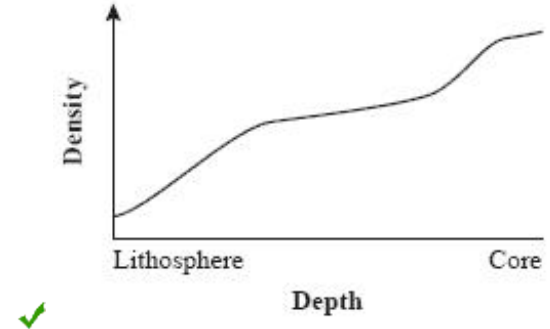
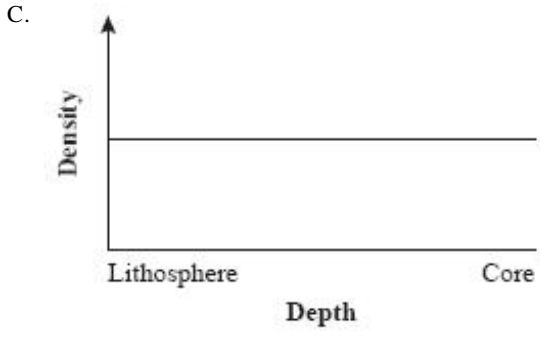
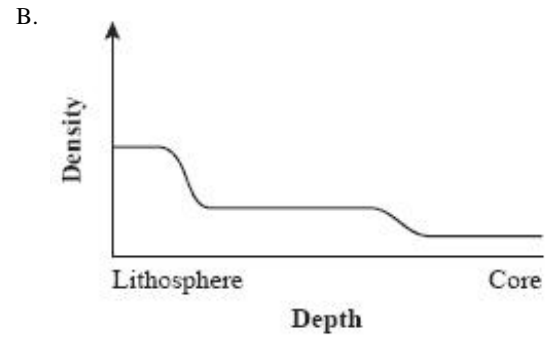
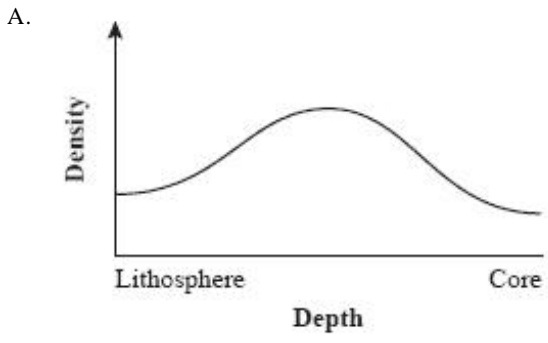
[SC:ES:3:2 - ILOs ESS, B, C, & P:1]

75) What is the best alternative hypothesis for how plate interactions change Earth's climate?

- ✓ Heat from volcanic eruptions at plate boundaries causes atmospheric temperatures to increase.
- B. Friction between moving plates causes the temperature of the oceans to rise dramatically.
- C. The gravitational pull of the moon forces the plates to move more rapidly away from each other.
- D. Plate motion causes the continents on the earth to shrink.

[ILOs ESS, B, C, & P:1 - SC:ES:3:2]

76) Which graph **best** represents the relationship between density and depth of material below Earth's surface?



[ILOs ESS, B, C, & P:1 - SC:ES:3:2]