

# EARTH AND ENVIRONMENTAL SCIENCE MOCK FINAL

1. Some parts of North Carolina can be classified as temperate rainforests. Where and why do these rainforests exist?
  - A. in large peat swamps where wetlands are related to higher rainfall totals
  - B. in the mountains where high elevations regularly cause higher rainfall totals
  - C. along the beaches where tropical systems regularly cause high rainfall totals
  - D. in the floodplains of rivers where additional groundwater is related to higher rainfall totals
2. In North Carolina, most of the mature Piedmont forests are dominated by deciduous trees, while most mature coastal upland forests are dominated by evergreen conifers. What factor contributes to this difference?
  - A. Rainfall in coastal areas is twice as high as in the Piedmont.
  - B. Rainfall in coastal areas is of much lower pH than rainfall in the Piedmont.
  - C. Most soils in coastal areas are clay-rich and of low permeability, favoring the deep root systems typical of coniferous trees.
  - D. Most soils in coastal areas are sand-rich and of high permeability, favoring the deep root systems typical of coniferous trees.
3. What does the removal of a top predator do to an ecosystem?
  - A. It has no effect on the ecosystem.
  - B. It benefits all other organisms in the ecosystem.
  - C. It allows other species to affect the ecosystem significantly.
  - D. It stabilizes the population of all other organisms in an ecosystem.
4. Which best defines biodiversity?
  - A. Biodiversity is the total amount of biomass on Earth.
  - B. Biodiversity is the total number of living organisms on Earth.
  - C. Biodiversity is the total variability of living organisms on Earth.
  - D. Biodiversity is the total number of animals and plant species on Earth.
5. Which best describes the function of a keystone species in an ecosystem?
  - A. It is the top predator in an ecosystem.
  - B. It provides all of the energy for its ecosystem.
  - C. It is the most abundant species in an ecosystem.
  - D. It stabilizes the population of other species in the ecosystem.

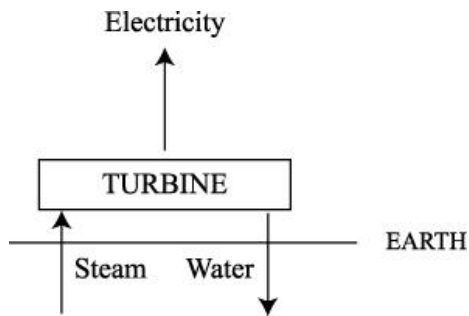
6. The photo shows an area with a heavy growth of kudzu, an introduced vine species commonly found in North Carolina.



Based on the evidence shown in the photo, what is the effect of kudzu on the habitat shown?

- A. The kudzu is overcrowding the native plant species.
  - B. The kudzu is providing habitat for many other species of plants.
  - C. The kudzu is a slow-growing vine that has beneficial effects for native plants.
  - D. The kudzu was introduced with a good understanding of North Carolina ecology.
7. Menhaden is a species of plankton-eating fish that has gone through cycles of overfishing. What is a probable short-term consequence of menhaden overfishing to the local ecosystem?
- A. Plankton populations decrease in size.
  - B. Menhaden populations increase in size.
  - C. Competitor populations decrease in size.
  - D. Menhaden predator populations decrease in size.

8. The diagram shows one way electricity can be created.



Which renewable energy source is used to create this electricity?

- A. coal energy
  - B. solar energy
  - C. wind energy
  - D. geothermal energy
9. Which energy source has the lowest long-term environmental impact?
- A. wind
  - B. nuclear
  - C. clean coal
  - D. corn ethanol
10. Why is solar power generally considered a renewable form of energy?
- A. It does not deplete the Sun.
  - B. It does not require digging in the ground.
  - C. It can be used in both heating and cooling.
  - D. It can be received from the Sun at no financial cost.
11. Starting in 2012, utility companies in North Carolina must draw 3 percent of their electricity from renewable sources. This requirement will continue to increase every three years until it reaches 12.5 percent in 2021. The table shows how North Carolina's requirement compares to those of other states.

**Renewable Energy Standards**

State	Requirement (%)	By Year
Colorado	30	2020
Delaware	20	2020
New Jersey	22.5	2021
New York	29	2015
North Carolina	12.5	2021
Pennsylvania	18	2021

Based on the information in the table, how does North Carolina’s commitment to developing renewable energy sources compare to that of the other states listed?

- A. It falls below standards set by the other states.
- B. It is comparable to standards set by the other states.
- C. It is more aggressive than the standards set by other states.
- D. It cannot be compared to the states that must meet standards before 2021.

12. As an important part of waste management, many farms are cultivating high energy–yielding trees and grasses. How can this technology impact the environment?

- A. decrease in soil conservation
- B. increase in global temperatures
- C. decrease in the use of fossil fuels
- D. increase in the use of land space for crops

13. Many farm operations are embracing the local-food movement by only purchasing livestock feed and fertilizers that originate within a 100-mile radius and only distributing their products within a 400-mile radius.

What impact could widespread adoption of the local-food movement have on the environment?

- A. loss of genetic diversity due to cross-pollination
- B. less available groundwater as a result of irrigation
- C. cleaner air as a result of decreased transportation needs
- D. nutrient-depleted soils as a result of growing local varieties

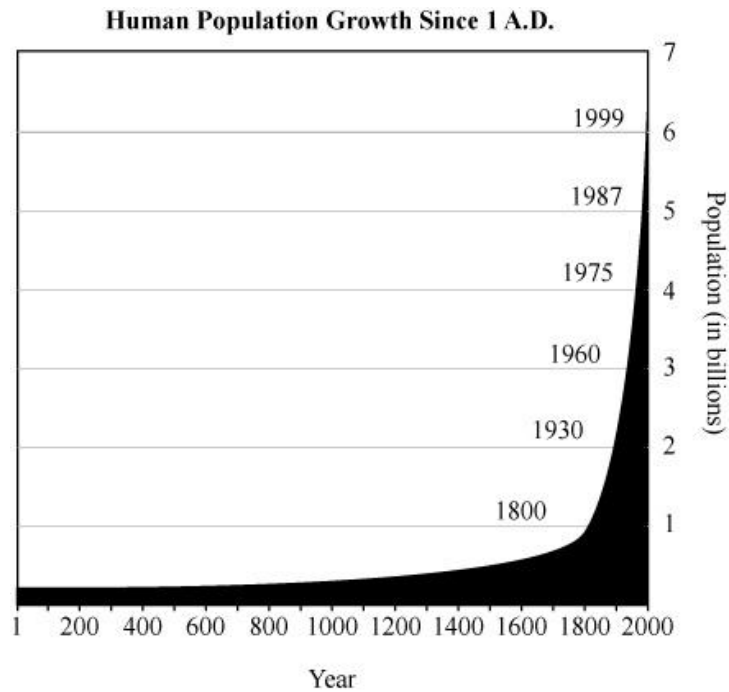
14. The table shows the annual corn production on an Amazonian subsistence farm.

Year	2005	2006	2007	2008
Bushels of Corn	97	89	74	62

If rainfall amounts have been consistent and this farmer has consistently applied the same agricultural methods, what factor would be the most probable reason for the corn yields this farmer is producing over time?

- A. Loss of crop to wild animals over time is increasing.
- B. Global warming is altering the length of the growing season.
- C. Soil nutrients are quickly being leached and lost to the root systems of crops.
- D. In Amazonia, genetic improvements to plant seeds are quickly lost over time.

15. The graph shows human population growth over a 2,000-year time frame.



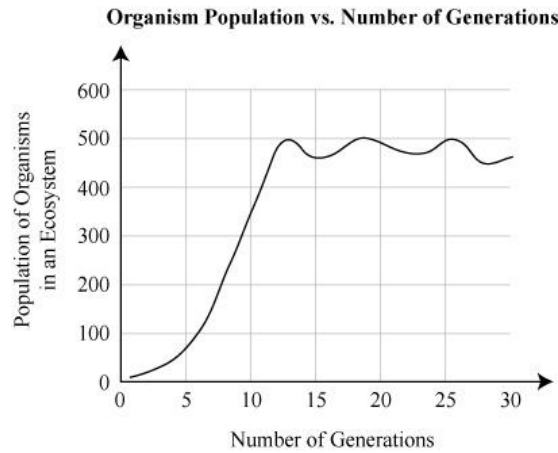
The exponential growth rate has increased the demand for global food supplies and for natural resources related to the production of food. Which natural resource has been least affected by increased food production?

- A. energy
- B. minerals
- C. freshwater
- D. arable land

16. According to one source, approximately 70% of the world's freshwater is currently used by agricultural industries. What problem is at the root of this stress on the world's freshwater sources?

- A. exponential human population growth
- B. lack of funding for aquaculture programs
- C. development of genetically modified crops
- D. increasing numbers of pathogens in aquatic ecosystems

17. The graph below shows a population of a group of organisms present in an ecosystem vs. the number of generations.



What is the carrying capacity for this hypothetical population of organisms?

- A. between 101 and 200 organisms
- B. between 201 and 300 organisms
- C. between 301 and 400 organisms
- D. between 401 and 500 organisms

18. The table shows transportation options, their fuel economies, and the number of students that could be transported in each type of vehicle.

Option	Miles per Gallon of Fuel	Maximum Students per Vehicle
Bus	3	25
Car	30	4
Plane	1	100
Train	9	120

If 40 students are traveling 90 miles from Charlotte to Greensboro, which choice is the most fuel-efficient transportation option?

- A. bus
- B. car
- C. plane
- D. train

19. According to Kepler's Third Law, which is the shape of every planet's orbit around the Sun?

- A. circular
- B. elliptical
- C. oval
- D. spherical

20. Which movement is the reason for the Earth year being 365 days?
- A. Earth's rotation about its axis
  - B. the Moon's rotation about Earth
  - C. the Moon's rotation about its axis
  - D. Earth's revolution around the Sun
21. If the Moon were more massive, what would happen to the barycenter of the Earth-Moon system?
- A. The barycenter of the Earth-Moon system would not be affected.
  - B. The barycenter of the Earth-Moon system would be located closer to the Sun.
  - C. The barycenter of the Earth-Moon system would be located closer to the center of the Moon.
  - D. The barycenter of the Earth-Moon system would be located closer to the center of the Earth.
22. Why are the constellations visible during the summer different from those visible during the winter?
- A. Earth's axis is tilted.
  - B. Earth rotates on its axis.
  - C. Earth revolves around the Sun.
  - D. Earth is closer to the Sun in the summer.
23. If Earth's rate of rotation were to slow down, what change would occur?
- A. Nutation of the Earth's axis of rotation would increase.
  - B. Precession of the Earth's axis of rotation would decrease.
  - C. Both precession and nutation of the Earth's axis of rotation would increase.
  - D. Neither the precession nor the nutation of the Earth's axis of rotation would change.
24. Which statement is true regarding the effect of the Sun and the Moon on Earth's tides?
- A. The effect of the Sun is zero.
  - B. The effect of the Moon is zero.
  - C. The effect of the Sun is more than that of the Moon.
  - D. The effect of the Moon is more than that of the Sun.
25. What best describes the energy of the Sun that moves through space?
- A. heat
  - B. gamma rays
  - C. infrared energy
  - D. electromagnetic energy

26. What is the relationship between biodiversity of life on Earth and the distribution of sunlight on Earth's land areas?

- A. Earth's biodiversity is equal everywhere that receives sunlight.
- B. Biodiversity is directly related to the amount of sunlight received by an ecosystem.
- C. Earth's biodiversity is not related to the amount of sunlight and ecosystem receives.
- D. Biodiversity is inversely related to the amount of sunlight received by an ecosystem.

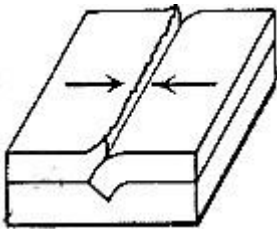
27. When plants receive solar energy and photosynthesize, which form of energy is used for storage?

- A. heat energy
- B. light energy
- C. nuclear energy
- D. chemical energy

28. What term best describes the process in which one type of rock is changed into other types of rock?

- A. mineralization.
- B. the rock cycle.
- C. saturation.
- D. plate tectonics.

29.

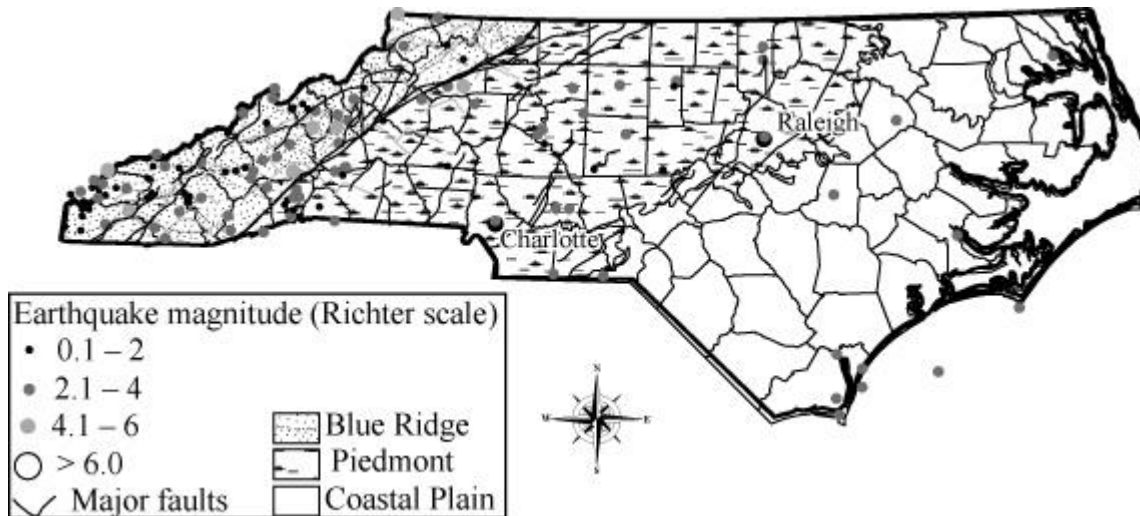


If the diagram above represents two continental plates, what type of geological event will occur?

- A. a mountain will form
- B. a volcano will form
- C. a valley will form
- D. an earthquake will occur



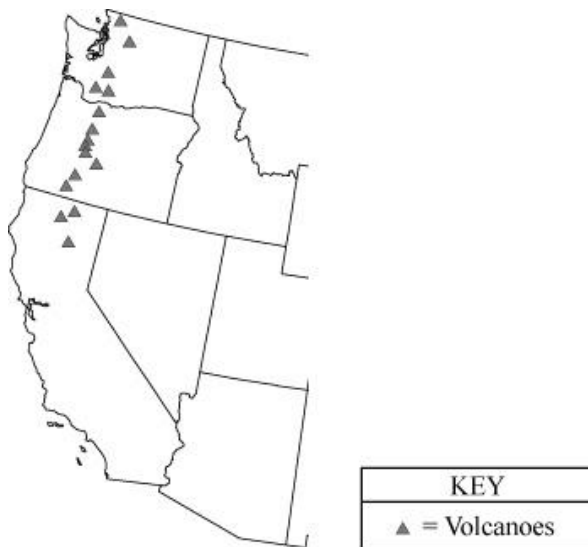
30. The map provides seismic information for North Carolina.



Which statement is best supported by the information on the map?

- A. A fault occurs in the Blue Ridge area.
- B. North Carolina experiences regular earthquake activity.
- C. Earthquake frequency and intensity is increasing in North Carolina.
- D. The Coastal Plain acts as a barrier to seismic activity in the Piedmont.

31. All active stratovolcanoes within the lower 48 states of the United States are concentrated in the area shown.



What kind of plate boundary created these volcanoes in this particular geographic region?

- A. convergent
- B. convolute
- C. divergent
- D. transform

32. Which of the following sediments are the smallest in size?

- A. sand
- B. gravel
- C. silt
- D. clay

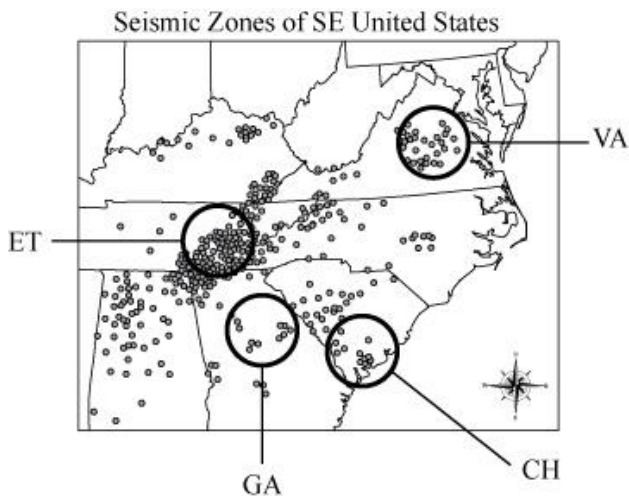
33. Which is a major force of shoreline reshaping in North Carolina?

- A. earthquakes
- B. hurricanes
- C. mudslides
- D. wildfires

34. Last summer, a family built a camp on a barrier island. They returned this summer, and the camp was gone. What is the most likely explanation for the camp's disappearance?

- A. The sea level permanently rose and submerged the barrier island.
- B. A barrier island is only a sand ridge, and the sand washed away in storms.
- C. A barrier island floats on the surface of the ocean, and the island drifted away.
- D. Tectonic plates broke the barrier island's connection to the mainland, and it sank.

35. The map shows the frequency of seismic activity recorded in the southeastern United States. Individual seismic zones are circled and labeled.



In which circled zone is activity most frequent?

- A. ET
- B. CH
- C. GA
- D. VA

36. What is the most probable effect agriculture has on river water within the floodplain of the river?
- A. The river water becomes clearer.
  - B. Flooding becomes less of a problem.
  - C. Nitrogen content of the river water is reduced.
  - D. Phosphorous content of the river water is increased.
37. What would be the most sustainable strategy in an agricultural area that is being depleted of irrigation water sources?
- A. plowing deeper into the soil
  - B. increasing the rate of irrigation
  - C. drilling deeper wells for irrigation
  - D. planting crops with deeper root systems
38. The National Oceanic and Atmospheric Administration has produced detailed three-dimensional maps of the shoreline of North Carolina. How does this information help policymakers preserve the shoreline?
- A. by reducing the density of human presence on the shoreline
  - B. by reducing the density of human development on the shoreline
  - C. by preventing various events and trends from changing the shape of the shoreline
  - D. by allowing more precise identification of the shoreline effects of various events and trends
39. What energy resource produces solid wastes that must be stored in isolation for long periods?
- A. nuclear fusion
  - B. nuclear fission
  - C. petroleum obtained from tar sand
  - D. petroleum obtained from underground reservoirs
40. Which fuel produces the least air pollution?
- A. coal
  - B. wood
  - C. petroleum
  - D. natural gas

41. Tropical regions and polar regions are able to maintain fairly constant average temperatures. What accounts for this fact?
- A. Earth radiates extra energy back into space.
  - B. The Sun always strikes these regions at the same angle.
  - C. Air masses remain stationary near the poles and equator.
  - D. Continual motion of air and water reallocates heat energy to all parts of Earth.
42. What are the two main factors that influence ocean currents?
- A. temperature and topography
  - B. wind and density
  - C. weather and temperature
  - D. topography and wind
43. Which is considered the underground region where groundwater can move but does not fill the pore space in the rock or sediment?
- A. aquifer
  - B. water table
  - C. zone of aeration
  - D. zone of saturation
44. Which will help groundwater flow most easily?
- A. clay soil
  - B. high porosity
  - C. low permeability
  - D. existence of an aquitard
45. What is true about freshwater in the United States?
- A. Freshwater obtained from aquifers is being used at sustainable rates.
  - B. Water tables in the western and midwestern states have been maintained.
  - C. Many urban areas have been able to sustain their freshwater supplies easily.
  - D. Policies related to use of water from western rivers have significantly altered these rivers.
46. Which of the following contributes to conserving water?
- A. building dams
  - B. maintaining forest
  - C. both a and b
  - D. none of the above

47. Researchers estimate that in 1850, the amount of fresh water available per person was 43 000 cubic meters annually. By 1990, the water available per person had dropped to 9000 cubic meters annually. What is primarily responsible for this change in availability of fresh water?
- A. threats to biodiversity
  - B. changes in rainfall pH
  - C. global population growth
  - D. development of desalinization processes
48. North Carolina lost approximately 50% of its original wetlands to development, primarily for agricultural operations. How has this most likely affected water quality?
- A. by increasing nitrates
  - B. by decreasing phosphorous
  - C. by decreasing sedimentation
  - D. by increasing dissolved oxygen
49. North Carolina regulations prevent the destruction of wetlands immediately adjacent to large bodies of water. What is one reason it is important to protect these wetland areas from development?
- A. Wetland areas contain naturally toxic water and should not be disturbed.
  - B. Wetland areas that lose vegetation reduce the evaporation rate and raise the water table.
  - C. Wetland areas act as buffers, filtering out non-point source pollutants such as nitrogen- and phosphorous-containing substances.
  - D. Wetland areas that are developed reduce sedimentation, preventing the development of deltaic systems.
50. The table shows the biotic values for several different organisms found in a nearby lake.

Organism	Biotic Value
Riffle Beetle	10
Mayfly Nymph	10
Water Penny	10
Clam	6
Snail	4
Leech	2

While attempting to assess the biotic index of this lake, a student found 25 leeches, 20 riffle beetles, 20 mayfly nymphs, 10 water pennies, 10 clams, and 10 snails. What is the biotic index of the lake?

- A. poor (<40)
- B. fair (40 to 59)
- C. good (60 to 79)
- D. excellent (>80)

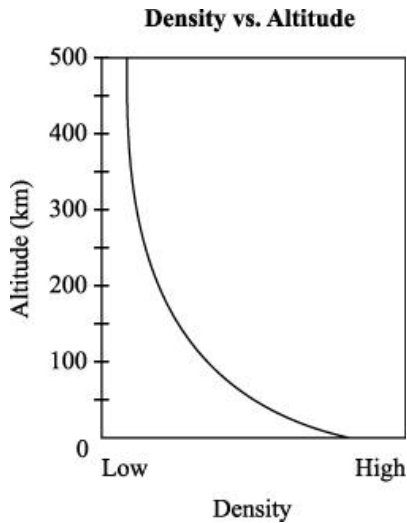
51. Which layer of the atmosphere contains weather, clouds, pollution and life forms?

- A. Mesosphere
- B. Stratosphere
- C. Thermosphere
- D. Troposphere

52. Why is stratospheric ozone beneficial to life on Earth?

- A. Stratospheric ozone is an important part of the water cycle.
- B. Stratospheric ozone absorbs UV radiation that is dangerous to life.
- C. Stratospheric ozone reverses the greenhouse effect in the atmosphere.
- D. Stratospheric ozone produces much of the oxygen that life uses for respiration.

53. The density of Earth's atmosphere vs. altitude is represented below.



Which best describes Earth's atmosphere?

- A. incompressible with increasing density as altitude increases
- B. incompressible with decreasing density as altitude increases
- C. highly compressible with increasing density as altitude increases
- D. highly compressible with decreasing density as altitude increases

54. Which conditions would least favor the formation of pressure differentials in an air mass?

- A. cyclonic air flow
- B. differences in surface and air moisture content
- C. highly variable topography of the underlying surface
- D. uniform, flat topography of the underlying surface and slow-moving air

55. Which type of weather front will often be preceded by fog?

- A. cold front
- B. warm front
- C. occluded front
- D. stationary front

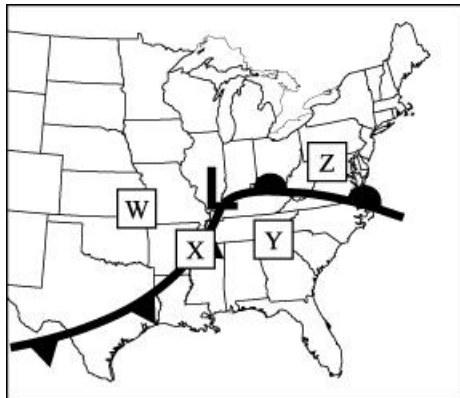
56. The 1993 “Storm of the Century” was a late winter storm that produced record-breaking snowfalls, extensive wind damage, coastal erosion, and chilling cold that affected most of the eastern United States including North Carolina. The storm was an extreme example of a classic “Nor’easter” cyclone. What significant weather-related condition must be in place that contributes to the formation of such storms?

- A. A strong Bermuda high-pressure system must be in place over the western Atlantic.
- B. Trade winds diverge and push warm tropical ocean water north into the Gulf of Mexico.
- C. The polar and subtropical jet streams are separated by great distances over the eastern United States.
- D. The difference between the temperatures of ocean waters and the land in southeastern United States is at its greatest.

57. How does the air pressure within a tornado funnel compare to the pressure outside of it?

- A. The air pressure inside the funnel is higher.
- B. The air pressure inside and outside the funnel is the same.
- C. The air pressure inside the funnel is usually much lower than outside.
- D. The air pressure inside the funnel is usually slightly lower than outside.

58. The image below represents a frontal system crossing part of the United States.



At which location would northeasterly winds be blowing?

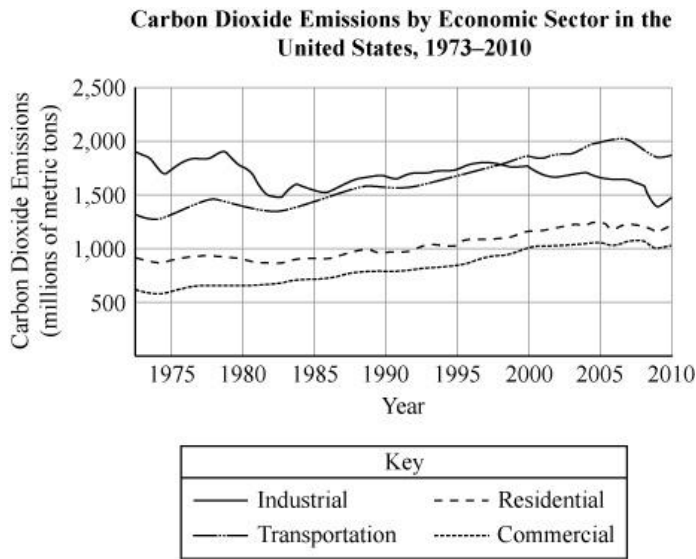
- A. Location W
- B. Location X
- C. Location Y
- D. Location Z

59. Which substance causes the majority of acid precipitation?
- A. lead
  - B. ozone
  - C. hydrocarbons
  - D. sulfur dioxide
60. During the 1980s and 1990s, the average year-round stratospheric ozone concentration declined by approximately 4% per decade. Discovery of this ozone depletion resulted in an international treaty that began what action?
- A. the creation of emissions standards for power plants
  - B. the banning of some chlorofluorocarbons' use and production
  - C. the development of renewable and non-polluting energy sources
  - D. the creation of carbon-offset programs to compensate for greenhouse gas emissions
61. Which man-made source contributes most to the formation of acid precipitation?
- A. chemical fertilizers
  - B. burning of fossil fuels
  - C. microbial action on livestock wastes
  - D. leakage of refrigerants and fire extinguishing equipment
62. Compared to inland towns and cities in the southeastern United States, what is the climate in coastal towns and cities?
- A. warmer winters and cooler summers
  - B. cooler winters and warmer summers
  - C. lower temperatures in both winter and summer
  - D. higher temperatures in both winter and summer
63. What is the predominant direction that weather conditions move in the United States?
- A. from east to west
  - B. from west to east
  - C. from north to south
  - D. from south to north



64. A southerly wind flow that originated over the Gulf of Mexico brings air into the southeastern United States. What is the most likely set of weather conditions that would be measured?
- A. low barometric pressure and low humidity
  - B. low barometric pressure and high humidity
  - C. high barometric pressure and low humidity
  - D. high barometric pressure and high humidity
65. What is the name of the phenomenon produced when equatorial Pacific Ocean water that is warmer than normal produces changes in weather patterns?
- A. cyclone
  - B. El Niño
  - C. La Niña
  - D. monsoon
66. Which statement explains why a gradual increase in atmospheric carbon dioxide would warm Earth's atmosphere?
- A. Carbon dioxide is a poor absorber of infrared radiation.
  - B. Carbon dioxide is a good absorber of infrared radiation.
  - C. Carbon dioxide is a poor reflector of ultraviolet radiation.
  - D. Carbon dioxide is a good reflector of ultraviolet radiation.
67. How does deforestation affect global warming?
- A. It has no effect on global warming.
  - B. It increases global warming because less carbon dioxide is absorbed.
  - C. It decreases global warming because more carbon dioxide is absorbed.
  - D. It increases global warming due to high sunlight reflection from bare ground.

68. The figure shows carbon dioxide emissions from different sectors of the economy of the United States from 1973 to 2010.



Based on the data shown, changing the carbon dioxide emission of which sector would best benefit the environment?

- A. commercial
  - B. industrial
  - C. residential
  - D. transportation
69. What do scientists believe is the cause of the increase in sea level over the past 50 years?
- A. The continents are sinking as the tectonic plates collide.
  - B. Warmer temperatures, due to increased solar radiation, are melting glaciers.
  - C. Warmer temperatures, due to increased use of fossil fuels, are melting glaciers.
  - D. The continents are sinking as volcanoes bring underground magma to the surface.
70. In order for barrier islands to form, the supply of sediment and rate of change in sea level must remain relatively constant. Which event is most likely to correspond to a lack of barrier island formation?
- A. hurricane
  - B. upwelling
  - C. shoreline erosion
  - D. climatic warming