# Environmental Science Green Exam
January 11, 2018 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 graphs best shows the relationship between luminosity and mass in main sequence stars? (Note the axes for each graph is logarithmic in scale.) All full credit, not germane to Enviro Science
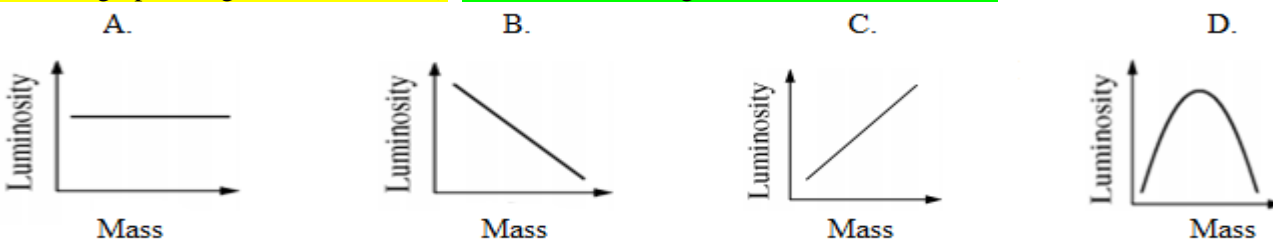
Use the following experiment to answer questions #2 and 3.
An experiment is set up to determine if rye grows better when it is planted by itself or together with clover. The setup involves three pans of each treatment. Set-ups A, B, and C contain rye alone. Set-ups D, E, and F contain clover and rye planted together, in rows alternating one seed of each type. One hundred seeds are planted in each pan. All treatments contain the same type of soil, are planted in the same size of pan, are exposed to the same amount of sunlight, and are maintained at the same temperature throughout the course of the experiment.

2. Constants in this experiment are A not E
    A. Temperature, number of seeds in each pan, and sunlight.
    B. Number of seeds in each pan, sunlight, and one pan of rye and clover.
    C. The pans of rye alternated with clover.
    D. The same as the independent variable.
    E. The pan of rye, temperature, and soil type.

3. The dependent variable in this experiment could be the
    A. Number of leaves on the clover.
    B. Height of the rye.
    C. Height of the clover.
    D. Presence of nodules on the roots of the clover.
    E. Number of clover seeds that germinate.

4. A hypothesis is different from a belief because it is
         A. Testable   B. Proven   C. The same as a theory   D. Sensible   E. False

5. Accuracy is
        A. How close a measured value is to repeated measurements of the same sample.
        B. A measurement.
        C. An estimation.
        D. Only measured in the metric system.
        E. How close a measured value is to the actual value.

6. Why can a hypothesis never be 'proven' true in science?
        A. Science is limited by the use of human senses.
        B. One can never collect enough data to be 100% positive.
   C. Experimental error is involved in every research project.
        D. Science evolves; hypotheses and therefore theories are always changing.
        E. There may always be alternative untested hypotheses that might account for the results with different or new technologies.

7. The process by which several researchers review another researcher's manuscript prior to publication to ensure research quality is referred to as _____.

      A. Investigative inquiry   D. Peer review
      B. Quality control   E. Scientific community
      C. Critical analysis

8. The below graph represents the solar insolation (the amount of solar energy over a given surface area of Earth) at various latitudes on Earth as well as at different times during the year. Each line represents a different latitude. Which line represents the equator?
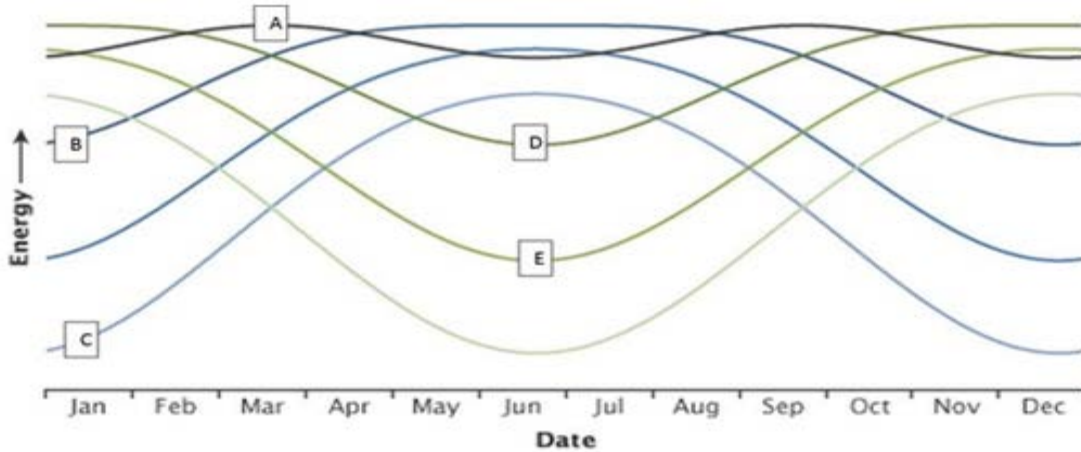
      A. Line A   B. Line B   C. Line C   D. Line D   E. Line E

9. In a controlled experiment, _____.
      A. The experimental organisms have all been used before and given good results
      B. The researcher controls for the effects of all variables except one
      C. The researcher knows the outcome before she or he begins
      D. The researcher has several hypotheses, one of which will be proven correct
      E. You need only a single experimental organism; replicates are not needed

10. Qualitative data _____.
      A. Cannot be replicated
      B. Cannot be used to support or disprove hypotheses
      C. Have variables that may not have been properly manipulated
      D. Is data that are expressed as numbers and tested using statistics
      E. Can be acquired in the detailed examination of personal interviews or observations

11. What letter on the timeline best represents the time when scientists estimate Big Bang occurred?
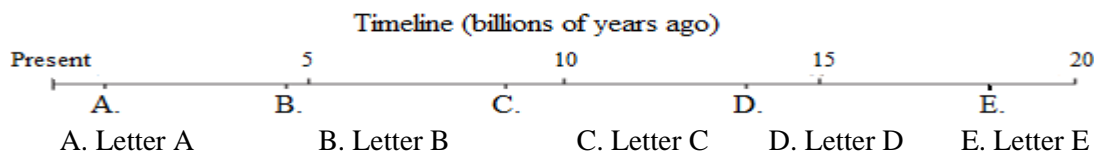
      A. Letter A   B. Letter B   C. Letter C   D. Letter D   E. Letter E

12. The source of energy from the Sun is
      A. Nuclear fission   C. Chemical reactions
      B. Gravitational contraction   D. Nuclear fusion

13. It is believed that the atmosphere of the primitive Earth was composed largely of carbon dioxide, nitrogen, and water vapor. The composition of certain iron-containing minerals suggests that the carbon dioxide began to be replaced by oxygen about 2.6 billion years ago. Which of the following is the best explanation for the change in atmospheric composition?

      A. Cyanobacteria evolved and relied on the process of photosynthesis, and not chemosynthesis, which now released oxygen.
      B. Ozone produced in the upper atmosphere by ultraviolet light break down to release atmospheric oxygen.
      C. Minerals such as iron oxide spontaneously released oxygen into the atmosphere.
      D. Water was split into atmospheric oxygen and hydrogen by lightning discharges.
      E. Oxygen was released in volcanic gases and slowly accumulated over time.

14. Coal forests were formed during which of these geological time periods?
      A. Devonian   B. Cambrian   C. Paleozoic   D. Ordovician   E. Carboniferous

15. The theory astronomers have developed to describe the formation of the universe is called
      A. The Big Bang Theory
      B. Galactic Expansion Evidence Theory
      C. The Red-Shift Theory
      D. The Black Hole Hypothesis
      E. The Expanding Cloud Theory

16. Each of the following is evidence which supports the Big Bang Theory except: all full credit not germane to enviro science.
      A. Red-shift
      B. The formation (age) of light elements and heavy elements,
      C. Cosmic Background Radiation
      D. A and B only
      E. A, B, and C all support the Big Bang Theory

17. Which of the following would be expected to result from a collision between a continental lithospheric plate and an oceanic lithospheric plate?
      A. A deep oceanic trench   C. A mid-oceanic ridge
      B. A chain of coastal volcanic mountains   D. A transform fault

18. The process by which the ocean floor sinks through a deep-ocean trench and back into the mantle is
      A. Convection   D. Conduction
      B. Continental Drift   E. Trench drift
      C. Subduction

19. The transformation of ice to gaseous water vapor is called
      A. Condensation   D. Melting
      B. Stage transfer   E. Sublimation
      C. Evaporation

20. The following image represents a prevailing wind flow that causes different climates on windward and leeward sides of a mountain range. Compared to the temperature & moisture of the air that rose up the steep windward side of the mountain, the temperature & moisture of the air that has descended to the base of the mountain at the same altitude on the leeward side will be:
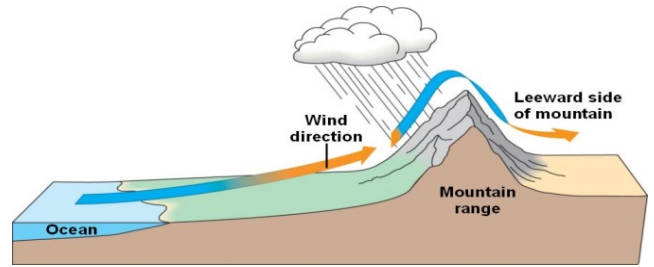
A. warmer and drier
B. warmer and more moist
C. cooler and drier
D. cooler and less moist

21. Day-to-day conditions in Earth's atmosphere, such as "sunny and humid," describe
    A. Climate   B. Climatograph   C. Weather   D. Biome

22. From Earth to space the main layers in our atmosphere are:
    A. Troposphere, Stratosphere, Mesosphere, Thermosphere
    B. Stratosphere, Troposphere, Mesosphere, Thermosphere
    C. Mesosphere, Troposphere, Stratosphere, Thermosphere
    D. Thermosphere, Troposphere, Stratosphere, Mesosphere

23. The Sun's rays are least direct
    A. Near the poles   C. At high altitudes
    B. Near the equator   D. Far from the ocean

24. The two ways in which humans have most interfered with the carbon cycle are
    A. Removal of forest and anaerobic respiration
    B. Aerobic respiration and burning fossil fuels
    C. Respiration and photosynthesis
    D. Burning fossils fuels, removal of forests and brush
    E. Combustion and causing volcanic eruptions

25. About what percentage of the Earth's surface is covered with water?
    A. 25%   D. 75%
    B. 33%   E. 90%
    C. 50%

26. The cycle most responsible for linking the other biogeochemical cycles is the
    A. Carbon cycle   D. Hydrologic cycle
    B. Nitrogen cycle   E. Sulfur cycle
    C. Phosphorus cycle

27. The most common abundant gas in the atmosphere is
    A. Nitrogen   D. Hydrogen
    B. Carbon dioxide   E. Water vapor
    C. Oxygen

28. The phosphorus cycle is an example of a (an)
    A. Hydrologic cycle   C. Carbohydrate cycle
    B. Sedimentary cycle   D. Atmospheric cycle

29. During which of the following processes within the hydrologic cycle do water molecules absorb energy?
      A. Formation of ice from water
      B. Formation of a cloud from water vapor
      C. Runoff from the land surface
      D. Evaporation from the ocean surface

30. The hydrologic cycle is driven primarily by
      A. Solar energy and gravity
      B. Solar energy from the moon
      C. Solar energy and mechanical energy
      D. Mechanical and chemical energy
      E. Chemical energy and gravity

31. Humans are most likely to alter the Earth's thermostat through their impact on
      A. Carbon dioxide and water vapor
      B. Nitrogen gas and water vapor
      C. Phosphate and potassium
      D. Hydrogen sulfide gas
      E. Sodium hydroxide

32. Carbon is a major component of
      A. The atmosphere   D. Organic compounds
      B. The oceans   E. Lakes and streams
      C. Sedimentary rocks

33. Which of the following best helps to explain why some localities have normally great tidal ranges (up to 60 feet) and others have one-to-two-foot tidal ranges?
   A. The relative positions of the Moon and Sun are different at different localities.
      B. The Coriolis Effect & rotation of Earth tend to enhance tidal flow in higher altitudes.
      C. Ocean topography & shape of the coastline amplify tidal flow at specific localities.
      D. Trade winds push the water into larger tidal bulges near rocky shorelines.

Use the following graph of the atmospheric layers to answer the question # 34.
34. The graph below shows the approximate variation of density with altitude. What factors will play a significant role in determining the actual density of air at a given altitude?

      I   Pressure
      II Temperature
      III Humidity

      A. II only
      B. I & II
      C. II & III
      D. I, II, and III
      E. None are correct

Air Density with Altitude
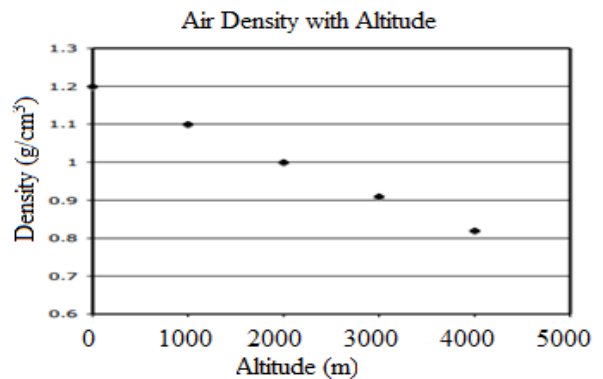
35. In the illustration below of the Earth's orbit about the Sun, which of the following is most likely true of the Earth at location X?

    A. The spring equinox occurs.
    B. The fall equinox occurs.
    C. The winter solstice occurs in the northern hemisphere.
    D. The summer solstice occurs in the northern hemisphere
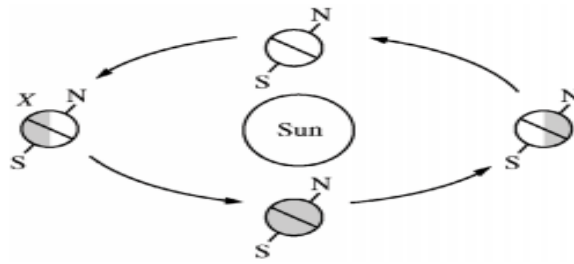
Use the following to answer data study to answer questions # 36-39. Dr. Uwanna B. Here collected the following data come from an aquatic ecosystem on a sub-tropical island off the coast of Florida called Near Paradise Island. Dr. Here calculated that the sun delivers 1,734,167 kcal/m^2 /year to this ecosystem. Data about the GPP and NPP of the communities there are as follows:

organisms	gross productivity (kcal/m^2/year)	net productivity (kcal/m^2/year)
aquatic plants	20,810	7,631
herbivores: snails, shrimp, insects, small fish, turtles	3,368	1103
carnivorous invertebrates and fish	383	111
large fish	21	5

36. Which of the following account(s) for the differences between gross and net productivity?

    I. experimental error
    II. metabolism
    III. photosynthesis

    IV. respiration
    V. unconsumed organisms

    A. only one of the above
    B. only two of the above
    C. only three of the above

    D. only four of the above
    E. all of the above

37. Global warming may cause an increase in cloud cover. If the amount of sunlight reaching this ecosystem were decreased by 10%, which of the following is *most likely* to occur?
    A. Water's high specific heat would compensate for the energy change.
    B. Primary productivity would slightly decrease without affecting the other trophic levels.
    C. A 10% decrease in productivity would occur in all trophic levels.
    D. A decrease in decomposition would compensate for the decrease in sunlight.
    E. The top carnivores would become endangered.

38. Why aren't there any quaternary consumers in this ecosystem?
    A. The large fish are too strong to be preyed upon by other animals.
    B. There is too little energy to support another population.
    C. Hunting and habitat destruction have caused those consumers to become extinct.
    D. Fish are better adapted to be herbivores than to be carnivores.
    E. Inadequate field sampling techniques caused inaccurate population counts.

39. Which of the following ecosystem components is missing from this aquatic ecosystem diagram?
    A. Decomposers   B. Humans   C. Predators   D. Land plants

40. If a similar study was performed in a mid-latitude deciduous forest the D and E are correct.
    A. Pattern of measurements & number of trophic levels would be very similar to this sub-tropical system.
    B. Forest would have more trophic levels & a more complex food web than the sub-tropical system.
    C. In the forest, at least 20% of the energy of each trophic level would be passed to the next level.
    D. The forest would have lower primary productivity and fewer trophic levels.
    E. The forest would have greater loss to respiration at each trophic level than the sub-tropical system.

41. Radiant Sun energy is stored by plants and released when plant material undergoes a
    A. Phase change   B. Nuclear change   C. Chemical change   D. Formation reaction

42. Some chemoautotrophic bacteria that live near deep-sea vents obtain their energy by converting
    A. Carbon dioxide and hydrogen to methane   D. Nitrogen to ammonia
    B. Hydrogen sulfide to elemental sulfur   E. Iron oxides to iron
    C. Alcohols to aldehydes

43. Most biomass pyramids show a rapid decrease in biomass as trophic levels increases. In aquatic systems, this pattern may be reversed so that it can be observed that the consumers are larger than the autotrophs. What explains this pattern?
    A. Biomass in aquatic systems cannot be measured accurately.
    B. Zooplankton reproduce quickly, but have poor survival success.
    C. Phytoplankton are rapidly consumed, but have a high turnover rate.
    D. Aquatic producers tend to have larger body sizes than terrestrial producers.
    E. Water is an easier medium to live in and aquatic organisms require less food

44. Which of the following is the correct sequence in the change in plant species from lower to higher elevations along the western slope of the Sierra Nevada?
    A. Hardy dwarf → deciduous → coniferous → grass
    B. Deciduous → grass → coniferous → hardy dwarf
    C. Grass → deciduous → coniferous → hardy dwarf
    D. Deciduous → coniferous → grass → hardy dwarf
    E. Hardy dwarf → grass → deciduous → coniferous

45. Which of the following best describes concern for coastal environments with regard to earthquakes?
    A. Coastal uplift, subsidence and tsunami damage
    B. Sea grass habitat displacement and eutrophication
    C. Coastal resilience and riparian rights
    D. Rain shadow effect and eutrophication
    E. None of these are correct.

Northern pike are fish that were introduced into the south-central area of Alaska in the 1950's 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.)

46. Scientists reason a decrease in salmon population in south-central Alaska is caused by pike's all full credit. Should say decrease/increase in salmon mortality
    A. Emigration, causing a decrease in pike mortality
    B. Emigration, causing an increase in pike mortality
    C. Immigration, causing a decrease in pike mortality
    D. Immigration, causing an increase in pike mortality

47. Which ecosystem most likely possesses the highest primary productivity per acre?
     A. Alpine meadow.
     B. Temperate, coniferous rainforest.
     C. Beech/maple hardwood climax forest.
     D. Mesotrophic, tropical, freshwater lake.
     E. Subtropical, estuarine mangrove swamp.

48. Reasons that the population of an exotic species often grows more rapidly when it is introduced to a new environment include
     I. The exotic species is resistant to pesticides
     II. There is a large, underutilized food source in the new environment
     III. The exotic species has few natural predators in the new environment

     A. I only   B. II and III   C. II only   D. I, II, and III   E I and III

49. Ecosystem services include all of the following except
     A. Reduced impact of weather extremes
     B. Production of antibiotics and drugs
     C. Decomposition of wastes
     D. Purification of air and water
     E. Pollination of crops

50. Invasive plants and animals in areas like Hawaii have
     A. Caused native species to die out.
     B. Increased the native bird species.
     C. Improved soil fertility.
     D. Increased crop yields.
     E. All of the above apply

51. If all centipedes disappeared from the simple food chain, which species would then benefit most is:

     A. Snakes
     B. Owls
     C. Mice
     D. Lizards
     E. Crickets

A Simple Food Chain
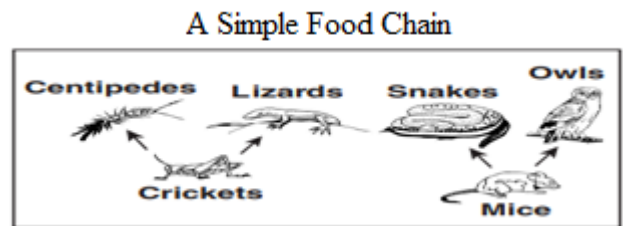
52. Keystone species are unique because they are thought to have profound effects on the composition and structure of ecological communities because they All full credit : question is flawed. Key has D
     A. Tend to reduce diversity by eliminating food resources for other species.
     B. Are more abundant than other species in the community.
     C. Have unusually narrow niche requirements.
     D. Have profound effects on the composition and structure of ecological communities
     E. Can prevent superior competitors from driving inferior competitors to local extinction.

53. The entire set of optimal conditions under which a species can live and replace itself
     A. is the fundamental niche
     B. is reduced by competition and predation
     C. is a subset of the realized niche
     D. A & B
     E. B & C

54. Why is it that no more that 5 to 6 trophic levels can occur in a community?
- A. There would not be enough physical space for more than 5-6 trophic levels
- B. Energy transfer through trophic levels is inefficient
- C. Energy cycles are two slow to allow more than 5-6 trophic levels to occur in the same community at the same time
- D. Community matrices will be unstable if there were more levels
- E. All the above

The following terms are used to describe relationships between different organisms. Use the terms below for questions 55 through 59.
- A. Predation
- B. Commensalism
- C. Mutualism
- D. Amensalism
- E. Parasitism

55. A term that describes when one organism eats its prey.
56. Which term applies when both parties benefit
57. Which term applies when one party benefits and the other is unaffected
58. The answer which best describes when one party suffers the other is unaffected
59. Which term applies when one party benefits and *most often*, the other suffers less than optimal health but sometimes the other party may die.

60. The species population with the greatest ability to respond to environmental change most likely is the one with
- A. High genetic diversity
- B. More animals than plants
- C. One dominant organism
- D. Low genetic diversity
- E. Two types of dominant organisms

61. Rainfall in tropical regions is below average for ten consecutive years. Insect species adapted for dry conditions are much more plentiful at the end of the ten years. Which of the following statements explains the increase in the population of insects?
- A. Biodiversity in the region has increased due to dry conditions
- B. Insects with high tolerance for dry conditions have migrated out of the region
- C. Selection pressures favored insect species with the high tolerance for dry conditions
- D. Natural selection has selected against insects species that are adapted for dry conditions
- E. All of the above.

Use the food web for questions # 62 through 65.

62. Which of the following is a food chain in the food web shown below?
   A. tree, rabbit, hawk, snake
   B. grass, grasshopper, snake, hawk
   C. grass, caterpillar, robin, hawk
   D. tree, deer, mountain lion, fox
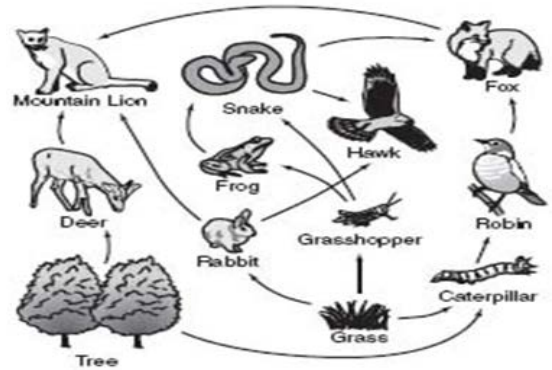
63. Which biome is this food web most likely part of?

   A. Forest
   B. Desert
   C. Aquatic
   D. Grassland

64. If the rabbits were eliminated from this food web, which species would be most adversely affected?
   A. Frogs and snakes   D. Deer and Mountain Lions
   B. Grasses and trees   E. Robins and Hawks.
   C. Mountain lions and Hawks

65. In this food web which species have the largest amount of energy available?
   A. Deer and Rabbits   C. Snakes and Robins
   B. Trees and Grasses   D. Grasshoppers and Frogs

66. Which term applies to all deserts?
   A. low precipitation amounts   D. lack of vegetation
   B. heat   E. cacti
   C. sand

67. The biome most in danger of desertification is
   A. Desert   D. Tropical Rain Forest
   B. Grassland   E. Taiga
   C. Deciduous Forest

68. Which of the following biomes would support and be characterized by the greatest number and diversity of herbivores?
   A. Tundra   D. Chaparral
   B. Taiga   E. Grassland
   C. Desert

69. In the carbon cycle how is carbon transferred from animals to plants by which of the following?
   A. Water   B. Carbon dioxide   C. Sugars   D. oxygen

70. Which biome is characterized by plants whose leaves drop off in the wintertime?
   A. Deciduous Broadleaf Forest   D. Tropical Rain Forest
   B. Tundra   E. All Of These
   C. Coniferous Forest

NEW JERSEY SCIENCE LEAGUE Green test
Environmental Science Answer Key:. Date: Jan 11, 2018 Corrections #s 1, 11, 16 not germane

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

JANUARY TEST: **Science:** methods, evidence, correlations, statistics, models, graphing & interpreting graphs. **Earth & Space Systems** – Big Bang evidence, stars and our sun, geologic time scale, Earth systems (ex: atmosphere, geosphere, hydrosphere) & dynamics (ex: plate tectonics, earthquakes, glaciers, volcanism) plus biogeochemical cycles, solar intensity & latitude **Energy** –Flow from sun to trophic levels, **Ecosystem Structure** - Biological populations, distribution, ecological niches; species interaction; keystone species; species diversity, major biomes. **Selection:** adaptations, natural, artificial, & selection pressures,

FEBRUARY TEST- Human Population Dynamics: Demographic transition, distribution; growth rates, doubling times; age-structure diagrams, density, carrying capacity; reproductive strategies; survivorship. **Succession –** primary, secondary, old field. **Soil & Soil Dynamics** – structure, types, erosion, depletion of nutrients, biogeochemical cycles, fertilizer, soil triangle. **Land Use–** Farm methods - traditional & sustainable; genetic engineering, deforestation; irrigation; pest control methods, overgrazing; deforestation; desertification; salinization, urbanization, and soil conservation techniques. **Pollution and Health** issues related to the environment**.** Plus any Jan Topics

MARCH TEST: Water Resources, Use, Pollution –zones, freshwater/saltwater concepts; eutrophication process, surface & groundwater issues, irrigation, tidal impact; coral reefs, salt marshes. **Waste-**Wastewater treatment process, point & non-point pollution, water's role in bioaccumulation, aquatic food webs, environmental degradation, health issues & water related diseases, electronic waste, plastic wastes-gyres. **Mining, Fishing, Biodiversity: extinction, loss, habitat destruction, laws.** January & February Topics.

APRIL TEST: Stratospheric Ozone - **Air Pollution** – Sources, primary & secondary; major air pollutants; heat islands, indoor air pollution; remediation and reduction strategies **Climate Change** - Greenhouse gases & effect; impacts & consequences of global warming; **Energy** – traditional and renewable forms, advantages & disadvantages; power; conversions; safety issues; radiation & health; radioactive wastes **.** Plus Jan, Feb, and March topics

Environmental Science **Green Exam** **Corrections:**
February 8, 2018

Select the answer that best completes the statements/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're taking on the Scantron.

Examine the graph below of white-tailed deer population vs gray wolves. Use the graph with questions # 1,2, and 3.
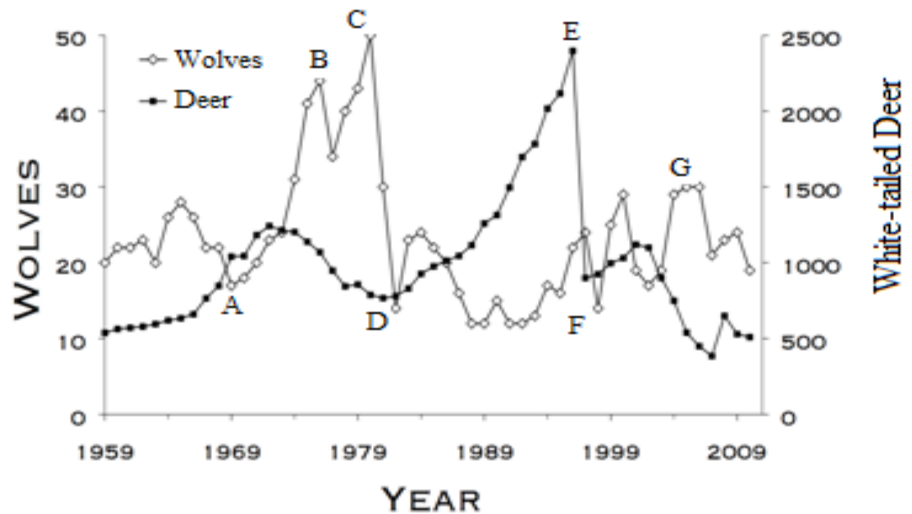
1. Which of the following is **not** an example of a density-independent factor?
   A. Drought   B. Flood   C. Forest fire   D. Hurricane   E. Competition

2. As the size of a white-tailed deer population increases,
   A. The carrying capacity of the environment for white-tailed deer will be reduced
   B. A volcanic eruption will have a greater proportional effect than on a smaller population
   C. The effect of limiting resources will decrease
   D. The number of gray wolves, a natural predator of white-tailed deer, will increase
   E. White-tailed deer are more likely to become extinct

3. On the graph above refer to section D through E for the deer population. This part of the curve best represents
   A. An exponential growth curve
   B. A logistic growth curve
   C. A stochastic growth curve
   D. Oscillation between overshoot and die-off
   E. A population at carrying capacity

4. Which of the following is **not** a statement of the logistic growth model?
   A. Population growth is limited by density-dependent factors
   B. A population will initially increase exponentially and then level off as it approaches the carrying capacity of the environment
   C. A graph of population growth produces an S-shaped growth curve over time
   D. Population growth slows as the number of individuals approaches the carrying capacity
   E. Future population growth cannot be predicted mathematically

5. Which of the following characteristics are typical of r-selected species?
   - I.   They produce many offspring in a short period of time
   - II. They have very low survivorship early in life
   - III. They take a long time to reach reproductive maturity

   A. I only   B. II only   C. III only   D. I and II   E. II and III

6. A high intrinsic growth rate would most likely be characteristic of
   - A. A K-selected species such as elephants
   - B. An R-selected species such as the American bullfrog
   - C. A K-selected species that lives near its carrying capacity
   - D. A species that is near extinction
   - E. A species with a low reproductive rate that takes a long time to reach reproductive maturity

Use the survivorship graph below for questions 7 and 8.

Three general types of survivorship curves
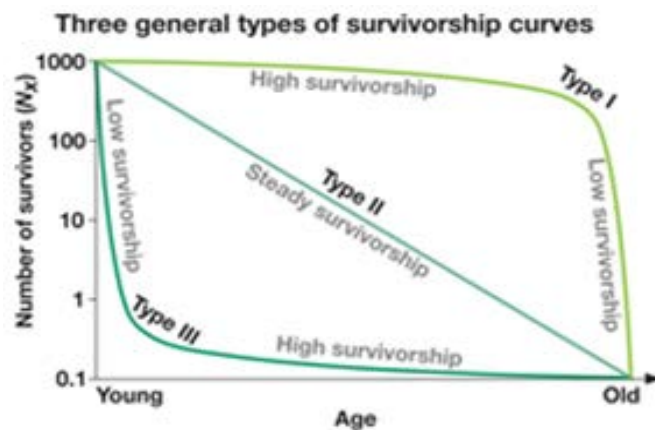
7. Which of the following descriptions **best matches** the survivorship curves represented below?

   - A. Type I could represent the house mouse, which is a typical r-selected species
   - B. Type II could be the average of r-selected and K-selected species in a specific area
   - C. Type III could represent elephants, which are typical K-selected species
   - D. Type III could represent oak species; experiencing low survivorship early & late in life
   - E. Type II could represent a coral species with constant decline in survivorship through life

8. Human demography (particularly in developed nations) would best be represented by which type of Survivorship Curve?
   - A. Type I   B. Type II   C. Type III

9. In the coniferous forests of northwest NJ, eight sparrow species coexist. Four species select their nesting sites based on tree diameter. The fifth species nests only in trees that have been dead for at least 10 years. The sixth species also nests in fir trees, but only in live or recently dead trees. The two remaining species nest in pine trees, but each selects trees of different sizes. This pattern is an example of
   - A. Resource Partitioning   B. Commensalism   C. True Predation
   - D. Predator-Mediated Competition   E. Keystone Species

10. If you measure the size of a grey squirrel population in three consecutive years, and its population size in year 1 is 1214, in year 2 is 1214, and year 3 is 1214, what is its geometric rate of increase?
   - A. 0   B. 0.15   C. 1.0   D. 1.50   E. 150

11. A bird can live for eight years. In what year will a change in survivorship have the greatest impact on per capita growth rate? (The amount of change is constant in any year.)

      A. The first year   B. The eighth year   C. The fifth year

      D. Cannot be determined   E. Any year will have an equal impact

12. The carrying capacity of an environment for a particular species at a particular time is determined by the

    A.   Supply of the most limited resource
    B.   Reproductive potential of the species
    C.   Reproductive potential of the predator
    D.   Distribution of the population
   E.   Number of individuals in the species

13. It took 50 years for Earth's human population to double from 1 billion to 2 billion. How long did it take for the population to double again to 4 billion?

    A. 66 years   D. 75 years
    B. 100 years   E. 44 years
    C. 50 years

14. Although exponential population growth cannot occur indefinitely, it can be observed for short periods of time in populations:

    A. That have a newly introduced invasive species expanding beyond their native range
    B. That are very small and are released from the imposed limits (such as hunting, habitat loss) that have reduced their population size
    C. Of humans following 1700, due to large changes in technologies and behaviors
    D. All of the above
    E. Only A and B are true.

Use the graph below of the four stages demographic transition with questions #15, and 16.
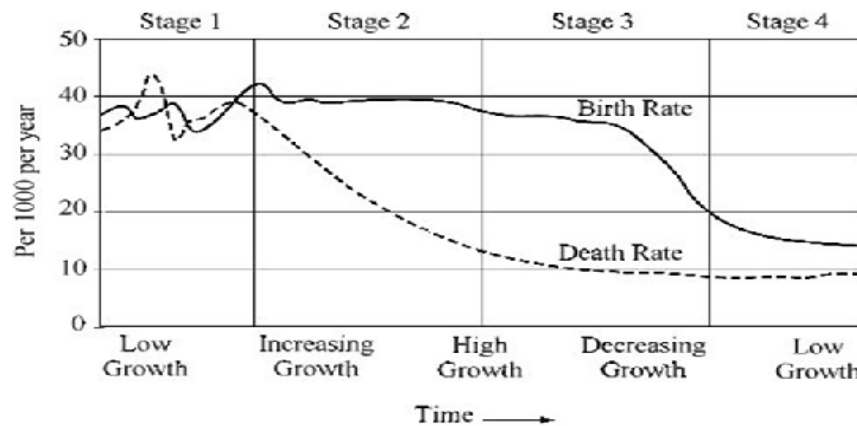
15. Which is a true statement about total fertility of a society? The total fertility of a society….

    A. … is the difference between the crude birth rate and the crude death rate.
    B. ..is the number of children necessary for a couple to replace themselves in the next generation
    C. …is negatively correlated with the number of women of child-bearing age.
    D. … decreases as the society progresses through the demographic transitions.

16. In which stage of the human demographic transition is the population size growing?
    A. Stage One   B. Stages Two and three   C. Stage Four   D. Stages one and four.

17. The current human population size on Earth is <u>closest</u> to which number?
    A. 2 billion people   B. 4 billion people   C. 8 billion people
    D. 10 billion people   E. 12 billion people

18. Based upon the human demographic transition model thus far, the human fertility rate is typically reduced when
    A. Wealth Increases   B. Education Increases, Particularly For Women
    C. Contraceptive Use Increases   D. Rates Of Disease Decrease
    E. All of the above

Select the one lettered choice that best fits each statement. A choice may be used once, not at all or more than once. For questions 19- 23 refer to the following characteristics of populations.
    A. Birth rate   D. Life expectancy
    B. Total fertility rate   E. Replacement birth rate
    C. Mortality rate

19. The average number of years a person is expected to live
20. The average number offspring a woman is expected to have during her reproductive years
21. Number of live births born per 1,000 people in a population
22. Number of children a couple must have to replace themselves
23. Number of people that die per 1,000 people in the population

24. Consider the two population pyramids below from the year 2005. Which statement about the graphs is true?
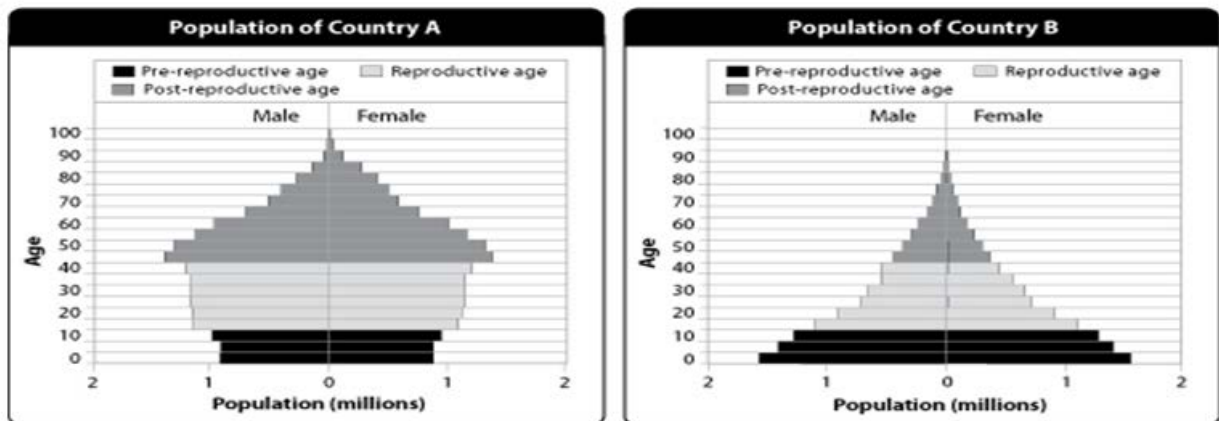
    A. Country A will have a rapid growth of population
    B. Country B will have a rapid growth of population
    C. Country B has a stable population
    D. Both countries have about the same population in the age group from 0 to 15.

25. In population ecology, scientists track the rate of change in populations by measuring additions to the population such as _____ and subtractions from the population such as _____.

    A. Immigration, Birth   D. Immigration, Death
    B. Emigration, Death   E. Emigration, Immigration
    C. Death, Birth

26. Why are cheetahs an example of how low genetic diversity does not necessarily mean the population is headed for extinction?

    A. While the genetic diversity continues to decline, there is no evidence of inbreeding depression.
    B. Genetic diversity, while low, is not declining in part because females mate with many males.
    C. They evolved with low genetic diversity to begin with, so they have adapted to it.
    D. None of the above

27. Your lab requires you to use the Lincoln Peterson Index (also known as the Mark and Recapture Method) to estimate the size of the butterfly population. You caught and marked 40 butterflies. The next day, you captured 40 more butterflies, of which 20 were marked. Estimate the size of this butterfly population using the Mark and Recapture formula.

$$\frac{R \text{ (marked recaptures)}}{T \text{ (total in second sample)}} = \frac{M \text{ (marked initially)}}{N \text{ (total population size)}}$$

$$N = \frac{M_i\ T}{R}$$

    A. 40   B. 60   C. 80   D. 100   E. 20

28. Using the graph below, estimate the mean rate of population growth (individuals per day) between day 3 and day 5.

    A. 200 individuals per day
    B. 350 individuals per day
    C. 600 individuals per day
    D. 500 individuals per day
    E. 900 individuals per day
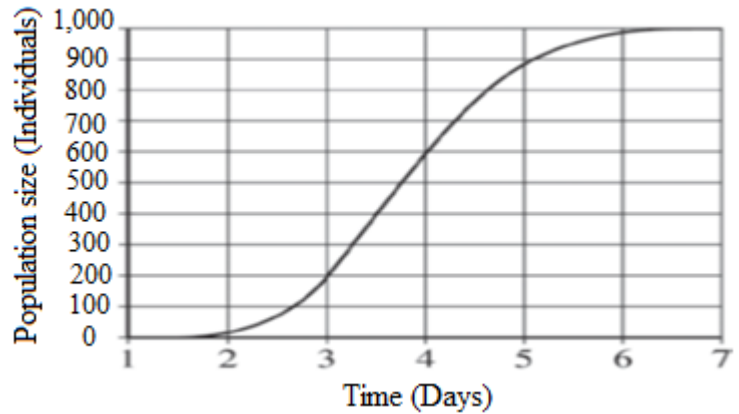
29, A population has a growth rate of 2%. How long will it take for the population to double using the rule of 70?

    A. 2 years   B. 15 years   C. 20 years   D. 35 years   E. 70 years

30. Which of the following statements about ecological succession is correct?
    A. Secondary succession is followed by primary succession
    B. Primary succession occurs over a shorter time span than secondary succession
    C. Succession is influenced by competition for limiting resources such as available soil, moisture, and nutrients
    D. In forest succession, less shade-tolerant trees replace more shade-tolerant trees
    E. Forest fires and hurricanes lead to primary succession because a soil base still exists

31. Succession that occurs after a fire in an ecosystem is called
    A. Primary Succession   B. Secondary Succession   C. Hydro-Sere Succession

32. Plants that grow after lichens that help to further break down rocks are called
     A. Pioneer Species   B. Mosses   C. Legumes   D. Short Grasses   E. All of these

33. Which natural events will cause primary succession to occur?
    A. Floods And Hurricanes
    B. Wild Fires And Controlled Burns
    C. Tsunamis And Tornadoes
    D. Glacier movement and volcanoes

34. Lichens are most likely to grow in the following type of area:
    A. An old growth deciduous forest
    B. After a volcano erupts
    C. A grassy area cleared by a wild fire
    D. An open farm field
    E. On a forest floor after a fire

35. The first plants to grow after a fire are called
        A. Indicator Species   B. Pioneer Species   C. Successional Species   D. seeds

36. In ecology, succession refers to:
    A. Balances Of Power
    B. Survival Of The Fittest
    C. Natural Selection
    D. One Species Gradually Being Replaced By Another

37. Which pioneer species is composed of algae and fungus that grows on bare rock.
        A. Mistletoe   B. Mosses   C. Lichens   D. Mushrooms   E. Epiphytes

38. A type of succession that occurs on abandoned farmland is called: B and D
        A. Primary   B. Old-Field   C. Hydro-Sere   D. Secondary

39. What type of vegetation would you expect to find on an abandoned farm after 150 years?
        A. Pine & Oak trees   B. Tall Shrubs   C. Grasses & hay   D. Lichens

40. Term for the final stable community is
        A. Pioneer   B. Climax   C. Farmland   D. Stable Hydro-Sere   E. Old Field

41. This succession process is likely to take many thousands of years before trees are seen is called:
  A. Pioneer   B. Secondary   C. Old Field   D. Climax grasslands   E. Primary & Hydro-sere

42. When does a climax community change?
    A. Never, it always remains stable
    B. After human disturbance
    C. After natural disaster
    D. Both B and C

43. According to the graph below, which of the following would be **most effective** at slowing down the loss of arable land?

A. Increasing the efficiency of desalinization processes
B. Reducing urban development
C. Increasing the efficiency of erosion control
D. Using more extensive irrigation systems
E. Discovering cheaper energy solutions

ESTIMATED WORLD ARABLE LAND LOST
BETWEEN 1985 AND 2000

Desertification (25 million ha)

Road building, urban development, industry, (150 million ha)

Salinization (60 million ha)

Erosion (50 million ha)
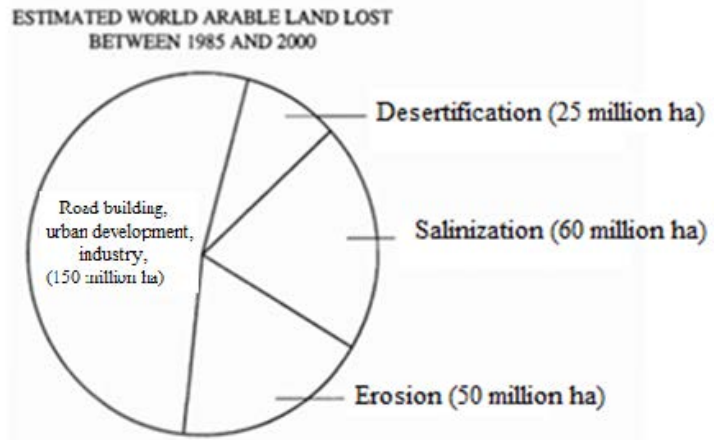
44. The hydrologic cycle is <u>primarily driven</u> by
A. action of plants
B. infiltration of water into the soil
C. solar energy
D. runoff of water into the Earth's oceans

45. Which of the following are concepts designed to create a sustainable city?
I. Conserve natural habitats
II. Focus on energy and resource conservation
III. Design affordable and fuel efficient automobile
IV. Provide ample green space

A. I and II only   B. I, II, III, and IV   C. III and IV   D. None of these choices.

The graph below shows temperature data taken at four different depths in the soil at a field around Clinton NJ for one year. Use the graph below with questions # 46 and 47.
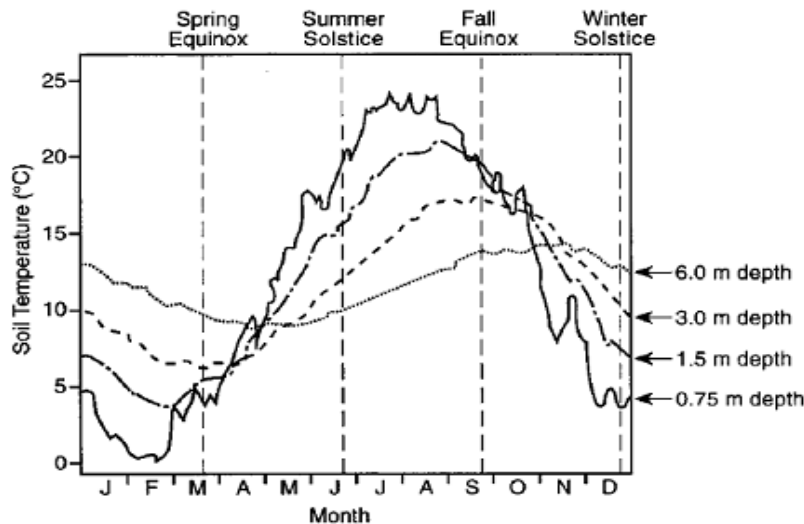
46. Which graph below best represents the relationship between the soil temperature and depth in the soil on June 21?

47. The graph of temperature vs soil depth shows that as depth increases, the annual temperature range
     A. decreases   B. increases   C. remains the same

48. What is the number one source of soil erosion?
    A. Wind erosion   B. Chemical erosion   C. Water erosion
    D. Physical degradation   E. All are equal

49. The type of planting in which an agricultural crop is grown simultaneously with a long-term tree crop to provide annual income while the tree crop matures is known as B not C
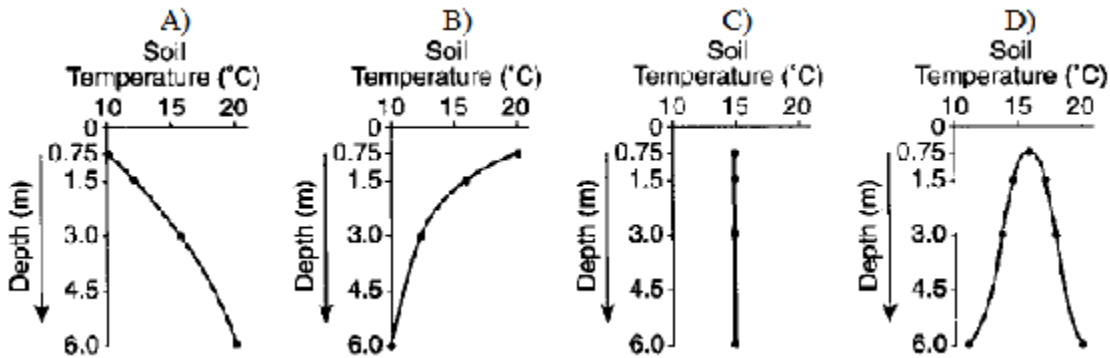   A. Crop Rotation   B. Alley Cropping   C. Mono Cropping   D. Intercropping

50. Which of the following is **not** a benefit associated with Integrated Pest Management (IPM)?
         A. More reliable and effective Pest Control
         B. Reduction in the use of the most hazardous pesticides
         C. Lessening the chance of pesticide resistance developing
         D. Total elimination of pest species
         E. All of the choices are benefits of Integrated Pest Management number

51. Which federal agency below does NOT manage US designated federal wilderness areas?
        A. National Park Service
        B. Forest Service
        C. Bureau of Land Management
        D. Fish and Wildlife Service
        E. All share in management

52. Which of the following is **not** a principle of IPM, Integrated Pest Management?
        A. Establish acceptable test levels called action thresholds and apply control if those thresholds are crossed.
        B. When insects are found, apply pesticide early so the insect biological life cycles are disrupted to the point that they are unable to multiply.
        C. Select crop varieties best suited for local growing conditions.
        D. Use mechanical and or biological controls prior to the application of pesticides.
        E. Regularly observe and record crop conditions.

53. The Green Revolution involved which of the following changes to agriculture?
   A. Mechanical: Tractors, combines, harvesters, and the petroleum that fueled them
   B. Biological: Hybridization of plants, antibiotics
   C. Chemical: Fertilizers, pesticides, and herbicides
   D. A and C Only
   E. A, B and C.

54. The description of an area's land contours and surface features is called
   A. Geography   B. Cartography   C. Graphology   D. Topography

55. Methods of agriculture that conserve soil from erosion include all of the following except all conserve the soil. No correct answer all full credit.
   A. Conservation Tillage   B. Terracing   C. Wind Breaks   D. No-Till

56. Overgrazing of public lands by privately owned livestock is an example of
   A. Tragedy of the Commons
   B. Eminent Domain
   C. Manifest Destiny
   D. Swapping of debt for natural resources
   E. Riparian Rights

57. Which of the following procedures is best for remediating the effects of soil salinization?
   A. Application of broad spectrum biocides to kill soil microorganisms
   B. Application of clay to increase water-holding capacity
   C. Application of super phosphates to increase soil fertility
   D. Addition of lime (CaO) to raise soil pH
   E. Addition of large amounts of water to leach salts out of the soil.

58. Distinctive horizontal layers of soil that differ in physical composition, chemical composition, organic content, or structure are called _____.
   A. Horizons   B. Peds   C. Soil Profiles   D. Soils   E. Loam Strata

59. Which sediment listed below is the least permeable?
   A. Clay   B. Silt   C. Sand   D. Pebbles

60. Soil with the lowest porosity is composed of particles that are all
   A. small and flat.   B. large and angular.   C. small and rounded.   D. large and rounded.

61. What kind of weathering causes the mineral composition of rocks to change?
   A. Mechanical weathering   D. Erosional weathering
   B. Electromagnetic weathering   E. Physical weathering
   C. Chemical weathering

62. Which of the following is not a form of erosion?
   A. Wind   B. Gully   C. Sheet   D. Compaction   E. Rill

63. The best type of soil for agriculture is
   A. Loam   B. Silt   C. Clay   D. Sand   E. Gravel

Refer to the above soil diagram below. To answer # 64-68, select the letter from the diagram below that best matches the characteristic or descriptions in # 64-68.
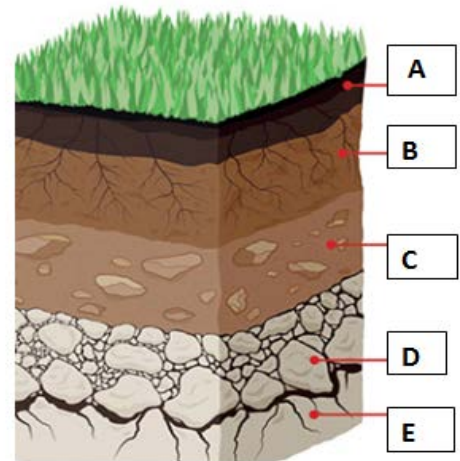
64. Bedrock layer is located here
65. Zone of leaching, compounds draining from above accumulate in this layer
66. Often called the O horizon, this layer consists of humus, partially decayed organic matter
67. Composed of weathered parent material, partially broken down inorganic minerals
68. Composed of mineral mixed with organic matter and living organisms.

DDT, diphenyl-trichloroethane, is a pesticide that was widely used from 1939 to 1973. It was used to kill malaria-carrying mosquitoes. It was found to be toxic to humans, wildlife, and ecosystems. In 1973 it was banned in the United States and eventually became illegal in many other nations.

Some nations still use DDT due to the extreme risk of malaria from mosquitoes.

The use of DDT in the US caused the decline and near extinction of birds of prey such as hawks, ospreys, brown pelicans, peregrine falcons, and bald eagles. DDT was found in water sources. This caused the proliferation throughout the food webs, where is began to bioaccumulate in organisms and biomagnify throughout food webs. In birds of prey, the pesticide weakens egg shells, ultimately causing the egg shells to break. This led to the decline in the bird's population and in many cases, helped to endanger the species. Even though DDT has been banned in the US it still persists in some groundwater and aquifers.

69. Based on the short article above what was the primary use of DDT?
      A. to kill insects
      B. to kill malaria carrying mosquitoes.
      C. to kill birds of prey
      D. to kill insects found water

70. Based on the short article one can say that
      A. DDT is no longer used
      B. Even though it was banned in 1973 it is still found in some aquifers.
      C. DDT had little or no effect upon water ecosystems.
      D. DDT is no longer found in wildlife.

NEW JERSEY SCIENCE LEAGUE <u>Green test</u> Corrections

Environmental Science Answer Key:. Date: Feb 8, 2018

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

JANUARY TEST: **Science:** methods, evidence, correlations, statistics, models, graphing & interpreting graphs. **Earth & Space Systems** – Big Bang evidence, stars and our sun, geologic time scale, Earth systems (ex: atmosphere, geosphere, hydrosphere) & dynamics (ex: plate tectonics, earthquakes, glaciers, volcanism) plus biogeochemical cycles, solar intensity & latitude **Energy** –Flow from sun to trophic levels, **Ecosystem Structure** - Biological populations, distribution, ecological niches; species interaction; keystone species; species diversity, major biomes. **Selection:** adaptations, natural, artificial, & selection pressures,

FEBRUARY TEST- Human Population Dynamics: Demographic transition, distribution; growth rates, doubling times; age-structure diagrams, density, carrying capacity; reproductive strategies; survivorship. **Succession –** primary, secondary, old field. **Soil & Soil Dynamics** – structure, types, erosion, depletion of nutrients, biogeochemical cycles, fertilizer, soil triangle.   **Land Use–** Farm methods - traditional & sustainable; genetic engineering, deforestation; irrigation; pest control methods, overgrazing; deforestation; desertification; salinization, urbanization, and soil conservation techniques. **Pollution and Health** issues related to the environment**.** Plus any Jan Topics

MARCH TEST: Water Resources, Use, Pollution –zones, freshwater/saltwater concepts; eutrophication process, surface & groundwater issues, irrigation, tidal impact; coral reefs, salt marshes.– **Waste-**Wastewater treatment process, point & non-point pollution, water's role in bioaccumulation, aquatic food webs, environmental degradation, health issues & water related diseases, electronic waste, plastic wastes-gyres. **Mining, Fishing, Biodiversity: extinction, loss, habitat destruction, laws.** January & February Topics.

APRIL TEST: Stratospheric Ozone - **Air Pollution** – Sources, primary & secondary; major air pollutants; heat islands, indoor air pollution; remediation and reduction strategies **Climate Change** - Greenhouse gases & effect; impacts & consequences of global warming; **Energy** – traditional and renewable forms, advantages & disadvantages; power; conversions; safety issues; radiation & health; radioactive wastes **.** Plus Jan, Feb, and March topics

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.

Questions #1-5 refer to the diagram below showing the dissolved oxygen (DO) and biological oxygen demand (BOD) levels of a New Jersey river.
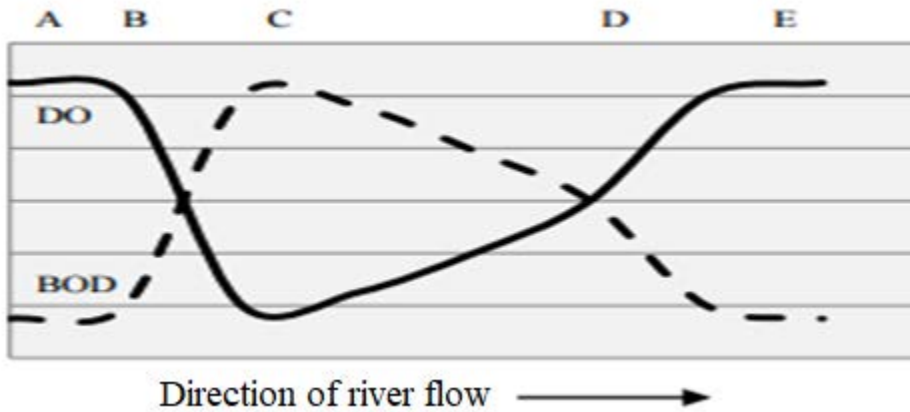
1. This diagram is a depiction of what typically happens in a river when a river flows past a
    A. point source of pesticide pollution.   C. non-point source of nutrient pollution.
    B. point source of organic waste.   D. golf course.   E. agricultural land.

2. Which of the following is most likely true of human activity along the river?
    A. The river is being polluted at the point labeled A.
    B. The river is being polluted at the point labeled B.
    C. The river is being polluted at the points labeled B and D.
    D. The river is being polluted at the points labeled B, D, and E.
    E. The river is being polluted at all of the labeled points.

3. The healthiest aquatic ecosystem can most likely be found at
    A. the points labeled B and D.   D. the point labeled C.
    B. the point labeled D.   E. the points labeled A and E.
    C. the points labeled C and D.

4. The area labeled point C in this river would most likely be called the _____Zone.
    A. Upstream Clean   B. Decomposition
    C. Recovery   D. Downstream Clean   E. Septic or Dead

5. Which of the following organism would likely be found at point C?
    A. Trout   B. Leeches   C. Perch   D. Mayflies   E. Benthic Worms

6. Grain crops are responsible for a large portion of US habitat destruction. Most grain grown in the United States is for
    A. export to countries that need grain.   C. cereals and baked goods.
    B. trade with other countries.   D. cattle feed.   E. liquor and fuel.

7. A process in which small holes are drilled into Earth and water-based chemical solvents are used to flush out desired minerals is known what type of leaching?
        A. Chemical   B. Ex-situ   C. Mechanical   D. Heap   E. In-situ

8. The hydrosphere includes all of the following **except**
        A. watershed.   B. wetlands.   C. parent rock.   D. rivers.   E. lakes.

9. An area with cold waters, low oxygen levels, and bottom dwelling fish best fits what zone?
        A. Benthic   B. Littoral   C. Limnetic   D. Open Water   E. Profundal

10. The amount of Earth's surface that is covered by water is approximately _____.
        A. 3%   B. 36%   C. 50%   D. 97%   E. 75%

11. An aquatic area where salt and freshwater mix with very high productivity levels is called
        A. open ocean. B. abyssal zone. C. headwaters.   D. estuary. E. littoral.

12. Which of the following correctly describes the waters in an upwelling area?
        A. Cold, nutrient-rich   C. Warm, nutrient poor
        B. Heavily polluted by human waste   D. Shallow and full of light

13. Which of the following best describes an unconfined aquifer? It is an area where
        A. water always comes to the surface water.
        B. water is free to flow in all directions.
        C. water is held in place by impenetrable rocks.
        D. pollutants enter the aquifer.
        E. an aquifer discharge area is located.

14. Of the following, which constitutes the greatest percent of **domestic water use** in the USA?
        A. Flushing toilets   B. Drinking   C. Cooking   D. Laundry   E. Pools

15. Of the following, which constitutes the greatest percent of **global water use**?
        A. Irrigation for agriculture   C. Coolant water for electricity produced from coal
        B. Smelting metal in manufacturing.   D. Drinking water   E. Flushing toilets

16. A water quality test that showed high levels of fecal coliform bacteria suggests that the water
        A. has been chlorinated at a treatment plant.   C. has too little oxygen to support fish.
        B. is contaiminated by human/animal wastes.   D. is safe for swimming.   E. is potable.

17. Which of the following will result in accelerated eutrophication when introduced in lakes?
         A. Viruses B. Pesticides C. Herbicides D. Phosphates   E. Acid wastes/salts

18. Approximately what percent of the water on Earth is fresh water (both liquid and solid)?
        A. 75%   B. 25%   C. 2.5%   D. 0.25%   E. 0.97%

19. Which is most likely to result from destruction of wetlands surrounding a river?
        A. A decreased sediment load in the river
        B. A decreased level of pollutants in the river such as nitrates
        C. Increased diversity of aquatic species in the river
        D. Increased levels of dissolved oxygen in the river
   E. Increased frequency of flooding of the river valley

20. Which is true of the cost per unit of removing pollutants from wastewater?
   A. It decreases as the toxicity of the pollutant increases. B is correct not D.
   B. It decreases as the time passed before remediation increases.
   C. It increases as the concentration of the pollutant decreases.
   D. It increases as the volume of the waste water decreases.
   E. It does not change over time or with concentration of pollutant.

21. In order for biological magnification to occur, the pollutant must be:
   A. Mobile   B. Persistent   C. Soluble in fats   D. Biologically active   E. All are correct

22. Which lists the major steps of cultural eutrophication, in the order in which they occur?
   A. nutrient input, algal bloom, nutrient depletion, algal die-off, decomposition, decreased dissolved oxygen, fish suffocate
   B. nutrient input, algal bloom, decomposition, algal-die off, increased dissolved oxygen, fish suffocate, nutrient depletion
   C. nutrient input, decreased dissolved oxygen, algal bloom, nutrient depletion, decomposition, algal die-off, fish suffocate
   D. nutrient input, algal bloom, algal die-off, fish suffocate, nutrient depletion, decreased dissolved oxygen, decomposition
   E. nutrient input, increased dissolved oxygen, algal bloom, nutrient depletion, algal die off, decomposition, fish suffocate

23. What is the relationship between groundwater and surface water?
   A. Surface water percolates through the soil to form groundwater.
   B. There is no relationship between them, they form independently.
   C. Groundwater filters through the soil to form surface water.
   D. A and C
   E. A, B and C

24. The reason chlorine is added during the wastewater treatment process:
   A. To filter and remove large debris
   B. To form flocs that bacteria and other impurities will cling to
   C. To kill bacteria that have accumulated and prevent future bacterial growth
   D. To remove unwanted gases
   E. None of the above

25. Trying to clean 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 making up an aquifer, contaminating clean recharge water.
   C. The recycling process of groundwater can take hundreds or thousands of years.
   D. All of the above
   E. None of the above

26. Which of the following represents nonpoint-source pollution?
   A. An unlined landfill
   B. A leaking oil tanker
   C. Polluted wastewater leaking from a chemical plant
   D. Fertilizer runoff from farms
   E. All of the above

27. Methods of mining coal have changed over the last 70 years. According to the graph below, which claim might NOT be supported by the data evidence reflected in the graph?
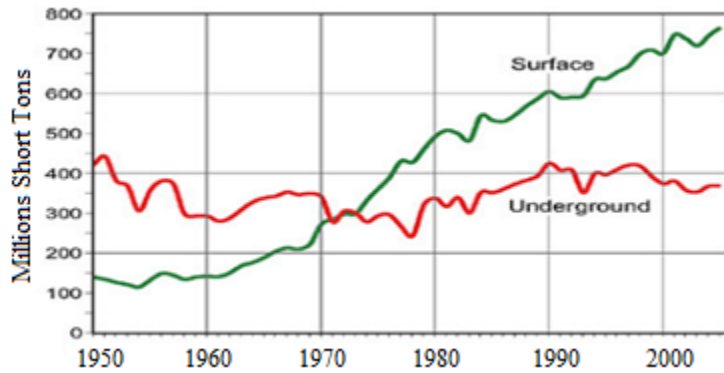
A. Surface mining became more efficient since the 1950s.
B. Surface mining became less costly since the 1950s.
C. Laws were enacted in the 1970s which made it easier to perform surface mining.
D. Underground mining costs rose significantly in the 1970s.
E. None of the above

28. Surface mining is less costly than subsurface mining because:
A. It requires fewer employees who earn less pay.
B. The healthcare costs of workman's compensation insurance costs less.
C. Safety issues (accidents, deaths & diseases – black lung) are reduced.
D. Legal costs for rescues, public relations, accidents & injuries cost less.
E. All of the above

29. Dredging streambeds may be an effective method to mine
        A. Coal   B. Sulfur   C. Aluminum   D. Iron   E. Gold

30. The physical properties of a mineral are mostly determined by the
        A. arrangement of the mineral's atoms
        B. age of the mineral sample
        C. size of the mineral sample
        D. temperature of the mineral sample

Use the graph below for questions # 31 and 32.
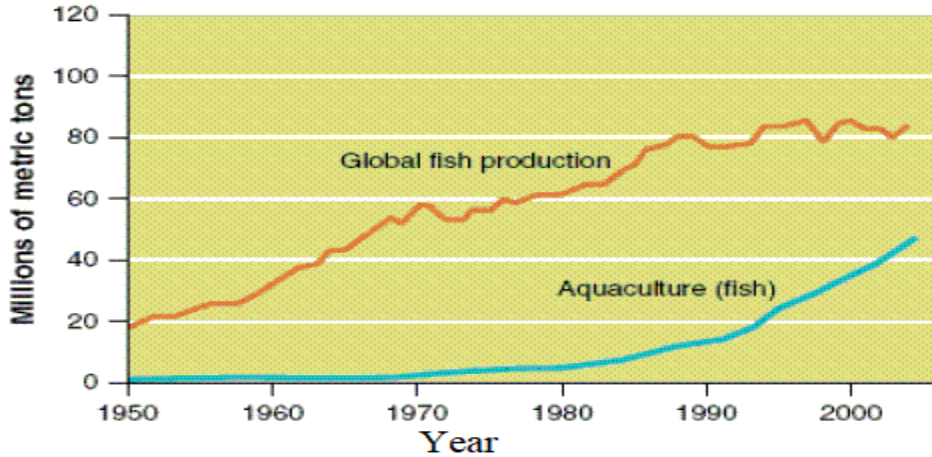
In the figure, the global fish production line includes both wild-caught fish and aquaculture-raised fish.

31. Based on the graph which statement about fish production is true?
      A. In 1950, about half of all fish production was from aquaculture.
      B. At all times shown in the figure, more fish have been wild-caught than raised through aquaculture.
      C. Around 1970, the number of fish raised through aquaculture briefly decreased.
      D. Between 1960 and 1970, the number of wild-caught fish decreased.
      E. Between 1990 and 2000 aquaculture production of fish increased

32. About how many metric tons of fish were wild-caught in 1990?
      A. 105 million metric tons
      B. 80 million metric tons
      C. 65 million metric tons
      D. 15 million metric tons
      E. 5 million metric tons

33. All of the following are methods of subsurface mining except
      A. room-and-pillar mining.   C. solution mining.
      B. long wall mining.   D. open pit mining.   E. None of the above

34. Placer deposits are surface mineral deposits that have been concentrated by
      A. movement of wind and water.   C. evaporation and condensation.
      B. subsurface mining.   D. surface mining.   E. All of the above

35. The layer of impurities on top of molten metal that forms during smelting is called
      A. dredge.   B. flux.   C. slag.   D. smelt.   E. overburden.

36. Collapse of _____ can lead to subsidence.
      A. pillars in abandoned mines   C. open pit mines
      B. solar evaporation ponds   D. placer deposits   E. mountaintop removal

37. From whom must mining companies obtain permits before mining a site?
    A. State & federal agencies   C. Federal agencies only
    B. Local government only   D. State & local government   E. Bonding Company

38. Mining reclamation refers to the process of
    A. removing coal from a subsurface seam.
    B. returning minerals to Native Americans.
    C. protecting the habitats of local wildlife.
    D. returning land to its original or better condition after mining.

39. Surface mining can cause
    A. air pollution   C. noise pollution
    B. water pollution   D. Both air & water pollution   E. All of the above

40. What typically contaminates a river during dredging?
    A. Potash   C. Seawater
    B. Placard deposits   D. Sediments

41. The _____ regulates the release of hazardous substances into the air, soil and water.
    A. Clean Water Act
    B. Comprehensive Response Compensation and Liability Act
    C. Safe Drinking Water Act
    D. Surface Mining Control and Reclamation Act of 1977

42. Acid mine drainage
    A. is unregulated in USA.   C. is the major cause of acid rain.
    B. harms or kills aquatic life.   D. purifies streams.

43. The most commonly found acid in mine drainage is
    A. carbonic acid (H_2CO_3)   C. sulfuric acid (H_2SO_4)
    B. hydrochloric acid. (HCl)   D. citric acid (E. acetic acid ($H_2C_2O_3$)

44. Which of the following correctly describes the process of smelting?
    A. Separating the desired metal from other elements in the ore
    B. Cleaning up drainage from mines
    C. Detoxifying harmful chemicals
    D. Removing ore from underground mines
    E. Refining gasoline

45. Nations have overfished international waters and have depleted many commercially
    important fish species. This is a good example of which of the following?
    A. International Agreements   C. Tragedy of the Commons
    B. Rule of 70   D. Trade Barriers   E. Sustainability

The larger bars in the graph are people who use traditional methods of fishing such as lines, nets, somar, in boats on the ocean. The shorter bars represent people who use aquaculture methods of supplying fish from 1995-2014

Traditional fishing methods (taller bars) vs aquaculture methods
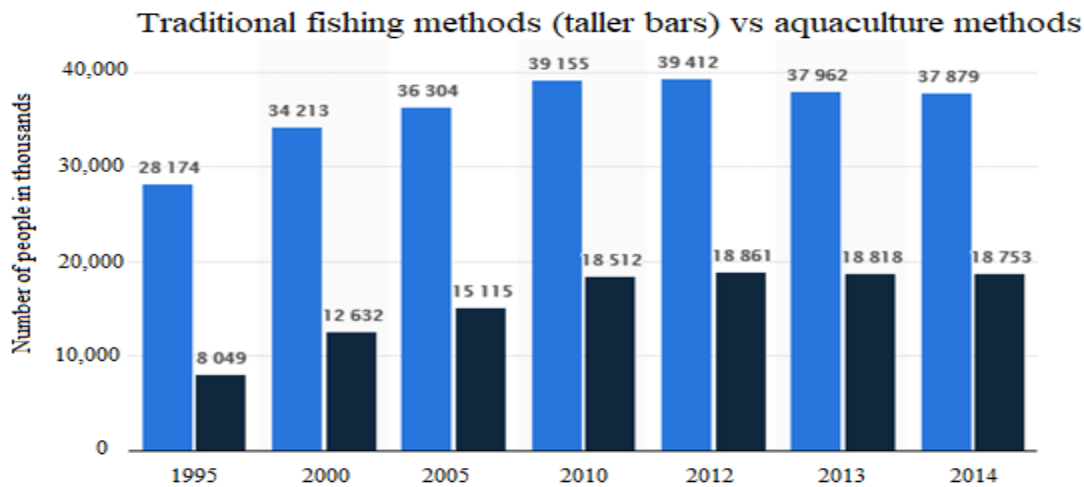
46. The above graph could best be used to make a claim that:
   A. Overfishing is not depleting fish stocks.
   B. Aquaculture may help compensate for the increase in demand and provide an alternative to the pressures of new technology depleting ocean stocks.
   C. Aquaculture is good because it reduces genetic diversity in fish species.
   D. None of these apply

47. Growing marine or aquatic species in net pens or tanks is known as
   A. cross cultivation.   C. a risk-free industry.
   B. bio-culture.   D. an easy source of iodine.   E. aquaculture.

48. When the non-target fish species or other marine animals are caught in nets or thorough other fishing methods, they are called
   A. surplus species.   C. by-catch.
   B. alternate species.   D. chum.   E. game fish.

49. Which of the following has caused the greatest increase in the introduction of marine alien species into new ecosystems?
   A. Tourism   C. Air travel
   B. Commercial fishing   D. Home aquariums   E. Shipping

50. Fishing methods like bottom trawling, gill netting & long-lining are especially subject to
   A. cruise safety policy.   C. seasonal variations.
   B. poor yields.   D. high fuel costs.   E. by-catch.

51. When species are transported geographically to an unknown area, they are called
   A. native species.   C. game fish.
   B. exotics.   D. non-native species.   E. functional species.

52. The International Union for Conservation of Nature and Natural Resources (IUCN) is
   A. known to try to save endangered species by dramatic attention-grabbing protests.
   B. an organization of multinational corporations united to fight conservation efforts.
   C. a collaboration of ~ 200 governmental agencies and 700 private conservation groups round the world.

53. Reintroducing the gray wolf in certain areas of the Northwestern United States
  A. is beneficial for all those working in the area.
  B. creates a mutualistic interaction between wolves and elks.
  C. is in accordance with the US Endangered Species Act of 1973.
  D. discourages hunters from hunting other animals.

54. Which of the following would _**not**_ be illegal under The Endangered Species Act?
  A. Destroying the habitat of an endangered plant during the building of a Federal highway
  B. Digging up an endangered plant in a public park and selling it
  C. Capturing a wild animal listed as a threatened species for exhibition in a reputable zoo.
  D. Having a permit to capture and conduct research with endangered species
  E. All of the above

55. The current rate of species extinction is
  A. slower than any time in this century.
  B. accelerating & attributable to human actions.
  C. the result of natural environmental processes.
  D. of little consequence to Earth's long-term survival.
  E. continuing at the same rate.

Use the letter of the items listed below to BEST match the relationship indicated in # 56- 60.
A. Plastics B. Plasmodium C. Excess amounts of Nitrogen-Phosphorus-Potassium (N-P-K)
D. Lead (Pb) E. Organic Matter
56. Flint Michigan water issues in the news
57. Vector associated with malaria
58. Trigger for eutrophication
59. Found floating in the Great Pacific Gyre
60. Animal waste

Use the letter of the water related health issues below to BEST match the relationship in # 61-65.
  A. Nitrates   B. Increase in salinity   C. Pb - Lead
  D. Mercury   E. Cryptosporidium parasites
61. Hypertension
62. Potential to lower IQ particularly in infants
63. Blue Baby Syndrome formerly known as Methemoglobinemia nitrate
64. Gastrointestinal Illness
65. Minamata neurological disease

Use the letter of the items listed relating to water and environmental issues to BEST match the example or relationship indicated in numbers 66-70.
  A. Fracking   B. Coral Bleaching   C. Salinization
  D. Subsidence E. Mining
66. Aquifer depletion or compaction, drainage of organic soils, thawing permafrost

67. Contamination of ground & surface water, methane pollution & its impact on climate change
68. Accumulation of salts in the soil by irrigation in dry climates.

69. Sedimentation, increase in global ocean temperatures, pollutants

70. Sediment pollution, increased turbidity

NEW JERSEY SCIENCE LEAGUE Green test Corrections

Environmental Science Answer Key:. Date: March 8, 2018

Deadline: All March exam results must be post marked by March 16th or scan the record sheet and email to newjsl@ptd.net or the scores will not count.

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

JANUARY TEST: **Science:** methods, evidence, correlations, statistics, models, graphing & interpreting graphs. **Earth & Space Systems** – Big Bang evidence, stars and our sun, geologic time scale, Earth systems (ex: atmosphere, geosphere, hydrosphere) & dynamics (ex: plate tectonics, earthquakes, glaciers, volcanism) plus biogeochemical cycles, solar intensity & latitude **Energy** –Flow from sun to trophic levels, **Ecosystem Structure** - Biological populations, distribution, ecological niches; species interaction; keystone species; species diversity, major biomes. **Selection:** adaptations, natural, artificial, & selection pressures,

FEBRUARY TEST- Human Population Dynamics: Demographic transition, distribution; growth rates, doubling times; age-structure diagrams, density, carrying capacity; reproductive strategies; survivorship. **Succession –** primary, secondary, old field. **Soil & Soil Dynamics** – structure, types, erosion, depletion of nutrients, biogeochemical cycles, fertilizer, soil triangle. **Land Use–** Farm methods - traditional & sustainable; genetic engineering, deforestation; irrigation; pest control methods, overgrazing; deforestation; desertification; salinization, urbanization, and soil conservation techniques. **Pollution and Health** issues related to the environment**.** Plus any Jan Topics

MARCH TEST: Water Resources, Use, Pollution –zones, freshwater/saltwater concepts; eutrophication process, surface & groundwater issues, irrigation, tidal impact; coral reefs, salt marshes– **Waste-**Wastewater treatment process, point & non-point pollution, water's role in bioaccumulation, aquatic food webs, environmental degradation, health issues & water related diseases, electronic waste, plastic wastes-gyres. **Mining, Fishing, Biodiversity: extinction, loss, habitat destruction, laws.** January & February Topics.

APRIL TEST: Stratospheric Ozone - **Air Pollution** – Sources, primary & secondary; major air pollutants; heat islands, indoor air pollution; remediation and reduction strategies **Climate Change** - Greenhouse gases & effect; impacts & consequences of global warming; **Energy** – traditional and renewable forms, advantages & disadvantages; power; conversions; safety issues; radiation & health; radioactive wastes **.** Plus Jan, Feb, and March topics

Dates for 2018 Season

Thursday March 8, 2018   Thursday April 12, 2018

All areas and schools must complete the April exam and mail in the results by April 27th, 2018

No area may take the April exam during the first week of April or the first week of May

New Jersey Science League

PO Box 65 Stewartsville, NJ 08886-0065

Phone # 908-213-8923 fax # 908-213-9391 email: newjsl@ptd.net

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 1ST, 2ND, 3RD, AND 4TH).

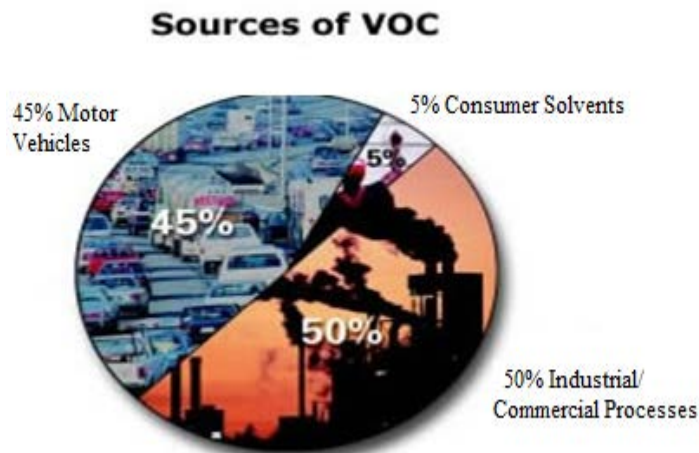**If you return scantrons of alternates, then label them as ALTERNATES.**

Dates 2019 Season

Thursday January 10, 2019   Thursday February 14, 2019

Thursday March 14, 2019   Thursday April 11, 2019

New Jersey Science League GREEN <mark>Corrections</mark>
Environmental Science Exam April 12, 2018
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.

Relating to ozone, match the following letters with the appropriate statements that follow:
A. Chlorine   C. Troposphere   E. Stratosphere
B. CFC's   D. Strong sunlight

1. "Bad" or harmful ozone is found here

2. Compound known to deplete the ozone layer.

3. A factor that contributes to the formation of ground level ozone.

4. Where "good or protective" ozone is found

5. This can destroy 100,000 ozone molecules

6. Which of the following is not correct?   Ground level ozone is formed
    A. From NOx emitted by cars, power plants, industrial boilers and refineries.
    B. From VOC 's from chemical plants.
    C. When ozone producing sources react chemically in the presence of sunlight.
    D. When ozone producing sources react chemically in the presence of moisture.
    E. When vehicle emissions (from fossil fuels) react with sunlight.

Ozone Air Quality, 2000 – 2016
(Annual 4th Maximum of Daily Max 8-Hour Average)
Northeast Trend based on 125 Sites

Source: https://www.epa.gov/air-trends/ozone-trends#ozreg Northeast ozone concentration (ppm) as measured by the National Standard of Ozone Air Quality from 2000- 2016
7. When reading the graph above, all of the following statements are correct **except**:
    A. From 2000 to 2007 the ozone level in the Northeast was mostly above the National Standard.
    B. The National Standard is about 0.07 ppm.
    C. The National Standard fluctuates from year to year.
    D. The white line in the middle represents the average of the Northeast sites.
    E. Average Northeast ozone concentration (ppm) from 2000- 2016 reflects a overall decrease.

8. Refer to the previous graph in # 7. The Northeast regional average of ozone air quality in 2000 was:
    A.   0.08 ppm   C. 0.80 ppm
    B.   0.68 ppm   D.   70 ppm   E   0.10 ppm

9. Ground level ozone presents a danger to human health. It can result in the following:
   A. Reduce lung function, inflames tissue, worsens asthma, bronchitis & chronic conditions
   B. Cause chest pain, coughing, throat irritation
   C. Permanently scar lung tissue with long term exposure
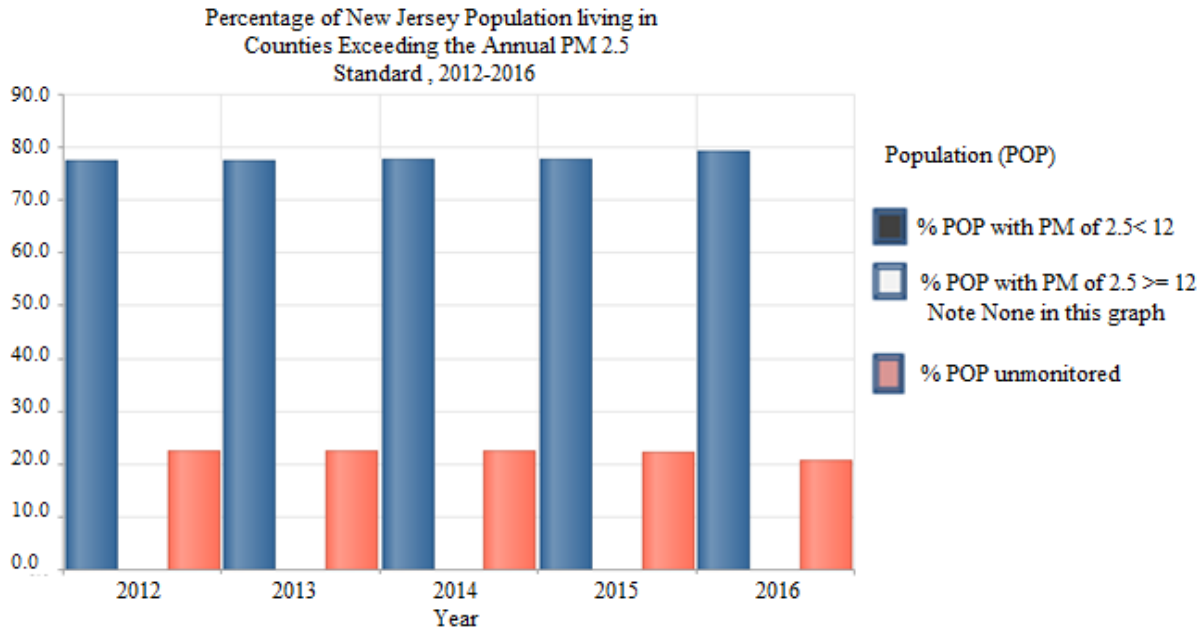   D. All of the above - Letters A-C
   E. None of the above

10. The ozone layer in the atmosphere is located within which sphere?
A. Troposphere   B. Stratosphere   C. Thermosphere   D. Mesophere

11. VOCs are chemical compounds containing carbon that vaporize easily and enter the atmosphere. Based upon information reflected in the below graphic which source would have the **least impact** on reducing sources of VOCs.

Sources of VOC

45% Motor Vehicles

5% Consumer Solvents

45%

50%

50% Industrial/ Commercial Processes

   A. Regulations requiring the use of low emitting, non-toxic materials when manufacturing transportation (cars, buses, trucks, etc.) vehicle interiors.
   B. Regulations requiring air purification systems to remove VOCs in and /or released from commercial product plants.
   C. Regulations requiring air purification systems to remove VOCs in and/or released from industrial processing plants.
   D. Regulations requiring elimination of incomplete combustion when burning of fossil fuels in automobile engines and power plants.
   E. Regulations requiring the use of low emitting, non-toxic materials when manufacturing consumer products.

12. Peroxyacyl nitrates also known as PANs are formed by light activated reactions of nitrogen oxides with volatile organic compounds (VOCs) or hydrocarbons. They are found in photochemical smog. Which of the following environmental effects are **NOT** associated with PANs?
   A. Damages plant tissues (cells, leaves, needles, stems, etc.)
   B. Inhibits photosynthesis in plants
   C. Suppresses plant growth
   D. Causes respiratory problems in animals
   E. Causes eutrophication in the oceans

GRAPH OF THE % OF NJ POPULATION LIVING IN COUNTIES EXCEEDING ANNUAL PARTICULATE MATTER (PM) STANDARD BETWEEN 2012 AND 2016


Percentage of New Jersey Population living in Counties Exceeding the Annual PM 2.5 Standard , 2012-2016

Population (POP)

■ % POP with PM of 2.5< 12

□ % POP with PM of 2.5 >= 12 Note None in this graph

▨ % POP unmonitored

13. Using the above graph, one can conclude that from 2012 to 2016
    A. That about 78% to 80% of NJ population (POP) live in areas where PM was 2.5<12.
    B. That 20 to 22% of NJ population (POP) is unmonitored.
    C. No NJ populations (POP) live in areas where PM is greater than 12 PM
    D. Only A and B are true
    E. A, B, and C are all true.

14. One way to remediate air pollution and heat island effect in urban areas involves planting more trees. All of the following are reasons trees help remediate air pollutants and heat island effects **except**:
    A. Trees act as nature's air conditioners cooling with shade, keeping street and building surfaces cooler.
    B. Trees employ evapotranspiration which dissipates the heat in and around the tree leading to cooler air in the area around the tree.
    C. Tree leaves help reduce air pollution by "capturing" airborne particles, such as Nitrogen dioxide, NO_2, Nitrogen oxide, NO, and Sulfur dioxide, SO_2, while releasing Oxygen, O_2.
    D. Trees intercept and absorb rain through their leaves and roots, reducing the amount of water entering the storm drain systems.
    E. Tree leaves collect the dust that blows around the city on their leaves. This helps to reduce some of the air pollution. The dust, for the most part, remains on the leaves until it rains where upon it washes to the ground.

15. Which apply to acid rain?
    A. It's a secondary pollutant
    B. It's a reaction between rain and NO_X and SO_X.
    C. It's a primary pollutant
    D. Only A and B apply
    E. Only B and C apply

16. Which **_TWO_** of the following categories of pollutants might apply to noise from a power plant?
    A. Point-source pollutant and cumulative pollutant
    B. Regional and non-point source pollutant
    C. Non-cumulative and point-source pollutant
    D. None of these apply to noise pollution from a power plant.

Match the definition with the remediation technique to reduce the effect of heat islands. Note that each choice is used only once.

    A. Cool pavements   D. Trees & vegetation
    B. Rooftop gardens   E. SMART growth
    C. Cool roofs

17. A vegetative layer that reduces temperatures in my area and the surrounding air around a building. This improves storm-water management, providing shade and removing heat from the air through evapotranspiration.

18. I am made of materials or coatings that significantly reflect sunlight and heat away from a building – reducing temperatures, increasing the comfort of occupants, and lowers energy demand.

19. Because I am made with materials that more solar energy, provide for permeability and stand up to high levels of traffic or use, I cool surfaces and surrounding air, and reduce storm-water runoff and improve nighttime visibility.

20. Zoning and building codes and practices that cover a range of strategies that help protect the environment and make communities more attractive, economically stronger, and more livable through examples such as zoning and green building codes.

21. Minerals, some heavy metals, and impurities are pulled into the roots where they are stored until the trees utilize them, others are stored in its shoots, stems, leaves or fruit.

Ground Data 1870-2000
Coastal tide gauge records
Credit CSIRO
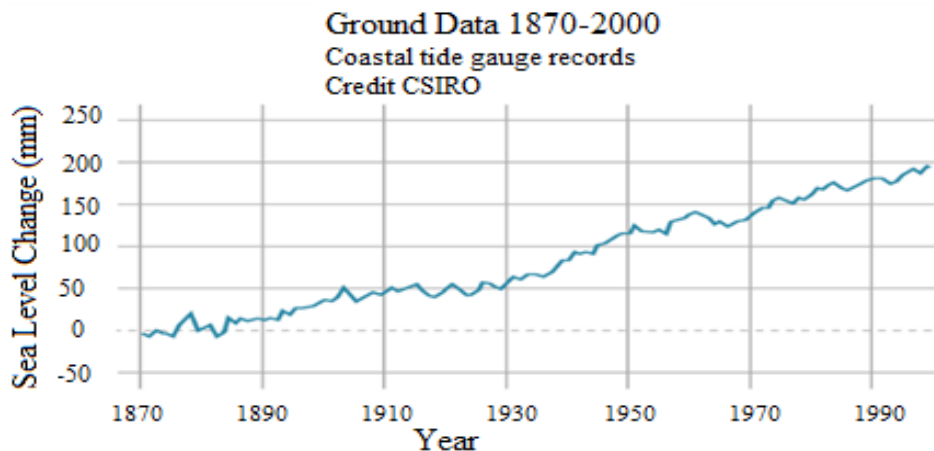
The graph above from CSIRO, depicts the change of sea level rise in mm using coastal tide gauge data from 1870 to 2,000. Match the **approximate** change in mm sea level with the year intervals listed in questions # 22-23.

        A. 30 mm   B. 50 mm   C. 60 mm   D. 120 mm   E. 200 mm
22. Years 1870-1920

23. Years 1870-2000

24. From 1930 to 1990 what is the approximate **rate of change** of the sea level?

    A. 3.4 mm/year   B. 2.2 mm/year   C. 0.5 mm/year   D. 1.0 mm/year

25. All of the following statements about effects of climate change are true **except**:
   - A. Melting sea ice floating in the ocean raises global sea level.
   - B. Arctic sea ice has shown a pattern of thinning.
   - C. Melting glacier ice adds water to global oceans contributing to sea level rise.
   - D. Melting ice from ice sheets formed on land, adds water to Earth's ocean and contributes to sea level rise.

The map below shows part of the coastline of North America. Use the map with questions # 26 and 27. The solid line represents the present coastline. The key with a – – – – represents the coast line 18, 000 years ago. The future coast line being represented by - - - - - - - - .
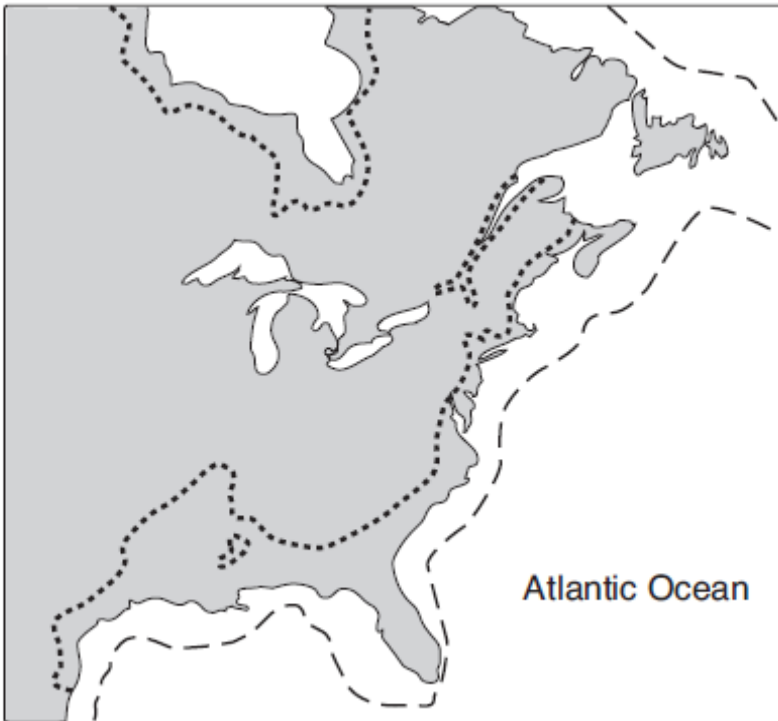
26. Which statement below best explains why 18,000 years ago the coastline was at a different location than it is today?

A. The climate of the Earth was extremely hot and dry.

B. A large amount of the Earth's water was stored in large continental sheets of ice.

C. The east coast of North America was being subducted under the Euriasian Plate.

D. North America had just separated from Africa, and the Atlantic Ocean was forming

27. Based on this graph it is assumed that the coastline will continue to move inland. What is the basis of the assumption that the ocean will continue to move inward?

A. the total amount of global precipitation will decrease

B. the thickness of the ozone layer will decrease

C. the concentration of carbon dioxide in the Earth's atmosphere will continue to increase

D. The rate of uplift of North American continent will increase.

28. Water is quite unique. Which of the following are characteristics of water that is/are important for life?
   A. Water has a high heat capacity.
   B. Water is more dense as a liquid than as a solid and has a high boiling point.
   C. Water has the ability to dissolve a large variety of chemical substances.
   D. A, B, and C above
   E. Only A is correct

Match the letter of the images of gas molecules below with the greenhouse gas in # 29-33
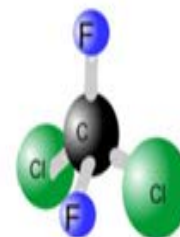Molecule A   Molecule B   Molecule C   Molecule D   Molecule E


   A.   B.   C.   D.   E.

   29. This molecule represents an example of a chloroflourocarbon
   30. This molecule represents water vapor
   31. This molecule represents methane a hydrocarbon
   32. This molecule represents nitrous oxide
   33. This molecule represents carbon dioxide

Questions 34-38 are characteristics of gases of the gases listed A through E below. Using the letters of the gases listed to identify each gas based upon the descriptions provided.
   A. Nitrous Oxide   D. Methane
   B. Carbon Dioxide   E. Chloroflourocarbons
   C. Water Vapor

34. A powerful greenhouse gas produced by soil cultivation practices, the use of commercial and organic fertilizers, fossil fuel and biomass burning. It is also called laughing gas.
35. A 100% synthetic compound of industrial origin used in a number of applications, but now largely regulated in production and release to the atmosphere by international agreement.
36. This gas is the most important green house gas. It is the main driving force of climate change. It is a product of respiration, volcano eruptions, and burning of fossil fuels.
37. This gas is also a product of hydrocarbon combustion. We measure its effect in the atmosphere by relative humidity. It also acts as a feedback mechanism to the greenhouse effect.
38. On a molecule-for-molecule basis, this gas is a far more active greenhouse gas compared to the two gases most often discussed. This gas is much less abundant in the atmosphere. However, that may change when the permafrost melts. This gas is produced through natural sources and human activities (decomposition of wastes, ruminant digestion and manure management). It is also called natural gas being used in homes for heating and cooking.
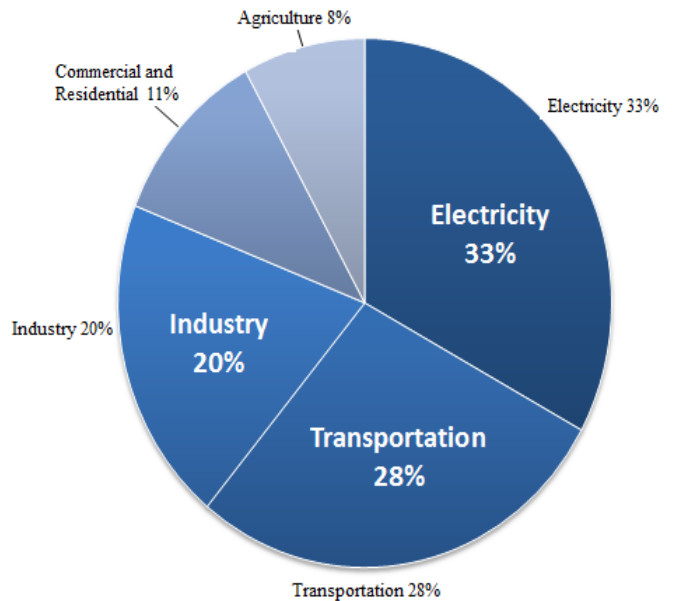
The graph below indicates that NASA's GRACE Project Data which shows a decrease in Greenland's ice mass measurements reflecting a rate of change of 286 gigatonnes per year (+/-21) in the period between 2002 until 2016.

Greenland Ice Mass Variation Since 2002 Rate of Change a decrease of 286.0 gigatonnes per year
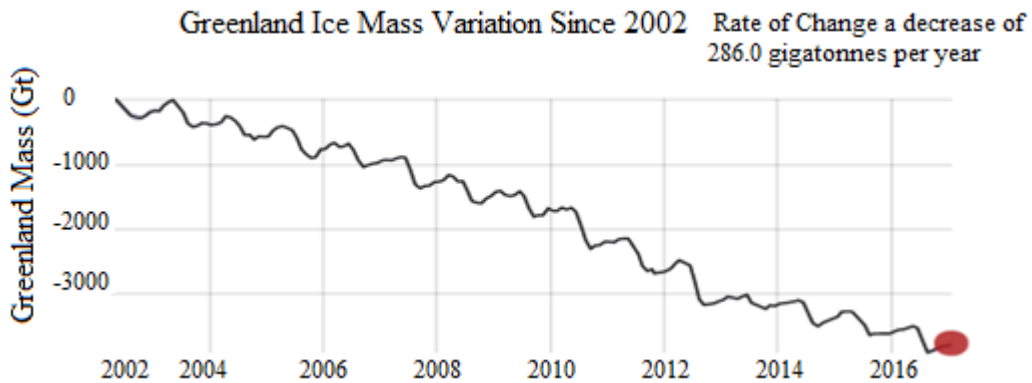
39. This graph could support the following
    A. A pattern of declining ice mass
    B. Support for the albedo (reflecting ability of a surface) effect
    C. Acceleration of ice mass growth
    D. A, B, and C.
    E. Only A and B

40. Based on the graph below which is the largest source of anthropogenic greenhouse gases in our country?

    A. electricity generation and industry
    B. electricity generation and transportation
    C. agriculture and transportation
    D. agriculture and electricity generation

Agriculture 8%
Commercial and Residential 11%
Electricity 33%
Electricity 33%
Industry 20%
Industry 20%
Transportation 28%
Transportation 28%

41. The atmosphere around Earth is warmed because _____
    A. warm air cannot escape, as in a greenhouse.
    B. molecules in the atmosphere are warmed by radiation from Earth and retain that heat.
    C. plants absorb CO_2
    D. plants release CO_2

42. Milankovitch cycles ……
    A. describe the timing of the northern lights in the thermosphere
    B. describe the transpiration, evaporation, and precipitation of Earth's water
    C. describe upwelling and down welling in the ocean
    D. refer to shifts in the temperature of surface water in the middle latitudes of the Pacific
    E. are changes in Earth's rotation and orbit around the sun that may trigger climate variation

43. Advantages of switching from our current electric grid to a SMART grid are
    A. It is super-efficient and digitally controlled for precision and accuracy
    B. Energy Flow responds to local needs (supply and demand) versus current constant flow
    C. Smart meters educate consumers by showing them how much energy each appliance uses
    D. All of the above
    E. Only B and C.

44. Current obstacles to electric cars include all **except**
    A. cost
    B. storage capacity of the batteries
    C. overheating and flammability of the batteries
    D. supportive subsidies from oil and gas companies

45. A significant disadvantage of a nuclear power is that….
    A. there have been and continue to be many nuclear power plant failures.
    B. highly reactive nuclear wastes can't be completely or permanently disposed of at this point in time.
    C. we lack the expertise to make nuclear power plants safe operating environments.
    D. uranium-containing ore run out in a couple of decades

The graph below reflects the cumulative percentage of NJ homes that were tested for the radioactive gas - radon per year from 1996-2015.

Cumulative Percentage of Homes that have Been Tested for Radon by year in NJ
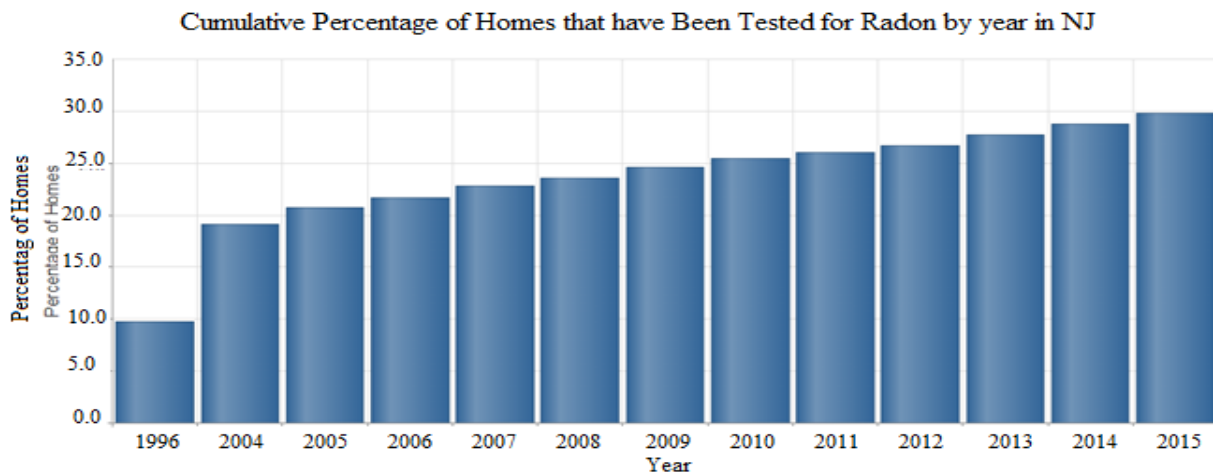
46. Based on the above graph about what % of NJ homes have been tested for Radon by 2015?
    A. 10.0 %   B. 20.0%   C. 25.0%   D. 30.0%   E. 35.0 %

Below is a table of risk factors associated with radon for smokers and non-smokers for developing lung cancer in their lifetime.

Radon Risk for Smokers and Nonsmokers
(Source: National Academy of Sciences, Biological Effects of Ionizing Radiation, Sixth Report, 1998)

Radon Level (in pCi/L)	Odds for non-smokers* of developing lung cancer due to radon if exposed to this level over a lifetime	Odds for smokers* of developing lung cancer due to radon if exposed to this level over a lifetime**
20	1 in 27	1 in 5
8	1 in 68	1 in 13
4	1 in 135	1 in 26
2	1 in 270	1 in 52
0.4***	1 in 1,350	1 in 260

*Smokers are defined as individuals who have smoked at least 100 cigarettes in a lifetime; non-smokers have never smoked
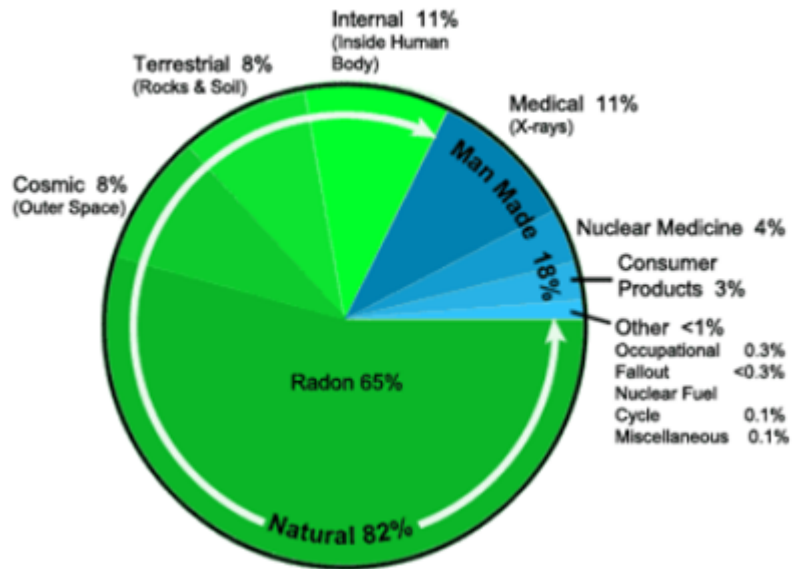***Average outdoor radon concentration.

47. Based on this table who is **most at risk** of developing lung cancer?

    A. Non-smokers in homes with Radon levels of 20 pCi/L level.

    B. Smokers in homes with Radon levels of 20 pCi/L level.

    C. Smokers in outside air where radon levels are at or below 0.4 pCi/L

    D. Non-smokers in homes with Radon levels of 2 pCi/L level.

SOURCES OF RADIATION EXPOSURE IN THE US POPULATION

48. Based upon the graphic below, Nuclear Fuel Cycle and Fallout, occupational and miscellaneous exposures account for what percent of radiation exposure in the US population?

    A. <1%

    B. 10%

    C. ~11%

    D. 8%

    E. 18%

Sources of Radiation Exposure in US Population

Internal 11% (Inside Human Body)
Terrestrial 8% (Rocks & Soil)
Medical 11% (X-rays)
Man Made 18%
Cosmic 8% (Outer Space)
Nuclear Medicine 4%
Consumer Products 3%
Other <1%
Occupational 0.3%
Fallout <0.3%
Nuclear Fuel Cycle 0.1%
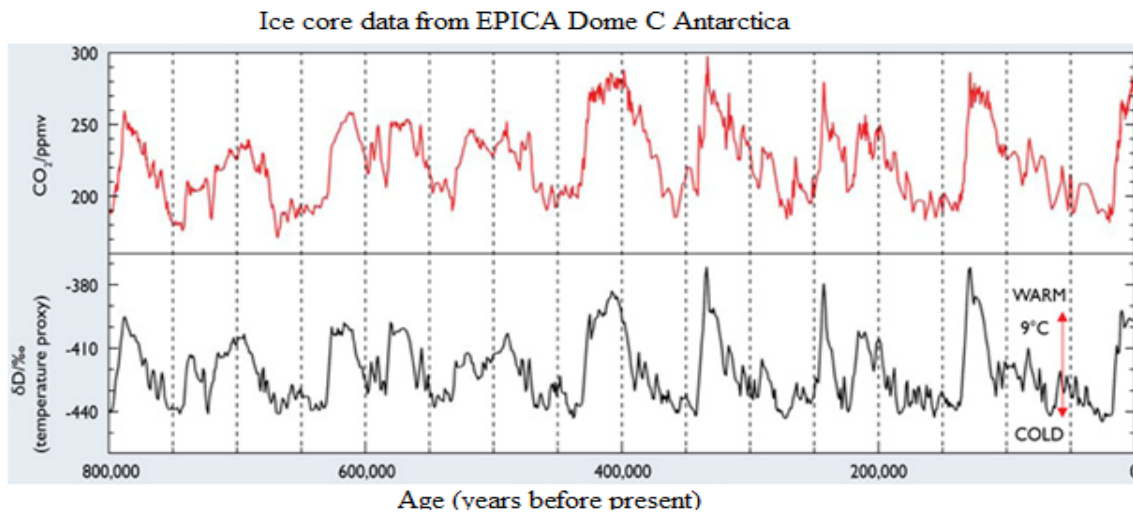Miscellaneous 0.1%
Radon 65%
Natural 82%

49. In the wake of the U.S. failure to ratify the Kyoto Protocol _____

    A. many nations cut off relations with the USA.

    B. cities and states are setting their own programs for reducing greenhouse gases.

    C. oil exporting nations refused to sell oil to the USA.

    D. many other nations have followed the USA and pulled out of the Protocol.

Match the following renewable resources with their specific advantages. Each is used only once and all five are used. Use with questions # 50 through 54.

A. Geothermal   C. Biomass   E. Hydropower
B. Wind   D. Solar

50. This renewable's advantages are high net energy yield, low cost electricity, long life span, no carbon dioxide emissions during operation, flood control below dam, water for irrigation, and reservoir development.

51. This renewable's advantages include large potential supplies, moderate costs, low net carbon increase, and use of agricultural, timber, and urban wastes.

52. This renewable's advantages include very high efficiency, low carbon dioxide emissions, low land use, small land disturbance, and moderate environmental impact. The energy supplied is constant. However, disadvantages include scarcity of suitable sites, moderate to high air pollution when greenhouse gases are released from the ground, noise and odor, and high cost of drilling and installation.

53. This renewable's advantages are reduction of air pollution, reduction of dependence on oil, and low land use. Disadvantages include production of components results in release of toxic chemicals, life of the systems is currently short, need backup systems in the event of bad weather, and high cost.

54. This renewable's advantages are high net energy yield and efficiency, low cost and environmental impact, no carbon dioxide emissions, and quick construction but disadvantages include need for backup systems, visual and noise pollution, interfering with bird migrations.

Ice core data from EPICA Dome C Antarctica

Climate and temperature proxy are physical characteristics of the past that stand in for direct physical measurements.

55. Using the graph above the most recent analyses of polar ice cores have given us the ability to profile global climate change as far back as _____ years.

A. 100,000   C. 50,000   E. 750,000+
B. 1,000   D. 300,000,000

56. Based upon the graph for # 55 which statement best describes the relationship between temperature and atmospheric carbon dioxide levels?

     A. Based on this graph there is no reason for concern for carbon dioxide levels and temperature.

     B. As carbon dioxide levels increase the temperature also increased.

     C. There is no correlation between carbon dioxide and temperature.

57. The graph below shows the different ways in which water is used in homes. Which uses the **least** amount of water?

A. Toilet
B. Shower
C. Clothes washer
D. Dish washer
E. Baths
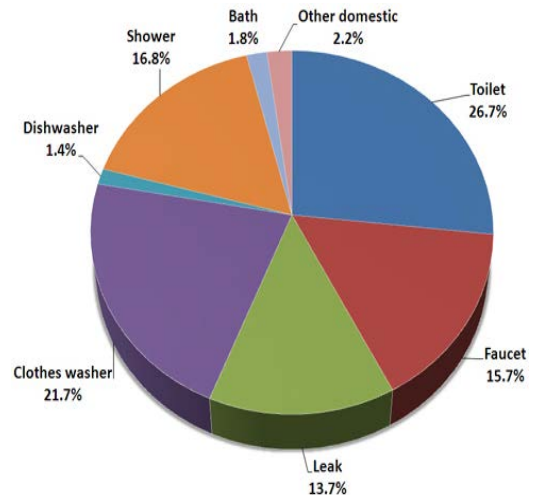
58. A population has a growth rate of 2% per year. How many years will it take to double the population?

A. 2 years   B. 15 years   C. 35 years   D. 40 years   E. 70 years.

59. Which of the following are exhibited by K-select organisms?

     I. Slow maturation   II. Many small offspring   III. Reproduction occurs late in life.

     A. I only   B. II only   C. III only   D. I and II only   E. I and III only

60. Of the choices in #59 which represent r-selected species?

A. I only   B. II only   C. III only   D. I and II only   E. I and III only

61. What is the SI base unit for energy?

A. Meter   B. Gram   C. Joule   D. Kelvin   E. Pascal

62. Which of the following are the **two** most important factors in determining a habitat's climate?

A. Temperature and wind speed
B. Wind direction and precipitation
C. Wind speed and rate of evaporation
D. Rate of evaporation and temperature
E. Temperature and precipitation

63. Water that falls to Earth's surface may enter the groundwater by which process?

     A. Precipitation   B. Infiltration   C. Condensation   D. Evaporation

64. A well to produce water should be drilled into which layer?

     A. Zone of aeration   C. Permeable aquifer

     B. Just above the water table   D. A sinkhole

65. What environmental effect can a dam have on the area **downstream** from the dam?
- A. The land is flooded, destroying homes and farm crops
- B. Flooding is reduced
- C. Sediment builds up
- D. Large amounts of water are lost through evaporation
- E. Recreational areas are built up.

The following is a graph of daily mean D/O dissolved oxygen levels taken at the Manville NJ testing site in 2012.

Raritan River at Manville, NJ
Data from US Geological Survey Year 2012
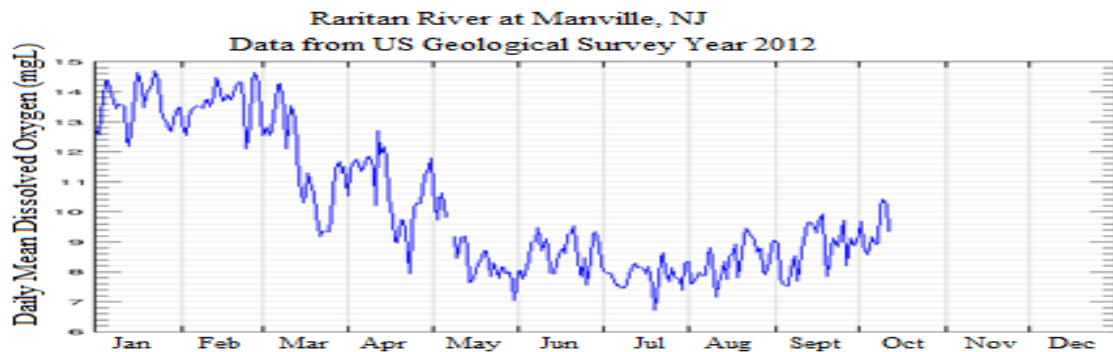
Notice: no data was colled from about the middle of Oct to the end of Dec 2012
Hurrican Sandy was from about Oct 26 through Nov 8, 2012

66. Which statements below are supported by the above graph?
- I. Winter months with cold temperatures have decreased decomposition & increased D/O.
- II. Winter months and snow melt have increased velocity, increasing D/O.
- III. Summer temperatures resulted in a downward trend in D/O
- IV. April showers increased velocity thereby increasing D/O.
- V. Trees were cut down along the river and stream bed, increasing sunlight and D/O.

A. I only   B. II and III only   C. III and IV only   D. II, III, and IV only   E. V only

67. Sometimes, data cannot be collected. What would the most likely reason be for the lack of data taken during late October through December in the year 2012?
- A. Equipment failure
- B. US Government shut-down
- C. Hurricane Sandy and its after-math
- D. None of the above

68. This winter season (2013-2014) has ranked among the top ten on record in terms of the amount of snowfall as of mid-February. Snow on the ground will do all of the following **except**:
- A. Melt when temperatures are high enough and enter storm drains
- B. Infiltrate into recharge zones
- C. Increase eutrophication
- D. Result in a high spring water table

69. Increases in all of the following factors decrease D/O in rivers and streams **except**;
- A. velocity
- B. altitude
- C. nutrient load and organic wastes
- D. temperature

70. Photosynthesis and time of day can impact dissolved oxygen levels because:
- A. photosynthesis increases during daylight hours
- B. photosynthetic organisms can produce more oxygen at night
- C. decomposers produce dissolved oxygen once dead organisms sink to the bottom at night
- D. none of the above

NEW JERSEY SCIENCE LEAGUE Green test Corrections

Environmental Science Answer Key: Date: April 12, 2018

All schools and areas must finish the April exam and post mark or scan all results by April 30th.

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

JANUARY TEST: **Science:** methods, evidence, correlations, statistics, models, graphing & interpreting graphs. **Earth & Space Systems** – Big Bang evidence, stars and our sun, geologic time scale, Earth systems (ex: atmosphere, geosphere, hydrosphere) & dynamics (ex: plate tectonics, earthquakes, glaciers, volcanism) plus biogeochemical cycles, solar intensity & latitude **Energy** –Flow from sun to trophic levels, **Ecosystem Structure** - Biological populations, distribution, ecological niches; species interaction; keystone species; species diversity, major biomes. **Selection:** adaptations, natural, artificial, & selection pressures,

FEBRUARY TEST- Human Population Dynamics: Demographic transition, distribution; growth rates, doubling times; age-structure diagrams, density, carrying capacity; reproductive strategies; survivorship. **Succession –** primary, secondary, old field. **Soil & Soil Dynamics** – structure, types, erosion, depletion of nutrients, biogeochemical cycles, fertilizer, soil triangle. **Land Use–** Farm methods - traditional & sustainable; genetic engineering, deforestation; irrigation; pest control methods, overgrazing; deforestation; desertification; salinization, urbanization, and soil conservation techniques. **Pollution and Health** issues related to the environment**.** Plus any Jan Topics

MARCH TEST: Water Resources, Use, Pollution –zones, freshwater/saltwater concepts; eutrophication process, surface & groundwater issues, irrigation, tidal impact; coral reefs, salt marshes **Waste-**Wastewater treatment process, point & non-point pollution, water's role in bioaccumulation, aquatic food webs, environmental degradation, health issues & water related diseases, electronic waste, plastic wastes-gyres. **Mining, Fishing, Biodiversity: extinction, loss, habitat destruction, laws.** January & February Topics.

APRIL TEST: Stratospheric Ozone - **Air Pollution** – Sources, primary & secondary; major air pollutants; heat islands, indoor air pollution; remediation and reduction strategies **Climate Change** - Greenhouse gases & effect; impacts & consequences of global warming; **Energy** – traditional and renewable forms, advantages & disadvantages; power; conversions; safety issues; radiation & health; radioactive wastes **.** Plus Jan, Feb, and March topics

Dates for 2018 Season
Thursday April 12, 2018

All schools and areas must finish the April exam and post mark or scan all results by April 30th.
No area may take the April exam during the first week of April or the first week of May
New Jersey Science League
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Phone # 908-213-8923 fax # 908-213-9391 email: newjsl@ptd.net
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 1ST, 2ND, 3RD, AND 4TH).
If you return scantrons of alternates, then label them as ALTERNATES.
Dates 2019 Season
Thursday January 10, 2019   Thursday February 14, 2019
Thursday March 14, 2019   Thursday April 11, 2019