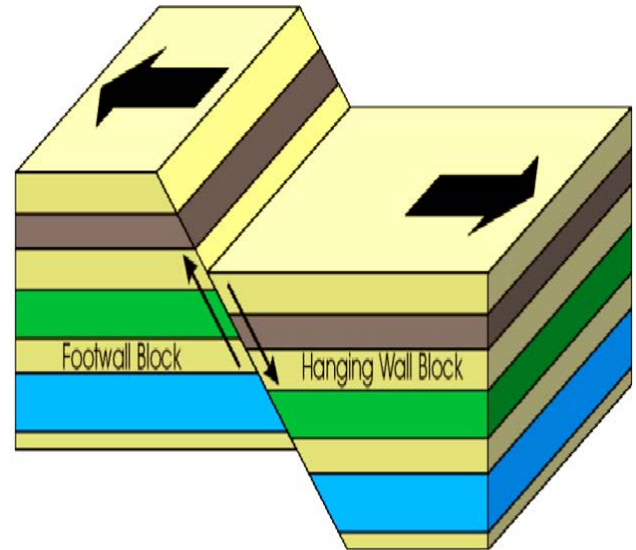


NJSL Environmental Science January 2015 GREEN TEST

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 scan-tron.

1. The Earth's mantle is made up of very hot material that rises to the top of the mantle, cools, then sinks, reheats, and rises again, constantly repeating the cycle. This action, which causes the Earth's crust to move, is known as
 - A. Convection currents
 - B. Magnetic fields
 - C. Hot spots
 - D. Conduction forces
2. This diagram illustrates which geological process?
 - A. Faulting
 - B. Folding
 - C. Weathering
 - D. Metamorphism



3. Which list shows the layers of the atmosphere in order, starting with the layer closest to earth?
 - A. Stratosphere, Troposphere, Mesosphere, Thermosphere
 - B. Troposphere, Mesosphere, Thermosphere, Stratosphere,
 - C. Stratosphere, Troposphere, Mesosphere, Thermosphere
 - D. Troposphere, Stratosphere, Mesosphere, Thermosphere
 - E. Troposphere, Thermosphere, Stratosphere, Mesosphere

Select the letter of the definition that matches the term for questions 4-8

- A. Pieces of the crust that "float" on the mantle
 - B. Oldest life form
 - C. Movement that cause matter or air that is hot to rise & cool to sink
 - D. Energy source at hydrothermal vents
 - E. Where 2 plates are colliding. One is pushed down under the other
4. Subduction zone
 5. Convection currents
 6. Cyanobacteria
 7. Plates
 8. Hydrogen sulfide, H₂S.

Select the letter of the definition that matches the term for questions 9-13

- A. The most geologically active areas on Earth.
- B. Deepest places on Earth's surface, located at subduction zones.
- C. Molten rock below the surface of the Earth
- D. Place where two plates are separating. These plates are moving in opposite directions making the oceans larger.
- E. Earth's plates have been floating on the mantle for millions of yrs.

9. Magma

10. "Continental Drift"

11. Mid-ocean ridge

12. Plate boundaries

13. Trenches

14. Why was atmospheric ozone important for the evolution of early life?

- A. It led to a decrease in the oxygen concentration of the atmosphere.
 - B. It led to an increase in the oxygen concentration of the atmosphere.
 - C. It reduced the intensity of infrared radiation reaching Earth's surface.
 - D. It reduced the intensity of ultraviolet radiation reaching Earth's surface.
15. A new book on a controversial scientific subject was recently published. How does one determine if the information in the book was valid and reliable?
- A. Research where the author went to school worked on any other research topics at a university or research organization and see if the author communicated with other scientists.
 - B. See if the media reviews of the book were favorable and check how many other books the author published.
 - C. Find out if the information in the book came from reputable sources and see if the author had published papers on other topics in international journals.
 - D. Find out if the author had other peer-reviewed research papers on the topic and compare the information in the book with several other relevant scientific sources.

16. Peter and Rosemary Grant of Princeton University have been studying thirteen species of finch living on the Galapagos Islands. The finches were thought to have evolved from a common ancestral finch population that arrived from South America. Which of the following statements best accounts for the thirteen species of finch from the common ancestral finch?

- A. After their initial arrival, the ancestral finches had an increased rate of mutations
 - B. Ancestral finches adapted to different environments during their life span.
 - C. Ancestral finches with variations suited to different environments survived & reproduce.
 - D. Ancestral finches reproduced with selected local birds suited to different environments.
17. What role does Earth's surface play in global warming?
- A. It reflects all of the sun's energy reaching the surface.
 - B. It absorbs the sun's energy and radiates infrared energy.
 - C. It absorbs the sun's energy and radiates ultraviolet energy.
 - D. It absorbs the sun's energy, keeping the temperature of Earth's crust constant.

18. Most of the dry mass of a plant is derived from:
 A. Minerals from soil B. Carbon from soil C. Oxygen from soil
 D. Oxygen from atmosphere E. Carbon from atmosphere
19. The relationship between gross primary production (GPP), net primary production (NPP), and respiration energy (R) is
 A. $NPP = GPP + R$ B. $NPP = GPP/R$
 C. $NPP = GPP - R$ D. $GPP = NPP - R$ E. None are correct
20. Which of the following would be an example of limiting abiotic factor(s)?
 A. Water availability B. Food availability C. Mate availability
 D. B and C E. A, B, and C.
21. Organisms that gain their energy and nutrients from eating plants are called
 A. Omnivores B. Primary consumers C. Producers
 D. Detritivores E. Autotrophs
22. Which of the following is **not true** of solar energy reaching the earth? Some solar energy is
 A. Reflected by atmosphere B. Captured by plants
 C. Absorbed by the ozone layer D. Recycled as high energy light
23. A pyramid of Energy shows.....
 A. Loss of energy at each trophic level B. Why food chains cannot be too long
 C. Available energy at each trophic level D. All of these choices
24. Which of the following does **not** qualify as a biogeochemical cycle?
 A. Water B. Carbon C. Nitrogen D. Energy E. Phosphorus
25. A significant cause of natural sulfur dioxide in the atmosphere is:
 A. Sulfur in animal tissue B. Volcanic eruptions C. Ocean sediment D. Animal waste
26. Which model illustrates the majority of real-world biotic interactions that occur in nature?
 A. A food web B. Energy pyramid C. A food chain
 D. Any biogeochemical cycle E. All of these
27. The increasing concentration of a toxic substance in the tissues of organisms at successively higher levels of the food chain is known as:
 A. Bioaccumulation B. Biocide C. Bio magnification
 D. Biomarkers E. Biological pest control
28. The concept of ecological footprint is measured in terms of the amount of
 A. resources an individual consumes daily.
 B. land and water area.
 C. resources an individual consumes over the course of a lifetime.
 D. resources an entire nation consumes yearly.
 E. resources an individual consumes yearly

29. According to the **law of conservation of matter**,
- I. matter can be created
 - II. matter cannot be destroyed
 - III. after a chemical reaction, the original atoms remain
- A. I only. B. II only. C. III only. D. I and II E. II and III.
30. In a food chain, the arrows are properly read as:
- A. Only ten percent is transferred Provides energy to....
 - B. This consumes that...
 - C. Provides energy to....
 - D. None of the above
31. Choose the correct sequence for energy flow within an ecosystem
- A. Herbivores → producers → carnivores → scavengers
 - B. Producers → herbivores → carnivores → scavengers
 - C. Producers → carnivores → herbivores → carnivores
 - D. Scavengers → producers → herbivores → carnivores
 - E. Carnivores → scavengers → producers → herbivores

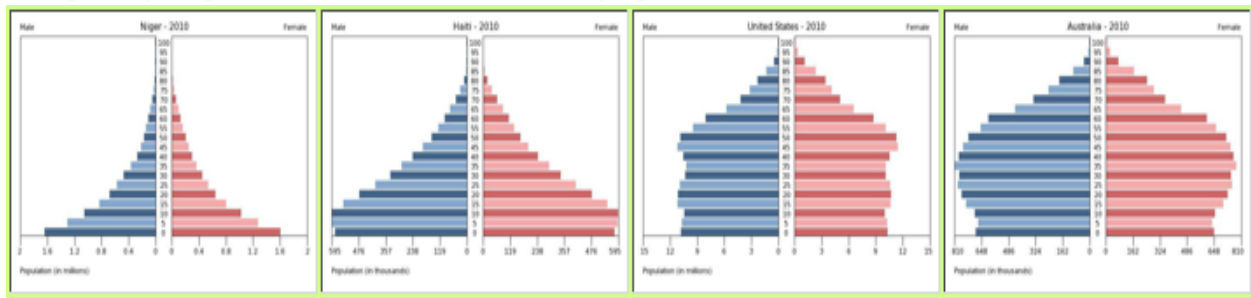


Food web source: <http://www.exploringnature.org/>

32. Using the photo above, which of the organism(s) would be considered a decomposer?
- A. Giraffe & vulture
 - B... Zebra & wildebeest
 - C. Lion & cheetah
 - D. Bacteria & termites
 - E. Acacia tree & Senegal Gum tree
33. What impact does deforestation have on the carbon cycle?
- A. Increase in amount of CO₂ in the atmosphere
 - B. Decrease in the amount of CO₂ in the atmosphere
 - C. Increase in the amount of photosynthesis
 - D. Increase in the amount of cellular respiration performed by autotrophs
 - E. Deforestation has no impact on the carbon cycle

34. When nutrients are transported through soil with water, this process is known as
 A. Infiltration B. Percolation C. Decomposition D. Leaching E. Nitrification
35. Which of the following is **not** a part of the carbon cycle?
 A. Transpiration B. Combustion C. Photosynthesis D. Extraction E. Respiration
36. The total fertility rate (TFR) is an estimate of the
 A. number of children that will survive to adulthood.
 B. number of years a typical infant will live.
 C. number of children each woman in a population will have.
 D. number of births per 1000 people per year.
 E. percentage of women in a population that are able to have children.
37. Developing countries tend to have a(n) ____ age structure diagram.
 A. rectangular-shaped B. inverted triangle C. pyramid-shaped D. square E. round
38. Populations whose age structure diagrams are narrower at the bottom than at the top have
 A. high death rates
 B. the same proportion of individuals in each age group
 C. a declining population
 D. a high growth rate
 E. all of the above
39. Using the rule of 70, a population growing at 10% would double in
 A. 7 years B. 10 years C. 15 years D. 17 years E. Not enough information

Interpreting Population Pyramids & the Demographic Transition Model



Pyramid A

Pyramid B

Pyramid C

Pyramid D

Using the population pyramids above, indicate what is most likely happening to the populations in each pyramid for questions #40 – 44 by selecting the letter below which best describes it:

- A. Stable or close to stable. B. Stable but going to decline in a few decades.
 C. Rapidly growing D. Growing

40. Pyramid A
 41. Pyramid B
 42. Pyramid C
 43. Pyramid D

60. Which statement is **false**?

- A. The existence, abundance, and distribution of a species in an ecosystem are determined by whether the levels of one or more physical or chemical factors fall within the range tolerated by a species.
- B. Organisms can adapt to slowly changing new conditions by acclimation.
- C. Too much or too little of any abiotic factor can limit or prevent growth of a population of a species in an ecosystem even if all other factors are at or near the optimum range of tolerance.
- D. There is no such thing as too much fertilizer.

61. All of the following are major causes of differences among freshwater aquatic ecosystems **except**

- A. Temperature
- B. Precipitation
- C. Salinity
- D. Depth of sunlight

For questions 62-65 select the letter of the best answer:

- A. Stabilizing selection
- B Directional Selection
- C Disruptive selection

62. You are an evolutionary biologist studying a population of bats in the rainforest of Brazil. Most of the population possesses moderate length wings, although some individuals have long wings and some individuals have short wings. Over the course of time, you notice that the frequency of moderate-length wings increases. You conclude that the most likely cause of this development is.....

63. As you study a population of a new flower In the Galapagos Islands, you notice that pink color is the most common color, although white flowers and red flowers are also present. Over the course of time and many generations, you notice that the proportion of flowers that are pink steadily increases. You conclude that this population is undergoing.....

64. You study fossils of giraffes. Although there appears to be considerable variability in lengths of necks, there appears to be a definite shift to longer necks over the course of time. You conclude that the species is undergoing....

65. When natural selection shifts allelic frequencies toward the extremes of a range of genetic expressions for a particular trait, an evolutionary biologist would say this is undergoing.....

66. The Thousand Islands region in upstate New York has many isolated islands. On one island, a fire burned most of the trees. The data table below indicates the percentages of tan beetles and dark-brown beetles present before and after the fire. The time is measured in days after the fire.

Changes in Beetle Population

Time in weeks	% of Tan beetles	% of Dark colored beetles
Before fire Time 0	88	12
8	80	20
16	70	30
24	65	35
48	60	40
60	56	44

The increase in the percentage of dark-brown beetles over time was most likely due to

- A. dark-brown beetles could not find food as well as the tan beetles
- B. dark-brown beetles were harder for predators to locate
- C. beetles turned dark brown to blend in with the darker, ash-covered ground
- D. exposure to ash from the fire changed the DNA of some of the tan beetles

Base your answers to questions 67 through 69 on the information below and on your knowledge. An experiment was carried out to answer the question “Does the pH of water affect the growth of radish plants?” Two groups of ten radish plants were set up. One group was watered with water having a pH of 3.0, and the other group was watered with water having a pH of 7.0. Both groups of plants received the same amount and intensity of light, the same amount of water, and they were grown in the same type of soil. The heights of the radish plants were measured every 2 days for a period of 2 weeks.

67. Which sentence is a possible hypothesis that was tested in this experiment?
- A. The intensity of the sunlight will affect the heights of the radish plants.
 - B. The amount of water will affect the heights of the radish plants.
 - C. The temperature of the water will affect the heights of the radish plants.
 - D. The pH of the water will affect the heights of the radish plants.
68. What was the dependent variable in this experiment?
- A. heights of the plants
 - B. temperature of the water
 - C. pH of the water
 - D. type of soil
69. Which activity might help to increase the validity of this experiment?
- A. repeating the experiment several times
 - B. using two different types of radish seeds in each group
 - C. using the same pH for both groups of plants
 - D. placing one set of plants in sunlight and one in darkness

An ecologist drives up a high mountain. The lowest level is at sea level. At sea level he sees deep-green vegetation, many birds, and many small animals. At the highest level elevation he sees bare rock, very little vegetation and very few birds.

70. Which sequence of biomes below did the ecologist most likely pass through while driving from the lowest elevation to the highest elevation of this mountain?

A	Grassland →	Tundra →	Taiga
B	Taiga →	Tundra →	Temperate deciduous forest
C	Tundra →	Temperate deciduous forest →	Taiga
D	Temperate deciduous forest →	Taiga →	Tundra

NEW JERSEY SCIENCE LEAGUE

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

January 15, 2015 (no corrections needed)

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

NJSL Environmental Science February 2015 Green test.

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 scan-tron.

1. Which of the following practices both reduces erosion and increases soil fertility?
 - A. strip cropping
 - B. terracing
 - C. contour farming
 - D. alley cropping
 - E. strip cropping and alley cropping

2. Retaining more water, reduced pore space, reduced oxygen flow and restricted root growth are the effects of
 - A. fertilization
 - B. drainage
 - C. soil compaction
 - D. drought

3. An acidic soil will have a pH _____ while an alkaline soil will have a pH _____.
 - A. above 7.0, below 7.0
 - B. below 7.0, above 7.0
 - C. above 1.2, below 13.5
 - D. none of the above

4. Textural classes of soil are:
 - A. sand, silt & clay
 - B. water, minerals, sand & air
 - C. organic matter, loam & subsoil strata
 - D. grass clippings, rhizomes and runners
 - E. humus, silt, clay and sand

5. Principle components of soil are:
 - A. colloids, water, oxygen & compost
 - B. air, water, minerals & organic matter
 - C. sand, rocks, organic matter & air
 - D. parent material, bedrock, topsoil & subsoil

6. The ability of soil to hold essential elements so plants can access them during plant growth is called:
 - A. nutrient level
 - B. pH
 - C. fertilization level
 - D. cation exchange capacity or CEC

7. Cation Exchange Capacity (CEC) and porosity can be increased, improving soil by adding:
 - A. fertilizer
 - B. sand
 - C. organic matter
 - D. gypsum

8. The letters NPK represent in order:
 - A. Nitrate, potash & potassium
 - B. Nitrogen, Potassium & Phosphate
 - C. Nitrogen, Phosphorus & Potassium
 - D. Nitrogen, Potassium, Calcium
 - E. None of the above

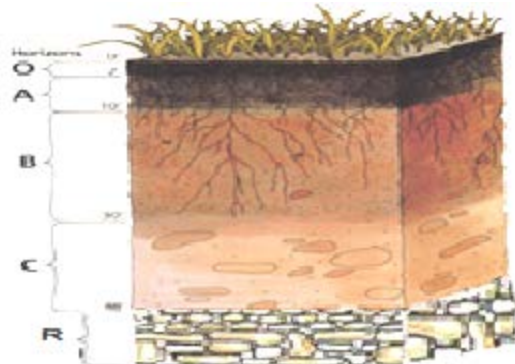
9. What is a soil horizon?
 - A. A factor influencing how soil is formed
 - B. A layer of soil
 - C. A measure of the organisms found in each layer of soil
 - D. Soil seen at the horizon and judged for color and fertility
 - E. None of the above

10. Organic matter called humus is important for healthy soil because:
 - A. It converts nitrogen into a usable form for plants
 - B. It is rich in nutrients which is important for soil fertility
 - C. It improves water penetration and infiltration into lower layers
 - D. It can break down organic pollutants

11. Microorganisms in soil are abundant. In fact, one teaspoon of soil contains an estimated:
- 4 billion microorganisms
 - 100-1,000 microorganisms
 - 500,000 microorganisms
 - 10,000 microorganisms
 - 1 million microorganisms
12. Soil erosion is defined as:
- A process by which soil is formed from parent rock
 - A process by which soil filters out silt
 - A harmful process which removes soil and transports it by wind and water
 - None of the above is accurate
 - A and C
13. What is the purpose of a fire in a forest that is maintained by intermittent fires?
- The large trees are fire proof
 - Fires leave the low-lying vegetation and burn the tree crowns
 - Some species release seeds only after exposure to intense heat
 - It takes up to a decade for new vegetation to grow
14. Which of the following types of species is least vulnerable to habitat fragmentation?
- Generalists
 - Specialists
 - Large predators
 - Migratory species
 - Endangered species

Use the letters below which correspond to the horizon layer indicated in the image to answer 15-19

Letter Choice:	The Horizon it refers to in the image to the right
A	A horizon
B	B horizon
C	C horizon
D	O horizon
E	R horizon



15. This layer contains parent material in sedimentary deposits, layer of large unbroken rocks.
16. Subsurface layer reflecting chemical or physical alteration of parent material
 This layer accumulates iron, clay, aluminum and organic compounds, a process referred to as illuviation. Not a question.
17. Organic deposit with litter layer of plant residues in relatively non-decomposed form
18. Organics mixed with mineral matter containing the most organic matter accumulation and soil microorganisms
19. This is the bedrock layer
20. "Limits to Growth" projected the following about the consequences of continuing our societies at current world population growth and industrial output rates
- Our societies will become static
 - Our societies are currently in sustainable dynamic equilibrium
 - Our societies will continue with minor changes
 - Our societies will demonstrate overshoot and collapse patterns in the next decade
 - Our societies will demonstrate overshoot and collapse patterns in the next century

21. Which of the following is *not* a goal of the 1994 UN Conference on Population and Development?
- Reduce and eliminate unsustainable patterns of production and consumption
 - Increase access to education, especially for boys
 - Improve the health care of infants, children, and pregnant mothers
 - Improve employment opportunities for young women
 - Provide universal access to family-planning services and reproductive health care
22. Of the following forms of birth control, the *second* most effective is
- Total abstinence
 - Condom (good brand)
 - Hormonal implant
 - Diaphragm plus spermicide
 - Rhythm method
23. The drop in human death rate overall & particularly in countries considered stage 2, 3 or 4 are due to
- Increased food productivity and better distribution
 - Improved personal hygiene and sanitation
 - Improved water supplies
 - Antibiotics and immunization
 - All of these answers

Use the information in the passage below to answer questions # 24 through 28

Urease is an enzyme used by plants to break down urea (a nitrogen-containing compound) into carbon dioxide and ammonia. Plants need nitrogen to grow and can obtain it from ammonia, but not from urea.

A new plant species called "Smithybean" was discovered. In these plants, there are 2 different kinds of urease, one produced in the seeds, the other produced in the leaves of the plant. Mutations in the chromosomes of the smithybean can stop production of either enzyme. In the following experiments, three types of smithybean plants were used: normal smithybean and 2 mutant strains, one lacking the seed urease (Strain 1) and 1 lacking the leaf urease (Strain 2).

Experiment 1 - Separate areas in a field were planted with normal, Strain 1, and Strain 2 smithybean. All types of smithybean appeared to grow, flower, and produce seeds equally well. There were no externally detectable differences among strains.

Experiment 2 - Small pieces of plant tissue of equal mass were obtained from each type of smithybean plant and separately placed on media in culture dishes. Tissue growing in this way will become an unorganized clump of cells referred to as *callus*. To provide a controlled nitrogen source, half the tissue samples of each type were placed on media containing urea, and the other half of the samples was placed on media containing ammonia. After 30 days, the weight gain (gain in mass) for each of the callus samples was determined. Results are shown below.

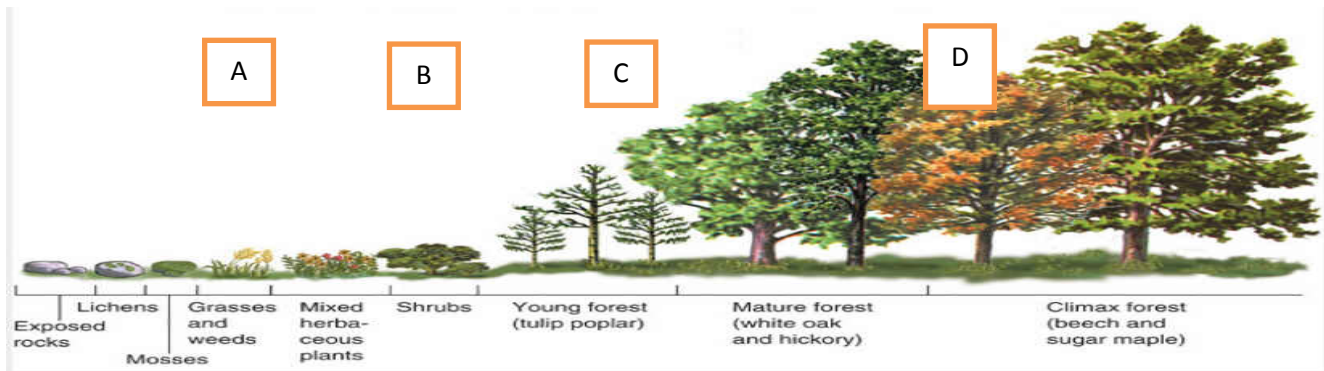
Plant type	Gain in mass (mg)	
	Urea	vs. Ammonia
Normal:	150	180
Strain 1:	155	160
Strain 2:	50	170

24. Which of the following best describes the role of urease in the plants grown in the field?
- Urease activity in leaves is essential for smithybean growth
 - Urease activity in seeds is essential for smithybean growth
 - The soil nutrients make the mutant smithybean grow like the normal strains
 - Urease is not essential to the growth of smithybean
25. Which of the nitrogen sources in Experiment 2 served as the control group?
- Ammonia, because all 3 strains of smithybean can use it
 - Ammonia, because it will inhibit the effects of urease
 - Urea, because it can be broken down by urease
 - Urea, because it cannot be used by Strain 2

26. Mutant strains are most useful in experiments like those in the passage because they:
- May produce unexpected results
 - Provide a natural, noninvasive way to vary a characteristic
 - Differ from normal strains in unknown, unpredictable ways
 - Can be modified to suit almost any type of research
27. In studying the metabolic needs of the smitheybean strains, Experiment 2 was probably more accurate than Experiment 1 because in Experiment 2 the:
- Nutrients in the media were more controlled
 - Nutrients in the soil could not be measured
 - Nutrients in the soil were more controlled
 - Callus was much different from the plants
28. Suppose a third strain were found that was unable to produce either form of urease. If this strain were subjected to the same procedures as those in the passage, what would be the expected results?
- Callus would grow on urea and on ammonia; the plant would grow in the field
 - Callus would not grow on urea but would grow on ammonia; the plant would not grow in the field
 - Callus would not grow on urea but would grow on ammonia; the plant would grow in the field
 - Callus would not grow on urea or on ammonia; the plant would not grow in the field
29. Which of the following would most accurately measure the density of a population being studied?
- Counting the number of prairie dog burrows per hectare
 - Counting the number of times a 1 kilometer transect is intersected by red squirrel tracks after snow
 - Counting the number of coyote droppings per hectare
 - Multiplying the number of moss plants counted in 10 quadrats of 1m² each by 100 to determine the density per kilometer²
 - Counting the number of zebras from airplane census observations
30. Which assumptions have to be made regarding the capture-recapture estimate of population size?
- Marked and unmarked individuals have the same probability of being trapped
 - The marked individuals have thoroughly mixed with the population after being marked
 - 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
- I only
 - II only
 - I and II only
 - II and III only
 - I, II, and III
31. Which of the following sets of measurements is the most useful when studying general populations ? (i.e. not only human populations)
- Density, dispersion, and demographics of a population
 - Gene frequency over time and the ratio of reproductive to non-reproductive individuals
 - Annual precipitation averages and mean annual temperatures of the habitat
 - Minimum and maximum amounts of precipitation and annual temperature extremes
 - Ratio of predators and the number of immigrants and emigrants
32. Which of the following scenarios would provide the most legitimate data on population density?
- Count the number of nests of a particular species of songbird and multiply this by a factor that extrapolates these data to actual animals
 - Count the number of pine trees in several randomly selected 10 m x 10 m plots and extrapolate this number to the fraction of the study area these plots represent
 - Use the mark-and-recapture method to estimate the size of the population
 - Calculate the difference in immigrants & emigrants to see if the population is growing or shrinking
 - Add the number of births & subtract the individuals that die to see if density is increasing or decreasing

33. Which of the following is the most important assumption for the capture-recapture method to estimate the size of wildlife populations?
- All females in the population have the same litter size
 - More individuals emigrate from, as opposed to immigrate into, a population
 - Over 50% of the marked individuals need to be trapped during the recapture phase
 - There is a 50 : 50 ratio of males to females in the population before and after trapping & recapture
 - Marked individuals have the same probability of being recaptured as unmarked individuals during the recapture phase
34. A population of ground squirrels has an annual per capita birth rate of 0.06 and an annual per capita death rate of 0.02. Calculate an estimate of the number of individuals added to (or lost from) a population of 1,000 individuals in one year.
- 120 individuals added
 - 40 individuals added
 - 20 individuals added
 - 400 individuals added
 - 20 individuals lost
35. Carrying capacity is:
- Seldom reached by marine producers and consumers because of the vast resources of the ocean
 - The maximum population size that a particular environment can support
 - Fixed for most species over most of their range most of the time
 - Determined by density and dispersion data
 - The term used to describe the stress a population undergoes due to limited resources
36. Which of the following causes populations to shift most quickly from an exponential to a logistic population growth?
- Increased birth rate
 - Removal of predators
 - Decreased death rate
 - Competition for resources
 - Favorable climatic conditions
37. Which of the following is characteristic of K-selected populations?
- Offspring with good chances of survival
 - Many offspring per reproductive episode
 - Small offspring
 - A high intrinsic rate of increase
 - Early parental reproduction
38. Which of the following could be a density-independent factor limiting human population growth?
- Social pressure for birth control
 - Earthquakes
 - Plagues
 - Famines
 - Pollution
39. Consider two forests: one is an undisturbed old-growth forest, while the other has recently been logged. In which forest are species likely to experience exponential growth, and why?
- Old growth, because stable conditions would favor exponential growth of all species in the forest
 - Old growth because each of the species is well established and can produce many offspring
 - Logged, the disturbed forest affords more resources for increased specific populations to grow
 - Logged, because the various populations are stimulated to a higher reproductive potential
 - Exponential growth is equally probable in old-growth and logged forests
40. Small NJ farms abandoned many years ago have become hardwood forests. This is an example of
- Local deforestation
 - Biotechnology of forests
 - Ecological succession
 - Habitat loss
41. Which statement best describes an ecosystem maintaining a state of approximate equilibrium?
- Nutrients from decayed organisms are recycled in a forest ecosystem
 - All the frog species in a South American rain forest become extinct
 - A mutation spreads through a species of bacterium, making them unable to decompose wastes
 - Mice are released into a field ecosystem as food for a declining predator population

42. In some parts of the world, forests are being cut down and burned to clear land for new homes and new farmland. A negative effect of these activities might be:
- An increase in global warming
 - Destruction of the ozone shield
 - A decrease in the average temperature of the atmosphere
 - An increase in biodiversity of the deforested areas
43. The northern section of NJ was covered by the Wisconsin glacier about 40,000 years ago. It left behind Glacial Lake Passaic which extended all the way south to Chatham, NJ. The Chatham area is no longer a lake, but a residential town and the location of what is currently known as Great Swamp. The changes from a lake 40,000 years ago to present are known as:
- Glacial changes
 - Hydro sere succession
 - Secondary succession
 - Terminal moraine development
 - None of the above
44. The diagram below represents different stages of an ecosystem over a period of time. Which stage of the ecosystem has the greatest long-term stability? Use the letter choices in the diagram for your answer.



45. Crop yields may be increased by which of the following:
- A new strain of rice that puts more of its carbohydrates into the grain
 - Drought-resistant corn
 - Corn that tolerates acidic soils
 - A, B and C are correct.
 - Only A and B are correct.
46. In sustainable agriculture, the practice of planting several different varieties of beans in fields is known as
- Polyculture
 - Agroforestry
 - Intercropping
 - Polyvarietal cultivation.
47. Continued high agricultural production by US farms depends most on which of the following natural resources?
- Coal
 - Limestone
 - Gypsum
 - Petroleum

For questions # 48 – 53 Read the study below then interpret the data and provides the best answer.

STUDY 1 Peony seeds were placed in dry containers. Some of the containers were stored at 5 °C for 4, 6, 8, or 10 weeks. The temperature and time periods were defined as storage temperature and storage period, respectively. The peony seeds were divided evenly so that there were 20 sets of 25 seeds. Twenty petri dishes were then prepared. Each contained damp paper. Each set of seeds was placed in a separate petri dish maintained at one of four temperatures for 30 days. The temperature and time periods were defined as germination temperature and germination period, respectively. Table 1 below shows the number of seeds that germinated in each dish.

TABLE 1

Storage Period in weeks	# of Seeds germinated at 13 °C	# of Seeds germinated at 18 °C	# of Seeds germinated at 23 °C	# of Seeds germinated at 28 °C
0	0	0	0	0
4	0	2	0	0
6	3	8	6	0
8	7	22	18	0
10	16	24	21	1

Tables adapted from Joel Beller, Experimenting with Plants. ©1985 by Joel Bell

Study 2 Peony seeds were placed in dry containers. The containers were stored at various temperatures for 10 weeks. The peony seeds were divided evenly so that there were 20 sets of 25 seeds. Twenty petri dishes were then prepared. Each contained damp paper. Each set of seeds was placed in a petri dish. The petri dishes were maintained at 1 of 4 temperatures for 30 days. Table 2 shows the number of seeds that germinated in each dish.

TABLE 2

Storage temperature	# of Seeds germinated at 13 °C	# of Seeds germinated at 18 °C	# of Seeds germinated at 23 °C	# of Seeds germinated at 28 °C
0	15	24	21	1
5	16	23	21	1
10	0	6	4	0
15	0	0	0	0
20	0	0	0	0

48. In general, the results of study 1 suggest that the peony seeds that are placed in a petri dish containing damp paper are most likely to germinate when they are maintained at which temperature?
 A. 13 °C B. 18 °C C. 23 °C D. 28 °C

49. Suppose another set of 25 peony seeds had been included in Study 2 and these seeds had a storage temperature of 25 degrees Celsius and a germination temperature of 18 degrees Celsius. Based upon the information provided, the number of seeds that would have germinated after being maintained for 30 days would most likely have been closest to
 A. 0 B. 8 C. 16 D. 24

50. In Study 2, at the storage temperature of 5 degrees Celsius, as germination temperature increased from 13 to 28 degrees Celsius, the number of seeds that germinated
 A. Decreased only
 B. Increased only
 C. Decreased then increased
 D. Increased, then decreased

51. Which of the following sets of seeds were exposed to the same conditions prior to being placed in the Petri dishes?
 A. The seeds from Study 1 that were stored for 8 weeks & the seeds from Study 2 that were stored at 5°C
 B. The seeds from Study 1 that were stored for 8 weeks & the seeds from Study 2 that were stored at 15°C
 C. The seeds from Study 1 that were stored for 10 weeks & the seeds from Study 2 that were stored at 5°C
 D. The seeds from Study 1 that were stored for 10 weeks & the seeds from Study 2 that were stored at 15°C

STUDY 3 - Peony seeds were placed in dry containers. The containers were stored at various temperatures for 10 weeks. The student then divided the seeds into 4 sets & maintained them as described in study 2. The results were as follows:

<u>Germination</u>	<u>Temperature (°C)</u>	<u>Number of seeds germinated</u>
	13	1
	18	6
	23	3
	28	0

52. These seeds most likely had a storage temperature of:
A. 0°C. B. 5°C. C. 10°C. D. 15°C.
53. The experimental designs of Study 1 and Study 2 differed in that in Study 3:
A. Storage temperature was held constant.
B. Storage time was held constant.
C. Germination temperature was varied.
D. Germination time was varied.
54. A localized group of organisms that belong to the same species is called a
A. Bio-system B. Community
C. Population D. Ecosystem
55. Global warming, as demonstrated by observations such as melting of glaciers, increasing CO₂ levels, and increasing average ambient temperatures, has already had many effects on living organisms. Which of the following might best offer a solution to this problem?
A. Continue to measure these and other parameters of the problem
B. Increase the abilities of animals to migrate to more suitable habitats
C. Do nothing; nature will attain its own balance
D. Limit the burning of fossil fuels and regulate our loss of forested areas
E. Recycle as much as possible
56. A controlled experiment is one in which
A. The experiment is repeated many times to ensure that the results are accurate
B. The experiment proceeds at a slow pace to guarantee that the scientist can carefully observe all reactions and process all experimental data
C. There are at least two groups, one of which does not receive the experimental treatment
D. There are at least two groups, one differing from the other by two or more variables
E. There is one group for which the scientist controls all variables
57. Why is it important that an experiment include a control group?
A. The control group is the group that the researcher is in control of, the group in which the researcher predetermines the results
B. The control group provides a reserve of experimental subjects
C. A control group is required for the development of an "If...then" statement
D. A control group assures that an experiment will be repeatable
E. Without a control group, there is no basis for knowing if a particular result is due to the variable tested
58. Which of the following are qualities of any good scientific hypothesis?
I. It is testable II. It is falsifiable
III. It produces quantitative data IV. It produces results that can be replicated.
A. I only B. II only C. III only
D. I and II E. III and IV
59. In presenting experimental data, a group of students show that most of their measurements fall on a straight diagonal line on their graph. However, two of their data points are "outliers" and fall far to one side of the expected relationship. What should they do?
A. Do not show these points but write a footnote that the graph represents the correct data
B. Average several trials and therefore rule out the improbable results
C. Show all results obtained and then try to explore the reason(s) for these outlier.
D. Throw out this set of data and try again
E. Change the details of the experiment until they can obtain the expected results

60. Which of the following is an example of qualitative data?
- The temperature decreased from 20 °C to 15 °C
 - The plant's height is 25 centimeters (cm)
 - The fish swam in a zigzag motion
 - The six pairs of robins hatched an average of three chicks
 - The contents of the stomach are mixed every 20 seconds
61. The progressive series of changes that eventually produce a climax community on what was once a bare rocky island is an example of:
- Primary succession
 - Speciation
 - Secondary succession
 - Evolution
 - Eutrophication
62. Some water, a small amount of soil, a few green aquatic plants and a fish were placed in a large bottle. The bottle was sealed to prevent the exchange of gases and other materials between its contents and the outside. The bottle was placed in a window to receive light during the daytime. Is carbon dioxide produced by the plants?
- Yes, but it is produced only at night when the plants can no longer carry on photosynthesis
 - Yes, it is produced all the time as a result of cellular respiration
 - No, it is a waste product of animals only
 - No, plants take in only the waste products exhaled by animals
 - No, plants only produce oxygen
63. During the growth of a tomato plant from a seed, it increases considerably in biomass. Which of the following materials, obtained from the environment, are necessary for the growth and increase in biomass?
- carbon dioxide and water
 - carbon dioxide, oxygen, and nitrogen
 - water, nitrate, and methane
 - water, carbon dioxide, and mineral salts
 - mineral salts, carbon dioxide, and oxygen

64. The sequence of energy flow through a food chain is
- primary consumers- producers- higher order consumers.
 - producers- higher order consumers- primary consumers.
 - higher order consumers- primary consumers- producers.
 - primary consumers- higher order consumers- producers.
 - producers- primary consumers- higher order consumers.

Read the following in order to answer questions 65-70.

Cavity-nesting birds must find trees that provide suitable sites for nest construction. These birds excavate nest depressions by removing wood from the tree, making a hollow cavity that provides a shelter for the nest. Once constructed, cavities serve as nest sites for many years. A study was done to provide information about the characteristics of trees used by four species of cavity-nesting birds. The data could prove useful to forest resource managers who are concerned about creating a balance between resource exploitation such as lumbering and the preservation of wildlife (e.g., cavity-nesting birds). Nest sites were sampled for yellow-bellied sap-suckers, hairy woodpeckers, downy woodpeckers, and black-capped chickadees. The characteristics of nest trees(NST) used by these four bird species are shown

in Table 1. In addition, trees were investigated that appeared to be suitable for nesting but were not currently being used for that purpose by any of the study birds. These "non-nest" trees(NNST) displayed at least two of the following qualities:

- Fungal conks (areas of fungal decomposition of wood)
- Branch or stem stubs
- Old wounds or scars
- Existing woodpecker holes
- Dead portions (trees living w/ dead portions visible)

Both nest trees for the 4 species and adjacent non-nest trees were measured for total tree height & trunk diameter at chest height. Nest trees(NST) only were also measured for nest height & trunk diameter at nest height (see Table 2).

TABLE 1	Number of nests			
	Yellow-bellied sapsucker	Hairy woodpecker	Downy woodpecker	Black-capped chickadee
Tree species;				
Quaking aspen	26	7	1	9
American beech	2	0	0	3
Paper birch	0	4	0	6
Yellow birch	0	0	0	4
Red maple	6	5	2	7
Sugar maple	2	1	2	3
Other	2	4	2	12
TOTAL	38	21	7	44
Attribute				
Living	33	11	5	3
Broken top	14	11	4	41
Branch stub	38	19	6	10
Hard outer wood	34	18	6	11
Fungal conk	32	14	6	24
Soundness				
(non-decayed wood)				
0-25	11	5	2	35
26-50	16	6	1	5
51-75	4	6	3	3
76-100	7	4	1	1
Bark cover				
0-25	0	0	0	3
26-50	0	1	0	9
51-75	4	0	0	9
76-100	34	20	7	23

Table 2	Yellow-bellied sapsucker		Hairy woodpecker		Downy woodpecker		Black-capped chickadee	
	(20 cm)*		(19 cm)*		(14 cm)*		(11 cm)*	
	NST	NNST	NST	NNST	NST	NNST	NST	NNST
Trunk diameter,	33.6	28.1	27.1	23.9	30.7	20.4	15.8	16.1
chest height (em)								
Trunk diameter,	22.8	-	22.4	-	17.1	-	13.2	-
nest height (cm)								
Total height (m)	19.4	14.1	17.5	14.1	19.7	10.0	3.8	8.5
Nest height (m)	8.6	-	8.3	-	9.3	-	2.5	-
a* = total, live body length	NST = nest tree			NNST = non-nest tree				

Tables adapted from D. E. Runde and D. E. Capen, "Characteristics of Northern Hardwood Trees Used by Cavity-nesting Birds." ©1987 by The Wildlife Society, Inc.

65. The data in Table I suggest that black-capped chickadees tend to avoid which kind of tree?
- A. Those with broken tops
 - B. Those with 25 or less sound wood
 - C. Those that are living
 - D. Birches
 - E. All of the above
66. Managed stands of timber usually have few older, dying, or dead trees. In such a forest, one would expect the number of cavity-nesting birds to be:
- A. High, because of the great number of live trees
 - B. High, because nest trees would have small trunk diameters
 - C. Low, because most of the trees would be sound
 - D. Low, because the average tree height would be over 10m.
 - E. None of the above
67. Which of the 4 bird species studied would most likely be found nesting in woodlots containing *only* paper-birch and yellow-birch trees?
- I. Yellow-bellied sapsucker
 - II. Hairy woodpecker
 - III. Downy woodpecker
 - IV. Black-capped chickadee
- A. I only B. III only C. I and III only D. II and IV only
68. Which of the following data from Table 2 would support the hypothesis that birds longer than 15 cm choose larger nest trees than birds less than 15 cm in length?
- I. Tree trunk diameter at nest height
 - II. Tree trunk diameter at chest height
 - III. Total tree height
- A. I only
 - B. II only
 - C. I and II only
 - D. I, II, and III
69. Which characteristic of non-nest trees(NNST) would researchers NOT be likely to identify?
- A. Total height B. Trunk diameter at nest height C. Species D. Soundness
70. Which statement below *best* describes why the researchers considered the characteristics of both nest and non-nest trees?
- A. Nest trees are used as an experimental control for non-nest trees.
 - B. Non-nest trees are used as an experimental control for nest trees.
 - C. Comparing both types of trees allows for a better definition of nest-tree criteria.
 - D. Non-nest trees are used as lookout

NEW JERSEY SCIENCE LEAGUE
Environmental Science Answer Key: Green test.
 February 12, 2015 **(Corrected)**

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

NJSL Environmental Science MARCH 2015 Green test.

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. The following are all surface mine extraction techniques except
 - a. open pit
 - b. contour strip mining
 - c. shaft
 - d. area strip mining
 - e. mountain top removal
2. Coal mining and burning coal produces
 - a. fly ash
 - b. bottom ash
 - c. flue-gas desulfurization sludge with heavy metals
 - d. a, b, and c.
 - e. none of the choices
3. All of the following are negative effects of acid mine drainage except:
 - a. a change in the pH of the water
 - b. subsidence
 - c. increased turbidity which decreases algal biomass
 - d. direct poisoning of aquatic life
 - e. increased turbidity which effects successful mating of some fish populations
4. As global mining reserves become depleted, lower grades of ore are mined resulting in:
 - a. negative environmental impact
 - b. more processing is required to purify lower grades
 - c. more pollution occurs due to more processing
 - d. all of the above
 - e. None of the above –mining is the same regardless of the grade of ore.
5. Discarded waste and rocks left over from the process of separating the valuable portion from the uneconomic portion (gangue) of ore is called:
 - a. overburden
 - b. tailings
 - c. erratics
 - d. fracking
 - e. None of the above
6. Which law established a program for regulating surface coal mining and reclamation activities?
 - a. General Mining Law
 - b. Surface Mining Control and Reclamation Act
 - c. Mineral Leasing Act
 - d. Resource Conservation & Recovery Act
 - e. none of the above

For questions #7-11, match the following letters with the **best** answer representing the cause:

- a. Erosion
 - b. Loss of habitat
 - c. Carbon output
 - d. Explosions
 - e. Acid rain and/or methyl mercury
7. Removal of mountain tops : Letter _____
 8. Surface mining operations result in this, unless the land is reclaimed. Letter _____
 9. This is caused by the machinery used in mining operations. Letter _____
 10. Caused when coal is burned & enters the atmosphere coming in contact with H₂O & aquatic waterways. Letter _____
 11. Unsafe procedures within a mineshaft. Letter _____

For questions #12-15, refer to the various methods used to catch fish:

- a. Drift-net
 - b. Long-line
 - c. Aquaculture
 - d. Bottom trawling
12. Dragged through the water indiscriminately to catch everything in its path Letter_____
13. Baited hooks attached to fishing lines dropped off the side of a boat, reeled back in and onto the deck Letter___
14. Marine organisms raised in a bay or a confined area Letter_____
15. A weighted net dragged on the sea floor Letter_____
16. The area where fresh and salt water mix is called
- a. creek
 - b. river or stream
 - c. estuary or bay
 - d. seawall
 - e. none of the above
17. Of the freshwater on Earth that is not trapped in snow pack or glaciers, most of it (95%) is trapped in
- a. lakes and streams
 - b. rivers
 - c. dams
 - d. aquifers
 - e. estuaries, marshes, and bogs
18. Which of the following ocean currents flows without obstruction or barriers around Earth?
- a. Antarctic Circumpolar Current
 - b. Gulf Stream
 - c. California Current
 - d. Rip Current
 - e. Baltic Sea Current
19. The primary use of freshwater is
- a. industry
 - b. domestic use
 - c. fishing
 - d. agriculture
 - e. landscaping
20. The largest use of industrial water is for
- a. cooling electrical power plants
 - b. manufacturing automobiles
 - c. mining
 - d. aquaculture
 - e. food and beverage industry
21. Which method of irrigation **conserves** the most water
- a. flooding fields
 - b. sprinklers
 - c. misters
 - d. irrigation channels
 - e. drip irrigation

22. Repeated use of irrigation can cause what problem

- a. waterlogging
- b. desertification
- c. leaching of minerals
- d. salt water intrusion
- e. salinization

23. What consequence of overusing groundwater would affect areas that are distant from the point of use?

- a. groundwater contamination
- b. saltwater intrusion
- c. subsidence
- d. depletion or reduction of stream flow
- e. aquifer replenishment

24. Renewable sources of energy that use water as a main source to spin turbines include all of these **except**:

- a. tidal power
- b. hydroelectric power
- c. geothermal power
- d. biomass power

25. Which best describes the differences between a primary and secondary pollutant?

- a. primary pollutants rise up the smoke stack before secondary pollutants are formed
- b. secondary pollutants are formed from primary pollutants interacting in the atmosphere
- c. primary pollutants are formed from secondary pollutants interacting in water
- d. secondary pollutants are formed by cars, while primary pollutants are made by burning wood.
- e. secondary pollutants are formed by burning coal, primary pollutants are made by burning gas and oil.

26. Photochemical smog does not require the presence of

- a. ultraviolet radiation
- b. ozone
- c. (PANs) peroxyacyl nitrates
- d. volatile organic compounds
- e. nitrogen oxides

27. Acid precipitation leaches out the metal _____, which may cause fish and other aquatic organisms to die from acid shock

- a. Al aluminum
- b. Pb lead
- c. Hg mercury
- d. Cd cadmium
- e. Fe iron

28. Which statement accurately describes a temperature inversion?

- a. a mixing of all layers of air
- b. a stable layer of warmer air over cooler air
- c. an unstable layer of warmer air over cooler air
- d. a layer of cooler air over warmer air
- e. an ozone layer concentrated in the stratosphere

29. What indoor air pollutant would most likely be found in particle board, wallpaper glue, furniture or carpeting?
- MBTE
 - ozone
 - radon
 - nitrous oxide
 - formaldehyde
30. Dust from a construction site, mine or farm is an example of which type of air pollution?
- primary
 - secondary
 - tertiary
 - natural
 - fugitive
31. Remediation and reduction strategies for air pollution include all of the following **except**
- Clean Air Act
 - Montreal Protocol
 - Kyoto Protocol
 - Noise Control Act
 - Air Pollution Control Act

Source: www.climatestrategies.us **Table 1 Percent Change in Emissions as compared to 2013**

	1980 vs 2013	1990 vs 2013	2000 vs 2013
Carbon Monoxide (CO)	-67	-59	-42
Lead (Pb)	-99	-80	-50
Nitrogen Oxides (NO _x)	-52	-48	-41
Volatile Organic Compounds (VOC)	-53	-39	-18
Direct PM ₁₀	-50	-20	-17
Direct PM _{2.5}	---	-24	-32
Sulfur Dioxide (SO ₂)	-81	-78	-69

Notes:

- Trend data not available
- Direct PM10 emissions for 1980 are based on data since 1985
- Negative numbers indicate reductions in emissions as compared to 2013
- Percent change in emissions based on thousand tons units

Emissions of air pollutants continue to play an important role in a number of air quality issues. In 2013, about 94 million tons of pollution were emitted into the US atmosphere. These emissions mostly contribute to the formation of ozone and particles, the deposition of acids, and visibility impairment. The table above shows changes in national estimates of emissions for common air pollutants or, where appropriate, precursor pollutants that form them.

For Questions 32-34 refer to the following answers and select the lettered choice that best fits each statement.

- Carbon monoxide CO
- Lead Pb
- Nitrogen dioxide NO₂
- Sulfur dioxide SO₂
- Direct Particulate Matter 10

32. Which pollutant had the largest percentage reduction between 1980 and 1990 as compared to 2013?
33. Which pollutant had the largest percentage reduction between 1990 and 2000?
34. Which pollutant had the largest percentage reduction between 2000 and 2013?
35. Which pollutants experienced approximately ~50% + or – reduction in emissions by weight (in thousand ton units) between 1980 and 2013?
- none of them
 - only carbon monoxide & Lead
 - only nitrogen dioxide & Sulfur dioxide
 - only direct PM₁₀, VOC's and nitrogen dioxides
 - all that were measured had a 50% or better reduction.

Table 2 National Emissions Estimates (fires & dust excluded) For Common Pollutants & their Precursors

Table 2	Millions of Tons Per Year						
	1980	1985	1990	1995	2000	2005	2013
Carbon Monoxide (CO)	178	170	144	120	102	81	59
Lead	0.074	0.023	0.005	0.004	0.002	0.001	0.001
Nitrogen Oxides (NO _x)	27	26	25	25	22	20	13
Volatile Organic Compounds (VOC)	30	27	23	22	17	16	14
Particulate Matter (PM)							
PM ₁₀	6	4	3	3	3	4	3
PM _{2.5}	NA	NA	2	2	3	3	2
Sulfur Dioxide (SO ₂)	26	23	23	19	16	14	5
Totals	267	250	218	189	160	135	94

Notes:

- For CO, NO_x, SO₂, and VOC emissions, fires are excluded because they are highly variable; for direct PM emissions, both fires and dust are excluded.
- PM estimates do not include condensable PM.
- The estimates for 2008 and beyond are based on the final version 3 of the 2008 NEI.
- PM_{2.5} emissions are not included when calculating the emissions totals because they are included in the PM₁₀ emissions number.
- EPA did not estimate PM_{2.5} emissions prior to 1990.
- The 1999 estimate for lead was used to represent 2000; the 2002 estimate for lead was used to represent 2005; and the 2008 estimate for lead was used to represent 2013.

36. Based upon the data table above, a rough estimate of the reduction in **total emissions** from 1980 to 2013 is about
- about one tenth of the 1980 levels
 - about a quarter of the 1980 levels
 - about half of the 1980 levels
 - about one third of 1980 levels
 - none of the above
37. What may be responsible for the reduction in carbon monoxide, nitrogen dioxides and lead?
- change in gasoline
 - catalytic converters
 - air pollution regulations
 - none of the choices of a, b, or c.
 - All of the choices of a, b, and c.

38. Which of the following occurs as a result of acid rain?
- global warming
 - ozone depletion
 - aluminum poisoning of plants
 - an increase in stream pH
39. Which technique of air pollution remediation turns an air pollution problem into a solid waste problem?
- fluidized bed combustion
 - catalytic converter
 - staged burner
 - electrostatic precipitators
 - at least two of the above

For questions # 40-44 refer to the following answers. Select the lettered word choice that best fits each statement.

- Nitrogen dioxide NO₂.
- Sulfur dioxide SO₂.
- Ozone O₃.
- Radon Rn
- Volatile organic compounds

40. Major indoor pollutant with non-anthropogenic source

41. Not a criteria pollutant

42. Major source is from coal-fired power plants

43. Irritant formed as a result of photochemical oxidation

44. Pollutant can be found outdoors at gas stations, indoors at nail salons or in a closed up building.

For questions# 45-48 refer to the following answers. Select the lettered word choice that best fits each statement.

- Neurotoxin
- Allergen
- Mutagen
- Teratogen
- Corrosive

45. Ozone is an example

46. Carcinogens are a subset of this category

47. Causes birth defects

48. Minimata disease is caused by this type of toxicity

49. The accumulation of DDT in peregrine falcons, brown pelicans and other predatory birds during the 1960's is an example of:

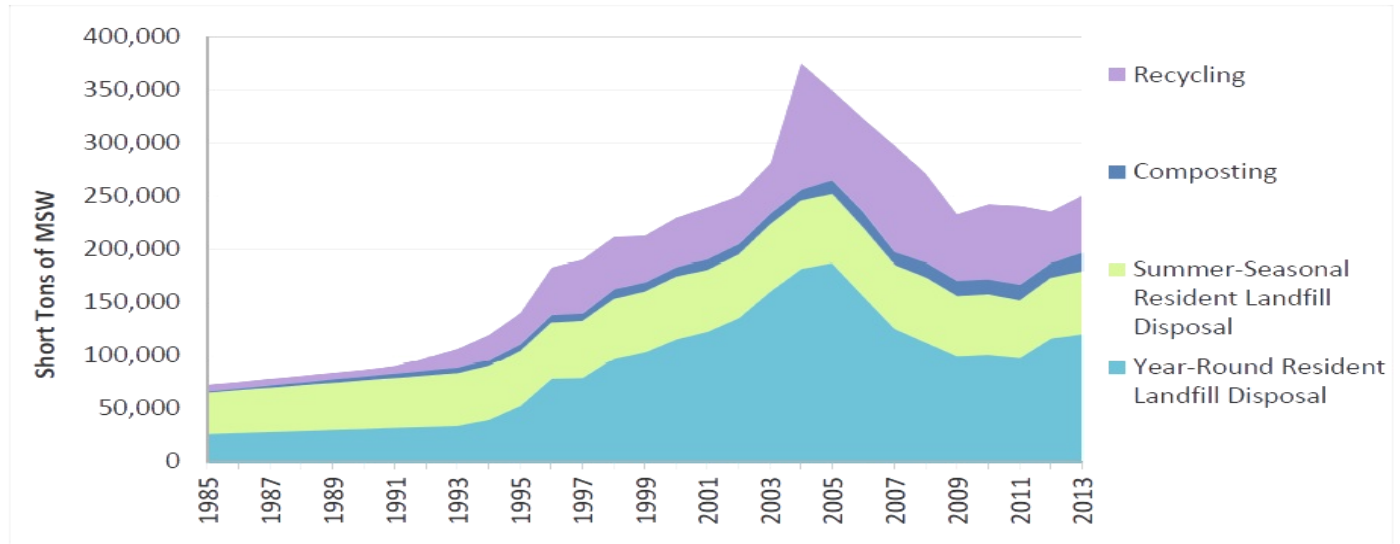
- bioaccumulation
- biomagnification
- acute exposure
- bioremediation
- pathogenic organisms

50. A dose that is represented by LD₅₀

- shows a response in 50% of the population
- is a dose that kills 50% of the study group
- is a dose with an acceptable risk level of 50%
- is a dose with a threshold response of 50%
- is a dose that is administered to 50% of the population

51. A federal tax on cigarettes is an example of:
- full-cost pricing
 - an internal cost
 - an external cost
 - a marginal cost
 - a life cycle cost

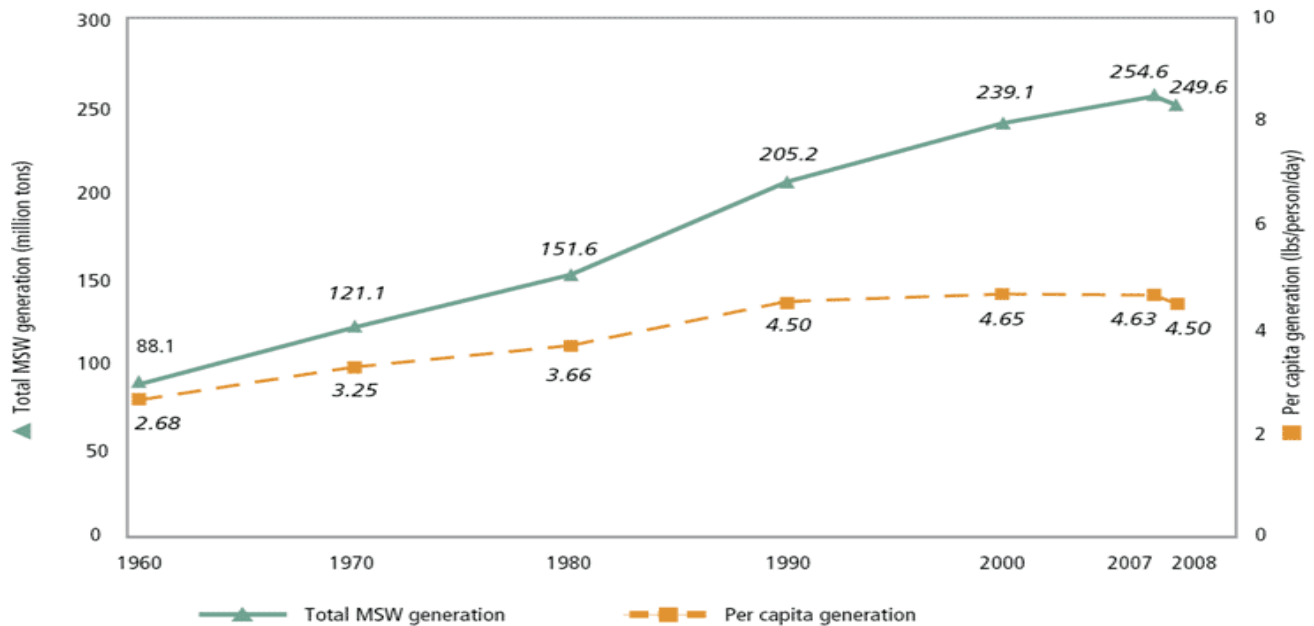
Figure 2 SOLID WASTE MANAGEMENT PROFILE FOR CAPE MAY COUNTY NJ



Source: Center for Climate Strategies <http://www.climatestrategies.us/> - SJTPO GHG Inventory Report

52. The graph above of municipal solid waste shows a peak around 2004- 2005 for all categories. Close to the end of 2005 a decline began in all categories. What factor (s) may account for this decline?
- economic crash or downturn in the economy.
 - increased price of aluminum
 - increased demand for recycled aluminum
 - none of the above
53. The disposal **trend** between Summer-Seasonal Residents and Year-Round Residents
- differs greatly because owners take a greater interest in their property
 - differs greatly because summer seasonal residents take care of the rental property
 - differs very little

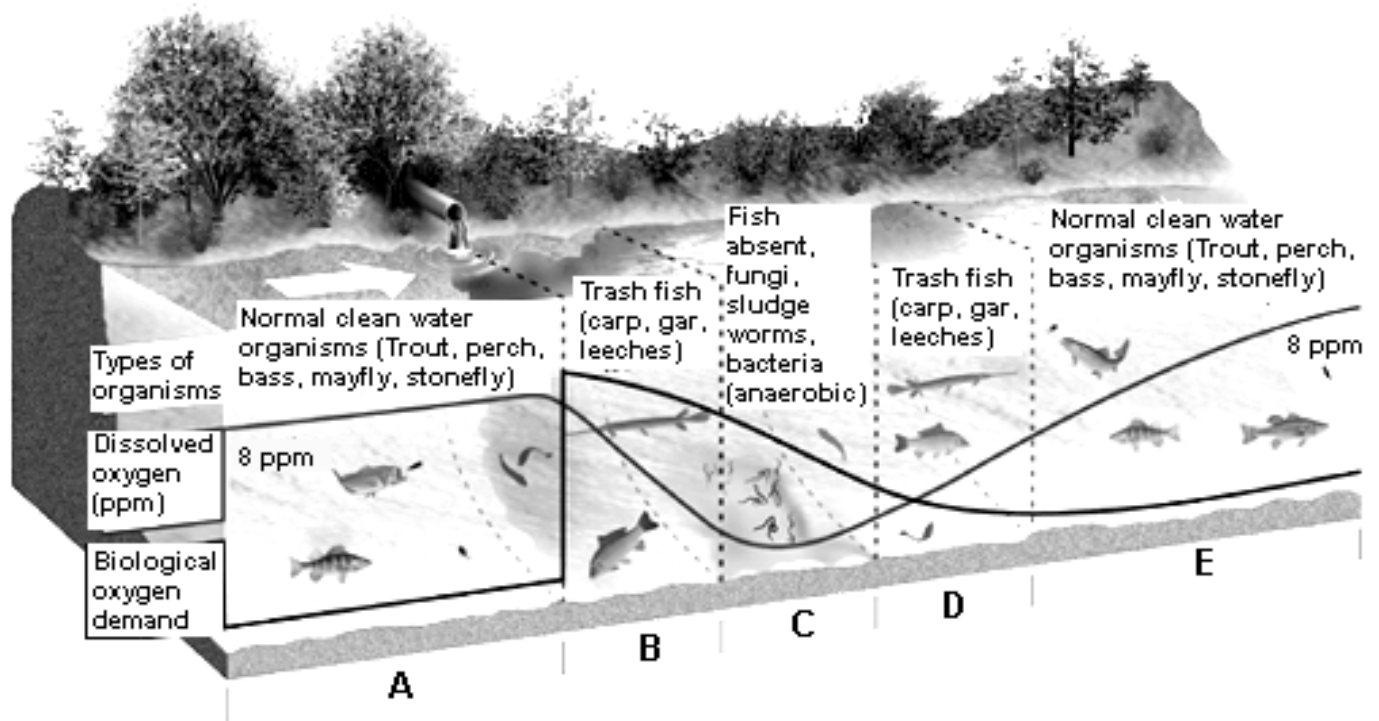
U.S. MSW Generation Rates, 1960 to 2008



Source www.avefficiency.com

54. According to the graph above, municipal solid waste (MSW) per capita generated in lbs. per person per day has changed from 1960 to 2007. How much is the change is:
- almost 4 times as much waste is produced in lbs. per person per day
 - almost 1.7 times as much waste is produced in lbs. per person per day
 - almost 1.7 times less waste is produced in lbs. per person per day
 - 55 times more MSW than lbs per person.
55. When analyzing the total amount of MSW generated in millions of tons from 1960 to 2007, the change that is indicated on the graph above is
- close to 4 times as much waste is produced in lbs. per person per day
 - close to 2 times as much waste is produced in lbs. per person per day
 - close to 3 times as much waste is produced in lbs. per person per day
 - Has been almost constant.
56. When analyzing the trends in the graph above what might be responsible for the decrease in amounts from 2007 to 2008?
- the downturn in the economy
 - changes in laws which support reduced trash - such as source reduction.
 - the environmental education & environmental awareness of average citizens
 - increased cost for trash pick-up and use of composting
 - all of the above
57. What is the most helpful and effective step a consumer can take to make sure that more materials are recycled?
- encourage others such as family, friends & neighbors to recycle
 - write letters to government representatives
 - actively seek out and purchase products made from recycled materials
 - volunteer at a local recycling center
 - wash out materials to be recycled.

58. Which of the following elements does not need to be added to make a healthy compost pile?
- carbon
 - phosphorous
 - nitrogen
 - water
 - oxygen
59. Which of the following represents the largest drawback to burning solid waste at incineration plants?
- less material to recycle
 - dioxins are produced in the combustion process
 - finding a place to store the ash
 - water pollution
 - land to build incineration plants on
60. The underground section between the surface of the earth in a water table is called the
- recharge zone
 - confined aquifer
 - transform boundary
 - divergent boundary
 - zone of aeration
61. Which of the following represents the nutrient-rich portion of a lake that is closest to the bottom?
- limnion
 - hypolimnion
 - mesolimnion
 - littoral zone
62. Some of the oil pollution of the oceans has always occurred naturally through natural leaks in the ocean floor. However, this source accounts for only about 9% of the oil that reaches the ocean. Which of the following is the primary source of oil pollution in the oceans?
- inland sources such as leaks from motor vehicles
 - boat or oil tanker spills
 - oil spills at drill sites like the BP Oil Spill
 - harbor pollution
63. What is the difference between point and nonpoint pollution?
- the toxicity
 - the type of waterway it enters
 - the source of the pollutant
 - the chemicals



For questions # 64- 68 The picture above is about the dilution and decay of degradable wastes. Notice the pipe which allows waste to flow into the water. Refer to the image above and select the zone with the lettered choice that best fits each statement. Each letter can be used once or more.

64. Organisms with high oxygen requirements will most likely be eliminated at which letter? _____
65. The breakdown of degradable wastes by bacteria **starts** to deplete the dissolved oxygen at letter _____
66. The water has recovered from oxygen-demanding wastes and heat. Letter _____
67. The zone where fish return before the return of clean water with oxygen of 8ppm. Letter _____
68. Zone where oxidation of waste takes place in the absence of oxygen. Letter _____
69. Thermal pollution is most often caused by _____ and changes the river by _____
- power plants ; decreasing dissolved oxygen
 - recreational boats; decreasing dissolved oxygen
 - power plants ; increasing dissolved oxygen
 - recreational boats ; increasing dissolved oxygen
 - sewage treatment ; increasing dissolved phosphate
70. Environmental consequences of raising beef in feedlots include;
- nutrient pollution of groundwater in nearby waterways about double
 - increased bacterial resistance to antibiotics
 - increased levels of hormones in our food supply
 - higher cholesterol in those who consume beef that is higher in fat content
 - all of the above.

NEW JERSEY SCIENCE LEAGUE Green test.

Environmental Science Answer Key:

March 12, 2015 (Corrected)

Record onto the area record the # correct

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

NJSL Environmental Science APRIL 2015 Green test.

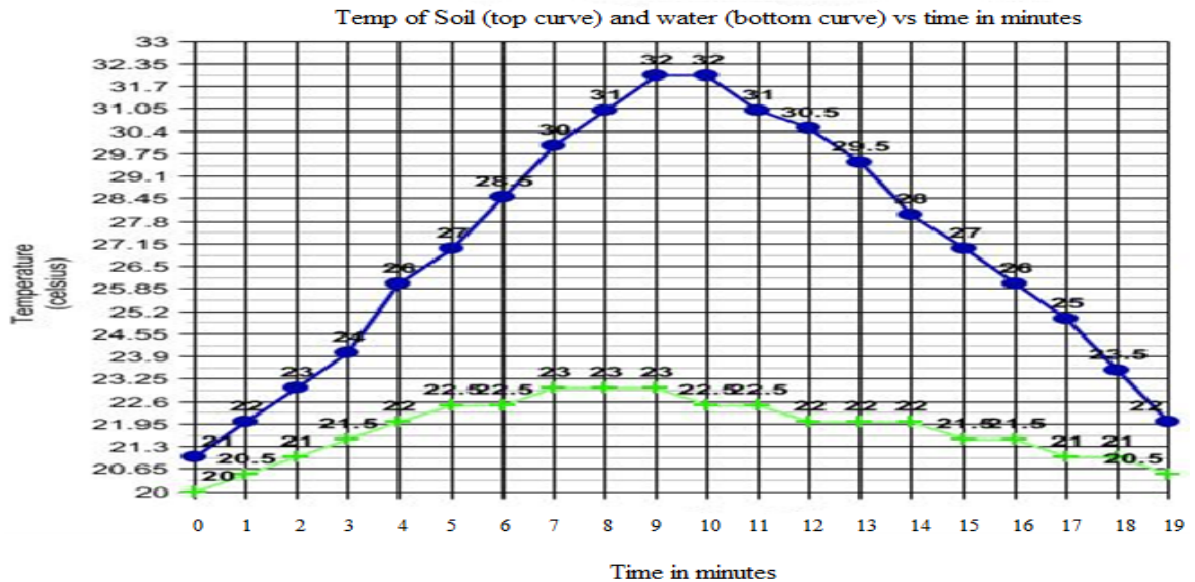
Choose the answer that best completes the statements or questions below and fill in the appropriate response on the form. If you change an answer be sure to completely erase your first choice. Please PRINT your name, school, area, and which test you are taking onto the scantron.

For Questions 1-4 refer to the following answers and select the lettered choice that best fits each statement.

- A. Active Solar
 - B. Passive Solar
 - C. Photovoltaic cells
 - D. Geothermal energy from heat pumps
 - E. Wind generators
1. The form of heat that does not originate from the sun _____
 2. Solar heating that requires a pump _____
 3. Produces electricity using no moving parts _____
 4. Heats and cools a home by virtue of design and orientation _____
 5. In the United States, the largest component of municipal solid waste is
 - A. Paper
 - B. Plastic
 - C. Glass
 - D. metals
 - E. wood
 6. The ozone layer exists primarily in what atmospheric layer?
 - A. Troposphere
 - B. Stratosphere
 - C. Mesosphere
 - D. Ionosphere
 - E. Thermosphere
 7. All of the following are involved in the thinning of the ozone layer **except**:
 - A. Polar stratospheric clouds
 - B. Nitrogen
 - C. Chlorine
 - D. Ozone
 - E. Bromine
 8. Depletion of ozone has all of the following consequences **except**
 - A. Increased skin cancers
 - B. Increased cataracts
 - C. Increase in immune system disorders
 - D. Increased crop yields

You read that the average temperature of the ocean has warmed and it is implicated in climate change. You set up an experiment to investigate the different rates at which soil (representing land) and water (representing the global oceans) heat and cool. You use the following equipment: thermometers (measuring in °C), identical containers for soil & water, radiation lamp and a timer. You obtain the temperature of the soil and water over a period of time and collect the following data. The top line on the graph represents the change in temperature of the land, while the bottom line represents the change in temperature of the water. Use the graph next page for questions # 9 through 16.

9. Based on the experimental results, what is true about the heating & cooling rates of soil & water?
 - A. Water heats faster, but cools slower
 - B. Water heats and cools faster
 - C. Soil heats faster, but cools slower
 - D. Soil heats and cools faster
10. During the heating-up period, which surface was raised to a higher temperature?
 - A. Soil
 - B. Water
 - C. They were raised in temperature by equal amounts
 - D. You cannot tell based on the data given



11. If you repeated this experiment but you let the water and soil heat for 20 minutes and cool for 20 minutes instead of the 10 minutes used in this experiment how would you expect the graph of temperature versus time to change?
- Only the soil temperature curve would change, the water temperature curve would remain the same
 - Both the soil and water temperature curves would change shape but maintain the same maximum temperature values
 - Only time for the experiment would change. The soil temperature and water temperature curves would remain the same
 - Both the soil and the water temperature curves would change so that they would have the same basic shape but higher maximum temperature values
12. Based on this experiment, compare the heating & cooling of air masses above the ocean & land.
- The air above the ocean and land heats and cools at the same rate
 - The air above the ocean heats and cools faster
 - The air above the land heats faster but the air above the ocean cools faster
 - The air above land heats and cools faster
13. Predict the relative air temperature over ocean and land during the day and night.
- During the day: air above the land is warmer, above the ocean is cooler. At night: air above the land is cooler, above the ocean is warmer
 - During the day: air above the land is cooler, above the ocean is warmer. At night: air above the land is warmer, above the ocean is cooler
 - During the day: air above the land is cooler, above the ocean is warmer. At night: air above the land is cooler, above the ocean is warmer
 - During the day: air above the land is warmer, above the ocean is cooler. At night: air above the land is warmer, above the ocean is cooler
14. A sea breeze is a breeze blowing from the ocean onto the land. When would a sea breeze occur?
- A sea breeze occur during the night
 - A sea breeze occur during the day
 - A sea breeze occur during the night and the day
 - A sea breeze never occur

15. Your experiment can be applied to global warming in which of the following ways:
- A. It demonstrates and supports the stability of temperature in the ocean versus the land- therefore a rise in ocean temperature maybe significant even if just one or two degrees.
 - B. As permafrost melts, soil is exposed and warms releasing methane gas
 - C. As water warms it will be less dense and impact the thermohaline circulation which drives ocean currents and therefore climate change.
 - D. All of the above can apply
 - E. None of the above apply

16. What is the difference in temperature between soil and water during the 12th minute? (Based upon the graph above)

- A. 4 degrees Celsius
- B. 7.5 degrees Celsius
- C. 8 degrees Celsius
- D. 8.5 degrees Celsius

For questions 17-21 refer to the following answers. Select the one that best fits each statement.

- A. El Niño/Southern oscillation
- B. Global Warming
- C. Ozone depletion
- D. Milankovitch cycle
- E. Leapfrog Effect

17. Results in pollutants moving up to the polar region _____
18. Results in periodic weather disturbances in North America _____
19. Chronic change due to greater absorption of long-wavelength infrared light that is re-radiated from the Earth's surface. _____
20. Caused by human pollution, this results in greater incidence of skin cancer in areas such as New Zealand _____
21. The "wobble" in the Earth's orbit that may affect long-term climate fluctuations. _____
22. All of the following are greenhouses gases except
- A. Carbon dioxide
 - B. Methane
 - C. Nitrous oxides
 - D. Ozone
 - E. Sulfur dioxide

For questions 23-27 refer to the following gases found in the atmosphere. Select the one that best fits each statement.

- A. Carbon dioxide
 - B. Methane
 - C. Nitrous oxides
 - D. Ozone
 - E. Water vapor
23. Of the gases listed which one is present in the greatest quantity in the atmosphere.? _____
24. Largely due to human activity, this gas gained the most popular press coverage. _____
25. This gas affects the amount of UV radiation reaching Earth's surface. _____
26. Nitrogen gas in the atmosphere produces this gas in internal combustion engines. _____
27. This gas may increase as permafrost melts, releasing it from arctic tundra. _____
28. Which of the following represents the greatest contribution of methane emission to the atmosphere?
- | | |
|--|---------------------|
| A. Flatulence or fermentation from animals | C. Landfills |
| B. Coal mining | D. Rice cultivation |
| | E. Burning biomass |

29. Thermal pollution in a river is most often caused by _____ and changes the river by _____
- A. Power plants ; decreasing dissolved oxygen
 - B. Recreational boats; decreasing dissolved oxygen
 - C. Power plants ; increasing dissolved oxygen
 - D. Recreational boats ; increasing dissolved oxygen
 - E. Sewage treatment ; increasing dissolved phosphate
30. Which one of the following is **NOT** an indicator of a high stream or river dissolved oxygen (DO)?
- A. Stonefly larvae
 - B. Mosquito larvae
 - C. Caddisfly larvae
 - D. Mayfly larvae
 - E. Trout
31. What is the correct sequence in which coal is made from organic material?
- A. Peat anthracite lignite bituminous
 - B. Peat lignite bituminous anthracite
 - C. Peat bituminous anthracite lignite
 - D. Peat anthracite bituminous lignite
 - E. Anthracite lignite bituminous peat
32. Which of the following energy saving techniques can be accomplished anywhere regardless of sun exposure?
- A. Geothermal heating and cooling
 - B. Electrical production from photovoltaic cells
 - C. Passive solar heating through building design
 - D. South facing windows
 - E. Batch heating of water
33. Which layer of the atmosphere contains the most amount of water vapor?
- A. Troposphere
 - B. Mesosphere
 - C. Stratosphere
 - D. Ionosphere
 - E. Biosphere
34. Ozone depleting gases are particularly damaging because
- A. They are toxic yet unstable
 - B. So many different molecules deplete ozone
 - C. They act as catalysts: a few do a lot of damage
 - D. None of the above
35. Which of the following is the greatest threat to wildlife preserves?
- A. Hunters
 - B. Poachers
 - C. Global warming
 - D. Invasive species
 - E. Tourists

36. Which type of species is a critical link in an ecosystem, upon which the survival of many other species depends?

- A. Indicator species
- B. Symbiotic species
- C. Threatened species
- D. Invasive species
- E. Keystone species

For Questions 37-39 refer to the following answers and select the lettered choice that best fits each statement.

- A. Succession
- B. Convergent evolution
- C. Ecotone
- D. Divergent evolution
- E. Complexity

37. The boundary between two distinct ecosystems. _____

38. In this process, a similar environment will cause one species to develop traits similar to another species within the same environment. _____

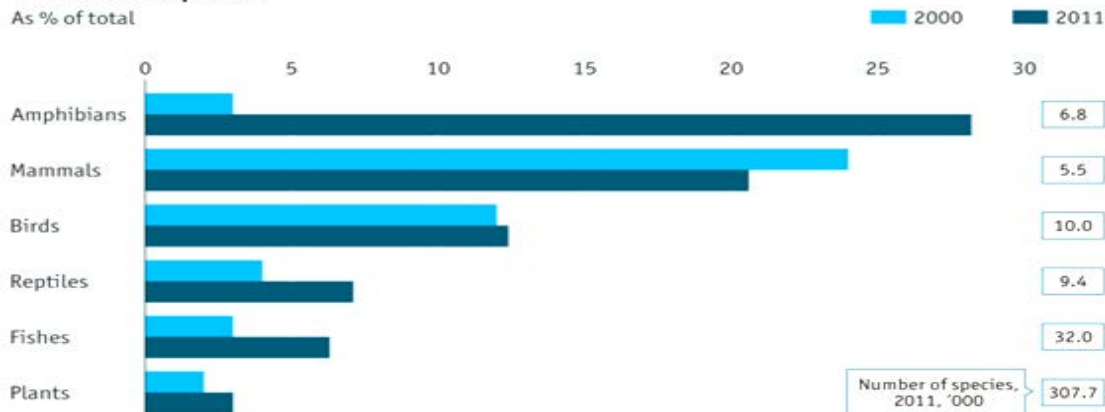
39. Change in the composition of a biological community with one dominant population yielding to another until a climax community is established. _____

40. The treaty that controls international trade in endangered species is known as

- A. Endangered Species Act
- B. CITIES
- C. International Treaty on Endangered Species
- D. Lacey Act
- E. Federal Preserve System

Threatened species

As % of total



Source: International Union for Conservation of Nature

The graph above shows the change of threatened species from 2000 to 2011. Use the graph with questions 41 through 44. For questions # 41-44 refer to the following answers. Select the lettered word choice that best fits each statement.

- A. Plants
- B. Fishes
- C. Mammals
- D. Birds
- E. Amphibians

41. Which species showed the greatest increase in threatened species?

42. Which species actually showed a reduction in threatened species?

43. Which species showed the least change in threatened species between 2000 and 2011?

44. Which species approximately doubled in threatened species?

For questions # 45- 49 refer to the following answers. Select the lettered word choice that best fits each statement

- A. Kyoto Protocol
- B. Montreal Protocol
- C. CITIES Treaty
- D. Migratory Bird Treaty
- E. Minamata Convention on Mercury

45. Designed to protect health and environment from anthropogenic emissions of mercury compounds. Letter _____

46. Makes it unlawful to hunt, take, capture, kill or sell migratory birds (signed in 1881 between USA & Great Britain) _____

47. Multilateral treaty to protect endangered species _____

48. First time countries united in establishing a successful global solution to an environmental problem _____

49. International agreement calling for unilateral decrease by all nations in the production of greenhouse gases _____

For questions # 50- 54 refer to the following answers. Select the lettered word choice that best fits each statement

- A. Bhopal
- B. Love Canal
- C. DDT/ Silent Spring
- D. Chernobyl
- E. Exxon Valdez

50. Environmental crisis involving a toxic reactive gas that killed thousands during the night _____

51. Gallons of oil in an Alaskan sound, resulted in double hulled ships _____

52. Outlined problems of biomagnification on non-target organisms _____

53. Toxic waste dumpsite upon which housing was developed –shed light on land fill issues _____

54. Nuclear reactor accident _____

For questions 55-58 refer to the following answers. Select the one lettered choice that best fits each statement.

- A. Convection
- B. Conduction
- C. Radiation
- D. All of the above
- E. None of the above

55. The mechanism(s) by which energy is transferred _____

56. Carried by photons _____

57. Occurs as a result of two particles colliding _____

58. Heated material moving from one place to another. _____

59. The California Water Project and the Mono Lake water diversion program is most like the Aral Sea incident in Asia because

- A. Wetlands were formed from the diverted water
- B. Channels dug allowed for better ship navigation
- C. Both involve large hydroelectric projects
- D. Both involve conserving water for the future generations
- E. Diverted water left a more highly saline lake

60. Hydroelectric power is an alternative energy source that is often harnessed by building a dam. What environmental impact can a dam have on the area downstream from the dam?

- A. Land is flooded destroying homes and crops
- B. Large amounts of water are lost due to evaporation
- C. Flooding is reduced
- D. Sediments build up
- E. None of the above

61. What is the most feasible solution to storing high-level radioactive waste?

- A. Sending it into space
- B. Leaving it where it is produced
- C. Burying it deep underground
- D. Putting it in sealed tight canisters

62. Although a feasible energy source for appropriate areas, this energy source has the potential for both visual and noise pollution

- A. Tidal Power
- B. Geothermal Power
- C. Hydroelectric power
- D. Ocean – wave power
- E. Wind power

Sedimentary rocks (which form from sediment) are thought to be deposited in cycles that occur in discrete packages called sequences. Each sequence constitutes a complete cycle. The cause for the cyclicity has been linked to sea level change, uplift of continents, climate change, and changes in earth's orbit. These packages are thought to have a duration ranging from 50,000 to 200 million years.

One theory states that the sequences that occur on a scale of every 200,000 to 10 million years are usually caused by changes in the global ice volume. As temperatures increase and glaciers melt, sea level rises and new marine sediment—which is typically coarser-grained than underlying sediments—is deposited along shorelines. As global temperatures decrease and glaciers build up, sea level falls and shoreline environments are eroded.

In order to test this theory, two studies were undertaken which enable us better to understand the relations between glaciations (periods of maximum cooling and glacier build-up) and marine sedimentary sequences.

Study 1 - A 400 m long core of sedimentary rock from an ancient shoreline in the United States was analyzed. The core represents marine sediments deposited over the last 20 million years. The researchers observed patterns of erosion and change in sediment size and determined that unique sequences occurred every 50,000, 100,000, 5 million, and 12 million years.

Study 2 - At several sites beneath the Atlantic Ocean, a 50 m core was removed from 500,000-year-old ocean-floor marine sediments. These sediments contained abundant microfossils that can be used to determine the nature of past climates. The researchers studied the abundance and taxonomy of these microfossils and deduced patterns of warming and cooling of global temperatures. They found that periods of maximum cooling (peak glaciation) occurred 75,000, 175,000, 375,000, and 475,000 years ago.

63. The characteristics common to the studies is that both:

- A. Measured periods of maximum glaciations
- B. Utilized ancient and modern sedimentary rocks
- C. Analyzed data from marine sediments
- D. Measured the depth of the cycles

64. The two studies support the theory that marine depositional processes are:
- A. Controlled by microfossils and local climate changes
 - B. Unpredictable in nature
 - C. Most likely controlled by the cycling of glacial building and melting
 - D. Related to sequences of marine sediments
65. Which of the following characteristics of a sequence of marine sediments or sedimentary rocks would make it unsuitable for a study such as this?
- I. an age of only 30,000 to 40,000 years II. depth of ocean water III. location away from the polar ice caps
- A. I only
 - B. II and III only
 - C. I, II, and III
 - D. I and III only
66. Each of the following is true EXCEPT:
- A. Sediment size was a central factor in the results of both studies
 - B. Both studies are compatible with the claim that major climate changes occur at intervals of 50,000 years or more
 - C. Both studies provide support for the claim that cyclic climate changes caused changes in sediment patterns
 - D. Both studies concerned ancient marine sedimentary rocks
67. According to the theory discussed in the passage, as glacial melting increases, the sediments along coastlines and microfossils within oceans should respectively show:
- A. More deposition and cooler global temperatures
 - B. More erosion and cooler global temperatures
 - C. More deposition and warmer global temperatures
 - D. More erosion and warmer global temperatures
68. Which of the following hypotheses was investigated in Study 1?
- A. Changes in sea level cause sequences of sediments
 - B. Cycles occur every 50,000, 100,000, 5 million and 12 million years
 - C. The sea level is currently rising
 - D. Cyclicity in sediment deposition is the result of changes in global ice volume
69. The agency responsible for identification and listing of endangered species is the
- A. Forest Service
 - B. Department of Agriculture
 - C. National Park Service
 - D. Endangered Species Department of Interior
 - E. Fish and Wildlife Service
70. Which of the following nuclear reactions does **NOT** take place inside a nuclear reactor?
- A. Fission
 - B. Fusion
 - C. Beta decay
 - D. Alpha decay
 - E. Neutron capture

NEW JERSEY SCIENCE LEAGUE **Green test.**

Environmental Science Answer Key:

April 9, 2015

Record onto the area record the # correct

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