

NJSL Environmental Science January 14, 2016 **GREEN TEST (Corrections)**

Choose the answer that best completes the statements or questions below and fill in the appropriate response on the form. If you change an answer be sure to completely erase your first choice. Please PRINT your name, school, area, and which test you are taking onto the scantron.

Kilauea is a Hawaiian volcano that erupted in 1959, destroying vegetation and animal life over an area of 5 million square meters. Before the eruption, many organisms lived on the volcano in a rain forest community. The rain forest was dominated by Ohia trees and two species of tree ferns. Small trees, tall shrubs, and herbaceous plants (plants lacking woody tissues) were also present. After the eruption, scientists closely monitored the area to track the recolonization of the devastated habitat. Scientists did not find any organisms living in this area for the first six months following the eruption.

The table below shows the changes in one localized area that was covered by a massive amount of lava rock with many cracks and crevices. Despite the colonization of the area by several different types of organisms by year 9, the overall cover of the habitat was so low that the surface still looked barren.

Type of organism	Percentage of community* 6 months after Eruption	Percentage of community * 1 year after Eruption	Percentage of community* 3 years after Eruption	Percentage of community* 7 years after Eruption	Percentage of community * 9 years after Eruption
Algae	0	25	40	22	17
Moss	0	50	30	17	17
Ferns	0	25	20	17	17
Lichens	0	0	10	9	6
Seed plants	0	0	0	35	43

\*Percent by number of species

- Pioneer species are the first species to take hold in a barren area after a disaster has occurred. Based on the data, most of the pioneer species in this area were which of the following types of organisms?
  - Algae
  - Ferns
  - Mosses
  - Seed Plants
- The recolonization of this area by algae, mosses, ferns, and seed plants reestablished which trophic level in the devastated ecosystem?
  - Decomposer
  - Producer
  - Primary Consumer
  - Secondary Consumer
- Most organisms were unable to live in the area for the first six months after the eruption. Which of the following changes most likely needed to occur in the area so that organisms could return there?
  - Increase In oxygen
  - Increase in temperature
  - Increase in sunlight
  - Increase in soil nutrients
- All recolonizing species use which of the following processes to acquire food?
  - Cellular Respiration
  - Photosynthesis
  - Decomposition
  - Predation
  - Chemosynthesis to break down lava

Scientists studied two remote tropical forests to determine what effects nitrogen pollution was having on the tropical trees. They compared dried leaf specimens from 1968 with specimens from 2007. An increase in both leaf nitrogen concentration and proportion of heavy to light nitrogen isotopes was observed. A similar increase was observed when fertilizer was experimentally applied to the forest floor. The results have a number of important implications. The most obvious is for trees in the bean families (Fabaceae) that fix their own nitrogen in association with bacteria. Increased nitrogen from the outside could take away their competitive advantage making them less common thus changing the composition of the tree communities. Adapted from Science Daily (Nov. 3, 2011).

5. The increase in leaf nitrogen in the remote forests can most likely be attributed to

- A. Effects of Agriculture.
  - B. Nitrogen Fixation.
  - C. Burning of Fossil Fuels.
  - D. Global Climate Change.
  - E. Ozone Depletion.
- All full credit

6. Most of the nitrogen in forest soil normally comes from

- A. Bacteria that carry out nitrogen fixation
- B. Bacteria that carry out denitrification
- C. Fungi which carry out ammonification
- D. Weathering of nitrate containing rocks
- E. Diffusion from atmospheric nitrogen compounds

7. Most of the nitrogen in the world is found as \_\_\_\_\_ in the \_\_\_\_\_.

- A.  $N_2$  ... Atmosphere
- B.  $NO_2$  ... Atmosphere
- C.  $NH_3$  ... Soil
- D.  $NH_3$  ... Water
- E.  $NO_x$  ... Minerals

8. The most significant reason for loss of N in the soil is

- A. Acid Rain
- B. Use of Inorganic Fertilizers.
- C. Decomposition.
- D. Habitat Destruction
- E. Leaching

9. The scientists predicted that trees in the Fabaceae group, (also called Leguminosae or bean and pea family) could be negatively impacted by an increase in soil nitrogen because they...

- A. are harmed by excess amounts of N
- B. are sensitive to changes in soil pH.
- C. lose their competitive advantage as nitrogen-fixers.
- D. will show increased mutations due to heavier N.
- E. their growth rate will slow as global temperatures increase.

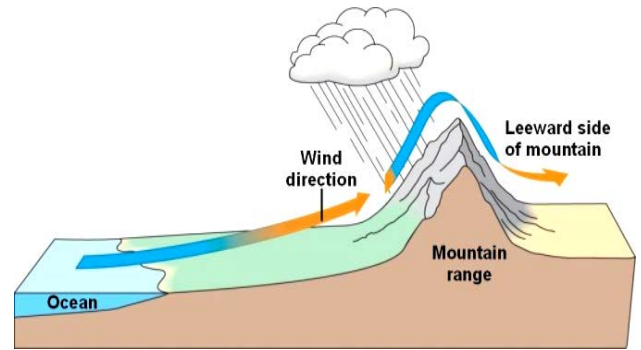
10. Nitrogen is one of the most important components of fertilizer. The other two major components of fertilizer are

- A. K and Ca
- B. P and Ca
- C. C and K
- D. K and P
- E. S and P

11. How do plants utilize the nitrogen that is absorbed?

- A. The nitrogen is used in photosynthesis
- B. The nitrogen is used to build proteins
- C. The nitrogen is used to make glucose
- D. The nitrogen is combined with water to form nitric acid ( $HNO_3$ )

12. The cross section below represents a prevailing wind flow that causes different climates on the windward and leeward sides of a mountain range. Compared to the temperature and moisture of the air rising on the windward side, the temperature and moisture of the air descending at the same altitude on the leeward side will be:



- A. warmer and drier
- B. warmer and more moist
- C. cooler and drier
- D. cooler and more moist

Northern pike are fish that were introduced into the south-central area of Alaska in the 1950s by a fisherman. Scientists believe that increasing numbers of northern pike are reducing populations of salmon in this region. Northern pike eat large numbers of young salmon before the salmon leave to mature in the ocean. (—based on Nature, 2002 Dalton, Rex. 2002. Pike pests ravage Alaska’s salmon. Nature 418, no. 6901 (August 29): 907. )

13. Scientists believe the decrease in salmon population in south-central Alaska is caused by the Northern pike’s

- A. emigration, causing a decrease in mortality
- B. emigration, causing an increase in mortality
- C. immigration, causing a decrease in mortality
- D. immigration, causing an increase in mortality

14. Which of the following would have the biggest impact on achieving global sustainability?

- A. Recycling aluminum cans
- B. Using fuel-efficient vehicles
- C. Replanting deforested areas
- D. Reducing human population size

15. The process in which pioneer organisms colonize bare substrate such as rock, glacial till or sand is known as

- A. Weathering
- B. Cyclic Succession
- C. Stabilizing Succession
- D. Secondary Succession
- E. Primary Succession

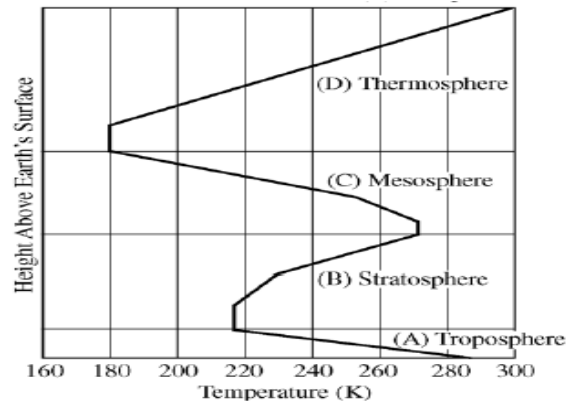
For questions #16-19 below, match the letter of the following relationships between wood bison and other species with the proper name of the species interaction.

- A. Elk and deer compete with wood bison for food and living space.
- B. Many wood bison are infected with tuberculosis or brucellosis bacteria.
- C. Smaller wood bison compete with larger wood bison for food and living space.
- D. Grazing by wood bison provides more suitable digging conditions for prairie dogs.

- 16. Parasitism matches with letter \_\_\_\_\_
- 17. Commensalism matches with letter \_\_\_\_\_
- 18. Interspecific competition matches with letter \_\_\_\_\_
- 19. Intraspecific competition matches with letter \_\_\_\_\_

For questions # 20-23, match the letter below with the corresponding atmospheric layer

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



- 20. Region where the majority of the protective ozone layer is located
- 21. Region that contains the majority of molecules in the atmosphere
- 22. Region largely responsible for the weather at Earth's surface.
- 23. Region with the lowest atmospheric pressure.

Questions 24-26 refer to the gases listed below:

- A. H<sub>2</sub>O
- B. CO<sub>2</sub>
- C. CH<sub>4</sub>
- D. O<sub>3</sub>
- E. CCl<sub>2</sub>F<sub>2</sub>

- 24. The most abundant nonanthropogenic greenhouse gas
- 25. A greenhouse gas that is exclusively anthropogenic
- 26. A greenhouse gas that, in the lower troposphere, is formed by photochemical reactions

27. Suppose researchers marked 800 turtles and later were able to trap a total of 300 individuals in that population, of which 150 were marked. What is the estimate for total population size?

Population estimate  $P$ ,  $N_1 = \#$  of individuals marked initially,  $N_2 = \#$  of individuals in the recapture sample,  $M = \#$  of marked individuals in the recaptured sample.  $P = \frac{N_1 \times N_2}{M}$

- A. 200
- B. 1050
- C. 600
- D. 2100
- E. 1600

28. Which assumptions have to be made when applying the mark-recapture estimate of population size?

- I. Marked and unmarked individuals have the same probability of being trapped.
  - II. The marked individuals have thoroughly mixed with the population after being marked.
  - III. No individuals have entered or left the population by immigration or emigration, and no individuals have been added by birth or eliminated by death during the course of the estimate.
- A. I only    B. II only    C. I, II, and III    D. I and II only

29. Which choice below is an example of a marine ecosystem?  
 A. pond      B. lake      C. estuary      D. bog

Refer to the following information for questions # 30-32.

A sample of a marine ecosystem was sampled in order to determine its food chain. The results are shown below.

Type of organism	Number of organisms
Shark	2
Crustaceans (Shrimp)	400
Mackerel	20
Phytoplankton	10,000,000,000
Herring	100

30. Which of the following organisms has the largest biomass in this food chain?

- A. Phytoplankton
- B. Mackerel
- C. Crustaceans
- D. Shark
- E. Herring

31. Which of the following organisms in this population are **secondary consumers**?

- A. Phytoplankton
- B. Mackerel
- C. Herring
- D. Shark
- E. Crustaceans

32. If the herring population is reduced by predation, which of the following is most likely to occur in this marine ecosystem?

- A. The mackerels will be the largest predator in the food chain
- B. The shrimp population will be greatly reduced
- C. The shrimp will become extinct
- D. The plankton population will be reduced over the next year
- E. There will be no change in the number of sharks in this food chain

33. A pesticide, DDT, is used in this food chain in the amount of 0.005 ppm. When local scientists take samples from several sharks, they find in the shark tissue the level of DDT at 5000 ppm. What is the best explanation for the drastic change?

- A. Eutrophication
- B. Primary Succession
- C. Biomagnification
- D. Interspecies competition
- E. None of the above: this is most likely an error in data collection

34. Predatory insects are likely to be more severely affected by pesticide treatments than the plant-eating insects because

- A. They receive a higher dose through the food chain
- B. They inhabit locations where they receive a higher dose from the farmer's application
- C. They have bigger appetites and therefore eat more
- D. They have bigger bodies, therefore they absorb more of the pesticide

35. Which of the following statement is False? Pesticides used in the 1800's and early 1900's

- A. contributed to major environmental problems, like the buildup of arsenic in soil.
- B. are now known as first-generation pesticides
- C. were inorganic pesticides used extensively to control pests in agriculture.
- D. included compounds of arsenic, copper, lead and sulfur.
- E. were synthetic organic chemicals

36. In the course of using chemical pesticides, such as DDT, it was observed that certain species of insects which had not previously caused significant harm became serious pests. This phenomenon is known as

- A. a mutation
- B. a synergistic effect
- C. resurgence
- D. resistance

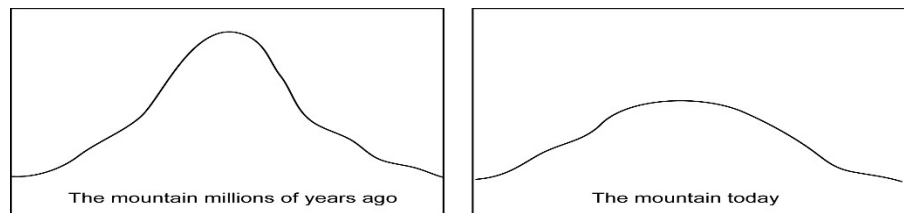
37. The best explanation for the above mentioned phenomenon is that

- A. the pesticide killed off predators which had previously held this species in check
- B. a mutation occurred in the species
- C. the pesticide increased the vigor of the species
- D. DDT was able to be used by the pest as an additional food source
- E. DDT is actually a reproductive stimulator for some insect species

38. Resistance can occur in pests with repeated pesticide use. A similar situation can happen with

- A. broad spectrum pesticides and farm workers
- B. pheromone use to attract insects
- C. natural barriers and insect infestation
- D. antibiotic use and bacterial infections

39. Which statement below best explains why the mountain became half the size as it was millions of years ago?



- A. Wind and water could have broken the solid rock of the mountain gradually every day, which after millions of years could have made the mountain half the height it used to be.
- B. Wind and water could have made the mountain half the height it used to be, but only by occasionally breaking the solid rock of the mountain during huge storms.
- C. Even though the mountain could have become half the height it used to be, it could not have gotten smaller from wind and water breaking the solid rock of the mountain.
- D. Wind and water could have broken the solid rock of the mountain and made it smaller, but wind and water could not have made the mountain half the size it used to be.

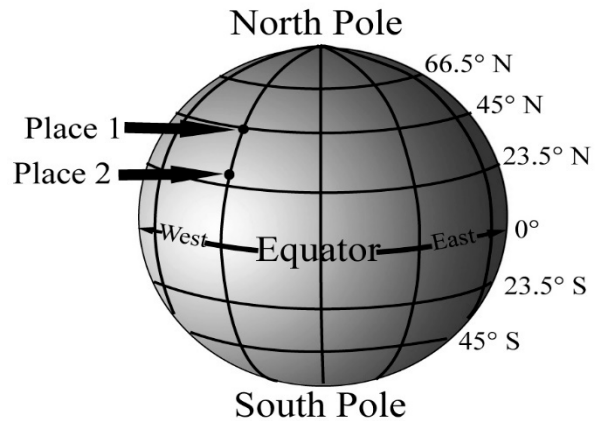
40. Which structure can form as a result of a divergent plate boundary? C not D.

- A. continental volcanic arc, due to the collision of two plates
- B. a continental mountain, due to the collision of two plates
- C. a mid-ocean ridge, due to the separation of two plates
- D. an ocean trench, due to the separation of two plates

A student is at Place 1 shown below and another student is at Place 2.

41. Which of the following statements is true about Place 1 compared to Place 2 on any day of the year?

- A. Some times of year the number of hours of daylight is higher at Place 1 and other times it is higher at Place 2, but the maximum intensity of sunlight during a day is always higher at Place 2 than at Place 1.
- B. The number of hours of daylight is always higher at Place 2 than at Place 1, and the maximum intensity of sunlight during a day is always higher at Place 2 than Place 1.
- C. The number of hours of daylight is always higher at Place 2 than at Place 1, but during some times of year the maximum intensity of sunlight during a day is higher at Place 1 and other times it is higher at Place 2.
- D. The number of hours of daylight is always higher at Place 2 than at Place 1, and the maximum intensity of sunlight during a day is the same at both places.

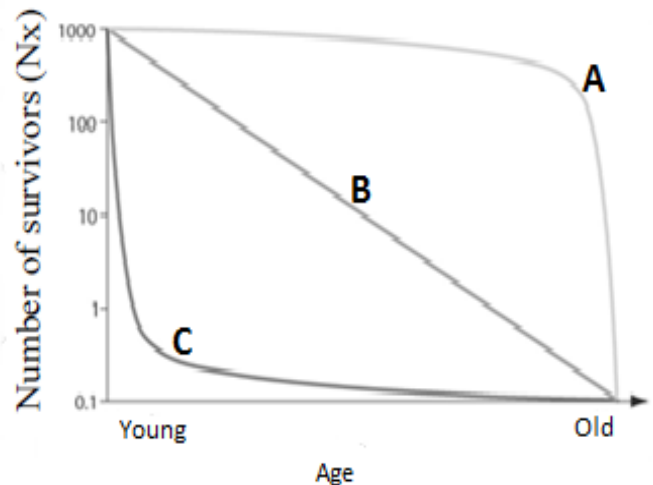


42. Which of the following statements is the main reason why any place at the equator is much warmer than the North Pole?

- A. Because the sun is more directly overhead at the equator than at the North Pole, the sunlight is more intense
- B. Because the equator is closer to the sun than the North Pole, the sunlight is more intense
- C. Because the North Pole has more snow, which makes the air colder than at the equator
- D. Because energy from deep inside the earth comes out at the equator and warms the air there

43. In the figure below, which of the following survivorship curves most applies to humans living in developed countries?

- A. curve A or B
- B. curve B
- C. curve C
- D. curve A



44. In the figure for #43, which of the following survivorship curves most applies to plant species?

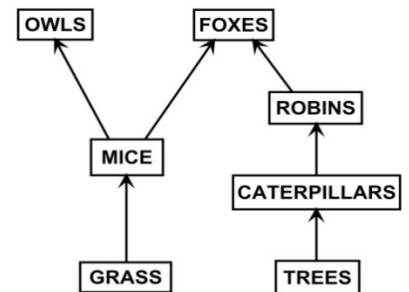
- A. curve A
- B. curve B
- C. curve C
- D. All 3 curves

45. A population is a group of individuals of the same species. Can the proportion of individuals with certain traits in a population change because the environment changes?
- Yes, when the environment changes, individuals in a population can change their inherited traits to better fit the environment, and this changes the proportion of individuals with certain traits in that population.
  - Yes, when the environment changes, individuals with certain inherited traits survive and reproduce. Other individuals with different inherited traits die, and this changes the proportion of individuals with certain traits in a population.
  - No, the proportion of individuals with certain inherited traits in a population changes randomly from one generation to the next, never as a result of changes to the environment.
  - No, the proportion of individuals with certain inherited traits in a population cannot change because a population is all one species and so will always have the same inherited traits.
46. Which of the following is REQUIRED for the process of natural selection to occur?
- Members of the same species must compete with one another.
  - Members of different species must compete with one another.
  - There must be a sudden environmental change.
  - Traits must be inherited from one generation to the next.

Use the diagrams below with questions # 47 and 48. The diagram below shows the feeding relationships between populations of plants and animals in an area. The arrows point from the organisms being eaten to the organisms that eat them.

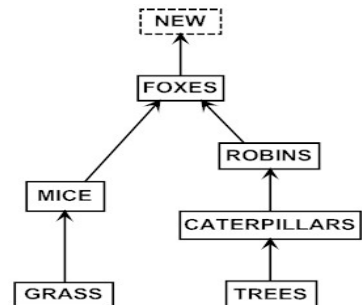
47. A disease kills all of the robins in this area. It does not kill any other plants or animals. If the size of the fox population stays the same, which population of organisms will increase after the robins die? Use only the relationships between the plants and animals shown in the diagram.

- Mice
- Owls
- Trees
- Caterpillars



48. A new species that eats only foxes becomes part of this food web. Using only the relationships between the plants and animals shown in the diagram below right which of the following could happen because of this change?

- The amount of grass and the number of mice, robins, caterpillars, and trees could increase.
- The amount of grass and the number of mice, robins, caterpillars, and trees could decrease.
- The number of robins could increase, and the number of caterpillars could decrease.
- The number of robins could decrease, and the number of caterpillars could increase.





Use the following information to answer questions 49 and 50.

Wood bison are the largest land animals in North America. They were a major food source for people of the First Nations. In the 1650s, an estimated 168,000 bison roamed northern Alberta, northeastern British Columbia, and the Northwest Territories. By 1891, only 250 bison were left in these regions. —based on <http://issues.albertawilderness.ca>, 2006 Alberta Wilderness Association. 2006. Issues and Areas: Wildlife, Bison, History. <http://issues.albertawilderness.ca/WL/bisonhistory.htm>.

49. Prior to the 1650s, the wood bison population in North America remained close to the carrying capacity of its habitat. The generalized growth curve and the reproductive strategy of the wood bison were, respectively,

- A. a J-curve and r selection
- B. a J-curve and K selection
- C. an S-curve and r selection
- D. an S-curve and K selection

50. Hunting of the bison for meat and hides by First Nations people helped maintain the bison population near the carrying capacity of its habitat by increasing the

- A. natality of the bison
- B. intraspecific competition
- C. environmental resistance
- D. biotic potential of the bison

51. Which pair of compounds can be classified as **inorganic**?

- A. nucleic acids and minerals
- B. proteins and water
- C. water and salts
- D. nucleic acids and proteins

52. Which is an organic compound found in most cells?

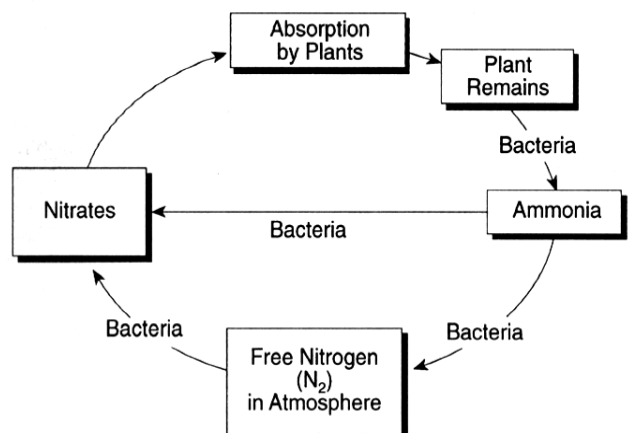
- A. glucose
- B. water
- C. sodium chloride
- D. oxygen gas

53. Which is a **biotic factor** operating within an ecosystem?

- A. the type of climate in a given region
- B. the carnivores that consume other animals
- C. the amount of oxygen gas in the air
- D. the rate of flow of water in a river

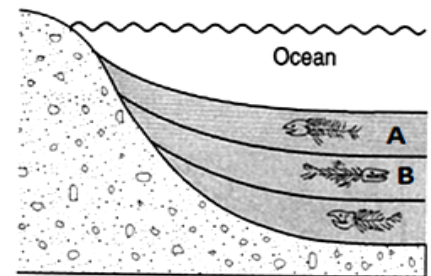
54. Events that take place in a biome are shown in the diagram below. Which of the following processes are best represented by the diagram?

- A. Respiration and photosynthesis are interrelated.
- B. Transpiration and condensation are related to the water cycle.
- C. Decomposers release a material that is acted on by other organisms.
- D. Predators and their prey are involved in many interactions.
- E. Biomagnification and bioaccumulation



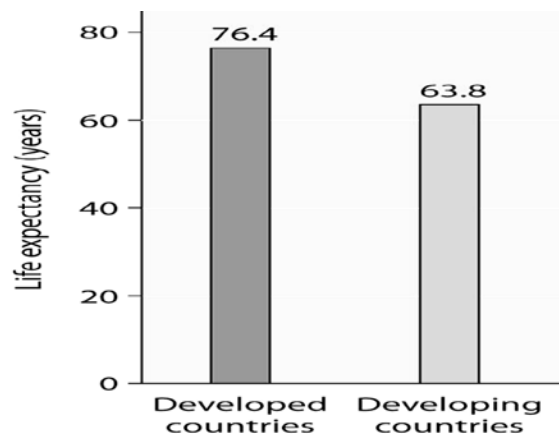
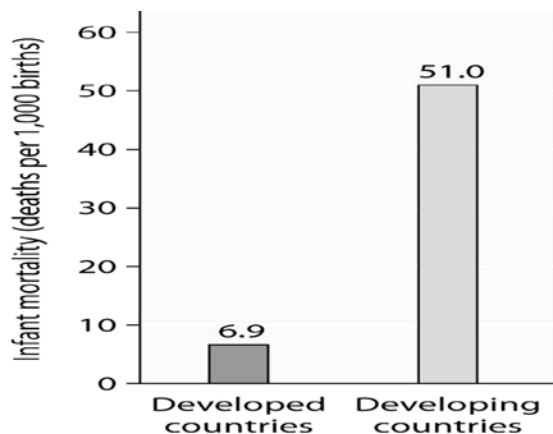
55. If excessive amounts of hot water are discharged into a lake, the immediate result will most likely be
- an increase in the sewage content of the lake
  - a decrease in the amount of dissolved oxygen in the lake
  - an increase in the amount of PCB pollution in the lake
  - a decrease in the amount of phosphates in the lake
  - a decrease in the amount of nitrates in the lake
56. An example of a biological control against insects is the use of
- herbicides
  - wildlife refuges
  - pesticides
  - sex hormones
  - all of the above

57. The side diagram shows undisturbed sedimentary strata at the bottom of an ocean. The fossils found in layer B resemble the fossils found in layer A. This similarity suggests that



- the fossils in layer B were formed before the fossils in layer A.
- modern forms of life may have evolved from earlier forms of life.
- vertebrate fossils are only found in sediments.
- the fossils in layer A must be more complex than those in layer B.
- the fossils in layer B become more complex with time.

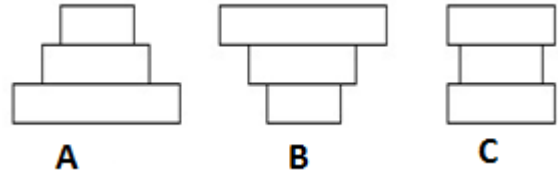
The two charts below are comparing infant mortality and life expectancy at birth in developed and developing countries (data as of 2005). Use the charts to answer question #58.



58. A logical conclusion that can be drawn from the graphs above is **developed countries** have \_\_\_\_.
- lower infant mortality rates and lower life expectancy than developing countries
  - lower infant mortality rates and higher life expectancy than developing countries
  - higher infant mortality rates and lower life expectancy than developing countries
  - higher infant mortality rates and higher life expectancy than developing countries

59. Below are age structure diagrams of three populations. Which of the age structure population pyramids show slow growth?

- A. A
- B. B
- C. C
- D. A and B
- E. None of these



60. Which radioactive isotope was used to establish the geological time scale?

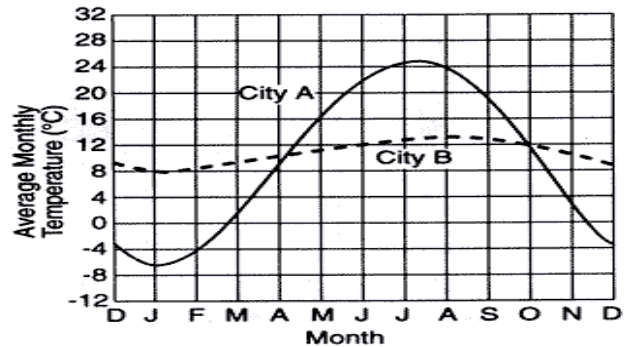
- A. uranium-238
- B. iodine-131
- C. cobalt - 60
- D. technetium-99
- E. carbon-13

61. Which pair are naturally occurring polymers?

- A. starch and nylon
- B. starch and cellulose
- C. protein and nylon
- D. protein and plastic

62. The graph below shows the average monthly temperatures for two cities, A and B, which are both located at 41° north latitude. Which statement best explains the difference in the average yearly temperature range for the two cities?

- A. City B is located in a different planetary wind belt.
- B. City B receives less yearly precipitation.
- C. City B has a greater yearly duration of insolation.
- D. City B is located near a large body of water.



63. Clouds usually form when

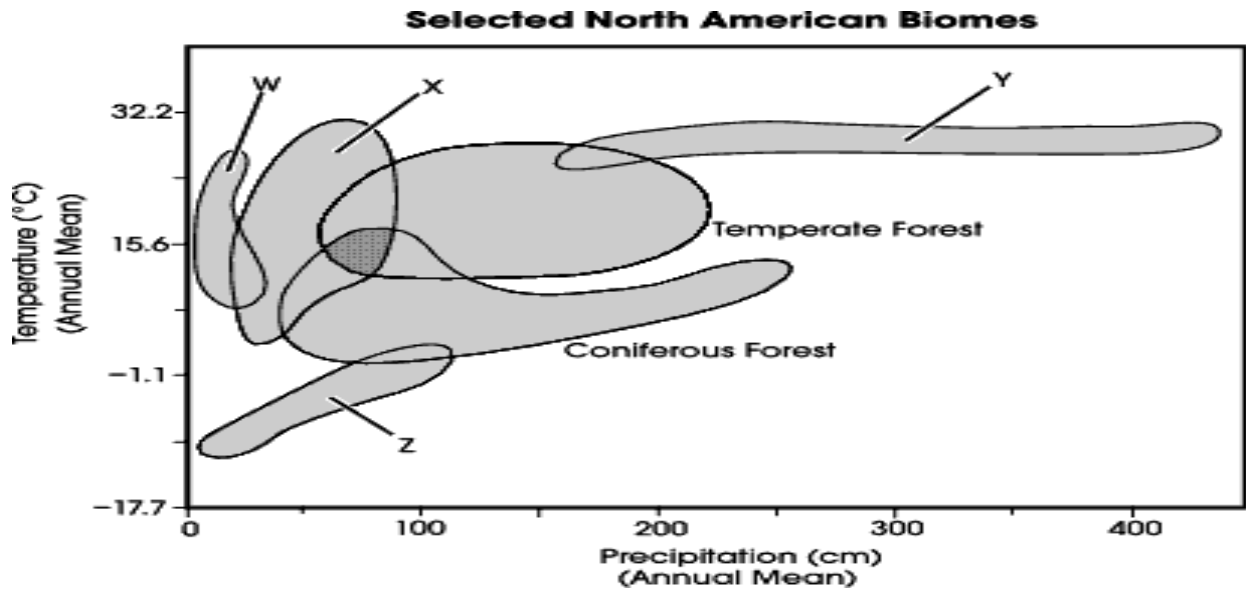
- A. air temperature reaches the dewpoint
- B. evaporation has warmed the surrounding air
- C. relative humidity is 0%
- D. condensation nuclei have been removed from the air

64. Toxins in the food chain are magnified as you go to higher and higher trophic levels. This is because...

- A. Higher trophic levels are mostly filled with many less-complex organisms so there are more individuals eating the toxins.
- B. Most of the toxins released into the environment are consumed only by animals high on the food chain.
- C. Many toxins are not cleared from tissues, so each animal that eats another retains a relatively small percentage of the carbon, nitrogen, etc but 100% of the toxins.
- D. Organisms higher on the food chain are larger, so the toxins are easier to see.

65. Which of the following will occur if the trend of global temperature increase continues?
- Night temperatures will decrease as day temperatures increase.
  - Tropical areas will become cooler than they currently are.
  - Sea levels will drop due to increased evaporation.
  - The incidence of insect-borne diseases will decrease.
  - The troposphere will contain more water vapor.

The graph below is of annual mean temperature ( $^{\circ}\text{C}$ ) vs precipitation (cm) for several biomes. Use the graph for questions # 66, 67, and 68.



66. What is the correct name of the biomes labeled with “W”, “X”, “Y” and “Z” in that order? **D not E**

- Tundra, temperate deciduous forest, desert, grassland
- Temperate deciduous forest, desert, grassland, savannah
- Desert, grassland, tropical rainforest, boreal forest
- Desert, grassland, tropical rainforest, tundra**
- Desert, grassland, temperate rainforest, tundra

67. In which biome would you expect to find either: corn, soybeans, wheat or cattle?

- W
- X
- Y
- Z
- None of these

68. Which biome has little precipitation, shallow roots, is very fragile and has a very short growing season?

- W
- X
- Y
- Z
- None of these.

69. In which biome would you find plants that are deep, dark green growing in relatively rich soil?

- Tundra
- Savannah
- Desert
- Tropical rainforest
- Coniferous forest

70. In which biome would you find epiphytes, lianas(vines) and understory plants with large leaf surfaces?

- Tundra
- Savannah
- Desert
- Tropical rainforest
- Coniferous forest

# NEW JERSEY SCIENCE LEAGUE

Environmental Science Answer Key: **Green test.**

January 14, 2016 (Corrections)

1	C	15	E	29	C	43	D	57	B
2	B	16	B	30	A	44	C	58	B
3	D	17	D	31	C	45	B	59	C
4	B	18	A	32	D	46	A	60	A
5	All full credit C	19	C	33	C	47	D	61	B
6	A	20	B	34	A	48	C	62	D
7	A	21	A	35	E	49	D	63	A
8	E	22	A	36	C	50	C	64	C
9	C	23	D	37	A	51	C	65	E
10	D	24	A	38	D	52	A	66	D not E
11	B	25	E	39	A	53	B	67	B
12	A	26	D	40	C not D	54	C	68	D
13	D	27	E	41	A	55	B	69	E
14	D	28	C	42	A	56	D	70	D

NJSL Environmental Science **GREEN TEST**

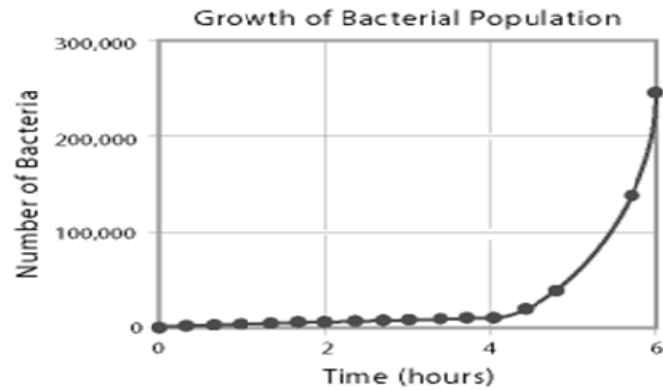
February 11, 2016 (Corrections)

Choose the answer that best completes the statements or questions below and fill in the appropriate response on the form. If you change an answer be sure to completely erase your first choice. Please PRINT your name, school, area, and which test you are taking onto the scantron.

1. Which of the following is not an environmental effect of deforestation?
  - a. reduction of wildlife habitat
  - b. soil erosion
  - c. loss of topsoil
  - d. re-establishment of trees
  
2. Which is an example of land used as a protected area to preserve scenery and ecosystems?
  - a. Grand Canyon National Park
  - b. Great Basin
  - c. Great Plains
  - d. Rocky Mountains
  
3. The National Farmland Protection Program was designed to
  - a. protect farmland from being overtaken by natural grasses and weeds.
  - b. protect farmland from damage by wild grazing animals that are destroying crops.
  - c. protect farmland from being developed.
  - d. protect farmland from environmental damage from pollution.
  
4. Which of the following has not resulted from urban sprawl?
  - a. suburbs
  - b. overgrazing
  - c. loss of farmland
  - d. traffic congestion
  
5. Which of the following most effectively allows forests to recover from tree harvesting?
  - a. cutting only medium-sized or mature trees
  - b. cutting all of the trees and then replanting the area with seedlings
  - c. allowing the forest to reseed itself
  - d. cutting only young trees and then replacing them with seedlings
  
6. Eliminating invasive plants and replacing them with native plants is one aspect of
  - a. urban management.
  - b. deforestation.
  - c. range improvement.
  - d. overgrazing

7. The graph below shows the growth of a bacterial population. Which term describes the growth curve?

- a. logistic
- b. limiting
- c. exponential
- d. demographic



8. Traffic jams, substandard housing, and polluted air and water can be caused by rapid growth in cities, a phenomenon known as

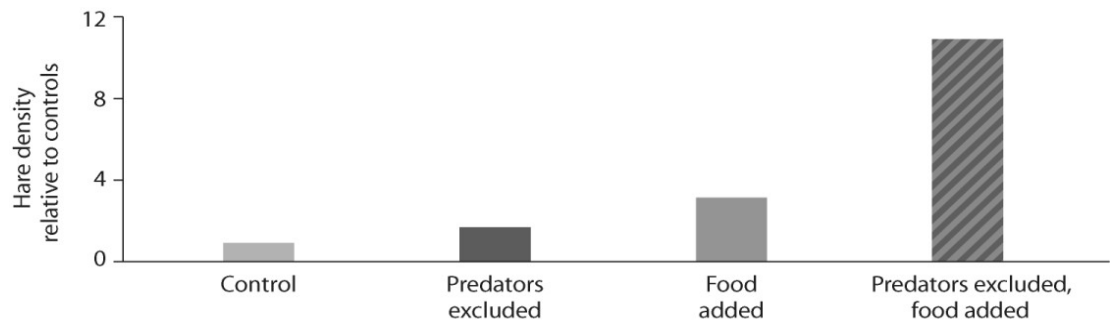
- a. urbanization.
- b. urban sprawl.
- c. urban crisis.
- d. infrastructure.

9. What can be done to sustain the productivity of rangeland?

- a. Limit herd size.
- b. Eliminate invasive plants.
- c. Leave the land unused for a time.
- d. All of the above

10. Deforestation is an especially serious problem in tropical rain forests because

- a. farmers must repeatedly clear additional forest area to obtain land that can support crops.
- b. it takes so long for the replacement seedlings to reach maturity due to the hot climate.
- c. they are located in developed nations with high per person resource consumption.
- d. the downed trees are left to rot, damaging the soil.



11. Based on the data in the hare/lynx experiment above a scientist has suggested three conclusions.

Which are valid based upon the data?

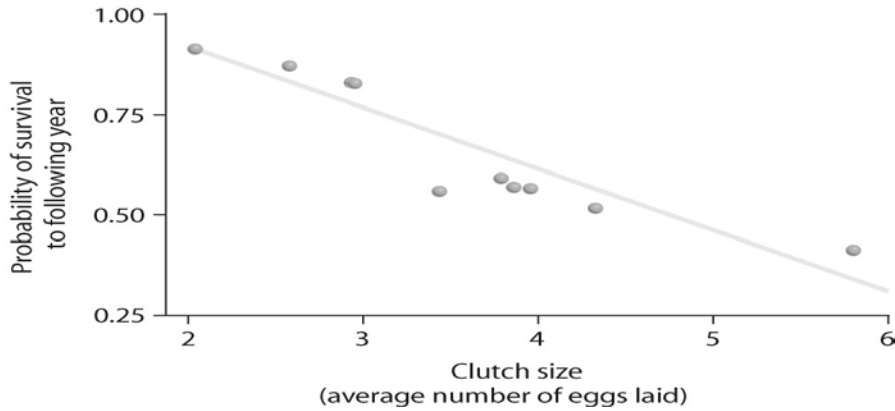
- I) Food is a factor in controlling hare population size.
- II) Excluding lynx is a factor in controlling hare population size.
- III) The effect of excluding predators and adding food in the same experiment is greater than the sum of excluding lynx alone plus adding food alone.

- a. only I
- b. only II
- c. only III
- d. I, II, and III

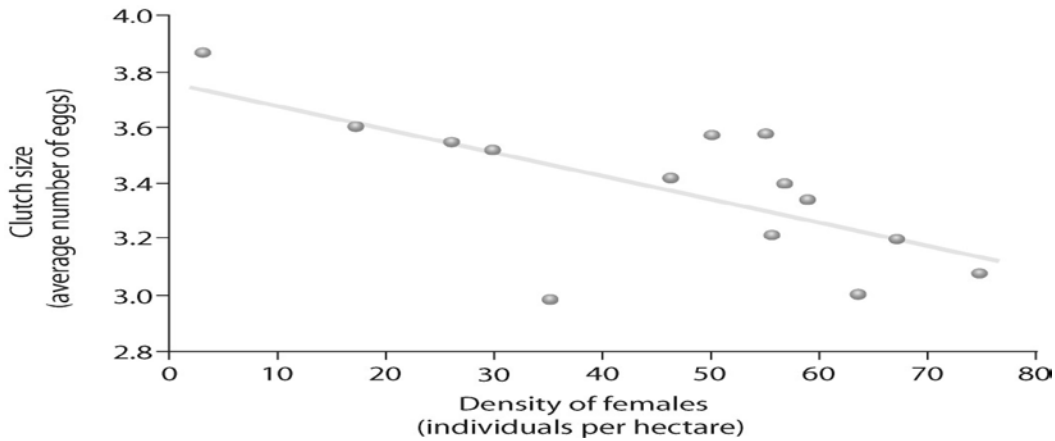
12. Which of the following statements about tree harvesting methods is correct?
- Clear-cutting is quick but more expensive than other methods due to the vast areas involved.
  - Selective cutting eliminates the possibility of soil erosion.
  - Clear-cutting requires the most road building due to large number of trees harvested.
  - Selective cutting minimizes the impact on forest ecosystems.
13. Heat islands affect local
- weather patterns.
  - water levels.
  - traffic patterns.
  - harvest patterns.
14. The designation of “wilderness areas”
- guarantees unrestricted public access.
  - historically forbade mining.
  - allows only limited development.
  - provides for protected habitats.
15. Environmental damage to wilderness areas
- is partly the result of ranching activities.
  - has yet to attract widespread attention.
  - may worsen as the U.S. population grows.
  - is not related to pollution from urban areas.
16. Which of the following is true of land-use plans?
- Developers must prepare detailed reports assessing the environmental impact of their projects.
  - The public often has input in land-use plans.
  - Projects in environmentally sensitive areas may be hotly debated.
  - All of the above
17. What is reforestation?
- removing all trees from an area
  - removing selected trees from an area
  - replanting trees in an area
  - none of the above
18. Farmland may become desertified if
- domestic animals are allowed to overgraze the land.
  - too many crops are grown on the land and the land gradually loses its fertility.
  - as a result of erosion, there is no fertile soil left to grow plants.
  - All of the above
19. Which of the following best describes changes in the genetic composition of a population over many generations?
- evolution
  - mutation
  - natural selection
  - emigration
20. Which of the following actions contributes to soil erosion?
- using compost as fertilizer
  - allowing land to lie fallow
  - driving farm machinery over fields
  - all of these practices contribute to soil erosion



21. Which of the following agricultural products requires the least amount of energy?
- a. beef cattle
  - b. wheat
  - c. dairy cows
  - d. Both (a) and (c)



22. Looking at the data in the figure above, what can be said about survival and clutch size?
- a. Animals with low survival tend to have smaller clutch sizes.
  - b. Large clutch size correlates with low survival.
  - c. Animals with high survival tend to have larger clutch sizes.
  - d. Probability of survivorship does not correlate with clutch size.



23. Based on the figure above of clutch size vs density of females, which of the following statements correctly interprets the data?

- a. As female density increases, clutch size increases.
- b. As female density increases, survivorship decreases.
- c. Clutch size decreases as female density increases.
- d. Clutch size is a density independent limiting factor

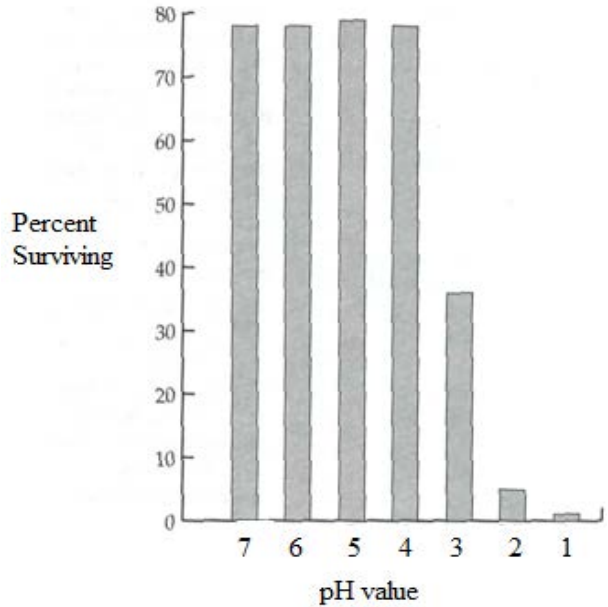
24. Which of the following is characteristic of *K*-selected populations? All full credit Key has A

- a. offspring with good chances of survival
- b. many offspring per reproductive episode
- c. small offspring
- d. a high population growth rate

25. When a farmer uses no-till farming methods,
- seeds are planted among the roots of the previous crop.
  - more erosion is likely.
  - only organic fertilizers are used.
  - All of the above
26. Which of the following is a good way to reduce salinization?
- use ocean water instead of groundwater to irrigate crops
  - increase the use of synthetic pesticides
  - using rainwater instead of groundwater on crops
  - adopt no-till farming methods
27. All of the following factors can cause famines except
- the failure of food production to keep pace with population growth.
  - distribution problems caused by political turmoil.
  - new, higher-yield crops.
  - crop failure brought on by sustained drought.
28. The results of the green revolution were not entirely positive because
- there were too few subsistence farmers
  - use of pesticides and fertilizers increased the risk of pollution - a negative in cost/benefit
  - substantial resources were no longer required to grow the new grain varieties.
  - All of the above
29. Soil formation
- is an inorganic process.
  - occurs more quickly in arid regions.
  - is hindered by frequent temperature changes.
  - usually involves the decomposition of bedrock.
30. Soil erosion caused by wind and water
- occurs more slowly in dry areas because the soil sticks together.
  - is reduced by incorporating strips of vegetation into plowed land.
  - only slightly exceeds the rate of soil formation on a global basis.
  - is always the result of dramatic events such as floods and mudslides
31. No-till farming helps to conserve soil fertility because
- remnants of the previous crop are left to slowly decay.
  - deep ridges are cut across, not down, the slopes of hills.
  - the ground is carefully turned to mix soil nutrients.
  - only organic fertilizers and natural pesticides are used.

32. Biological mechanisms of pest control include all of the following except
- a. making male insects infertile with X rays.
  - b. releasing *Bacillus thuringiensis* to control insect larvae.
  - c. breeding plants with natural defenses.
  - d. applying an organophosphate chemical with a short half-life.
33. Earth's available arable land is being reduced by
- a. fast-growing human populations.
  - b. soil erosion.
  - c. desertification.
  - d. All of the above
34. Erosion is most likely when the soil is
- a. bare and exposed to wind and rain.
  - b. plowed along the contour of the land.
  - c. covered with grass.
  - d. planted to forest.
35. Plowing with machines, irrigating with drip systems, and \_\_\_\_\_ are all modern agricultural methods.
- a. using manure
  - b. applying chemical fertilizers
  - c. irrigating with ditches
  - d. Both (a) and (b)
36. IPM - Integrated pest management can include chemical pest control, \_\_\_\_\_, and a mix of farming methods.
- a. frequent tilling
  - b. aquaculture
  - c. biological pest control
  - d. All of the above
37. Genetic engineering of food crops **A not D**
- a. continues to be debated among scientists.
  - b. is only used with corn.
  - c. must be disclosed on food ingredient labels.
  - d. Both (a) and (c)

A scientist place 100 fish eggs into each of seven solutions with the pH's listed. After 4 days (96 hours) the number of survivors were counted then graphed. The percent surviving is given in the graph below.



38. What pH in this experiment represents the LD<sub>50</sub> ?  
 LD<sub>50</sub> is the lethal dose of a pathogen, radiation, or toxin, required to kill 50% of a population which is being studied.

- a. 6.0
- b. 4.0
- c. 3.0
- d. 2.0

39. What pH has the least number of survivors?

- a. 1.0
- b. 2.0
- c. 3.0
- d. 4.0

40. Which statement describes the purpose of this experiment?

- a. So see what chemical is best at changing the pH of water.
- b. To understand how acid rain affects the pH of water.
- c. To find out how fish live in streams with different pH values.
- d. To observe how many fish would hatch at different pH values.

41. Of what is pH a measure?

- a. amount of heavy metals in water
- b. concentration of oxygen in the water
- c. concentration of hydrogen ions in the water
- d. the depth a scientist can see under the water

Use the following answer choices for questions 42 thr 47:

- A) Sand
- B) Silt
- C) Clay
- D) Loam
- E) None of these

- 42. A combination of the other three main soil types
- 43. The most coarse soil type
- 44. Heaving may occur as a result of freezing and thawing, pushing plants out of the soil
- 45. Individual particles can only be seen with an electron microscope
- 46. Composed primarily of quartz and feldspar
- 47. Has a porosity between 0.51 and 0.58.

Use the following answer choices for questions 48-52

A) Heavy Metals      B) Pesticides    C) Solvents      D) All of these      E) None of these

- 48. Benzene
- 49. DDT
- 50. Mercury
- 51. Organophosphates
- 52. The most mobile of the above groups; often create a health hazard by draining into groundwater.

Questions 53 thr 57 refer to the following risks to human health. Use each choice once.

- a. radon gas
- b. asbestos
- c. malaria
- d. earthquake
- e. aids

- 53. The virus that causes this disease is transmitted through bodily fluids.
  - 54. Can cause massive destruction
  - 55. Caused by microscopic fibers of a mineral
  - 56. Radiation that causes lung cancer
  - 57. Caused by a protozoan carried by mosquitoes
58. The maximum number of a species that can be sustained in an ecosystem. This phrase best describes
- a. carrying capacity
  - b. an ecotone
  - c. natural selection
  - d. a community
  - e. upward curve of a population graph
59. Which of the following phrases of the hydrologic cycle requires the input of solar energy?
- a. evaporation
  - b. percolation
  - c. precipitation
  - d. condensation

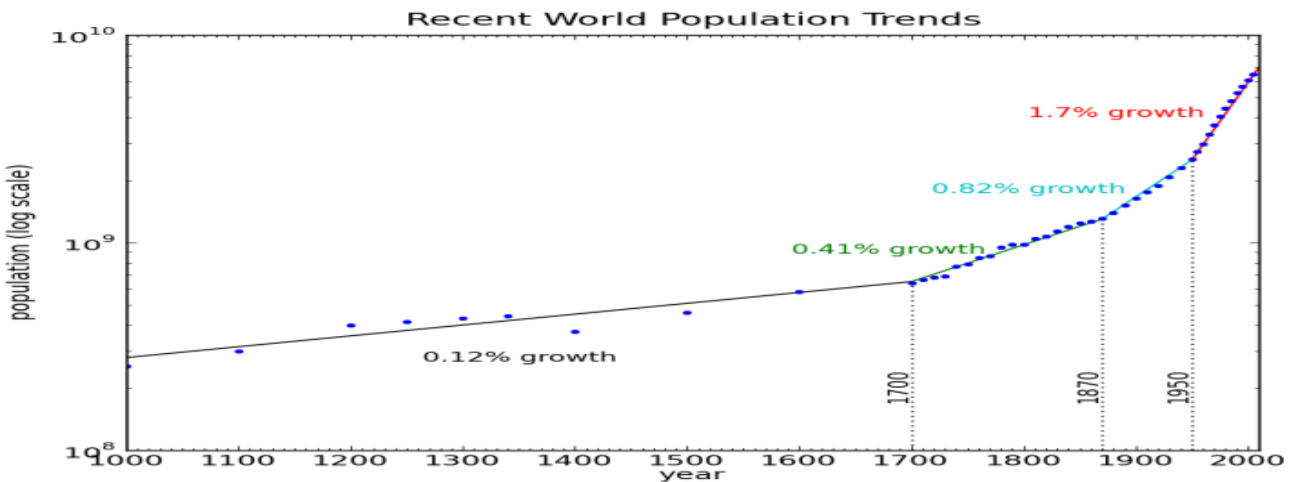
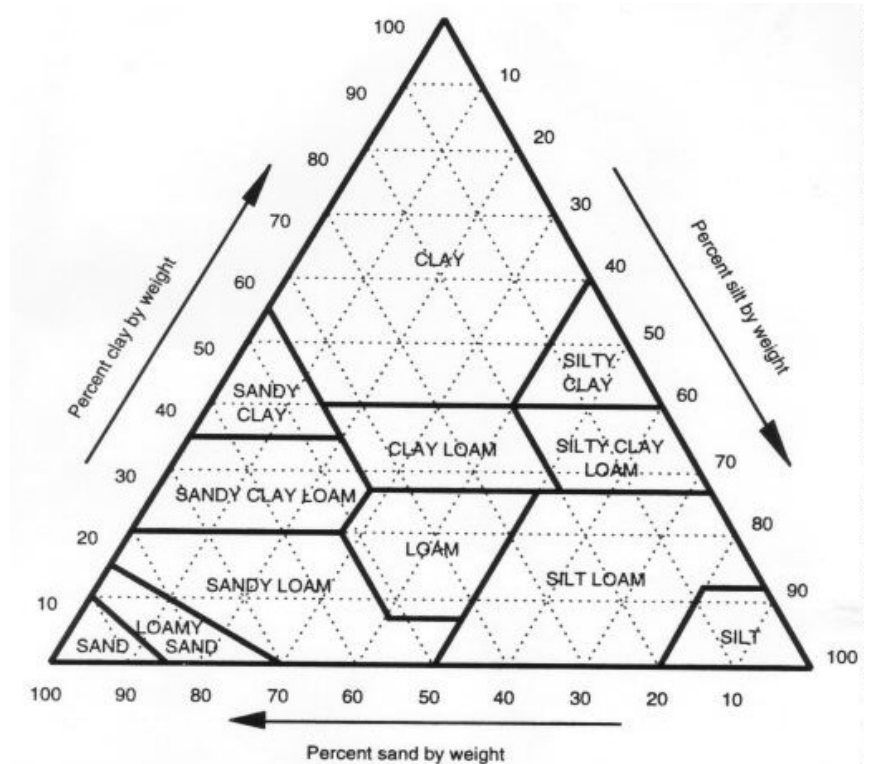
Use the soil triangle to answer these questions:

60. A soil sample that is 60% clay, 20% silt, and 20% sand would be classified as

- a. Sandy clay loam
- b. Loam
- c. Clay
- d. Silty Clay
- e. Clay Loam

61. A soil sample that is 30% clay and 70% sand would be classified as

- a. Sandy clay loam
- b. Loam
- c. Clay
- d. Silty Clay
- e. Clay Loam



62. The 0.41% growth rate from 1700 to 1870 can be attributed to: **C and D**
- a. Population controls such as birth control, China's one child policy & abortion
  - b. The Green Revolution
  - c. The Renaissance & scientific progress
  - d. The Industrial Revolution
  - e. Longer lifespan due to uncovering the human genome

63. The 0.82% growth rate from 1870 to 1950 can be attributed to:
- a. Population controls such as birth control, China's one child policy & abortion
  - b. The Green Revolution
  - c. The Renaissance & scientific progress
  - d. The Industrial Revolution
  - e. Longer lifespan due to uncovering the human genome
64. The 1.7% growth rate from 1950 to the present can be attributed to:
- a. Population controls such as birth control, China's one child policy & abortion
  - b. The Green Revolution
  - c. The Renaissance & scientific progress
  - d. The Industrial Revolution
  - e. Longer lifespan due to uncovering the human genome
65. Impacts of 1.7% growth without sustainable solutions include all of these except:
- a. Increase in the demand for food
  - b. Increase in the demand for clean water
  - c. Potential increase in infectious diseases
  - d. Increase in birth rate
  - e. Habitat destruction

For questions 66-70 choose from the names of the biomes below:

- a. Tropical rain forest
- b. Desert
- c. Savanna
- d. Temperate grassland
- e. Tundra

66. This biome is also known for the permafrost

67. Biome known for heat, plants with thick waxy coating, and animals that estivate(similar to hibernation).

68. Characteristic organisms of this biome includes: bison, gazelles, zebras, rhinoceroses

69. This biome is the preferred habitat of buffaloes (*Bison bison*)

70. This biome is known for greatest biodiversity

# NEW JERSEY SCIENCE LEAGUE

## Environmental Science Answer Key: **Green test.**

Feb 11, 2016 (Corrections)

1	D	15	C	29	D	43	A	57	C
2	A	16	D	30	B	44	C	58	A
3	C	17	C	31	A	45	C	59	A
4	B	18	D	32	D	46	B	60	C
5	A	19	A	33	D	47	C	61	A
6	C	20	C	34	A	48	C	62	D & C
7	C	21	B	35	B	49	B	63	D
8	C	22	B	36	C	50	A	64	B
9	D	23	C	37	A not D	51	B	65	D
10	A	24	All full credit A	38	C	52	C	66	E
11	D	25	A	39	A	53	E	67	B
12	D	26	C	40	D	54	D	68	C
13	A	27	C	41	C	55	B	69	D
14	D	28	B	42	D	56	A	70	A

**Environmental Science: Open to All Students. 70 multiple choice questions per exam**

**A complete list of topics is located at [entnet.com/~personal/njscil/html](http://entnet.com/~personal/njscil/html)**

**FEBRUARY TEST-** Correlations, statistics, models, graphing & interpreting graphs as related to environmental science. **Impacts of growth** - Hunger; disease; economic effects; habitat destruction. **Agriculture** - types of agriculture; Green Revolution; genetic engineering and crop production; deforestation; irrigation; sustainable agriculture. **Controlling pests** Types of pesticides; costs/benefits of pesticide use; IPM, **Forestry**-Tree plantations; old growth forests; forest & fire management; national forests, **Rangelands**- Overgrazing; deforestation; desertification; rangeland management; federal rangelands, **Soil and Soil Dynamics** - Rock cycle; formation; composition; physical & chemical properties; soil types; erosion& other soil problems; soil conservation, **Other Land Use - Urban land development** - Planned development; suburban sprawl; urbanization, **Transportation infrastructure** - Federal highway system; canals, channels; undeveloped areas; ecosystem impacts, **Public and federal lands**-Management; wilderness areas; national parks; wildlife refuges; forests; wetlands. **Land conservation options**- Preservation; remediation; mitigation; restoration, **Sustainable land-use strategies.** Plus Jan topics

### Testing Dates for 2016

Thursday, February 11, 2016

Thursday, March 10, 2016

Thursday, April 14, 2016\*

\*All areas and schools must complete the April exam and mail in the results by April 28<sup>th</sup>, 2016.

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**PLEASE RETURN THE AREA RECORD SHEET AND ALL REGULAR TEAM MEMBER SCANTRONS  
STUDENTS PLACING 1<sup>ST</sup>, 2<sup>ND</sup>, 3<sup>RD</sup>, 4<sup>TH</sup>).**

(ALL

If you return scantrons of the Alternates, then label them as **ALTERNATES.**

### Dates for 2017 Season

Thursday, January 12, 2017

Thursday, February 9, 2017

Thursday, March 9, 2017

Thursday, April 13, 2017



NJSL Environmental Science March 10, 2016 **GREEN TEST (Corrections)**

Choose the answer that best completes the statements or questions below and fill in the appropriate response on the form. If you change an answer be sure to completely erase your first choice. Please PRINT your name, school, area, and which test you are taking onto the scantron.

**Mercury Concentration in Fish Table #1**

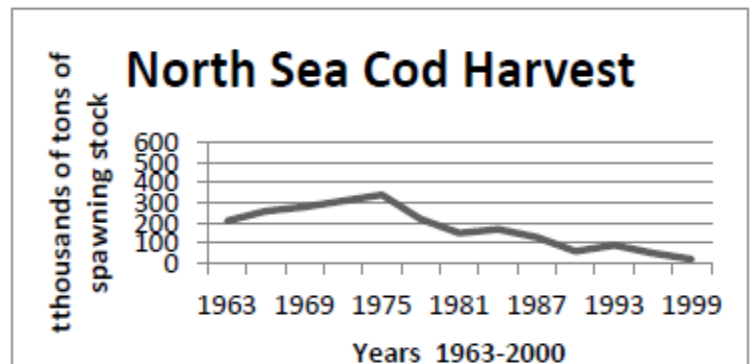
Fresh-water Fish	Mean Concentration of Methyl Mercury	Average size of mature freshwater fish	
		Length	Mass
Common Carp	0.11 PPM	30-63cm	4.5 kg
Channel Catfish	0.09 PPM	36-53cm	9.0kg
Large-mouth Bass	0.51 PPM	30-41cm	1.2kg
Yellow Perch	0.26 PPM	38-46cm	1.1kg

PPM= Parts per million

**Recommendation for the # of meals per month to eat fish containing Methyl Mercury Table #2**

Methyl Mercury Concentration (PPM)	Number of meals safely consumed per month
0.05	25
0.08	15
0.12	10
0.25	5
0.40	3
0.80	2

- According to table #1 above, which fish would be **safest** to eat?
  - Common carp
  - Channel catfish
  - Largemouth bass
  - Yellow perch
  - Not enough information
- Using table #2 estimate the maximum number of meals a family could safely eat of the common carp. (~ means approximately.)
  - ~ 28 meals per month
  - ~19 meals per month
  - ~15 meals per month
  - ~9 meals per month
  - ~4 meals per month
- Using table #2 estimate the maximum number of meals a family could safely eat yellow perch ?
  - ~ 20 meals per month
  - ~16 meals per month
  - ~12 meals per month
  - ~8 meals per month
  - ~ 4 meals per month
- In the tables above which fish is recommended to eat at the most twice a month?
  - Yellow Perch
  - Large Mouth Bass
  - Channel Catfish
  - Common Carp
- Use the graph to the right. About what year did the greatest rate of decline of North Sea Cod begin?
  - 1963
  - 1969
  - 1970
  - 1976
  - 1993



6. When sea cod stocks were increasing (1963-72) what was the approximate increase in harvest?  
A. 8 thousand tons                      B. 0.8 thousand tons  
C. 100 thousand tons                    D. 800 thousand tons

For questions #7-10, match the following fishing techniques with the most appropriate phrase:  
A. Bottom trawling    B. Long-line fishing    C. Sonar    D. Nets (gill, drift, & purse seines)

7. This technique is able to locate fish underwater  
8. This technique captures large schools of fish near the ocean's surface  
9. This technique often results in benthic habitat destruction  
10. This technique can hook non-target species of fish
11. This law regulates the release of hazardous substances into the air, soil, and water by mining.  
A. Clean Water Act  
B. Comprehensive Response Compensation and Liability Act  
C. Surface Mining Control and Reclamation Act of 1977  
D. Safe Drinking Water Act
12. This law creates standards minimizing surface effects of coal mining on the environment.  
A. Clean Water Act  
B. Comprehensive Response Compensation and Liability Act  
C. Surface Mining Control and Reclamation Act of 1977  
D. Safe Drinking Water Act
13. Acid mine drainage  
A. harms or kills aquatic life.  
B. causes acid rain.  
C. purifies streams.  
D. is unregulated in the United States.
14. Which of the following is **not** a method of subsurface mining?  
A. room-and-pillar    B. solution mining    C. Longwall mining    D. Open-pit mining.

**Table 2.** Recovery rates during mining, beneficiation, smelting, and refining of aluminum, chromium, iron, copper, manganese, nickel, phosphate & coal. Modified from Kippenberger, 2001]

Commodity	Percent world production included in this survey		Total recovery, in percent	Share of underground mines, in percent
	Mines	Smelters/refineries		
Aluminum		79 96	87	0
Chromium		77 ~100	65	70
Iron		65 90	77	4
Copper		~75 ~94	71	35 (estimated)
Manganese		51 ~97	47	30
Nickel		70 70	76	53
Phosphate		61	64	3
Hard coal		91	77	75

The above is a worldwide materials-flow study. Kippenberger (2001) examined the recovery rates for mining, beneficiating, and smelting eight mineral and energy commodities.

15. Kippenberger's table shows:

- A. Recoveries from mining to smelting have decreased
- B. Total recoveries of these commodities from mining to smelting are well below 100%
- C. Both A and B
- D. Neither A or B.

16. Based upon the data in the preceding table, which mineral shows the greatest recovery?

- A. Hard coal and Iron
- B. Chromium
- C. Aluminum
- D. Phosphate & Manganes

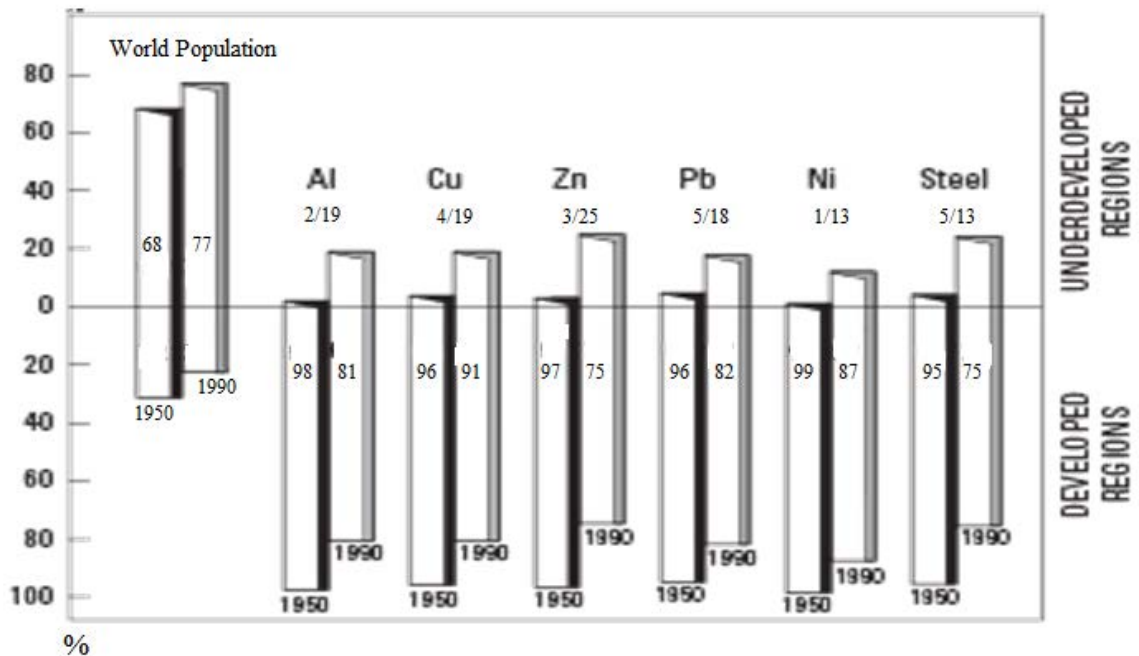
17. What is the general name of a mineral or group of minerals that are mined for their economic value?

- A. Native minerals
- B. Gangue minerals
- C. Ore minerals
- D. Longwalls

18. The physical properties of a mineral are most closely determined by the

- A. age of the mineral sample
- B. temperature of the mineral sample
- C. arrangement of the mineral's atoms
- D. size of the mineral sample

19. Placer deposits are surface mineral deposits that have been concentrated by
- A. Surface mining.
  - B. Movement of wind and water.
  - C. Subsurface mining.
  - D. Evaporation and condensation.



Data for developed regions from Wellmer and Becker-Platen, 2001; courtesy of Encyclopedia of Life Support Systems Publishers, Oxford, United Kingdom.

Student Key: Al, aluminum; Cu, copper; Zn, zinc; Pb, lead; Ni, nickel

20. From 1950 to 1990 which metals increased the most in underdeveloped countries?

All full credit. Key has C

A. Aluminum and copper

B. Nickel and lead

C. Zinc and steel

D. Nickel and steel

21. The table above illustrates all of the following **except**:

A. Correlates an increase in mineral use with the increase in world population

B. Underdeveloped countries use less amounts of minerals

C. The bulk of mineral resource consumption takes place in industrialized countries

D. The amount of energy needed to produce minerals steadily increases as mineral consumption increases.

22. The responsibility to sustain mineral resources is placed on developed, industrialized nations. They must assure a sustainable future by working to increase the efficiency of production and utilization of mineral raw materials. Reasons include all of the following **except**:

- A. These improvements require investments in research and development, much more easily undertaken in industrialized nations than poorer developing nations.
- B. Industrialized nations start much higher on the learning curve for efficient use of natural resources than do the developing nations.
- C. After development by industrial nations, more efficient technologies can then be adopted by developing nations to meet the natural resources needs of their growing populations.
- D. Developing nations lack mineral resources and therefore have no motivation to increase the efficiency of production and utilization of mineral raw materials.

23. Examples of alternative solutions or alternative commodities performing a similar function as a nonrenewable mineral or resources are:

- A. Using natural gas instead of oil for home furnaces
- B. Replacing copper phone wires with fiberglass cable made of silica.
- C. Wireless transmission of information using directional radio antennae or satellites.
- D. A and B
- E. B and C

24. Which of the following would *most* likely be mined using solution mining?

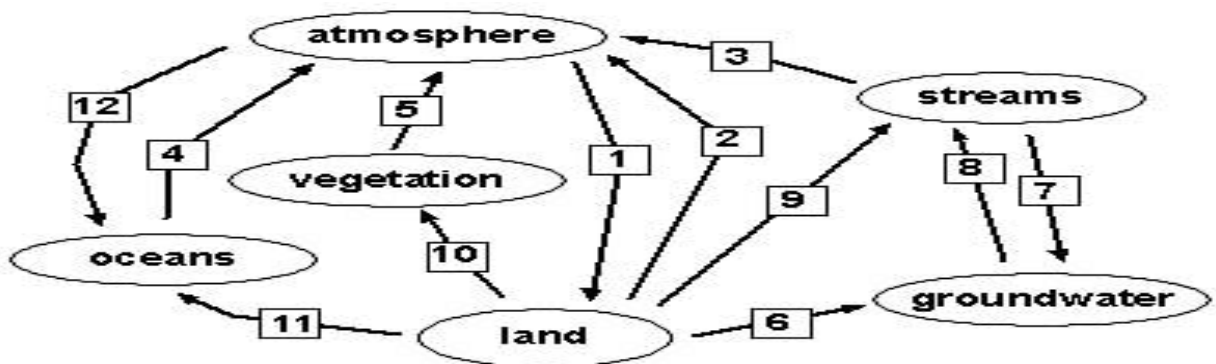
- A. Salt
- B. Gold
- C. Diamond
- D. quartz

25. The layer of impurities on top of molten metal that forms during smelting is called

- A. Smelt.
- B. Slag.
- C. Dredge.
- D. Flux.

26. A quarry also could be called

- A. An open pit.
- B. A longwall.
- C. The overburden.
- D. A pillar.



The above diagram illustrates the Hydrologic Cycle. Use with questions 27 thr 32

27. What would happen to the process identified by arrow 8 during a prolonged drought?

- A. Increase
- B. Decrease
- C. Remain constant
- D. Fluctuate continually though out drought.

For questions # 28-32 Choose the letter which best matches the process represented by the numbered arrow in the diagram above.

- A. Overland Flow/run off
- B. Precipitation
- C. Transpiration
- D. Infiltration/percolation
- E. Evaporation

28. Which process best represents Arrow 1?

29. Which process best represents Arrow 5?

30. Which process best represents Arrow 6?

31. Which process best represents Arrow 9?

32. Which process best represents Arrow 4?

33. Ice sheets covered much of the Northern Hemisphere one million years ago during part of the last ice age. How did this affect the depth of water in the oceans?

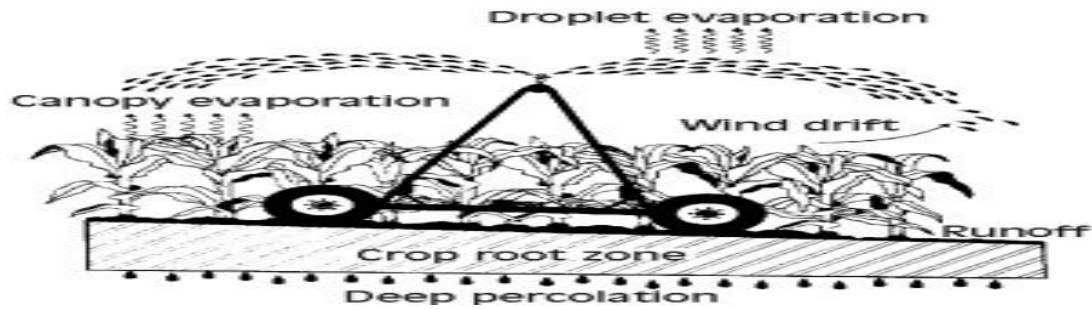
- A. Oceans were shallower than today
- B. Oceans were deeper than today
- C. Oceans were the same depth as today
- D. Oceans initially rose, then receded, then rose again and then became frozen.

34. The presence of fecal coliform bacteria in a sample of river water suggests:

- A. The pH of the river is very high.
- B. The water is contaminated with animal waste.
- C. The river is devoid of plant life.
- D. The dissolved oxygen level of the river is high.
- E. Fish caught from the river will be free of parasites

35. All of the following statements are true about the phosphorus cycle and phosphorous except which one?

- A. Phosphorus tends to be more localized compared to other biogeochemical cycles
- B. Phosphorus is generally found in rocks, sediments, and the soil.
- C. Living organisms do not need phosphorus
- D. Phosphorus does not exist in the atmosphere.



36. Which of the following methods of agricultural irrigation results in the loss of the **least amount of water by evaporation?** **All full credit Key has E(no e in choices)**

- A. Conventional center-pivot irrigation (pictured above)
- B. Gravity-flow irrigation
- C. Drip irrigation
- D. Flood irrigation

37. All of the following result in water loss **except:**

- A. High Topped sprinklers
- B. Canopy loss
- C. Droplet evaporation
- D. Wind drift
- E. Root drip hoses

38. Where is the largest amount of **fresh** water stored?

- A. Lakes and rivers
- B. Glaciers and ice caps
- C. Oceans
- D. Ground water

39. Polluted groundwater is difficult to clean because

- A. Groundwater is deep in the ground and dispersed through large areas of rock.
- B. Pollutants cling to materials in an aquifer contaminating clean water.
- C. The recycling process of groundwater takes hundreds or thousands of years.
- D. All of the above

40. Many areas of the world without adequate fresh water have become habitable because

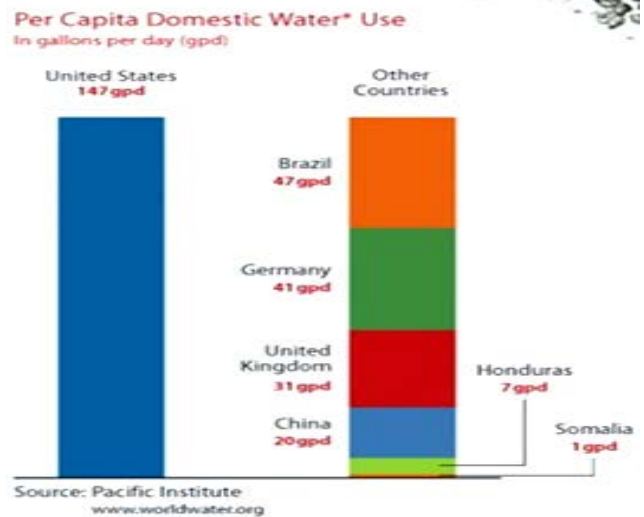
- A. Rainfall patterns have changed.
- B. Water management projects have diverted water to the area.
- C. Icebergs have been towed in to provide fresh water.
- D. All of the above

41. Most of Earth's water is located

- A. In solid form in the ice caps and glaciers
- B. Held in reservoirs behind large dams.
- C. In the oceans
- D. Stored in large underground rock structures.

42. Which one of the following is NOT a consequence of global climate change?
- A. little or no impact on human food supply.
  - B. rising of sea levels
  - C. alteration of worldwide precipitation patterns
  - D. melting of glaciers and polar ice caps
  - E. increased global temperatures
43. The 1990 Oil Pollution Act requires that all
- A. Underground storage facilities be constructed of composite materials.
  - B. Tankers in U.S. waterways be double hulled by the year 2015.
  - C. Oil used in the U.S. is recycled.
  - D. Leaking underground storage facilities be repaired in 90 days
  - E. Local municipalities have residents pay for damages.
44. A **true** statement about aquifers is that
- A. Their water levels remain stable because they recharge so rapidly.
  - B. They are hard to purify because the water collects in sand and rocks.
  - C. They are formed by underground rivers and leakage from deep lakes.
  - D. Their water won't circulate in the hydrologic cycle; it can't evaporate underground
45. A common feature of thermal pollution and artificial eutrophication is that they both
- A. Have sources that are difficult to identify and control.
  - B. Cause large mats of algae to bloom in fresh water.
  - C. Are a result of power plants and other industrial activity.
  - D. Occur only in cool winter months
  - E. Decrease the amount of oxygen dissolved in water.

46. According to the chart, the per capita daily water use by Brazil represents what approximate fraction of the use by USA?  
(gpd is gallons per day.)
- A. One fourth
  - B. One fifth
  - C. One half
  - D. One third



47. The per capita daily water use by the United Kingdom represents what approximate percentage of the use by USA?
- A. 10 %
  - B. 200%
  - C. 33%
  - D. 330%
  - E. 20%



48. By what factor does the USA use more water than China?  
A. ~7.35    B. ~0.14    C. ~20    D. ~200    E. ~0.25

For Questions 49-53, refer to and select from the following answers:

- A. Dissolved oxygen    B. Turbidity    C. Conductivity    D. Secchi disk    E. pH

49. Measures turbidity  
50. Measures acidity  
51. Decreased by excess nutrient pollutant  
52. Measure of salinity  
53. Caused by suspended particulates

54. Which of the following represents nonpoint-source pollution?  
A. Unlined Landfill    B. Polluted wastewater from a chemical plant  
C. Leaking oil tanker    D. Runoff from agricultural fields

55. A large number of dead fish turned up in a local creek caused by a gasoline tank which developed a leak in a nearby gas station. This is an example of:  
A. Thermal pollution    B. Nonpoint source pollution  
C. Point source pollution    D. Fracking pollution

56. In the United States, most municipal solid waste is disposed of by  
A. Composting    B. Recycling  
C. Incineration    D. Ocean dumping    E. Landfilling

57. Which of the following is the usual cause of cultural eutrophication in surface waters of both developed and developing countries? **D is correct. Not C.**

- A. Lack of proper filtration devices for power plant effluents  
B. Introduction of cyanobacteria to streams and rivers  
C. Runoff of metal ions in bodies of water  
**D. Runoff of nitrate compounds into bodies of water**

58. Which of the following statements does **not** describe a problem with modern landfills?  
A. Chemicals leaking out of waste stored there may pollute groundwater.  
B. Materials buried in landfills decompose in three years.  
C. Explosive gases can be produced by landfills and may build up in the basements of nearby buildings.  
D. Landfills require a lot of space to hold household and municipal waste
59. Which items make up the largest percentage of MSW produced by households and businesses?  
A. Aluminum cans    B. Plastic bottles and packaging  
C. Paper products    D. Yard waste, such as grass clippings and tree limbs
60. MSW Municipal Solid Waste consists of all of the following products except:  
A. Paper    B. Gas and corrosive materials  
C. Food wastes    D. Glass & plastics    E. Yard waste

For questions 61 -65 refer to the following methods of treating hazardous wastes:

- A. Underground burial      B. Reduce the amount manufactured or made  
C. Incineration              D. Neutralization      E. Bioremediation

61. Involves mixing water with other chemicals in order to produce less toxic materials

62. The easiest and cheapest method

63. living organisms process the waste, removing it from the ecosystem

64. Injection into deep wells

65. This process can cause secondary pollutants in the atmosphere

66. Which of the following components of a wastewater treatment plant is designed to facilitate the decomposition of organic material by aerobic microorganisms?

- A. Bar screen                      B. Grit-settling tank  
C. Activated-sludge tank          D. Chlorination tank          E. Ultraviolet-light

67. Which of the following human activities are most directly responsible for the increase in carbon dioxide in the atmosphere?

- A. Deforestation and the clearing of plants that absorbs CO<sub>2</sub>.  
B. The burning of fossil fuels releasing CO<sub>2</sub> into the atmosphere.  
C. The use of pesticides and fertilizers in agriculture.  
D. A and B only  
E. A, B and C.

68. Of the following, which is the **best** example of reclamation of disturbed lands?

- A. Restoring vegetation to an area that has been mined  
B. Constructing a new wetland to compensate for the loss of wetlands  
C. Growing crops on land formerly used for grazing  
D. Reintroducing an endangered species into an area from which it has disappeared  
E. Regulating the use of a natural resources in order for it to renew itself

69. Many factories use water to help cool its operational processes. This water is then released back into the river from which it came. What type of pollution does the water generate?

- A. carcinogens                      D. heavy metal pollution  
B. pathogens                      E. Acid pollution  
C. thermal pollution

70. Information gathered by a scientist about the toxicity of chemical X and chemical Y showed that they had individual safe limits for fish at particular concentrations. But when they were used together at the safe concentrations, there were extensive fish kills. This is an example of:

- A. Homeostasis                      C. Commensalism  
B. Synergism                      D. Bioaccumulation          E. Antagonism

**NEW JERSEY SCIENCE LEAGUE Green test.**

**Environmental Science Answer Key**

March 10, 2016 **Record onto the area record the # correct.** (Corrections)

1	B	15	B	29	C	43	B	57	D not C
2	D	16	C	30	D	44	B	58	B
3	E	17	C	31	A	45	E	59	C
4	B	18	C	32	E	46	D	60	B
5	D	19	B	33	A	47	E	61	D
6	C	20	C all full credit	34	B	48	A	62	B
7	C	21	D	35	C	49	D	63	E
8	D	22	D	36	E All full credit	50	E	64	A
9	A	23	E	37	E	51	A	65	C
10	B	24	A	38	B	52	C	66	C
11	B	25	B	39	D	53	B	67	D
12	C	26	A	40	B	54	D	68	A
13	A	27	B	41	C	55	C	69	C
14	D	28	B	42	A	56	E	70	B

**Environmental Science: Open to All Students. 70 multiple choice questions per exam**

**MARCH TEST:** Correlations, statistics, models, graphing & interpreting graphs as related to environmental science, **Mining** -Mineral formation; extraction; global reserves, law, **Fishing** - Fishing techniques; overfishing; aquaculture; relevant laws, **Global Water Resources & Use** - Freshwater/saltwater; ocean circulation; agricultural, industrial, and domestic use; surface & groundwater issues; and tidal energy; geothermal; environmental advantages/disadvantages, **Air pollution** - Sources — primary & secondary; major air pollutants; measurement units; smog; acid deposition- causes & effects; heat islands & temperature inversions; indoor air pollution; remediation and reduction strategies; Clean Air Act and other relevant laws, **Noise pollution** - Sources; effects; control measures

**Water pollution** - Types; sources, cause & effects, cultural eutrophication, purification, groundwater pollution, Clean Water Act & other laws, waste & potable water treatment methods, **Solid waste** - Types; disposal; reduction, **Hazards to human health** Environmental risk analysis; acute and chronic effects; dose-response relationships; air pollutants; smoking and other risks, **Hazardous chemicals** in the environment - Types of hazardous waste; treatment/disposal of hazardous waste; cleanup of contaminated sites; bio magnification; relevant laws: Plus Jan and Feb topics

**APRIL TEST:** Correlations, statistics, models, graphing & interpreting graphs as related to environmental science, **Stratospheric Ozone** - Formation of stratospheric ozone; ultraviolet radiation; causes of ozone depletion; effects of ozone depletion; strategies for reducing ozone depletion; relevant laws and treaties, **Global Warming** - Greenhouse gases & effect; impacts & consequences of global warming; reducing climate change; relevant laws and treaties, **Loss of Biodiversity** -Habitat loss; overuse; introduced species; endangered & extinct species, maintenance through conservation relevant laws and treaties, **Energy** - forms; power; units; conversions; Thermodynamics, **Energy Consumption** Industrial Revolution; exponential growth; energy crisis, **Fossil Fuel Resources and Use** - Formation of coal, oil, and natural gas; extraction/purification methods; World reserves and global demand; synfuels; environmental advantages/disadvantages of sources, **Nuclear Energy** - Nuclear fission process; nuclear fuel; electricity production; nuclear reactor types; environmental advantages/disadvantages; safety issues; radiation & health; radioactive wastes; nuclear fusion

**Hydroelectric Power** - Dams; flood control; salmon; silting; other impacts, **Energy Conservation** - Energy efficiency; CAFE standards; hybrid electric vehicles; mass transit, **Renewable Energy** - Solar energy; solar electricity; hydrogen fuel cells; biomass; wind energy; small-scale hydroelectric; ocean waves and tidal energy; geothermal; environmental advantages/disadvantages. Plus Jan, Feb, and March topics.

**Testing Dates for 2016**

Thursday, March 10, 2016

Thursday, April 14, 2016\*

\*All areas and schools must complete the April exam and mail in the results by April 28<sup>th</sup>, 2016.

**New Jersey Science League**

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**Web address:** [entnet.com/~personal/njscl/html](http://entnet.com/~personal/njscl/html)

**PLEASE RETURN THE AREA RECORD SHEET AND ALL REGULAR TEAM MEMBER SCANTRONS STUDENTS PLACING 1<sup>ST</sup>, 2<sup>ND</sup>, 3<sup>RD</sup>, 4<sup>TH</sup>).**

**(ALL**

If you return scantrons of the Alternates, then label them as **ALTERNATES.**

**Dates for 2017 Season**

Thursday, January 12, 2017

Thursday, February 9, 2017

Thursday, March 9, 2017

Thursday, April 13, 2017

**NJSL ENVIRONMENTAL SCIENCE**

**APRIL 14, 2016 GREEN TEST (Corrections)**

Choose the answer that best completes the statements or questions below and fill in the appropriate response on the form. If you change an answer be sure to completely erase your first choice. Please PRINT your name, school, area, and which test you are taking onto the scantron.

Scientists have monitored a population of the Southern Bent-wing Bat in a small cave system over a seven-year period. The number of bats estimated in the cave for each year is given in the table below. These bats like all bats are mammals, giving live birth to usually one but sometimes two. Mothers nurse their young. After breeding season they form maternity colonies to care for their young. In three to four weeks the young bats join the rest of the colony.

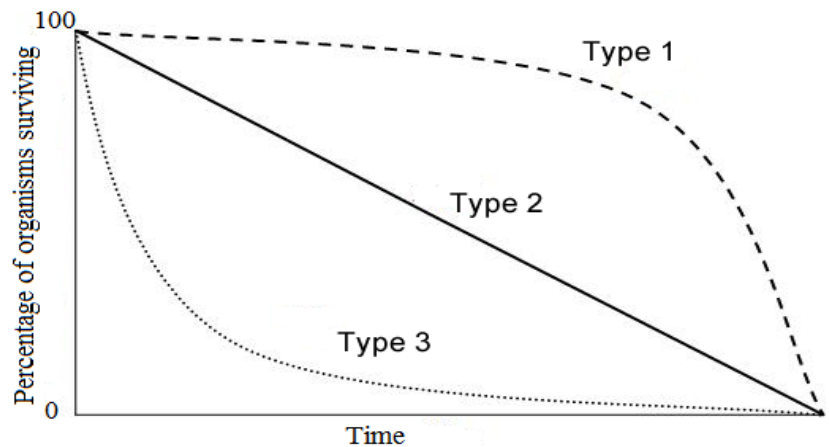
**SOUTHERN BENT-WING BAT POPULATION 2009-2015**

Year	2009	2010	2011	2012	2013	2014	2015
Number	110	110	115	122	110	110	114

1. The **average** population size living in the cave system over the seven-year period is best calculated as  
a. 110                      b. 112                      c. 121                      d. 113                      e. 116

2. What type of survivor ship graph do bats exhibit?

- a. Type I
- b. Type 2
- c. Type 3



3. The Southern Bent-wing Bat roosts and breeds only in caves and mine shafts in southeastern Southern Australia and southwestern Victoria. This means that the species...

- a. has a wide variety of habitats
- b. is at risk of genetic swamping
- c. is endemic to this region of Australia
- d. needs demographic variation to occur to maintain its population size

4. The total Southern Bent-wing Bat population has declined consistently from approximately 125,000 in 1969 to about 40,000 in 2009. It is likely that a decline of such numbers would have resulted in the conservation category of the species being reclassified from:

- a. critical to vulnerable
- b. endangered to critical
- c. critical to endangered
- d. endangered to vulnerable

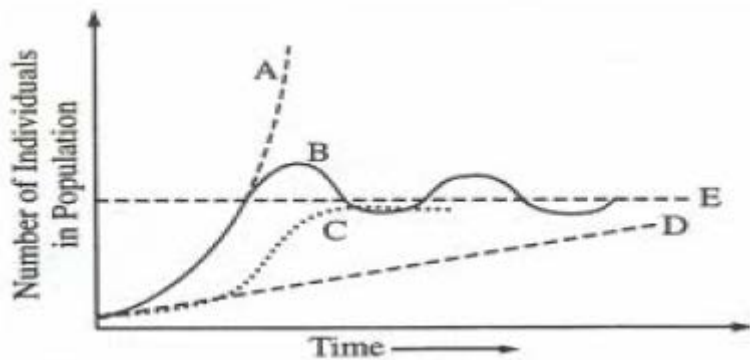
5. A number of reasons are suggested for the declining numbers of the Southern Bent-wing Bat. The reasons include

- clearing of forest habitats
- disturbance of breeding sites by tourists
- decrease in the insects the bats feed on due to pesticide use.

However, scientists lack data to identify the specific cause. In response to this lack of data, the precautionary principle would most strongly suggest that

- a. a captive breeding program should be established to rebuild species diversity
- b. authorities should still develop & implement strategies to address each possible cause
- c. little can be done to deal with the decreasing population, since the cause is unknown
- d. scientists investigate further to identify the main threat & write a risk assessment report

Questions 6-9 refer to the figure below. A, B, C, and D represent population growth curves, while E represents the carrying capacity.



6. This lettered-line represents the maximum number of individuals that can be supported by a particular ecosystem on a long-term basis

7. This lettered-line represents the biotic potential of the species

8. This lettered-line represents the growth of a population predicted by the logistic model

9. Which lettered-line represents a predator-prey relationship?

10. Which process takes place in a nuclear power reactor?

- a. fusion of hydrogen nuclei to form helium
- b. U-235 nucleus absorbing a neutron and splitting into two smaller nuclei
- c. C-14 decaying into N-14
- d. U-235 and U-239 fusing into plutonium

11. What form of energy is produced during every energy conversion

- a. none
- b. solar
- c. kinetic
- d. radiant kinetic

12. Which of the following is an example of low quality energy?

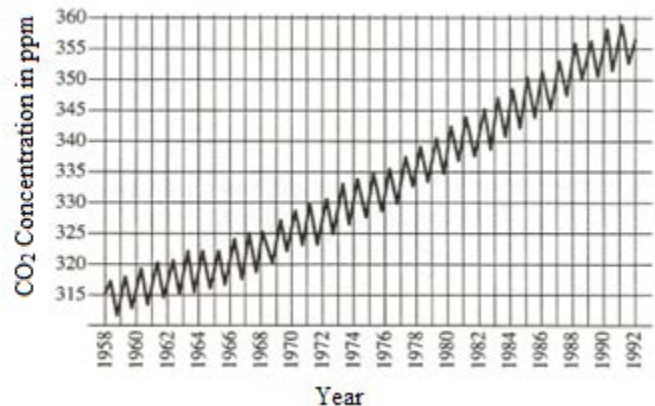
- a. radiant
- b. kinetic
- c. heat
- d. chemical potential
- e. all are low quality

13. Which of the following is an example of high quality matter?

- a. salt water
- b. aluminum can
- c. copper dissolved in the ocean
- d. gasoline emissions

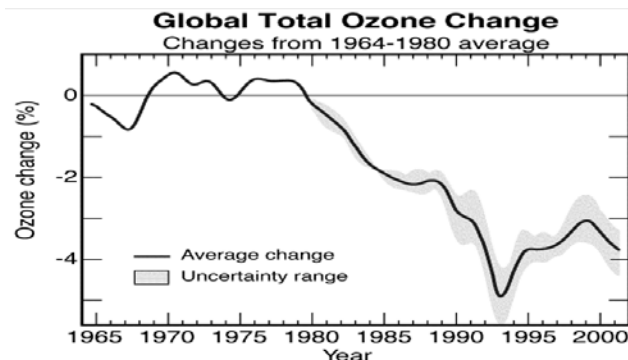
14. What law explains why there is no “away”?
- 1<sup>st</sup> law of conservation of energy
  - Law of gravity
  - 2<sup>nd</sup> law of conservation of energy
  - Law of conservation of matter
15. What process is responsible for turning solar radiation into chemical potential energy?
- cellular respiration
  - transpiration
  - decomposition
  - photosynthesis
16. Which of the following represents 99% of the volume of gases in the lower atmosphere listed in **descending** order?
- O<sub>2</sub>, N<sub>2</sub>, CO<sub>2</sub>, H<sub>2</sub>O
  - H<sub>2</sub>O, N<sub>2</sub>, O<sub>2</sub>, CO<sub>2</sub>
  - N<sub>2</sub>, O<sub>2</sub>, H<sub>2</sub>O, CO<sub>2</sub>
  - O<sub>2</sub>, CO<sub>2</sub>, H<sub>2</sub>O, N<sub>2</sub>

For questions 17 and 18 refer to the following graph:



17. Data in this graph can be useful in explaining the greenhouse effect when compared with
- volcanic activity
  - sunspot activity
  - mean global temperatures
  - annual nitrous oxide production
  - cycles of flooding and drought
18. The annual fluctuation in carbon dioxide concentration can best be explained by the
- seasonal use of fossil fuels
  - regularity of volcanic activity
  - deforestation in the tropics
  - seasonal photosynthetic activity of green plants

19. Which of the following most likely caused the record low of ozone level in 1994?



- a. 1991 eruption of Mt. Pinatubo
- b. 1980 eruption of Mount St. Helen
- c. Record high CO<sub>2</sub> emission from heavy industries
- d. Record high NO<sub>2</sub> emissions from chemical industries

20. An example of a non-renewable, non-fossil energy resource is

- a. oil
- b. coal
- c. tidal power
- d. uranium

21. Which of the following is **not** a renewable energy source?

- a. wind
- b. natural gas
- c. biomass
- d. solar

22. The term 'exothermic' refers to a chemical reaction

- a. in which heat is absorbed
- b. in which heat is given out
- c. that proceeds very rapidly
- d. that requires high temperatures to begin the reaction

23. Some of the products from a barrel of oil are given in the table below. Which is produced in the greatest amount from a barrel of petroleum?

### What a barrel of oil makes

- One barrel of crude oil contains 42 gallons which creates 45 gallons of petroleum products
- About 47% of each barrel of crude oil is refined into automobile gasoline
- In the US an average of about 2.5 gallons of crude oil are consumed per person each day
- The US imports about 40% of its required crude oil and about 52% of that amount comes from OPEC countries

Product	Share of Total U.S. Petroleum Consumption
Gasoline	47%
Heating Oil/Diesel Fuel	20%
Jet Fuel (Kerosene)	8%
Propane/Propylene	6%
Natural Gas Liquids and Liquid Refinery Gases	6%
Still Gas	4%
Petrochemical Feedstocks	2%
Petroleum Coke	2%
Residual/Heavy Fuel Oil	2%
Asphalt and Road Oil	2%
Lubricants	1%
Miscellaneous Products	0.4%
Other Liquids	0.4%
Aviation Gasoline	0.1%
Special Naphthas	0.04%

- a. lubricants
- b. asphalt
- c. gasoline
- d. home heating oil

24. How many gallons of jet fuel come one barrel of oil?

- a. 3.36
- b. 3.6
- c. 8.0
- d. 21.2

25. Mercury is particularly hazardous to human health because
- it bio-accumulates up the food chain.
  - as a heavy metal, it can cause serious impact injury.
  - it is light and volatile, and so is widely dispersed through the environment by wind.
  - as a pure metal, it is very soluble in water, easily absorbed through drinking water.
26. Which of the following is the best description of sulfur dioxide (SO<sub>2</sub>)?
- a gas less dense than air
  - a gas more dense than air
  - a gas insoluble in water
  - an acidic liquid at ordinary room temperature
27. Sulfur dioxide is a toxic, pungent, irritating gas. The dosage of sulfur dioxide is best described as
- a measure of the harm sulfur dioxide does to a person.
  - the amount of sulfur dioxide a person experiences in a given time.
  - the amount of sulfur dioxide absorbed by a person in a given time.
  - the amount of sulfur dioxide entering the environment in a given time.
28. The toxicity of mercury is best described as
- how mercury enters the environment.
  - a measure of the harm mercury does to a person.
  - the persistence in the environment.
  - how much mercury a person experiences in a given time.
29. In some regions, the combination of acid rain and smog causes damage to forests that is worse than the impact of either acid rain or smog on its own. This is an example of
- specificity
  - acute toxicity
  - chronic toxicity.
  - synergistic action.
30. Which one of the following best accounts for mercury's significant harm in the environment?
- persistence
  - degradability
  - specificity
  - synergism
- A consumer group wants to find out which of two new car models gets the best gas mileage. A car's gas mileage is the number of miles a car can go for each gallon of gas it uses. They decide to fill the gas tanks of each car with the same number of gallons of gas and compare the miles per gallon for each car. They use "regular" grade gas in both cars. Neither car gets the "premium" grade gas.
31. Why is it important that the two cars get the same grade of gas?
- By using the same grade of gas, the consumer group can learn both which car model gets the best mileage and which grade of gas gives the best mileage.
  - By using the same grade of gas, the consumer group can learn which grade of gas gives the best mileage.
  - If the cars do not get the same grade of gas, the consumer group cannot find out which car model has the best mileage.
  - It is NOT important for both cars to have the same grade of gas because they are not testing which grade of gas gives the best mileage.



32. Although nuclear reactors used to produce electricity do not release carbon dioxide, nuclear energy is still responsible for the release of this greenhouse gas. Which activity probably does **not contribute largely** to the carbon dioxide released by nuclear power generation.

- a. construction of the nuclear reactor facility
- b. transportation of nuclear fuel and waste
- c. mining and production of uranium fuel rods
- d. cooling of the secondary coolant by a large reservoir of water

33. We can use radioisotopes as **tracers** in environmental and medical research because isotopes

- a. generally behave identically in chemical and physical processes.
- b. have different masses.
- c. generally behave differently in chemical and physical processes
- d. all of the above

34. Indoor "air cleaners" are often advertised. The air cleaner uses a motor to circulate the air in a house, while it is being cleaned by the air cleaner. However, some air cleaners actually generate one of the following pollutants?

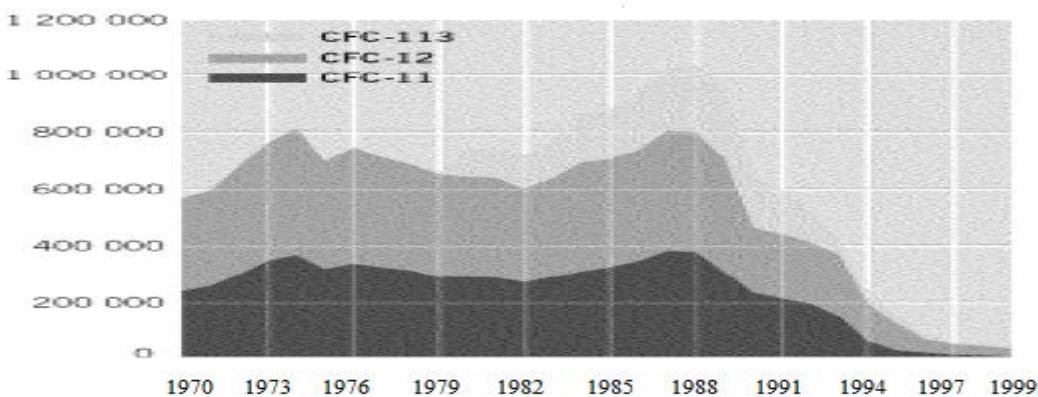
- a. ozone
- b. mold
- c. methane
- d. CFCs

35. What is the source of the nitrogen in the NO<sub>x</sub> emitted from the combustion of gasoline in a car?

- a. natural gas
- b. oil
- c. coal
- d. the atmosphere
- e. none of these

36. Based on the graph below, which time period is characterized by the greatest decrease in CFC-12 and CFC-11 emissions?

**World production of major chlorofluorocarbons in tons per year**



- a. 1973-1976
- b. 1991-1994
- c. 1985-1988
- d. 1994-1997
- e. 1988-1991

37. In the United States DDT has been replaced with

- a. organophosphates which are less toxic to humans but are more persistent
- b. organophosphates which are highly toxic to humans but are less persistent
- c. organophosphates which are less toxic to humans and less persistent
- d. chlorocarbons which are less toxic to humans but are more persistent
- e. chlorocarbons which are more toxic to humans but are less persistent

38. Thermal pollution

- a. destroys aquatic life by increasing dissolved oxygen levels
- b. makes aquatic organisms more vulnerable to parasites and toxic chemicals
- c. is mainly a result of overexposure to the sun's rays
- d. can be prevented by the ample use of air conditioning
- e. none of the above

39. Fuel for both nuclear and coal power plants must be mined. Which miners are most likely to contract black lung disease?

- a. uranium miners
- b. plutonium miners
- c. coal miners
- d. cadmium miners

40. Many people hear about atmospheric ozone depletion and wonder why we don't simply replace that which has been destroyed. Knowing about CFCs and how catalysts work, which of the following best explains why this would not be a lasting solution.

- a. Governments would be too slow to respond as they argued about who should shoulder the burden of undertaking such an endeavor.
- b. Any ozone placed into the stratosphere would be destroyed by the same catalytic action that destroys naturally occurring stratospheric ozone.
- c. The amount of energy required to create and transport sufficient ozone to the stratosphere would be cost prohibitive.
- d. all of the above.

41. The day starts out clear, bright & sunny. Later, a brown haze develops indicating the presence of

- a. nitric oxides,  $\text{NO}_x$
- b. methane,  $\text{CH}_4$
- c. carbon monoxide,  $\text{CO}$
- d. ozone,  $\text{O}_3$
- e. sulfur oxides  $\text{SO}_x$

42. The Kilauea volcano in Hawaii emits 200-300 tons of sulfur dioxide into the atmosphere each day. This is an example of:

- a. the magnitude of the chemistry associated with the environment.
- b. air pollution from a natural source.
- c. the impact of natural processes on the earth's environment.
- d. the Kilauea volcano is an example of all of the above.

43. Which of the following substances contribute to global warming?

- a. CFCs
- b. carbon dioxide
- c. methane
- d. all contribute to global warming.

44. During the Antarctic spring ozone is destroyed at a greater rate than it is formed

- a. in polar stratospheric clouds
- b. on the surface of atmospheric ice crystals
- c. in a process that is catalytic
- d. all of these choices are correct

45. Industrial Revolution is a key point in the Earth's atmospheric history because

- a. before then, large amounts of petroleum & coal were not being used as energy.
- b. spectrometers (measure molecular response to infrared radiation) were developed then.
- c. the first aircraft that could be used to collect atmospheric samples were developed then
- d. the first atmospheric studies were conducted at that time.

46. Which step in the process of photosynthesis is dependent on light energy?
- combining hydrogen and oxygen to form water
  - splitting carbon dioxide into carbon and oxygen,  $O_2$ .
  - splitting water into hydrogen atoms and oxygen,  $O_2$ .
  - combining carbon and oxygen into carbon dioxide

47. The data table below shows the amount of energy in megajoules to make one kg of a substance. All of these are recycled. Which material would be the most economical to recycle in terms of energy needed to produce the original material?

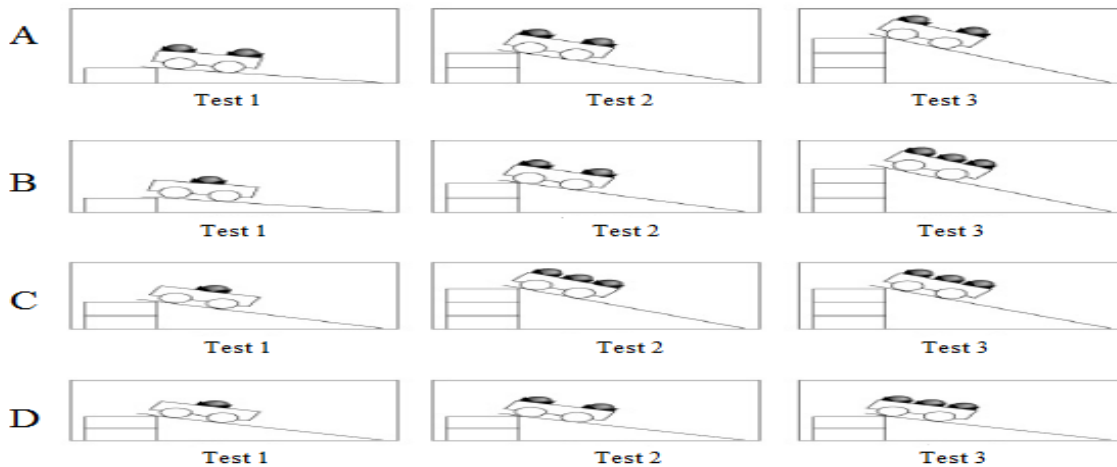
- glass
- steel
- aluminum
- copper
- paper

	Energy Required (MJ/kg)	
	New:	Recycled:
<b>Glass</b>	25	25
<b>Steel</b>	50	26
<b>Aluminum</b>	250	8
<b>Copper</b>	60	7
<b>Paper</b>	24	15

ENERGY REQUIRED IN THE PRODUCTION OF VARIOUS MATERIALS

48. A student wants to know if the **weight** of a cart affects its speed at the bottom of a ramp. He can change the weight of the cart by adding different numbers of balls, and he can change the height of the ramp by using different numbers of blocks. Which set of tests (A, B, C or D) should he compare ?

Modified from TIMSS item population 2 (I-12), 1994



49. It is estimated that one quart of oil pollutes 250,000 gallons of fresh water. One gallon of oil would pollute how many gallons of freshwater?

- 5,000
- 50,000
- 100,000
- 1,000,000
- 10,000,000

50. Which processes do scientists use to estimate environmental risks to humans?

- Animal studies
  - Epidemiological studies
  - Statistical Probabilities
- a. I only
  - b. I and II only
  - c. II only
  - d. I, II, and III

51. On December 3, 1984, a chemical plant involved in the production of the pesticide Carbaryl (sevin) released a plume of methyl isocyanate killing over 2000 people and injuring over 15,000 in the city of

- a. Bhopal, India    b. Nairobi, Kenya    c. Ougadogoo, Burkina Faso    d. Seviso, Italy

52. A direct result of flooding due to global warming is

- a. purify water wells
- b. increase the concentration of nutrients in lakes
- c. spread disease-carrying pathogens
- d. lower concentrations of harmful chemicals in waterways

53. The depletion of stratospheric ozone increases the damage to biological tissues due to

- I. UVA radiation    II. UVB radiation    III. UVC radiation

- a. I only    b. II only    c. III only    d. II and III only    e. I, II and III

54. Phytoremediation is the process by which

- a. contaminated wastewater is concentrated through chemical and physical means
- b. organic contaminants in groundwater are destroyed by light
- c. steam is forced into an aquifer to vaporize volatile and semi-volatile contaminants
- d. plants are used to remove or destroy contamination in groundwater or surface water
- e. solutions of toluene or methane are injected into contaminated groundwater to support the co-metabolic breakdown of contaminants

55. After the Chernobyl incident, what was distributed to children and adults in nearby areas to prevent cancer?

- a. iodine pills    b. calcium pills    c. radioactive shielded clothing    d. vitamin B pills

56. Which of the following is the best way to reduce acid deposition in the US?

- a. making smokestacks higher
- b. building more smokestacks
- c. adding calcium carbonate into lakes
- d. switching fossil fuels to other types of energy
- e. developing acid resistant phytoplankton

57. This area is famous for the nuclear power-plant accident that released unknown amounts of radioactive material into the atmosphere when the core partially melted and fell to the bottom of the reactor, causing a lot of US industries to lose interest in financing new US power plants.

- a. Three Mile Island, US    b. Indian Point, US    c. Chernobyl, Russia    d. Yucca Mtn, US

58. The table below is the amount of solid waste produced by each of these countries in million of tons per year in 1997. Of the total solid waste produced by these countries, what % is approximately generated by the United States?

US	China	Russia	Japan	Germany	UK	Mexico	France	Italy	Spain
236	220	200	52	48	34	32	32	29	26

- a. 5%    b. 26%    c. 33%    d. 75%

59. Which of the following acts established a Federal Superfund?

- a. The Resource Conservation and Recovery Act
- b. The Comprehensive Environmental Response, Compensation and Liability Act
- c. The Food Quality Protection Act
- d. The Nuclear Waste Policy Act
- e. The Estuary Protection Act

60. Which of the following statements concerning biodiversity & ecosystem stability is FALSE?
- The more diverse an ecosystem is, the less redundancy there is with species occupying the same niches.
  - There is a minimum threshold of species diversity below which ecosystems can't work.
  - The greater species diversity of an ecosystem, the more stable that ecosystem is.
  - Ecosystems with higher biodiversity tend to have lower net productivities.
  - Ecosystems with higher biodiversity tend to fluctuate less than simpler ones.
61. Which of the following is not a human health benefit resulting from the absorption of UV radiation in the stratosphere before it gets to the troposphere
- Low rates of skin cancer (e.g., basal cell, squamous cell carcinoma, melanoma)
  - Low rates of sunburns
  - Low rates of miscarriage
  - Low rates of eye damage (e.g., cataracts)
62. Identify which of the following are human activities that lead to the formation of tropospheric ozone as a secondary pollutant
- Burning fossil fuels (in cars, trucks, landscaping equipment, industrial production)
  - Releasing VOCs (e.g., pumping gas, using solvent-based paints)
  - Coal-fired electric power generation
  - Only A and B
  - A, B, and C.
63. Which of the following are negative impacts of tropospheric ozone?
- damages plant tissue
  - reduces primary productivity/inhibits photosynthesis
  - stresses plants, making them more vulnerable to disease and pests
  - irritates the human respiratory system
  - all of these
64. The fact that organisms are adapted to survive in particular environments helps to explain why
- captive-breeding programs are often ineffective.
  - non-native plant species never flourish in new areas.
  - habitat destruction accounts for most extinctions.
  - compromise is impossible on environmental issues.
65. How can zoos, botanic gardens, and wildlife parks help save species?
- by preserving threatened species from destruction.
  - by collecting species from remote wilderness areas.
  - by participating in captive breeding programs.
  - Both (a) and (c)
66. Reintroducing the gray wolf in certain areas of the northwestern United States
- is beneficial for all of those working in that area
  - creates a mutualistic interaction between wolves and elks
  - is in accordance with the U.S. Endangered Species Act of 1973
  - discourages hunters from hunting other animals

For 67-70, Match the health hazard with the letter of the item that may cause it:

- |               |                            |                                    |
|---------------|----------------------------|------------------------------------|
| a. Radiation  | b. Sulfuric Acid $H_2SO_4$ | c. Carbon Monoxide CO              |
| d. Mercury Hg |                            | e. Giardia a flagellated protozoan |

67. Asphyxiant  
 68. Infectious Organism  
 69. A biomagnification substance  
 70. Carcinogen

**New Jersey Science League**  
**Environmental Science Answer Key GREEN EXAM**

**April 14, 2016**

**Record onto the area record the # correct (Corrections)**

1	D	15	D	29	D	43	D	57	A
2	A	16	C	30	A	44	D	58	B
3	C	17	C	31	C	45	A	59	A
4	B	18	D	32	D	46	C	60	D
5	B	19	A	33	A	47	C	61	C
6	E	20	D	34	A	48	D	62	E
7	A	21	B	35	D	49	D	63	E
8	C	22	B	36	E	50	D	64	C
9	B	23	C	37	B	51	A	65	D
10	B	24	B	38	B	52	C	66	C
11	D	25	A	39	C	53	E	67	C
12	C	26	B	40	D	54	D	68	E
13	B	27	C	41	A	55	A	69	D
14	D	28	B	42	D	56	D	70	A

**Environmental Science** For a complete list of topics see the following web address: Topics of Study Environmental Science 70 multiple choice questions per exam. **Open to all students.**

**MARCH TEST:** Correlations, statistics, models, graphing & interpreting graphs as related to environmental science, **Mining** - Mineral formation; extraction; global reserves, law, **Fishing** - Fishing techniques; overfishing; aquaculture; relevant laws, **Global Water Resources & Use** - Freshwater/saltwater; ocean circulation; agricultural, industrial, and domestic use; surface & groundwater issues; and tidal energy; geothermal; environmental advantages/disadvantages, **Air pollution** - Sources — primary & secondary; major air pollutants; measurement units; smog; acid deposition- causes & effects; heat islands & temperature inversions; indoor air pollution; remediation and reduction strategies; Clean Air Act and other relevant laws, **Noise pollution** - Sources; effects; control measures **Water pollution** - Types; sources, cause & effects, cultural eutrophication, purification, groundwater pollution, Clean Water Act & other laws, waste & potable water treatment methods, **Solid waste** - Types; disposal; reduction, **Hazards to human health** Environmental risk analysis; acute and chronic effects; dose-response relationships; air pollutants; smoking and other risks, **Hazardous chemicals** in the environment - Types of hazardous waste; treatment/disposal of hazardous waste; cleanup of contaminated sites; bio magnification; relevant laws: Plus Jan and Feb topics

**APRIL TEST:** Correlations, statistics, models, graphing & interpreting graphs as related to environmental science,

**Stratospheric Ozone** - Formation of stratospheric ozone; ultraviolet radiation; causes of ozone depletion; effects of ozone depletion; strategies for reducing ozone depletion; relevant laws and treaties, **Global Warming** - Greenhouse gases & effect; impacts & consequences of global warming; reducing climate change; relevant laws and treaties, **Loss of Biodiversity** -Habitat loss; overuse; introduced species; endangered & extinct species, maintenance through conservation relevant laws and treaties, **Energy** - forms; power; units; conversions; Thermodynamics, **Energy Consumption** Industrial Revolution; exponential growth; energy crisis, **Fossil Fuel Resources and Use** - Formation of coal, oil, and natural gas, extraction/purification methods; World reserves and global demand; synfuels; environmental advantages/disadvantages of sources, **Nuclear Energy** - Nuclear fission process; nuclear fuel; electricity production; nuclear reactor types; environmental advantages/disadvantages; safety issues; radiation & health; radioactive wastes; nuclear fusion **Hydroelectric Power** - Dams; flood control; salmon; silting; other impacts, **Energy Conservation** - Energy efficiency; CAFE standards; hybrid electric vehicles; mass transit, **Renewable Energy** - Solar energy; solar electricity; hydrogen fuel cells; biomass; wind energy; small-scale hydroelectric; ocean waves and tidal energy; geothermal; environmental advantages/disadvantages. Plus Jan, Feb, and March topics.

**Dates for 2016 Season**

**Thursday April 14, 2016**

**All areas and schools must complete the April exam and mail in the results by April 28<sup>h</sup>, 2016**

**New Jersey Science League**

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Web address: <http://entnet.com/~personal/njscil/html/>

What is to be mailed back to our office?

**PLEASE RETURN THE AREA RECORD AND ALL TEAM  
MEMBER SCANTRONS (ALL STUDENTS PLACING 1<sup>ST</sup>, 2<sup>ND</sup>, 3<sup>RD</sup>,  
AND 4<sup>TH</sup>).**

If you return scantrons of alternates, then label them as ALTERNATES.

**Dates for 2017 Season**

**Thursday January 12, 2017 Thursday February 9, 2017**

**Thursday March 9, 2017 Thursday April 13, 2017**