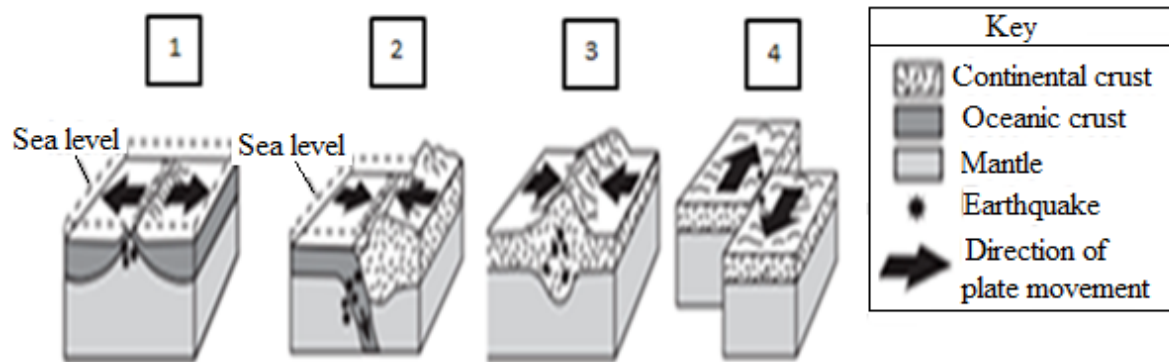


NJSL Environmental Science January 12, 2017 GREEN TEST Corrections:

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



Review the diagrams of plate movements above. Identify each using the letter from the list (A-D) below and place your answer in the corresponding numbers below: Use the choices with questions # 1-5.

- A. Convergent continental plates
- B. Transform boundaries
- C. Divergent boundaries
- D. Oceanic-continental convergence with subduction occurring

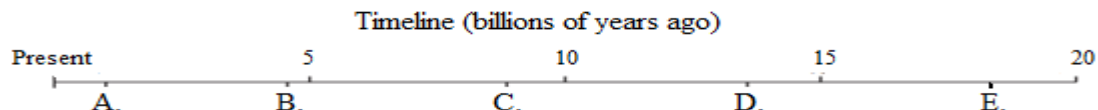
1. Diagram one is best described by letter:
2. Diagram two is best described by letter:
3. Diagram three is best described by letter:
4. Diagram four is best described by letter:
5. The San Andreas area of California is this type of boundary.

6. Earth's early atmosphere contained carbon dioxide, sulfur dioxide, hydrogen, nitrogen, water vapor, methane, and ammonia. These gases were present in the atmosphere primarily because
 - A. Radioactive decay products produced in Earth's core were released from Earth's surface
 - B. These gases came from comets hitting the early Earth.
 - C. Evolving Earth life-forms produced these gases through their activity
 - D. Earth's growing gravitational field attracted these gases from space
 - E. Volcanic eruptions on Earth's surface released these gases from the interior

7. Earth's primitive atmosphere was deficient in free oxygen. What process was primarily responsible for the development of the present percentage of free oxygen in Earth's atmosphere?

- A. Outgassing
- B. Photosynthesis
- C. Volcanic Eruptions
- D. Oxidation of Iron-Based Minerals

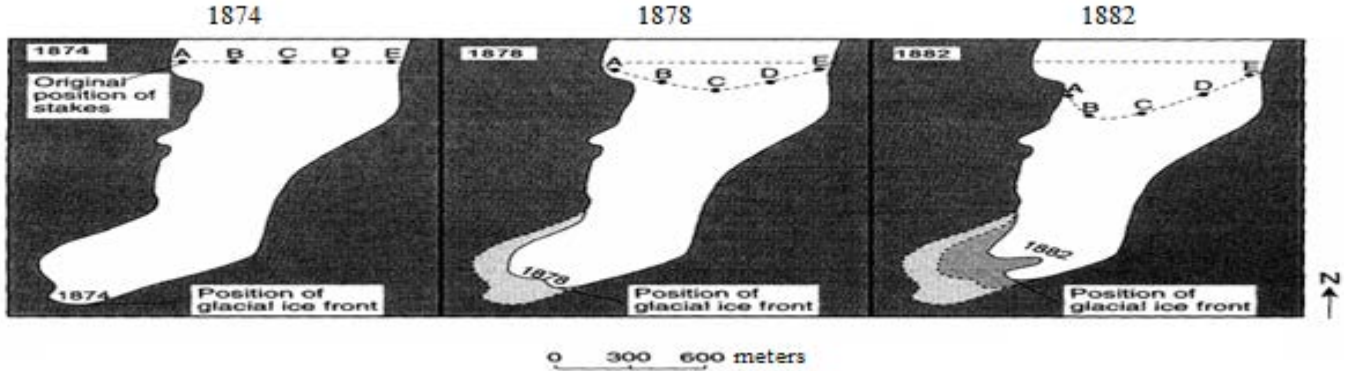
This timeline below represents the present to 20 billion years ago. Letters A, B, C, & D represent specific times.



8. 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

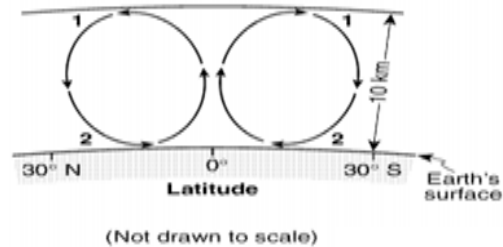
Base your answer to question 9 on the three glacial maps that follow, which show the ice movement and changes at the ice markers placed on the glacial ice and left there for eight years.



9. Notice that markers labeled A, B, C, D, and E are changing over time. What does this show?
- The glacial ice is becoming thicker
 - Glacial ice is forming smaller crystals
 - Glacial ice is shifting northward
 - Glacial ice is moving to the center of the glacier.

10. The diagrams below shows general movement of air within a portion of Earth's atmosphere located between 30° N and 30° S latitude. Numbers 1 and 2 represent different locations in the atmosphere. The air movement shown in cross section below is due to the process of:

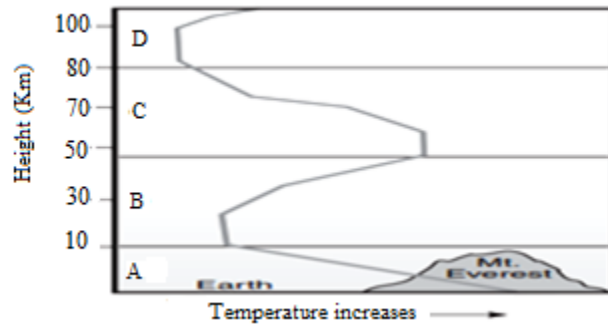
- Condensation
- Conduction
- Evaporation
- Convection



11. Most of the hurricanes that affect the east coast of the United States originally form over:
- Warm waters of the Atlantic Ocean in summer
 - Warm land of the southeastern United States in summer
 - Cool waters of the Atlantic Ocean in spring
 - Cool land of the southeastern United States in spring
12. As a tsunami approaches shallow water which of the following set of transformations occurs?
- Wavelength increases, wave period decreases, and wave height stays the same
 - Wavelength decreases, wave period decreases, and wave height increases
 - Wavelength decreases, wave period increases, and wave height increases
 - Wavelength decreases, wave period stays the same, and wave height increases
13. What caused the Indian Ocean tsunami that devastated Indian Ocean coastline areas on December 26, 2004?
- Super Volcano
 - An Earthquake
 - A Caldera
 - Landslide
 - A New Mountain Range
14. Which of the following human activities reduces the level of ozone in the atmosphere?
- Using artificial lighting in scientific polar stations
 - Using large banks of solar cells for energy production
 - Using fossil fuels for heat and electricity
 - Destroying large areas of the equatorial rain forest
 - Releasing chlorofluorocarbons from aerosol cans

15. The diagram below shows four layers of Earth's atmosphere. Which correctly labels the layers in the correct sequence represented by A, B, C, and D? (from Earth moving upward)

- A. Troposphere, stratosphere, mesosphere, thermosphere
- B. Thermosphere, mesosphere, stratosphere, troposphere
- C. Troposphere, mesosphere, thermosphere, stratosphere
- D. Mesosphere, troposphere, thermosphere, stratosphere



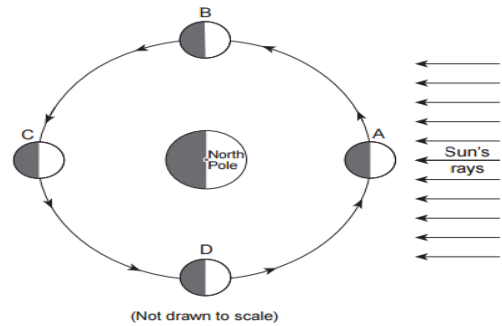
Use the diagram above and the letters of each layer of the atmosphere to answer questions 16-19.

- 16. This layer is where the ozone layer exists
- 17. This is where the Aurora Borealis exists
- 18. This layer is where humans live
- 19. This layer is the densest layer of the atmosphere

The diagram below represents the Moon at different positions, labeled A, B, C, and D, in its orbit around Earth.

20. At which two Moon positions would an observer on Earth most likely experience the spring tides (highest high tides and the lowest low tides)?

- A. Positions A & B
- B. Positions B & C
- C. Positions C & A
- D. Positions D & B



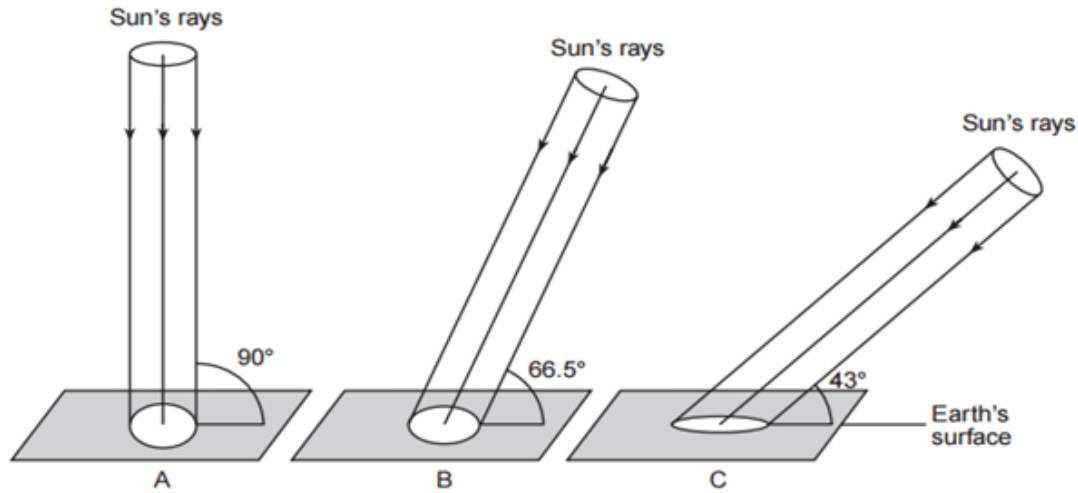
21. During which Moon phase below could an observer on Earth see a **lunar eclipse**?



22. If the tilt of Earth's axis were increased from 23.5° to 30°, summers in New Jersey would be

- A. Cooler, and winters would become cooler
- B. Cooler, and winters would become warmer
- C. The same and winter would have more daylight hours
- D. Warmer, and winters would become warmer
- E. Warmer, and winters would become cooler

Base your answers to questions 23-25 on the diagram below representing equal-sized portions of Sun's rays striking Earth's surface at 23.5° N latitude at noon at three different times of the year. The angle at which the Sun's rays hit the Earth's surface and the relative areas of Earth's surface receiving the rays at the three different angles of insolation are shown.



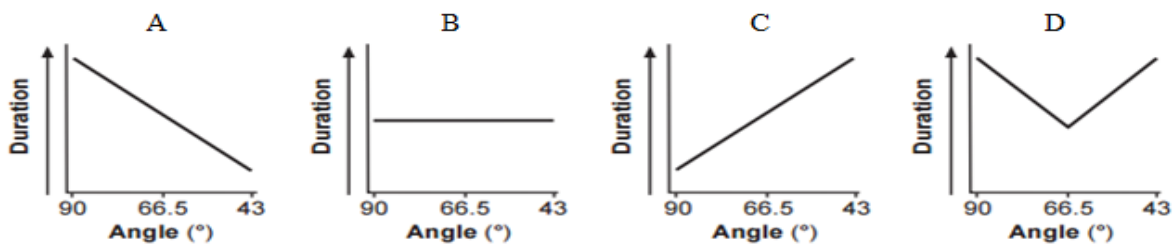
23. As viewed in sequence from A to B to C, these diagrams represent which months and which change in the intensity of insolation?

- A. December → March → June; and decreasing intensity
- B. December → March → June; and increasing intensity
- C. June → September → December; and decreasing intensity
- D. June → September → December; and increasing intensity

24. As the angle of the Sun's rays striking Earth's surface at noon changes from 90° to 43°, the length of a shadow cast by an object will

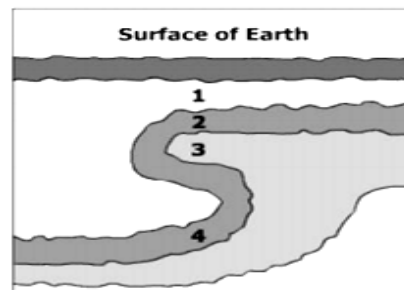
- A. Decrease
- B. Increase
- C. Decrease, then increase
- D. Increase, then decrease

25. Which graph below best shows the duration of insolation at this location as the angle of insolation changes?



26. The diagram below represents areas below the surface of the Earth in which fossils can be found. In which area would the oldest fossils be found?

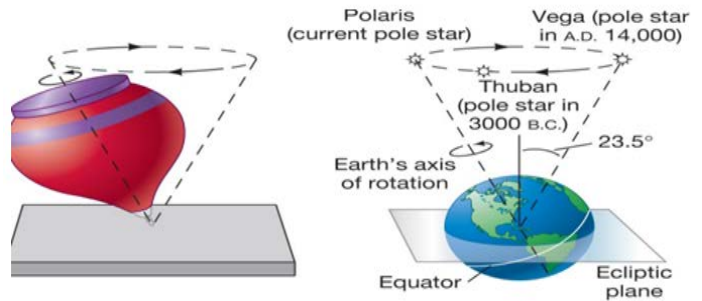
- A. Area 1
- B. Area 2
- C. Area 3
- D. Area 4



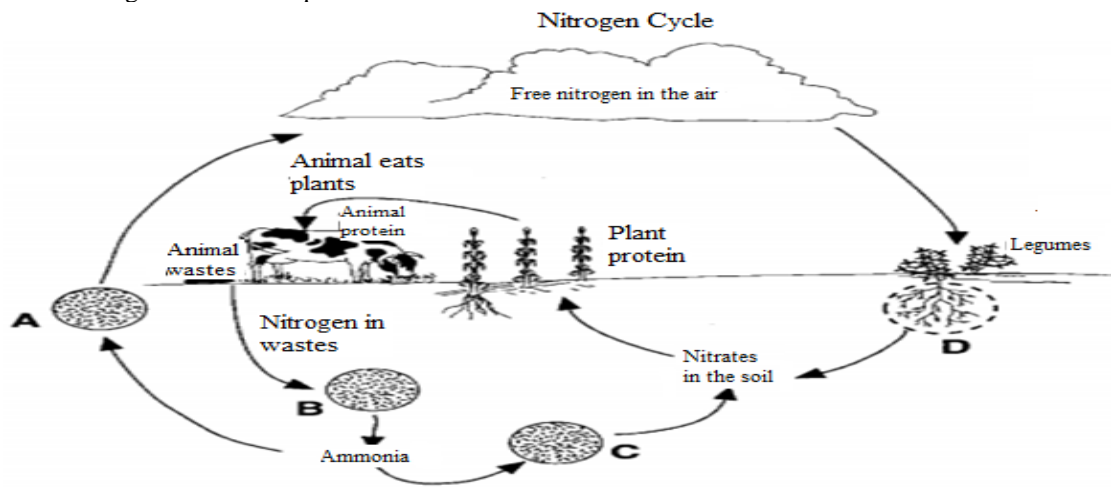
27. What causes seasons on Earth?
- The wobble of Earth's rotation on its axis
 - The path (circular and at time elliptical) of the Earth around the sun
 - Movement of Earth closer to or farther from the Sun
 - The 23.5° tilt of Earth's rotational axis
 - Changes in temperature caused by global warming and cooling

28. The Earth's axis rotates (Precesses) just as a spinning top. This was discovered by the Greeks. It takes about 26,000 years to complete one cycle. Therefore the North Celestial Pole will not always point to the same star field. What is the cause of Precession?

- Rotation of Earth's molten core
- Moons' gravitational pull
- Weight of the ice at the poles
- Suns' gravitational pull
- Two of these choices.



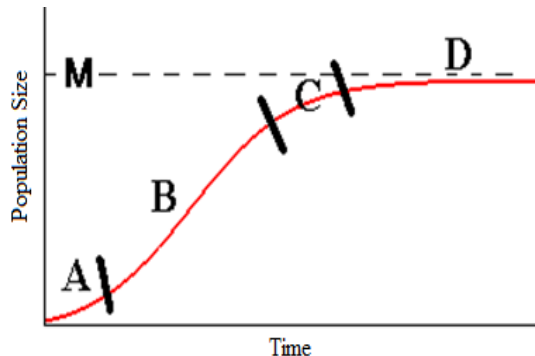
Use the diagram below for questions #s 29-32.



29. In this diagram region A refers to the:
- Action of nitrogen-fixing bacteria
 - Action of denitrifying bacteria
 - Decomposition
30. In this diagram region B refers to which nitrogen ion or molecule? Should say in region B what type of bacteria. All full credit
- Ammonium (NH_4^+)
 - Nitrate (NO_3^-)
 - Nitrite (NO_2^-)
 - Nitrogen gas (N_2)
31. Using the diagram above, region C refers to the bacteria which convert ammonium ions and ammonia to B and C
- Hydrogen (H_2)
 - Nitrate (NO_3^-)
 - Nitrite (NO_2^-)
 - Nitrogen gas (N_2)
32. About what percent of the air is nitrogen by volume?
- 20%
 - 80%
 - 50%
 - 25%
33. In the carbon cycle, all of the following organisms carry out both cellular respiration and photosynthesis except:
- Cyanobacteria
 - Lichens
 - Photosynthetic Protista (ex. Euglena) & Algae
 - Chemoautotrophs in ocean thermal vents
 - CO_2 fixing bacterium
34. A group of organisms that all belong to the same species and live in the same given area is called a(n)...
- Community
 - Population
 - Colony
 - Ecosystem

35. Which one of the following is **NOT** a density-dependent factor?
 A. Competition B. Predation C. Parasitism D. Storms

Use the Population growth graph below to answer # 36, 37 and 38.



36. Describe what would happen to the carrying capacity if deforestation occurred and the population had a **decrease** in available shelter and food supply?
 A. Increase in carrying capacity
 B. Decrease in carrying capacity
 C. Stay the same
 D. It would reflect a boom and bust pattern
37. What lettered section on the graph represents the carrying capacity?
 A. A B. B C. C D. D
38. What lettered section on the graph represents **a slowing of the growth** of the population?
 A. A B. B C. C D. D
39. Which of the following factors keep populations from exceeding the carrying capacity?
 A. Availability of food C. Competition
 B. Available habitat space D. All of the Above
40. In a tide pool, 15 species of invertebrates were reduced to eight after one species was removed. The species removed was likely a(n)
 A. Predator B. Keystone species C. Prey D. Resource partitioner E. Mutualistic organism
41. Which of the following is the most accepted hypothesis as to why invasive species take over communities in which they have been introduced?
 A. Invasive species are more aggressive than native species in competing for environmental limited resources
 B. Humans carefully select which species will out compete nuisance native species
 C. Invasive species have a higher reproductive potential than native species
 D. Invasive species come from geographically isolated areas, so they thrive in regions with more competition
 E. Invasive species are not held in check by the predators and agents of disease that have always been in place for the native species
42. There are more species in tropical areas than in places more distant from the equator. This is probably a result of
 A. More ecological disturbances B. More intense annual sunlight
 C. Fewer disease agents D. Fewer predators

Species interactions: The symbols +, -, and o are used to show the results of interactions between individuals and groups of individuals in the examples below. The symbol + denotes positive interaction, - denotes negative interaction, and o denotes that individuals are not affected by interacting. The first symbol refers to the first organism mentioned.

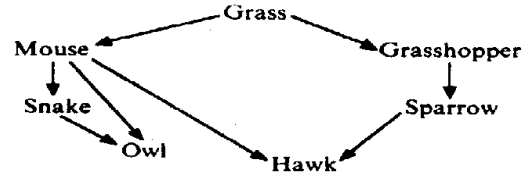
- A. +/+ B. +/o C. +/- D. 0/0 E. -/-
43. What letter indicates the interactions between a carrier crab & sea urchin hitch-hiker?
44. What letter indicates the interactions that exist between the cattle egret and grazing cattle?
45. What letter indicates the interactions that exist between a lion pride and a hyena pack?
46. What letter indicates the interactions that exist between a honey bee and a flower?
47. What indicates interaction between cellulose-digesting organisms in the gut of a termite and the termite?
48. **What letter indicates the interactions that between a dog and a tick?** **All full credit, should be -/+ not a choice**

49. The sum total of an organism's interaction with the biotic and abiotic resources of its environment is called its
 A. Habitat B. Logistic growth C. Biotic potential D. Micro-climax E. Ecological niche

Questions 50-52; refer to the food web below:

50. Which organism is most likely to be located at the apex of this pyramid of biomass?

- A. Grass B. Grasshopper C. Snake
 D. Mouse E. Hawk



51. All of the following statements about the diagram are correct EXCEPT

- A. The grasshopper is an herbivore
 B. Only two trophic levels are depicted
 C. The mouse and grasshopper are at the same trophic level
 D. All of the organisms except grass are consumers, regardless of position

52. The organic and inorganic materials in all of the organisms in the diagram will eventually return to the environment by the action of:

- A. Carnivores B. Primary Consumers C. Secondary Consumers D. Decomposers

Experiment: Jacob was doing a field study of lake productivity at noon on a summer day. Using a titration technique, he determined the initial amount of dissolved oxygen in the lake water at a depth of 2 feet to be 8 mg O₂ per liter of lake water at noon. He filled and sealed two clear glass bottles with lake water from the same location and depth, labeling one bottle "Light" and the other bottle "Dark." The "Dark" bottle was wrapped completely with several layers of foil. Both bottles were then lowered to the same location where the initial sample was taken. After one hour, the bottles were retrieved, and again through titration, the amount of dissolved oxygen in the water in the "Light" bottle was determined to be 10 mg O₂ per liter while the amount of oxygen in the water in the "Dark" bottle was 5 mg O₂ per liter.

53. What was the amount of dissolved oxygen produced in one hour period in the light bottle? Need to specify net O₂ then letter A, or gross O₂ then C.

- A. 2 mg O₂ per liter per hour C. 5 mg O₂ per liter per hour
 B. 3 mg O₂ per liter per hour D. 8 mg O₂ per liter per hour E. 10 mg O₂ per liter per hour

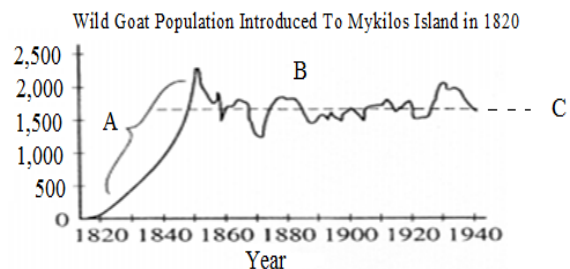
54. What was the amount of oxygen lost to cellular respiration over the one hour period?

- A. 2 mg O₂ per liter per hour C. 5 mg O₂ per liter per hour
 B. 3 mg O₂ per liter per hour D. 8 mg O₂ per liter per hour E. 10 mg O₂ per liter per hour

The graph below shows the changes in a population of wild goats introduced to a Greek island in the early 1800's.

55. The type of population growth illustrated by the section A of the graph is known as

- A. Stabilizing
 B. Exponential
 C. Density-dependent
 D. Logistic
 E. Linear



56. The graph indicates the goat population most likely is

- A. Growing in excess of its carrying capacity, since many fluctuations in size population occur after 1850
 B. Headed for extinction because of the population explosion about 1930
 C. Regulated by density-dependent factors, as there appears to be a 10-year cycle of sharp declines in size
 D. Shifting from *K*-selected strategy to an *r*-selected strategy
 E. Stable after 1850 under the effects of density-dependent regulating factors

57. The dashed line (C) on the graph represents the:
- A. Maximum population size
 - B. Environments carrying capacity
 - C. Point of maximum effect for density-independent factors
 - D. Average birth rate
 - E. Biotic potential of the population

For questions 58-61 choose from the following answers:

- A. Tropical rainforest
- B. Savanna
- C. Temperate deciduous forest
- D. Taiga
- E. Chaparral

58. Forests of cold climates of high latitudes and altitudes, acid soil

59. Warm year –round, prolonged dry seasons, scattered trees. **Ans is B not C.**

60. Low biodiversity due to lots of shade limiting food for herbivores. Four seasons & major resource for timber

All full credit. B is not correct. Not clear on choices.

61. Mild climate, fire a key factor, located near coastlines

62. Whether an area supports a grassland or deciduous forest depends primarily on

- A. Changes in temperature
- B. Latitude north & south of equator
- C. Consistency of rainfall year to year and effect it has on fires
- D. Changes in length of growing season

63. In the carbon cycle, which of the following carbon compounds would be utilized as energy by heterotrophs?

- A. Calcium Carbonate (CaCO₃)
- B. CO₂
- C. Organic Molecules
- D. Carbonic Acid

64. All of the following statements concerning characteristics of predator-prey relationships are correct **EXCEPT**:

- A. A rise in the population of prey is often followed by a rise in the population of predators
- B. A rise in the population of predators is followed by a decrease in the population of prey
- C. Camouflage is an adaptation that protects prey
- D. Production of large numbers of offspring in short periods of time ensures survival of some prey populations
- E. The population of predators most often eliminates the population of prey

Use the diagram below to answer questions 65-67 The organisms in the boxes on the right correspond to the letters alongside each on their right side.

Classify the organisms by their metabolic strategies

65. Which organisms would be appropriately found in the Venn Diagram section labeled **Heterotrophs** only?

- A. A & B
- B. B & D
- C. D & E
- D. B & C
- E. B & E

66. Which organisms would be found in the Venn Diagram section labeled **Autotrophs** only?

- A. A & C
- B. A & D
- C. D & E
- D. B & C
- E. B & E

67. Which organism would be appropriately found in the Venn Diagram section labeled **both**?

- A. Fern
- B. Euglena
- C. Grass
- D. Paramecium
- E. Yeast

68. All of the **potential conditions** under which an organism could conceivably survive and reproduce constitute it's

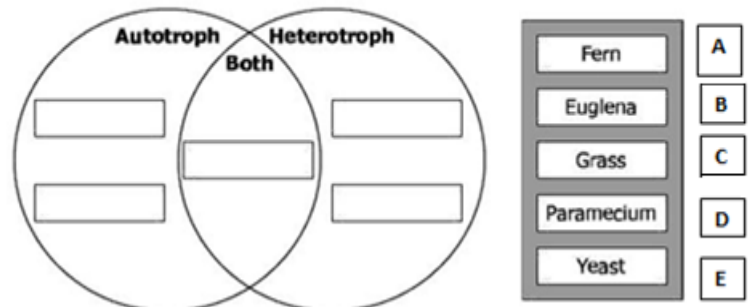
- A. Habitat
- B. Realized niche
- C. Fundamental niche
- D. Resource partition

69. All of the **actual conditions** under which an organism survives & reproduces in a given ecosystem constitute it's

- A. Habitat
- B. Realized niche
- C. Fundamental niche
- D. Resource partition

70. The biggest threat to species is:

- A. Low reproductive rates
- C. Collecting, hunting, & poaching Alien, invasive species



B. Alien, invasive species

D. Loss of habitat

E. Disease

NEW JERSEY SCIENCE LEAGUE

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

Date: Jan 12, 2017

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

Environmental Science 70 multiple choice questions per exam. **Open to all students.**

JANUARY TEST: Scientific method, correlations, statistics, models, graphing & interpreting graphs. **Earth** - Geologic time scale; plate tectonics, earthquakes, glaciers, volcanism; seasons; solar intensity & latitude **Systems- Atmosphere, geosphere, hydrosphere:** Composition; structure; weather & climate; air and water circulation & patterns, Biogeochemical cycles (focus on nitrogen & carbon) **Energy** - GPP and NPP, energy webs, pyramids, trophic levels; **Ecosystem Structure** - Biological populations, distribution, ecological niches; species interaction; keystone species; species diversity, major biomes. **Population** - Population concepts, density, carrying capacity; reproductive strategies; survivorship.

FEBRUARY TEST- Human population dynamics: Demographic transition, distribution; growth rates, doubling times; age-structure diagrams. **Succession, Bio-magnification. Soil and Soil Dynamics** - Rock cycle; composition; physical & chemical properties; soil types; types and definitions of erosion and soil triangle graph. **LAND USE - Agriculture** – **Methods of agriculture;** genetic engineering, crop production; deforestation; irrigation; sustainable agriculture methods, pest control methods Including emphasis on IPM; **Public and federal lands Use-** forest, land & fire management and issues like overgrazing; deforestation; desertification; salinization, urbanization, and soil conservation techniques. Plus 5 question review of Jan Topics

MARCH TEST: Mining: methods, and effect of mining on water and soil, **Fishing** – overfishing and techniques, aquaculture, **Water resources, use, pollution** – ocean zones, freshwater/saltwater concepts; understanding eutrophication process, causes and effects, surface & groundwater issues- fracking, irrigation; **Waste-Wastewater** treatment process, point & non-point pollution, water's role in bioaccumulation and aquatic food webs, environmental health issues **Biodiversity** issues. Plus 10 question review of Jan & Feb 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; negative and positive feedback loops; **Energy** – traditional and renewable forms, advantages/disadvantages; power; conversions; safety issues; radiation & health; radioactive wastes; Plus 15 question review of Jan, Feb, and March topics.

Dates for 2017 Season

Thursday January 12, 2017 Thursday February 9, 2017

Thursday March 9, 2017 Thursday April 13, 2017

All areas and schools must complete the April exam and mail in the results by April 28th, 2017

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 2018 Season

Thursday January 11, 2018 Thursday February 8, 2018

Thursday March 8, 2018 Thursday April 12, 2018

NJSL Environmental Science

February 9, 2017 **GREEN TEST** Corrections:

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

1. An environmental student sampled soil from her home and determined that the sample contained: 30% clay, 20 % silt and 50% sand. Using the soil texture chart provided, what would her soil sample be classified as?

- A. Silty clay loam
- B. Clay loam
- C. Sandy clay loam
- D. Clay
- E. Sandy Loam

2. Which of the following best explains why agricultural production on floodplains is often relatively high?

- A. On floodplains, soils tend to be nutrient-rich and fertile
- B. On floodplains, high water tables make irrigation unnecessary
- C. Periodic flooding leaches toxic pollutants out of floodplain soils
- D. Periodic flooding prevents the pH of floodplain soils from becoming too high
- E. Floodplains are usually sparsely settled and thus more acreage is available for agriculture.

3. The water-holding capacity of soil is LEAST likely to be affected by the addition of which of the following?

- A. Clay
- B. Humus
- C. Manure
- D. Pesticide
- E. Sand

4. Which of the following is likely to minimize soil erosion?

- A. High-yield crops
- B. Deforestation
- C. Herbicide use
- D. Annual plowing
- E. No-till agriculture

5. Very sandy soils are **not** good for agriculture because of their poor:

- A. Water holding capacity
- B. Aeration
- C. Workability
- D. None of these reasons

Refer to the letters which identify biome soils in order to answer questions 6-10:

- A. Desert soil
- B. Grassland soil
- C. Tropical rainforest soil
- D. Taiga forest soil
- E. Deciduous forest soil

6. Soil that has a substantial organic layer: fire helps breakdown plant material in this layer

7. Soil is acidic due to needle accumulation

8. Rocky and dry this soil has very little organic matter

9. Soil is acidic with little organic matter even though it has a very large plant population

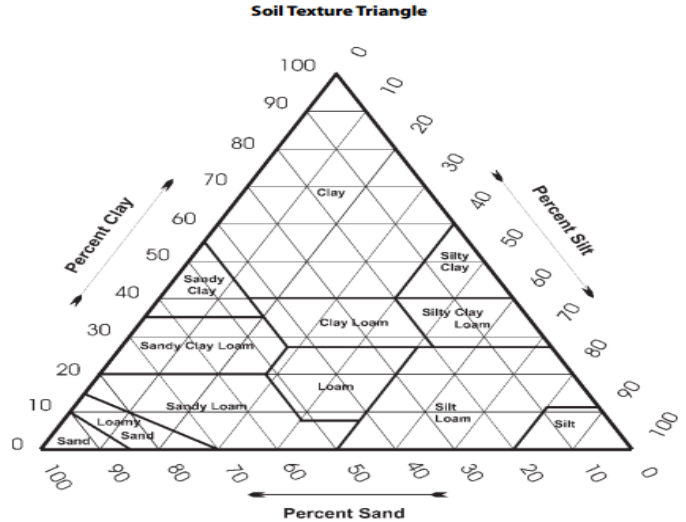
10. Soil is rich in humus and partially decayed leaves.

11. If a soil has the ability to hold high amounts of water and gases in its pore spaces, then it is said to have...

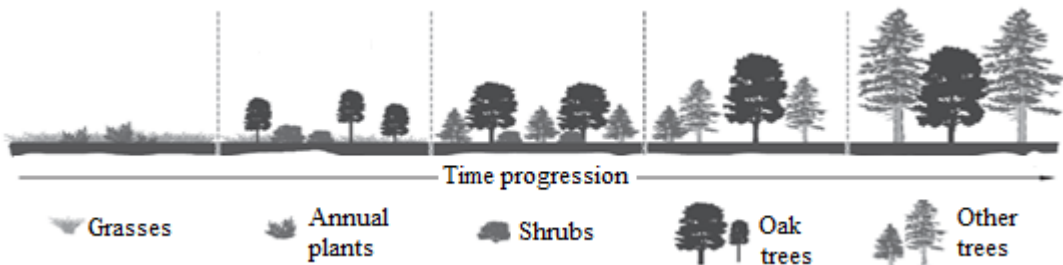
- A. High soil porosity
- B. Low soil porosity
- C. High soil permeability
- D. Low soil permeability

12. Which of the following correctly describes the forestry process of clear-cutting?

- A. Some mature trees are left to shade younger trees
- B. Only commercially valuable tees are cut down
- C. A few mature trees are left to reseed the land after cutting
- D. Almost all trees are uniformly cut down

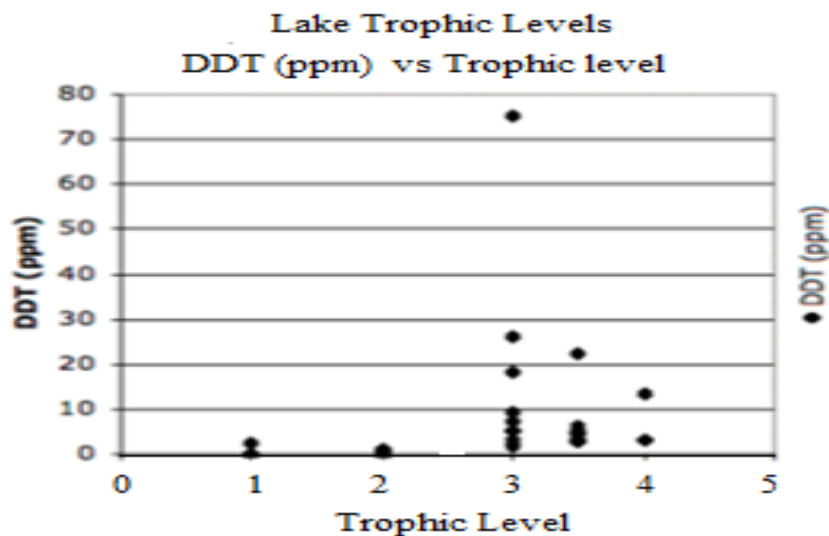


20. At the end of 13 days which solution has a decreasing rate of duckweed growth?
- N-P-K solution
 - Distilled water
 - Pond water
 - Nitrate solution
21. Of the following, which is the best example of reclamation of disturbed lands?
- Restoring vegetation to an area that has been mined
 - Constructing a new wetland to compensate for the loss of wetlands
 - Growing crops on land formerly used for grazing
 - Reintroducing an endangered species into an area from which it has disappeared
 - Regulating the use of a natural resource in order for it to renew itself
22. As urbanization increases and natural soil surfaces are covered, the groundwater supply is reduced due to
- Increased evaporation & transpiration
 - Loss of recharge area
 - Capping of artesian wells
 - Confinement of aquifers
 - Decreased runoff
23. The diagram below shows the progression of events after a fire in an ecosystem. Based on the diagram, which of the following best explains why oak trees are later replaced by other trees?



- Eventually the other trees grow taller than the oak trees & form a dense canopy that shades the understory.
 - Oak trees alter the pH of the soil, making the forest better suited for shrubs and other trees.
 - Roots of shrubs proliferate in the soil of the forest and prevent the oak trees from obtaining water.
 - Oak trees succumb to environmental pollutants more rapidly than do either the shrubs or the other trees.
24. Fire has which of the following effects on a typical forest community?
- It causes all of the plants and animals in the community to become dormant
 - It recycles dead plant material, thus nutrients become available
 - It prevents reestablishment of the prefire community
 - It allows for increased mutation rates in the surviving species
 - It forces predators to become omnivores
25. A state highway was constructed over wetlands. The state obtained a permit to fill the existing wetlands in accordance with the provisions of the Clean Water Act of 1972, and agreed to create another wetland. This trade-off approach to addressing an environmental issue is known as
- Mitigation
 - Restoration
 - Preservation
 - Remediation
 - Sustainability
26. Industrialized agriculture differs from the more traditional agriculture by a small farmer because
- Crop are grown on small plots
 - Uses human labor to harvest crops
 - It uses large amounts of fossil fuels, pesticides & water
 - Rows of crops are interspersed between rows of trees
27. An organic farmer has decided to rent part of his neighbor's field to grow a little extra squash, but his neighbor just sprayed the field with 300 kg of Seed Stopper, a very effective weed preventer that inhibits germination. Seed Stopper has a half-life of 47 days. The field would be fine to use so long as less than 6% of the pesticide remained. About how many months would the farmer have to wait to plant his crop?
- Two months
 - Three months
 - Six months
 - Eight months
 - 11 months

The graph below shows the trophic levels of DDT consumed in a lake ecosystem. Use the graph below with questions 28, 29, and 30.



28. What is indicated by the numbers along the x-axis of the graph, labeled “trophic level?”
- As you go from left to right, organisms are feeding at higher levels of the food chain.
 - Higher trophic levels indicate smaller organisms
 - The consumers are to the left and the producers to the right
 - Trophic levels indicate the position in the ecosystem; lower level organisms live at the bottom of the lake, higher level organisms at the surface of the lake
29. What would be the approximate average concentration of DDT in a fish at trophic level 3?
- 0 ppm
 - 5-10 ppm
 - 10-40 ppm
 - 75 ppm
30. If you want to consume less DDT, which would be the better meal?
- 100 g of fish from trophic level 2
 - 1,000 g of fish from trophic level 2
 - 100 g of fish from trophic level 4
 - 1,000 g of fish from trophic level 4
31. The half-life of DDT is 15 years. If you apply 150 kg of DDT, how much will remain after 90 years?
- 75 Kg
 - 37.5 kg
 - 9.375 kg
 - 2.34 kg
 - None of these are correct
32. What benefits do insects provide?
- Pollination
 - Waste removal
 - Predator/Parasite of Pests
 - Valuable products
 - All are benefits of insects
33. What strategies does Integrated Pest Management (IPM) include?
- Ecological
 - Genetic/biological
 - Mechanical & chemical
 - Bio-rational chemicals
 - Cultural
- All of the above
 - Only I, II, and III
 - Only II, III, IV, and V
 - Only V
34. Plants exposed to pollutants over a long time may become more susceptible to disease or insect attack. Which of the following best explains this observation?
- Competitive exclusion
 - High biotic potential
 - Synergistic effect
 - Development of resistance
 - Greenhouse effect.
35. What type of farm activity can increase particulate air pollution?
- Pesticide aerosol from crop spraying
 - Dust from field erosion
 - Methane production from animal waste piles
 - Organic gasses that create odor in animal feedlots

36. In the nitrogen cycle, transformation of nitrogen gas to nitrogen-containing compounds is performed primarily by
 A. Fungi B. Carnivores C. Green plants D. Herbivores E. Bacteria

Select from the following to answer questions # 37-41

A. Tropical rain forest B. Temperate grassland C. Arctic tundra D. Taiga E. Desert

37. Permafrost; temperatures range from approximately -50°C to $+25^{\circ}\text{C}$; a growing season of 60 days or less
 38. Over 10 inches of precipitation per year; long, cold winters & short summers; dominant vegetation is gymnosperm
 39. Lack of water common in summer; seasonal temperature variations; maintained by periodic fires
 40. Less than 10 inches of precipitation annually; extremes of hot & cold through the year; large rapid daily temperature variation
 41. This biome has the greatest diversity of species.

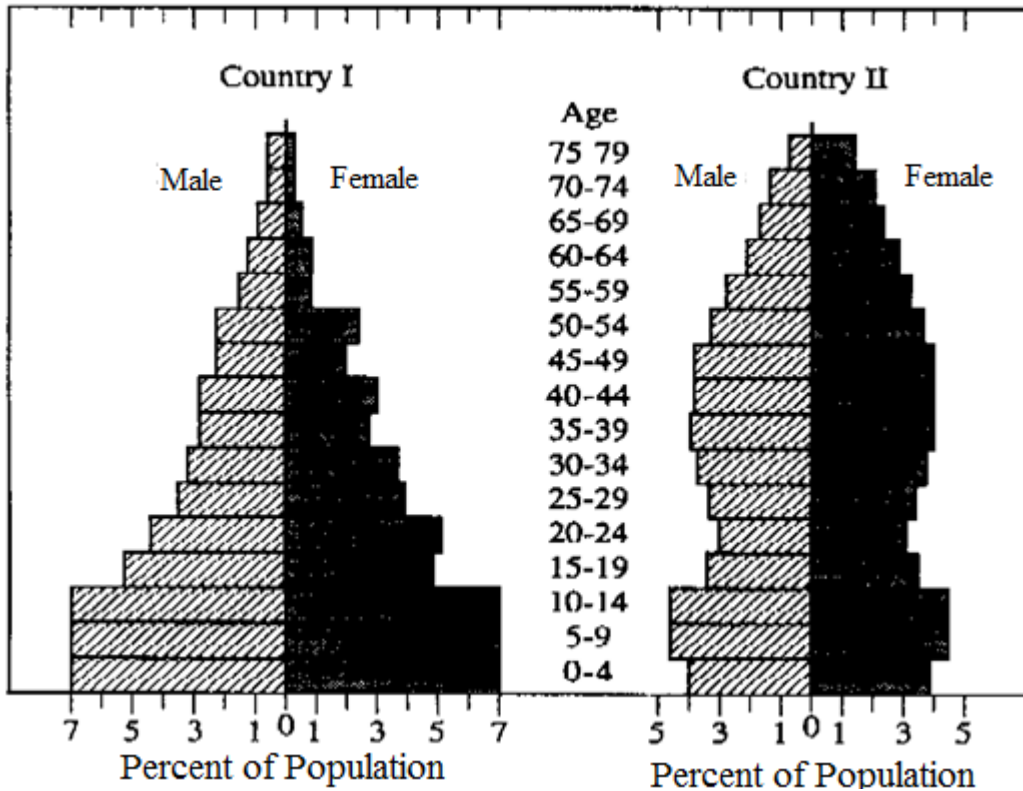
42. In the carbon cycle, all of the following organisms carry out both cellular respiration and photosynthesis **except**. **D** is correct Not C.

- A. Cyanobacterium C. Photosynthetic protist (ex. Euglena) & Algae
 B. Lichens D. Chemoautotrophs in ocean thermal vents E. CO_2 fixing bacterium

43. A country currently has a population of 100 million and an annual growth rate of 3.5%. If the growth rate remains constant, what will the population be in 40 years?

- A. 100 million B. 200 million C. 400 million D. 800 million E. 350 million

Questions #s 44-48 refer to the following graphs. The illustrations below show the age and sex of the human populations in Country I and Country II. The ages are grouped by 5-year classes, and the sexes are represented separately. The percentages in the different age classes are shown by the relative widths of successive horizontal bars.



44. Using the graphs above which country has the fastest growth?

- A. Country I B. Country II C. Countries I and II D. Neither of these countries.

45. Approximately what percentage of the individuals in Country I were younger than 15 years of age?

- A. 10% B. 21% C. 42% D. 63% E. None of these choices

46. Which letter below best approximates the ratio of males to females among individuals below 15 years of age?

- | | | | | | |
|----|------------------|-------------------|--|------------------|-------------------|
| | <u>Country I</u> | <u>Country II</u> | | <u>Country I</u> | <u>Country II</u> |
| A. | 1 : 1 | 1 : 1 | | C. 0.5 : 1 | 0.5 : 1 |
| B. | 0.75 : 1 | 0.75 : 1 | | D. 1 : 1 | 0.5 : 1 |

47. If, in Country I, infant mortality declined & birth rate remained the same, then initially the population would

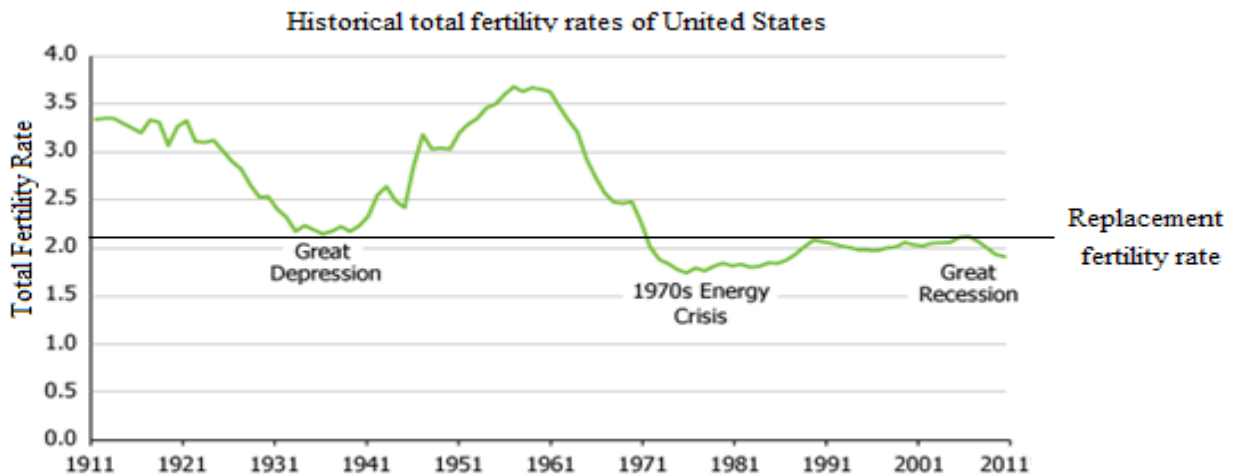
- A. Be more evenly distributed among the age classes
- B. Be even more concentrated in the young age classes
- C. Stabilize at the illustrated level for all age classes
- D. Increase in the oldest age classes
- E. Increase in the median age classes

48. Over the next 10-15 years, the stabilization of Country I's population at its current size would require that

- A. Infant mortality be reduced to about half the present level
- B. The death rate be reduced drastically
- C. Each couple produces fewer children than the number required to replace themselves
- D. About 15 years be added to the life expectancy of each person
- E. Couples have an average of only 3 children

49. The graph below is the total fertility rate of the United States from 1911 to 2011. According to this graph the replacement fertility rate for the most part remained below the replacement level (2.1) from the early 70s to the Great Recession. The population of the United States continued to grow during this time period.

What was the reason for the continued growth?



A. immigration B. emigration C. migration D. Both B and C E. none of these choices.

50. Using the graph in #49 what stage of demographic transition is the United States presently in?

- A. industrial B. postindustrial C. preindustrial D. transitional

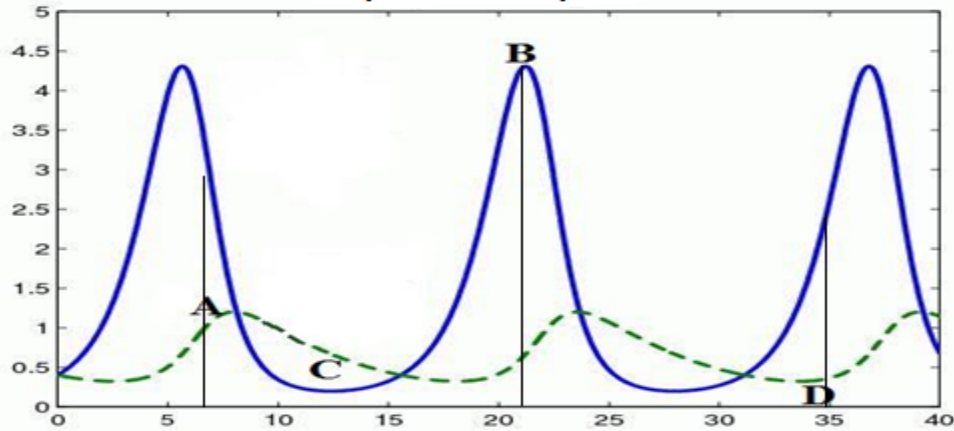
51. Declining death rates due to increased food production and improved medical care while birth rates remain high is characteristic of what demographic transition stage?

- A. Pre-Industrial B. Stabilization C. Transitional D. Post-Industrial E. Transitional

52. The demographic transition is a (n)

- A. untested hypothesis B. natural law C. model based on observed patterns D. international law.

Prey-Predator Cycles



53. For this graph on predator-prey relationship what should the axis be labeled? What information is missing from this graph & where does it belong? X represents X-axis; Y represents Y-axis.

- A. Time: X & Population #: Y
- B. Time: X & Carrying Capacity: Y
- C. Carrying Capacity: X & Time: Y
- D. Population #: X & Time: Y

54. A line has been drawn down from point B to the X-axis. Which statement below is true about predator prey relationship?

- A. Both populations are decreasing.
- B. The prey population is growing while the predator population is declining.
- C. The prey population is at a peak, while the predator population is growing.
- D. Both populations are declining.

55. Which letter on the graph is the prey population about at its highest level?

- A. Point A
- B. Point B
- C. Point C
- D. Point D
- E. none of these

56. Which statement below describes a country that is **not** expected to grow quickly in the near future.

- A. A pyramid shaped age structure diagram
- B. High female literacy
- C. A female to male ratio of 1.2 to 1
- D. None are applicable

57. The distribution of the number of amphibians present in this figure below is largely influenced by?

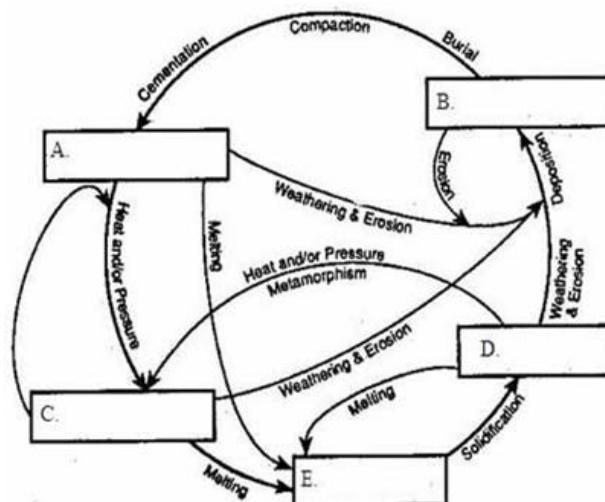
- A. Climate
- B. Competition among same species
- C. Disturbance
- D. Predation
- E. None are correct

Distribution of Amphibians on North American Continent



Below is a diagram of the rock cycle in the Earth's Crust. Use the diagram and choices below for questions 58-61.

- A. Metamorphic rock
- B. Igneous rock
- C. Sedimentary rock
- D. Magma
- E. Sediments



58. The box in the rock cycle diagram labelled A corresponds to answer letter _____
59. The box in the rock cycle diagram labelled B corresponds to answer letter _____
60. The box in the rock cycle diagram labelled C corresponds to answer letter _____
61. The box in the rock cycle diagram labelled E corresponds to answer letter _____
62. Carbon is stored in the rock cycle in sedimentary rocks of limestone, dolomite, and chalk. Which of the following has shifted the storage of carbon from sedimentary rocks to the atmosphere?
 A. Combustion of fossil fuels B. mining of coal C. Extraction of crude oil D. soil erosion.
63. What processes can change igneous rocks into metamorphic rocks?
 A. Extruding and Cooling B. Heat & Pressure C. Weathering & Erosion D. Compaction & Cementation
64. What allows scientists to categorize rocks into the three rock types: igneous, sedimentary and metamorphic?
 A. process of deformation B. involvement of sediment C. process of formation
 D. weathering E. process of filtration
65. Which of the following would you most likely expect to see in a community with a large number of specialist species?
 A. Large niche overlaps B. Small niche breadths C. Large niche breadths D. Increased ranges of resources
66. Which of the following is/are acceptable means of estimating primary productivity?
 A. Carbon dioxide uptake B. Oxygen production C. Carbon -14 uptake
 D. A and B only E. A, B, and C are correct
67. Within a given bird species, individuals that breed at higher latitudes produce a single, large clutch of eggs. Those at lower latitudes produce multiple clutches with fewer eggs. This is most likely due to which of the following:
 A. seasonal patterns of resource availability C. differences in age of parents
 B. differences in body size D. cost of migration
68. An organism has type III survivorship. If 50% of its eggs were eaten by a predator, then what effect would this result in?
 A. devastating, since such a loss could not be recovered.
 B. inconsequential because such losses are common in type III survivorship.
 C. the parents relocating to avoid the predator or face extinction.
 D. inconsequential because the parents can compensate for the losses by increasing their nurturing of the remaining eggs.
69. In a country where there are increasingly more household ownership, _____.
 A. Consumption will decrease C. Population growth rates should increase
 B. Consumption will increase D. Birth rate will increase E. Birth rates will remain constant
70. Countries that have entered the third stage of demographic transition are most probably characterized by
 A. Weak or developing economies C. Social conditions that favor smaller families
 B. Death rates that far exceed birth rates D. Populations with a high proportion of young people

NEW JERSEY SCIENCE LEAGUE
Environmental Science Answer Key: Green test.

Date: Feb 9, 2017 **Corrections:**

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

Environmental Science 70 multiple choice questions per exam. **Open to all students.**

JANUARY TEST: Scientific method, correlations, statistics, models, graphing & interpreting graphs. **Earth** - Geologic time scale; plate tectonics, earthquakes, glaciers, volcanism; seasons; solar intensity & latitude **Systems- Atmosphere, geosphere, hydrosphere:** Composition; structure; weather & climate; air and water circulation & patterns, Biogeochemical cycles (focus on nitrogen & carbon) **Energy** - GPP and NPP, energy webs, pyramids, trophic levels; **Ecosystem Structure** - Biological populations, distribution, ecological niches; species interaction; keystone species; species diversity, major biomes. **Population** - Population concepts, density, carrying capacity; reproductive strategies; survivorship.

FEBRUARY TEST- Human population dynamics: Demographic transition, distribution; growth rates, doubling times; age-structure diagrams. **Succession, Bio-magnification. Soil and Soil Dynamics** - Rock cycle; composition; physical & chemical properties; soil types; types and definitions of erosion and soil triangle graph. **LAND USE - Agriculture – Methods of agriculture;** genetic engineering, crop production; deforestation; irrigation; sustainable agriculture methods, pest control methods Including emphasis on IPM; **Public and federal lands Use-** forest, land & fire management and issues like overgrazing; deforestation; desertification; salinization, urbanization, and soil conservation techniques. Plus 5 question review of Jan Topics

MARCH TEST: Mining: methods, and effect of mining on water and soil, **Fishing** – overfishing and techniques, aquaculture, **Water resources, use, pollution** – ocean zones, freshwater/saltwater concepts; understanding eutrophication process, causes and effects, surface & groundwater issues- fracking, irrigation; **Waste-Wastewater treatment process,** point & non-point pollution, water’s role in bioaccumulation and aquatic food webs, environmental health issues **Biodiversity** issues. Plus 10 question review of Jan & Feb 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; negative and positive feedback loops; **Energy** – traditional and renewable forms , advantages/disadvantages; power; conversions; safety issues; radiation & health; radioactive wastes; Plus 15 question review of Jan, Feb, and March topics.

Dates for 2017 Season

Thursday January 12, 2017 Thursday February 9, 2017

Thursday March 9, 2017 Thursday April 13, 2017

All areas and schools must complete the April exam and mail in the results by April 28th, 2017

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 2018 Season

Thursday January 11, 2018 Thursday February 8, 2018

Thursday March 8, 2018 Thursday April 12, 2018

NJSL Environmental Science **Corrections**

March 9, 2017 **GREEN TEST**

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

A scientist is interested in producing transgenic agricultural crops that can be grown in fields irrigated with seawater. Genes for salt tolerance were isolated from a salt marsh plant and inserted into the genomes of four agricultural crops: rice, corn, soybeans, and wheat. The resulting transgenic plant seedlings were grown hydroponically in a nutrient medium containing 0.5%, 1.0%, 1.5%, or 2.0% sodium chloride (NaCl). The total biomass of the resulting plants were determined after 21 days. The table below shows these results compared to non-transgenic plants grown under the same conditions.

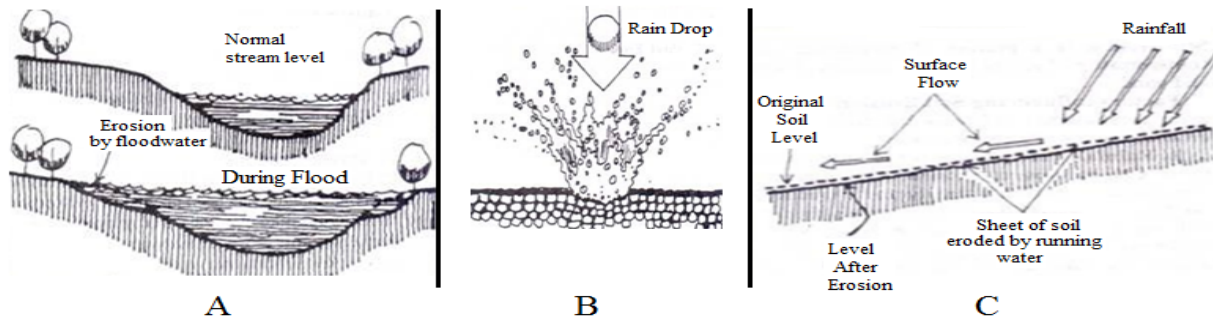
	Percent Increase in Yield of Transgenic Plants Compared to Control Plants			
% NaCl	Rice	Corn	Soybeans	Wheat
0.5	27%	22%	33%	44%
1.0	18%	44%	34%	59%
1.5	12%	37%	31%	63%
2.0	5%	18%	29%	21%

- Which of the following conclusions is best supported by the data presented in the table above?
 - The yield of transgenic plants is greater than that of non-transgenic plants grown in fresh water
 - For these four plants as the salt concentration increased the biomass of each plant increased.
 - Seawater is not a viable replacement for freshwater in growing agricultural crops
 - The concentration of salt tolerated is species specific
- As the salt concentration increased which plant had a steady decreasing % growth (negative slope)?
 - Rice
 - Corn
 - Soybeans
 - Wheat
- How can this experiment be improved?
 - record the time of plant growth in terms of days
 - test the same plants in fresh water
 - record the daily mass change of the plants for 42 days instead of 21.
 - repeat the experiment using % NaCl in 0.2% increments.

Match the type of erosion from this list with the correct definition:

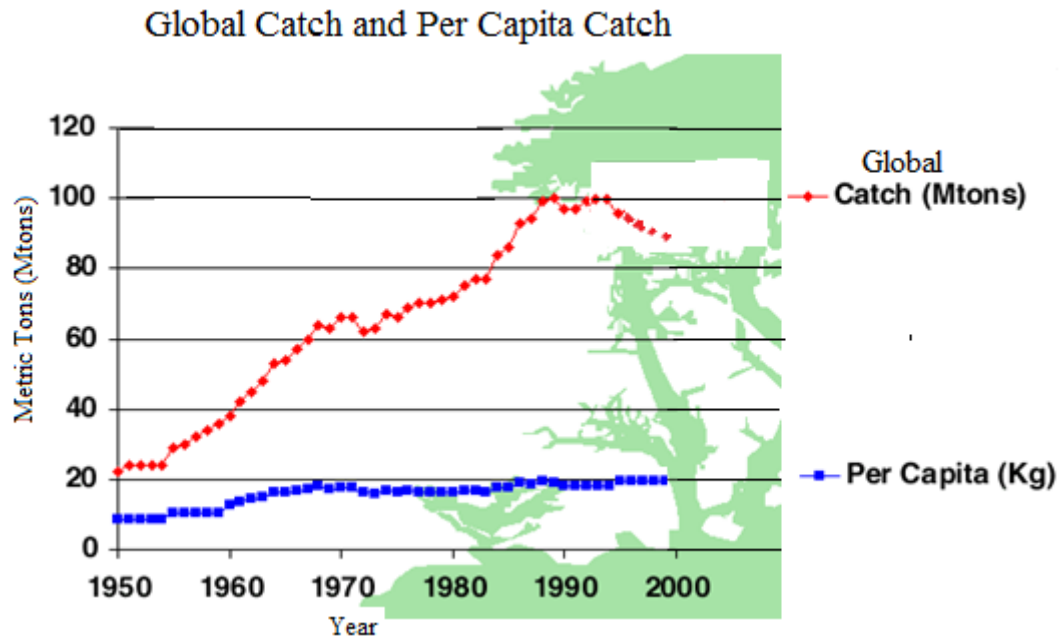
- Streams & rivers change their courses by cutting one bank & depositing the silt loads on the others.
 - Sheet
 - Stream Bank
 - Gully
 - Slip
- This erosion occurs when soil is removed uniformly in a thin layer from the entire surface area.
 - Sheet
 - Stream Bank
 - Gully
 - Slip
- Landslides cause erosion. Large masses of soil and rock slide down a hill, thus damaging the fields in the foothills, destroying telephone lines, and other forms of communication.
 - Sheet
 - Stream Bank
 - Gully
 - Slip

7. The images below are about different types of erosion. What type of erosion does image A represent?



- A. Sheet B. Stream Bank C. Splash D. wind erosion
8. Image B represents what type of erosion?
 A. Sheet B. Stream Bank C. Splash D. wind erosion
9. Image C represents what type of erosion?
 A. Sheet B. Stream Bank C. Splash D. wind erosion

Perhaps one of the largest problems for marine resource sustainability is the increasing demand for fish products. The global consumption of fish has doubled since 1973. Stocks are consistently overfished, threatening to completely collapse populations of fish around the world. Below is a graph of the total catch (top line) and the per capita catch (bottom line) since 1950. Use the graph of global and absolute fish catch as of 2006 to answer the following:



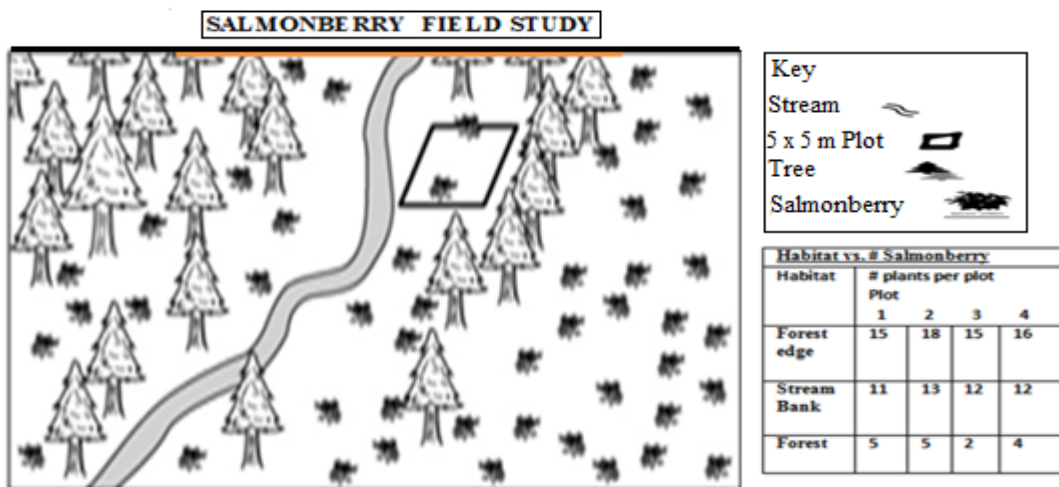
10. The total global catch appears to:
 A. Have stabilized around 1970 at 20 Mtons
 B. Increased through the 1980's and then sharply decreased since the late 1980's
 C. Has risen exponentially and continues to do so
 D. Steadily Risen until about 1990.

11. All of the following contribute to over fishing. Which one does not?
- By-catch
 - Trawler nets
 - Casting of drift nets into international waters
 - Increasing zones for aquaculture.
12. In 2009, aquaculture contributed 50 % of total fish consumed globally. There are serious questions about sustainability of aquaculture. These include which of the following:
- Proliferation of diseased fish.
 - weaker stocks and less genetic diversity
 - eutrophication of coastal zones
 - All of these
13. Starting in during the mid nineties global catch began to decline. What is the major cause?
- acid rain
 - escalating price of diesel for boats
 - overfishing
 - decline in market price

Salmonberry plants can be found all along the Pacific coast and serve as a food source to many animals like humming birds, other birds, deer and bear. A field study was conducted to learn about the salmonberry plant populations in different habitats in Washington. The procedures followed in the study are:

- Record location, date, time and temperature of field study area
- Choose a random location in the forest edge area.
- Measure a 5 x 5 meter plot and label as Plot 1 – forest edge area
- Count & record the number of salmonberry plants in Plot 1
- Repeat steps 2-4 for plots #2 & #3, choosing a new location in the forest edge area for each plot.
- Repeat steps 1 through 5 for the stream bank and forest habitats.
- Calculate and record the average number of salmonberry plants for each habitat.

Data: **Location:** Forest edge area, forest & stream bank.
Date/time: May 1st -11 AM to 2 PM **Temp:** 10 -15 °C



14. How could this field study be improved?
- Choose another area that has similar conditions as in the first study.
 - Use 3 (1 x 1) meter plots in each habitat
 - Count the number of trees in the field study area
 - Count all habits in the field study at the same time on the same day.

15. Which output from bears is used by salmonberry plants?
 A. Bears help distribute salmonberry seeds. C. O₂ from bears is used for plant photosynthesis
 B. H₂O from bears is used for plants respiration D. Glucose from bears is used for respiration in plants
16. Blackberry plants are found at forest edge habitats. How could blackberry plants limit the population of salmonberry plants?
 A. Blackberry plants produce purple berries
 B. Blackberry plants compete for the same resources
 C. Blackberry plants improve oxygen in an ecosystem
 D. Blackberry plants lack flowers that attract bees
17. Based upon the data table which area produces the most Salmonberry plants?
 A. Forest edge B. Stream bank C. Forest
18. Salmonberry plant roots absorb minerals. What cellular process moves minerals across root cell membranes from an area of low mineral concentration to an area of high mineral concentration?
 A. Facilitated diffusion B. Passive transport C. Active transport D. Osmosis
19. Scientists wondered how the presence of the new type of grass could affect the population of salmonberry plants in a forest ecosystem. What kind of investigation would be most appropriate to answer this question?
 A. A field study because factors that are hard to control could influence the results
 B. A research paper because information is available about many kinds of plants
 C. A controlled experiment because all the variables can be kept the same
 D. A simulation because computers are more reliable than natural systems

Use the following answers for questions 20 through 24. Select the one lettered choice that best fits each statement.

- A. Heap leach extraction B. Electrolysis C. Electrostatic precipitation D. Reverse osmosis
 E. Bioremediation
20. Use to obtain fresh water from the sea
21. Used to refine aluminum
22. Process which uses cyanide solutions to extract gold from ore
23. Uses bacteria to digest toxic wastes
24. Removes particulate for air
25. An advantage of recycling aluminum rather than disposing of it in landfills is that aluminum can be
 A. Produced from recycled metal using much less energy than required for its production from aluminum ore
 B. Produced from ore that is chemically reactive and dangerous to transport, store, and process (
 C. Produced from ore that is scarce and found primarily in remote, inhospitable regions at high latitudes
 D. Absorbed by plants and then biomagnified in both terrestrial and aquatic food chains
 E. Leached from landfills in the form of Al³⁺ ions that could increase the pH of lakes and streams
26. Economic benefits of building large dams include which of the following?
 I. Storage of water for agriculture and domestic use
 II. Controlling floods upstream
 III. Production of renewable energy
- A. I only B. I and III only C. II only D. II & III only E. I, II, and III

36. Of the five tanks which is the control? Use the tank letters in the data table.
37. How could the results of this experiment be improved?
- A. Eliminate tank A, because the DO remained the same
 - B. Instead of fresh water use salt water.
 - C. Repeat the experiment several times
 - D. Increase the amount of green algae with tank E having the greatest amount.
38. Managing game species for sustained yields would be consistent with what conservation approach?
- A. Holistic Approach
 - B. Gaming Approach
 - C. Species Approach
 - D. Wildlife Management Approach
39. The reason that sea and land breezes form is:
- A. Land heats & cools more slowly than the water
 - B. Land heats & cools more quickly than the water
 - C. Air moves more easily over water than over land
 - D. Air moves more easily over land than over water.
40. The major source of radon in houses in the NJ and other areas of the United States is
- A. Furniture and carpets
 - B. Fossil fuel combustion
 - C. Underlying bedrock
 - D. Nuclear power plants

Two junior scientist are proposing two hypothesizes regarding eutrophication. Read the following scenario in order to answer questions # 41-45

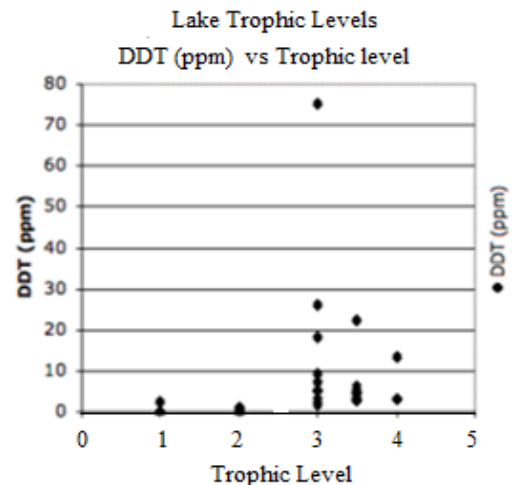
Junior Scientist 1 hypothesizes: The root cause of eutrophication is not known. However, the frequency and increasing incidents of eutrophication point to human farming activity as the potential cause. The growth of the phytoplankton is caused by runoff that contains multiple sources of nitrates that are also found in fertilizer. The nitrates allow for the phytoplankton to grow rapidly. The solution to the problem is to either move the drainage so the runoff from the human farming activity cannot reach the water source or move the farms.

Junior Scientist 2 hypothesizes: Eutrophication can happen naturally without any real cause. Sometimes when there are periods of heavy rain, the increase in rain water leads to an imbalance in the pH of the water. This in turn creates favorable conditions for the phytoplankton to grow and proliferate. This is a natural cycle that also ensures that too many fish and other animals do not build up in a freshwater source. This type of bloom is nature's way of eliminating overpopulation with an abiotic factor. Although many organisms will die as a result, it will help to thin the numbers of organisms and ensure a healthier freshwater source.

41. In her hypothesis, junior scientist 1 indicates the cause of eutrophication is
- A. A change in the pH of the water
 - B. Run-off from farms & agricultural activities
 - C. The increasing changes in phytoplankton
 - D. The build-up of phosphates
42. There is disagreement between the two hypotheses about eutrophication. The main point of disagreement is the:
- A. Source of nitrogen
 - B. Effects of the lack of dissolved oxygen
 - C. Root cause of eutrophication
 - D. Effects of the plant life in the aquatic setting

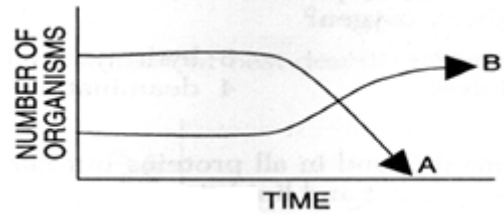
43. Both scientists would agree that eutrophication is
- Algae that will occasionally grow in aquatic ecosystems due to human activities
 - A bloom of phytoplankton that grows in response to high levels of phosphates
 - A large build-up of algae that grows rapidly in a body of water
 - An explosion of algae due to natural factors and the need to reduce overpopulation
44. According to junior scientist 2, eutrophication is necessary for
- Natural control of the pH of aquatic waters
 - Control of overpopulation
 - A normal pond process in response to farm land runoff
 - Rejuvenation of aquatic life, thriving during such an event.
45. Junior scientist 1 mentions farming and agriculture in order to:
- Shows humans changing natural waterways is bad
 - Bolster the idea that humans causing a change in pH of water can lead to eutrophication
 - Bolster the idea that human activity such as farming increases nitrates leading to eutrophication
 - None of these choices
46. The end result of a severe eutrophication event will always be:
- A re-growth of new life because of nitrates in water
 - The death of phytoplankton when it over-accumulates
 - A massive die-off of both plant & animal life in the aquatic environment
 - The growth of more plant life in the water as they grow well with plankton
47. What is indicated by the numbers along the x-axis of the graph, labeled “lake trophic level?”

- As you go from left to right, organisms are feeding at higher levels of the food chain.
- Higher trophic levels indicate smaller organisms
- Trophic levels indicate the position in the ecosystem; lower level organisms live at the bottom of the lake, higher level organisms at the surface of the lake
- The consumers are to the left and the producers to the right



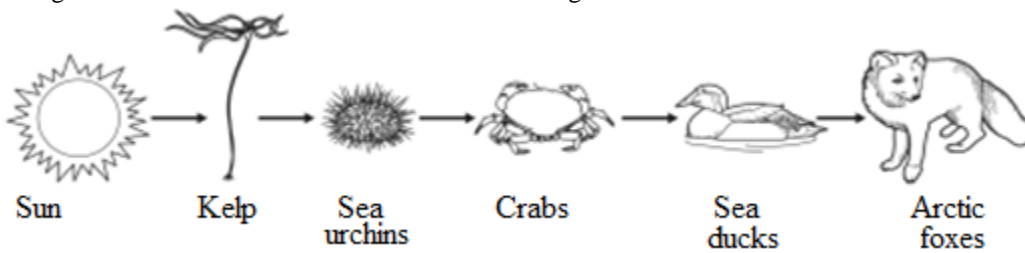
48. What would be the approximate average concentration of DDT in a fish at trophic level 3?
- 0 ppm
 - 5-10 ppm
 - 10 ppm
 - 10-40 ppm
49. If you want to consume less DDT, which would be the better meal?
- 100 g of fish from trophic level 2
 - 1,000 g of fish from trophic level 2
 - 100 g of fish from trophic level 4
 - 1,000 g of fish from trophic level 4
50. The half-life of DDT is 15 years. If you apply 150 kg of DDT, how much will remain after 90 years?
- 0.75 Kg
 - 0.375 kg
 - 9.375 kg
 - 2.34 kg
 - None of these are correct

51. The graph below shows that changes in two populations of herbivores in a grassy field. A possible reason for these changes is that



- A. All of the plant populations in this habitat decreased
- B. Population B competed more successfully for food than population A
- C. Population A produced more offspring than population B did
- D. Population A consumed the members of population B

The diagram below shows an ocean food chain. A change occurs when sea otters move into the ocean bay.



52. Sea otters eat all the sea urchins. This change will cause:

- A. Crabs to have more food
- B. Sea Ducks to have less food
- C. Arctic foxes to have more food
- D. Kelp to have less food

53. Assume 100 units of energy are supplied by the sun to the primary produce in this food chain. How much of the sun's energy will be available to the crabs? **D is correct not C.**

- A. 100
- B. 10
- C. 1
- D. 0.1**

54. Point sources of pollution

- A. Enter ecosystems from dispersed and often hard-to-identify sources
- B. Include runoff of fertilizers and pesticides from farmlands and suburban lawns
- C. Are easier to identify than nonpoint sources
- D. Are more difficult to control than nonpoint sources
- E. Are always found in rural areas

55. Nonpoint sources of pollution

- A. Enter ecosystems from single identifiable sources
- B. Are more difficult to control than point sources
- C. Include smokestacks and automobile exhaust pipes
- D. Are cheaper and easier to identify than point sources
- E. Are always found in rural areas

56. Select the choice that correctly states the best priority for use of non-renewable resources, such as metals and plastics, from the environmentally sustainable perspective.

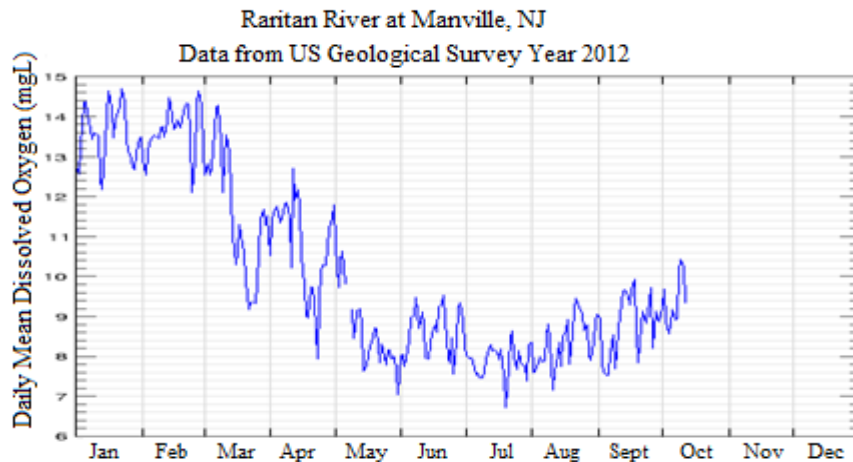
- A. Reduce, recycle, refuse
- B. Reduce and recycle
- C. Recycle, reuse, reduce
- D. Reduce, reuse, recycle

Refer to the following answers. Select the one lettered choice that best fits each statement.

A. Neurotoxin B. Allergen C. Mutagen D. Teratogen E. Corrosive

- 57. Ozone is an example of this
- 58. Carcinogens are a subset of this
- 59. Causes birth defects
- 60. Methyl mercury poisoning
- 61. Mold, ragweed and animal dander are examples

The following is a graph of daily mean Dissolved oxygen levels taken during 2012 at Raritan River Manville NJ testing site.



62. 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
63. Sometimes, data cannot be collected. What would be the most likely reason for the lack of data taken during late October through December 2012?
- A. Equipment failure
 - B. US Government shut-down
 - C. Hurricane Sandy and its after-math
 - D. None of the above
64. The winter season (2013-2014) has ranked among the top ten on record in terms of the amount of snowfall as of mid-February. What does snow on the ground do?
- I. Melt when temperatures are high enough and enter storm drains
 - II. Infiltrate into recharge zones when melted
 - III. Increase eutrophication
 - IV. Result in a high spring water tables
- A. I only B. I and II only C. III only D. I, II, and IV
65. Which factor below will increase the amount of dissolved oxygen in a river or stream?
- A. velocity
 - B. altitude
 - C. Nutrient load and organic wastes
 - D. Increasing temperature
 - E. Volume

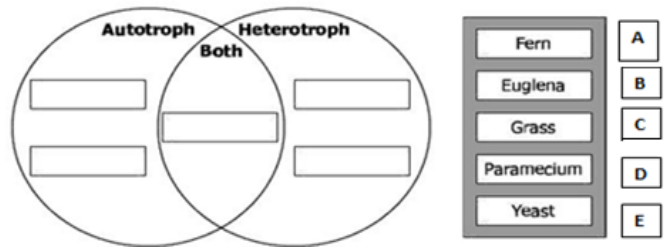
66. Photosynthesis and time of day can impact dissolved oxygen levels because:
- A. photosynthesis increases during daylight hours
 - B. photosynthetic organisms can produce more oxygen at night
 - C. decomposers produce dissolved oxygen once dead organisms sink to the bottom at night
 - D. none of these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

Use the diagram below to answer questions 67-68 The organisms in the boxes on the right correspond to the letters alongside each on their right side.

Classify the organisms by their metabolic strategies

67. Which organisms would be found in the Venn Diagram section labeled Heterotroph?

- A. A & B
- B. B & D
- C. D & E
- D. B & C
- E. B & E



68. Which organisms would be found in the Venn Diagram section labeled Autotroph?

- A. A & B
- B. B & D
- C. D & E
- D. A & C
- E. B & E

69. The information below was collected in the field while studying the effect of pH on the growth of the duckweed plant. The data shows that duckweed has optimum growth at a pH of:

Field Data

Pond	pH of Pond Water	Number of Duckweed Plants
A	6	150
B	12	300
C	8	500
D	4	80

- A. 6
- B. 12
- C. 8
- D. 4

70. Acid rain is a constant problem in North East portion of the United States. How will acid rain affect the ponds?
- A. All of the ponds will experience an increase in pH thus increasing duckweed growth.
 - B. All of the ponds will experience a decrease in pH reducing duckweed growth.
 - C. Acid rain will only cause a minor change in the pond's pH. The growth of duckweed will not be altered.
 - D. The pH of all ponds will decrease. Pond B will experience an increase in duckweed growth

NEW JERSEY SCIENCE LEAGUE **Corrections**

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

Date: March 9, 2017

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

Environmental Science 70 multiple choice questions per exam. **Open to all students.**

JANUARY TEST: Scientific method, correlations, statistics, models, graphing & interpreting graphs. **Earth** - Geologic time scale; plate tectonics, earthquakes, glaciers, volcanism; seasons; solar intensity & latitude **Systems- Atmosphere, geosphere, hydrosphere:** Composition; structure; weather & climate; air and water circulation & patterns, Biogeochemical cycles (focus on nitrogen & carbon) **Energy** - GPP and NPP, energy webs, pyramids, trophic levels; **Ecosystem Structure** - Biological populations, distribution, ecological niches; species interaction; keystone species; species diversity, major biomes. **Population** - Population concepts, density, carrying capacity; reproductive strategies; survivorship.

FEBRUARY TEST- Human population dynamics: Demographic transition, distribution; growth rates, doubling times; age-structure diagrams. **Succession, Bio-magnification. Soil and Soil Dynamics** - Rock cycle; composition; physical & chemical properties; soil types; types and definitions of erosion and soil triangle graph. **LAND USE - Agriculture – Methods of agriculture;** genetic engineering, crop production; deforestation; irrigation; sustainable agriculture methods, pest control methods Including emphasis on IPM; **Public and federal lands Use-** forest, land & fire management and issues like overgrazing; deforestation; desertification; salinization, urbanization, and soil conservation techniques. Plus 5 question review of Jan Topics

MARCH TEST: Mining: methods, and effect of mining on water and soil, **Fishing** – overfishing and techniques, aquaculture, **Water resources, use, pollution** – ocean zones, freshwater/saltwater concepts; understanding eutrophication process, causes and effects, surface & groundwater issues- fracking, irrigation; **Waste-Wastewater treatment process,** point & non-point pollution, water’s role in bioaccumulation and aquatic food webs, environmental health issues **Biodiversity** issues. Plus 10 question review of Jan & Feb 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; negative and positive feedback loops; **Energy** – traditional and renewable forms, advantages/disadvantages; power; conversions; safety issues; radiation & health; radioactive wastes; Plus 15 question review of Jan, Feb, and March topics.

Dates for 2017 Season

Thursday March 9, 2017 Thursday April 13, 2017

All areas and schools must complete the April exam and mail in the results by April 28th, 2017

New Jersey Science League

PO Box 65 Stewartsville, NJ 08886-0065

phone # 908-213-8923 fax # 908-213-9391 email: newjisl@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 2018 Season

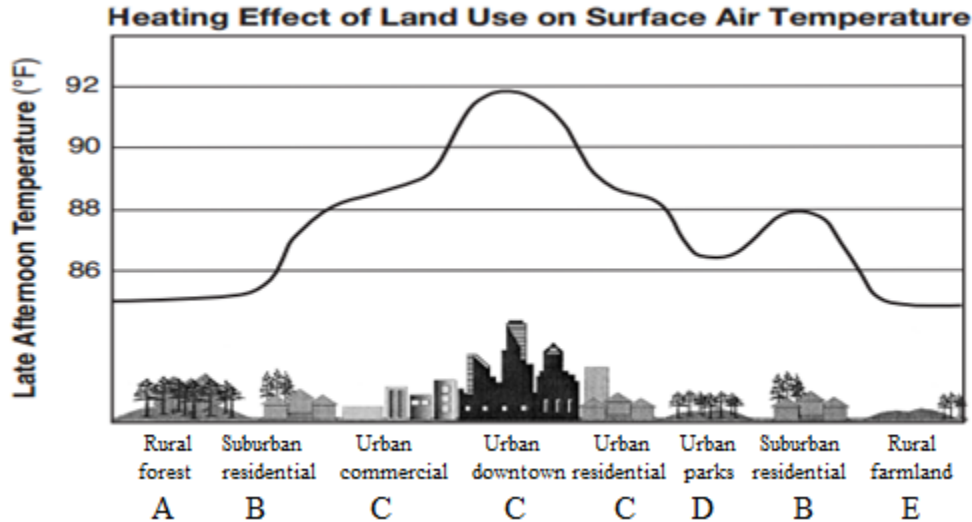
Thursday January 11, 2018 Thursday February 8, 2018

Thursday March 8, 2018 Thursday April 12, 2018

NJSL Environmental Science **Corrected**

April 13, 2017 **GREEN TEST**

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



- Which land use results in the least heating effect in urban areas?
 A. Commercial B. Residential C. Downtown D. Parks
- The Heating Effect diagram above has been divided in sections labeled A, B, C, D, and E. Which lettered section will have the greatest runoff from a rain storm?
 A. A B. B C. C D. D E. E
- In which letter sections of the diagram above does **most transpiration** occur?
 A. A and B B. C only C. D and B D. B and E E. A and E

Questions 4-7 refer to the following energy efficiencies of various power sources expressed as percentages. Use the answer choices below for these questions:

- A. 100% B. 95% C. 30% D. 15% E. 1%

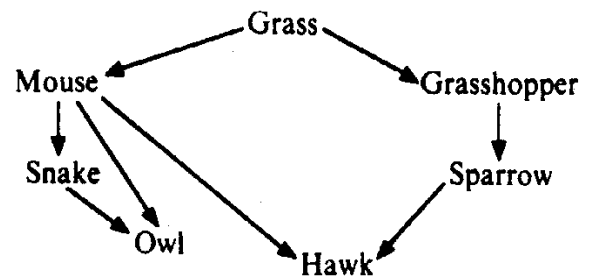
- Approximate efficiency of an average coal-fired power plant
- Approximate efficiency of the conversion of light energy to chemical energy in photosynthesis.
- Approximate percentage of electrical energy converted to heat in the average incandescent light bulb
- The maximum efficiency possible in an energy conversion process that is not limited by the Second Law of Thermodynamics
- The Rutgers Eco-Complex in Burlington County extracts natural gas from the landfill and burns it to produce electricity. This is an example of which of the following processes?
 A. Cogeneration B. Gas hydration C. Gasification D. Electrolysis E. Reclamation

9. If mean global temperature keeps increasing as predicted by scientists, which of the following is most likely?
- There will be fewer insect pests and disease-carrying organisms
 - Specialist species living in fragile ecosystems will risk extinction
 - There will be an increase in sulfate concentrations in wetlands
 - There will be an increase in the reproductive rate of mammals
 - The geographical range of many plants will move toward the equator
10. The increase in levels of skin cancer in recent years is most related to:
- The increase in outdoor recreation
 - More beachfront recreation due to sea level rise
 - Warmer temperatures due to global warming
 - An increase in ultra-violet radiation due to ozone depletion
 - An increase in infrared radiation due to ozone depletion
11. Stratospheric ozone depletion is most likely to result in which of the following?
- Increased growth of food crops due to increasing amounts of ultraviolet radiation
 - Extended grazing season for cattle
 - Disruption of photosynthesis in plants
 - Increased movement of the human population toward equatorial regions
 - A higher percentage of cloudless days

12. Which of the following would be the strongest evidence in support of a scientist's contention that a local area was experiencing acid deposition? **Also letter A.**
- An increase in the concentrations of soluble heavy metals in a local pond
 - A gradual increase in the temperature of a local lake
 - Increase in the rate of photosynthesis of aquatic plants in a local lake
 - A long-term increase in the pH of a local pond
 - A sudden die-off of fish in a local stream

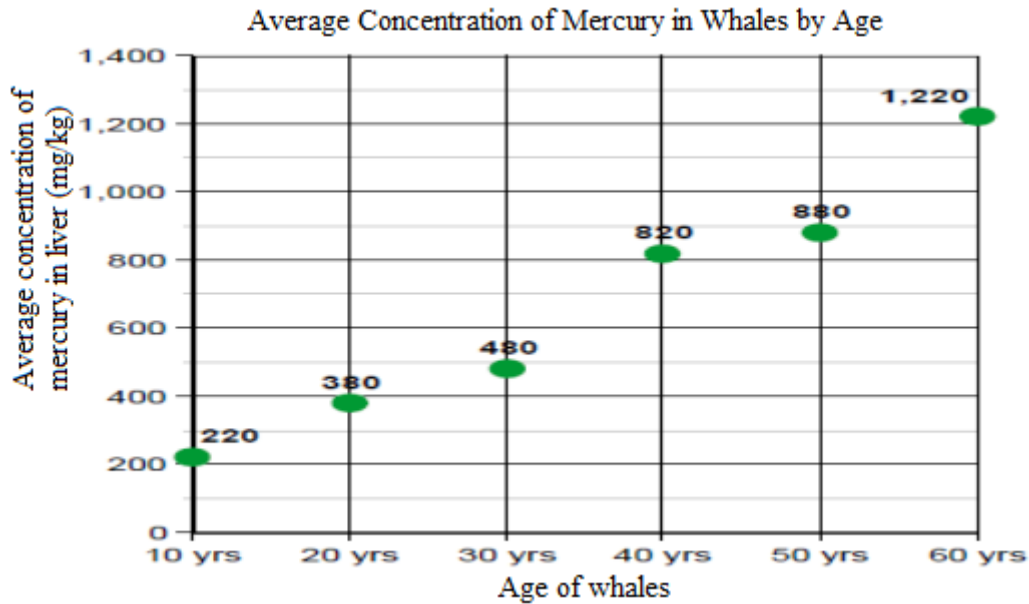
Questions 13-15 refer to the food web below:

13. Which organism is most likely to be located at the apex of the pyramid of biomass?



- Grass
 - Grasshopper
 - Snake
 - Mouse
 - Owl
14. All of the following statements about the diagram are correct EXCEPT
- The mouse is an herbivore
 - Only three trophic levels are depicted
 - The snake and sparrow are at the same trophic level
 - The grass is a producer
 - All of the organisms except grass are consumers, regardless of position
15. The organic & inorganic materials in all organisms in the diagram will eventually return to the environment by:
- Carnivores
 - Primary Consumers
 - Secondary Consumers
 - Decomposers

For questions 16-17 use the information provided in the graph below. In 2002, a scientist conducted a study of the mercury concentrations in the livers of 26 dead whales. The age of each whale (to the nearest 10 years) was determined and the concentration of mercury in its liver was measured in mg/kg. The data gathered is shown below.



16. Which one of the following is the closest *estimate* of the average annual increase of mercury concentration in the whales?
- A. 10 mg/kg
 B. 20 mg/kg
 C. 200 mg/kg
 D. 1200 mg/kg
17. Which one of the following is the best explanation for the data?
- A. The mercury accumulated in the livers of the whales.
 B. Older whales absorb more mercury per annum than younger whales.
 C. The concentration of mercury in the water gradually increased with time.
 D. Older whales have more difficulty excreting mercury than younger whales.
18. Uranium-235 has a half-life of 710 million years. If it is determined that a certain amount of stored U-235 will be considered safe only when its radioactivity has dropped to 0.10 percent of the original level, approximately how much time must the U-235 be stored securely to be safe?
- A. 7.1×10^6 years
 B. 7.1×10^7 years
 C. 7.1×10^9 years
 D. 7.1×10^8 years
 E. 710 years
19. The annual consumption of petroleum in the United States is about 23 barrels per capita. As of 2010 census there are about 309 million people in the United States. What is the **approximate consumption** of petroleum in the United States?
- A. 12 million
 B. 240 million
 C. 2 billion
 D. 10 billion
 E. 7 billion

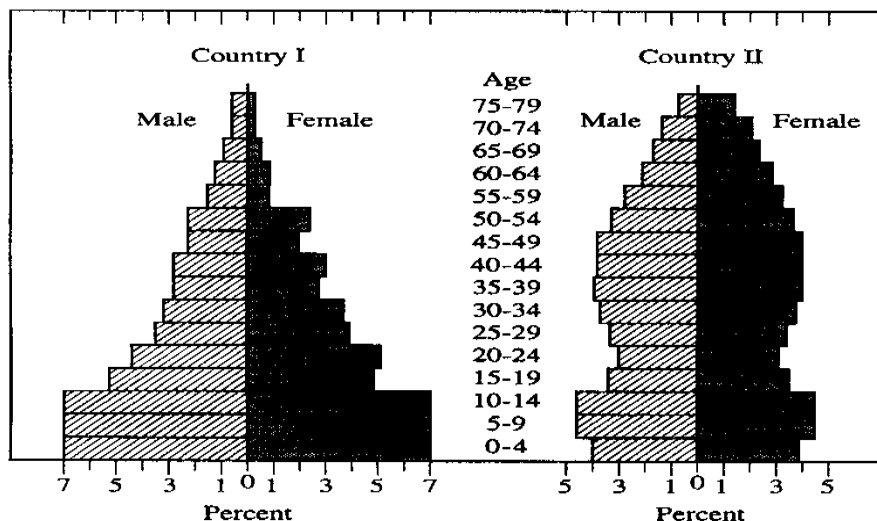
20. One solution for reducing the amount of atmospheric carbon dioxide would be to
- Increase oceanic temperatures to enhance carbon dioxide uptake
 - Increase the rate of removal of tropical rain forests
 - Decrease the total area of rice paddies
 - Decrease the use of fossil fuels
 - Decrease the production of chlorofluorocarbons

Match the energy source below with the description of the energy sources' benefit or drawback or both. A choice can be used more than once.

- A. Solar B. Wind C. Geothermal D. Nuclear E. Biomass

21. Produces little or no air pollution & land can be used to grow crops but is noisy & can be unsightly
 22. Pipes are installed about 15 feet underground. Uses Earth's heat to heat and cool homes.
 23. If installed on rooftops, requires little land disturbance
 24. Uses the kinetic energy of the moving air to produce electricity.
 25. Uses waste & captures methane which can pollute waterways & increase climate change
 26. The waste from this energy source must be stored for centuries. Causes thermal pollution of lakes and rivers.

Questions 27-31 refer to the following graphs. The illustrations below show the age and sex of the human populations in Country I and Country II. The sexes are represented separately. The percentages in the different age classes are shown by the relative widths of successive horizontal bars.

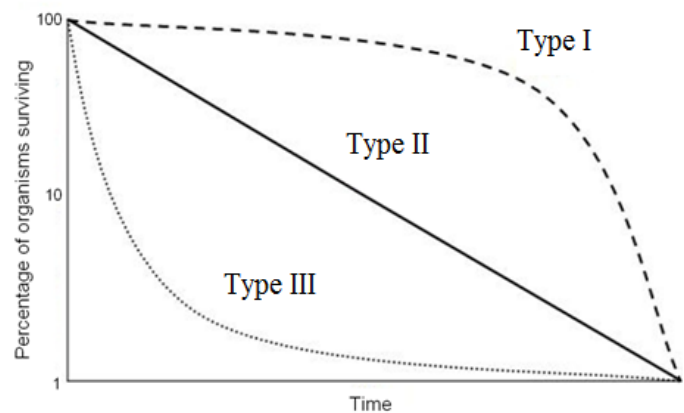


27. Approximately what percentage of the individuals in Country I were younger than 15 years of age?
 A. 10% B. 21% C. 42% D. 63% E. It can't be determined from the graph.
28. Which letter below best approximates the ratio of males to females among individuals below 15 years of age?
- | | Country I | Country II | Country I | Country II |
|----|-----------|------------|------------|------------|
| A. | 1 : 1 | 1 : 1 | C. 0.5 : 1 | 0.5 : 1 |
| B. | 0.75 : 1 | 0.75 : 1 | D. 1 : 1 | 0.5 : 1 |
29. If, in Country I, infant mortality declined & birth rate remained the same, then initially the population would
- Be more evenly distributed among the age classes
 - Be even more concentrated in the young age classes
 - Stabilize at the illustrated level for all age classes
 - Increase in the oldest age classes
 - Increase in the median age classes

30. Over the next 10-15 years, the stabilization of Country I's population at its current size would require that
- Infant mortality be reduced to about half the present level
 - The death rate be reduced drastically
 - Each couple produces fewer children than the number required to replace themselves
 - About 15 years be added to the life expectancy of each person
 - Couples have an average of only 3 children
31. In a standard population pyramid the age range of each bar is how many years?
- 5 years
 - 10 years
 - 15 years
 - 20 years

Use the following survivorship curve for the next two questions.

32. Where would humans be placed on the survivorship curve?
- Type I
 - Type II
 - Type III
33. Which of the following organisms shows a Type III survivorship?
- Lizard
 - Panda
 - Elephant
 - Mosquito



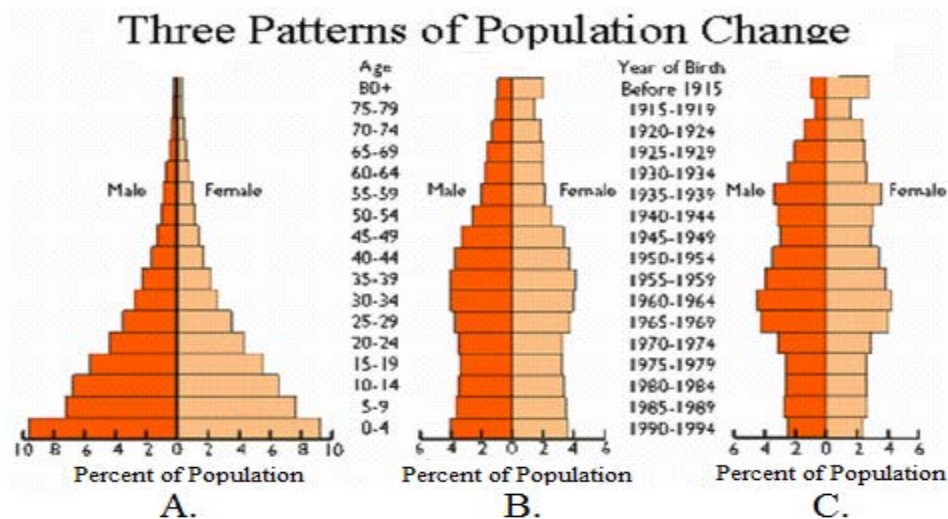
The questions 34, 35, 36 refer the Population growth rates (percentages) of three countries and the three age-structure pyramids on the next page.

Population Growth Rates of Three Countries

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Germany	0.29	0.27	0.26	0.04	0.02	0	-0.02	-0.03	-0.04	-0.05	-0.06	-0.21	-0.2	-0.19	-0.18

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Kenya	1.53	1.27	1.15	1.27	1.14	2.56	2.57	2.8	2.76	2.69	2.59	2.48	2.44	2.27	2.11

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
United States	0.91	0.9	0.89	0.92	0.92	0.92	0.91	0.89	0.88	0.98	0.97	0.96	0.9	0.9	0.77



34. Which pattern of population change would be used to reflect the data for the United States?
35. Which pattern of population change would be used to reflect the data for Germany?
36. Kenya in 2014 had a growth rate of approximately 2.1. The population of Kenya in 2014 was about 38 million. At this growth rate how many years will it take for Kenya to double its population?
- A. 48 years B. 37 years C. 33 years D. 28 years

Questions 37-41 refer to the following air pollutants. Each can be used once or not at all.

- A. Sulfur dioxide, SO₂ B. Lead, Pb C. Ozone, O₃ D. Methane, CH₄ E. Particulates

37. Most often cited as the causative factor for acid deposition
38. Implicated in human neurological damage
39. Considered harmful in the troposphere but beneficial in the stratosphere
40. Is the major pollutant electrostatic precipitators are designed to remove from power-plant smokestack emissions
41. This gas is given off by farm animals.
42. The combustion of one gallon of automobile fuel produces about 5 pounds of carbon (in CO₂). Two autos are making a trip of 600 miles. The first auto gets 20 miles per gallon, and the second gets 30 miles per gallon. Approximately how much less carbon (in CO₂) will be produced by the second auto on this trip?
- A. 300 lbs. B. 150 lbs. C. 100 lbs. D. 75 lbs. E. 50 lbs.
43. Which gas below would contribute to the formation of sulfuric acid (H₂SO₄) in the atmosphere?
- A. Carbon dioxide gas C. Methane
 B. Sulfur dioxide(SO₂) aerosols D. CFC's
44. An aerosol mixture of smoke particulates and sulfur compounds forms a grayish colored substance that is called
- A. Urban smog C. Brown smog
 B. Inversion smog D. Industrial smog

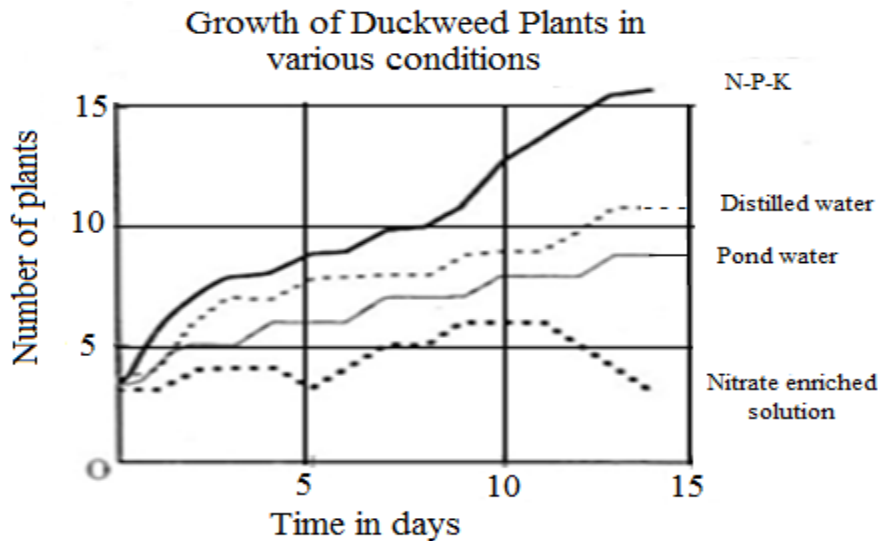
45. Ground water related problems with fracking include:
- Liquid waste stored in waste lagoons can leach into groundwater (aquifer)
 - Drilling can allow methane (or natural gas) to seep into groundwater
 - Leaks from the well casings can contaminate the water with either fracking liquids or flowback liquids
 - Radioactive isotopes used as tracers in fracking fluids can contaminate groundwater
 - All of the choices A-D are ground water related problems with fracking.

Use the following for questions 46-49.

An experiment was performed to test the conditions in which duckweed, a small aquatic plant, can reproduce efficiently. Three duckweed plants were placed in each of four culture dishes at room temperature with the following solutions:

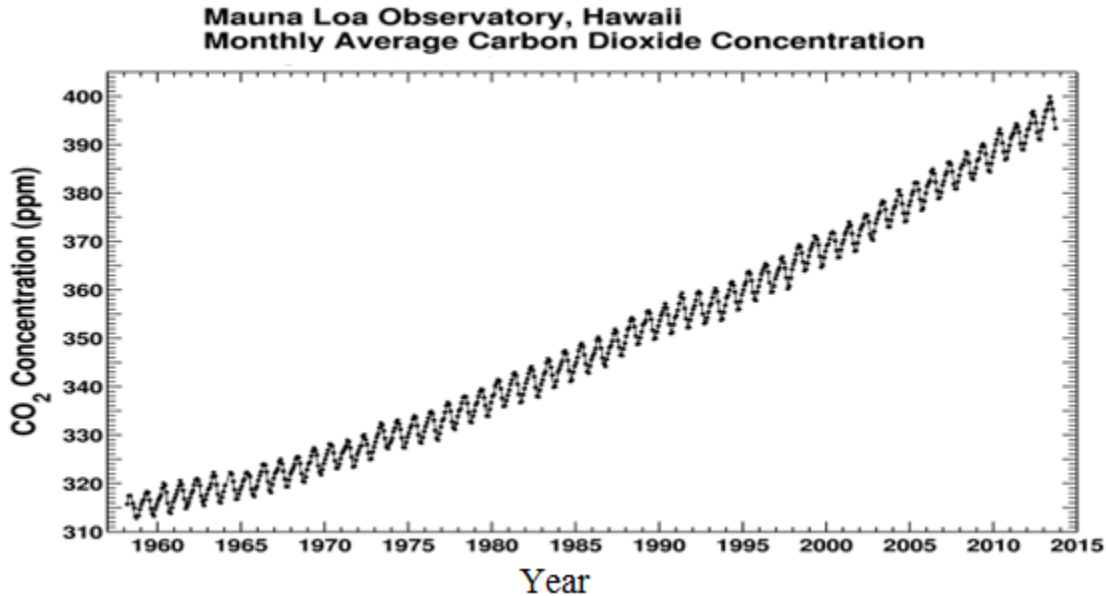
- distilled water
- pond water
- an N-P-K fertilizer solution
- a nitrate-enriched solution.

The graph summarizes the growth in numbers of duckweed plants over two-weeks.



46. According to the graph how many plants were placed into each solution at the start of the experiment?
- One in each culture dish
 - Two in each culture dish
 - Three in each culture dish
 - Four in each culture dish
47. After 5 days the **pond water** had how many plants?
- 3 plants
 - 5 plants
 - 6 plants
 - 9 plants
48. Duckweed reproduced at the fastest rate in
- Pond water
 - Distilled water
 - Pond water with added chlorophyll
 - N-P-K fertilizer solution
 - Nitrate-enriched distilled water
49. Under which of the following additional conditions would the duckweed population most likely grow faster?
- Oxygen gas bubbled through the culture dishes
 - The addition of an organism that eats duckweed
 - The addition of distilled water to every culture dish
 - An increase in light intensity
 - The addition of glucose to the culture medium

50. The types of organism found in a pond or lake depend on
- A. The amount of sunlight
 - B. The temperature of the water
 - C. The presence of appropriate nutrients
 - D. Available dissolved oxygen levels
 - E. All of the above
51. The major constituents of the Earth's atmosphere are
- A. 95% carbon dioxide(CO₂) and some water vapor (H₂O_{vap})
 - B. 79% nitrogen(N₂) and 21% oxygen (O₂)
 - C. 79% oxygen(O₂) and 21% nitrogen (N₂)
 - D. Ozone (O₃), carbon dioxide(CO₂) and water vapor(H₂O) in about equal amounts.



52. The annual fluctuation in carbon dioxide concentration can best be explained by the
- A. Seasonal photosynthetic activity of plants
 - B. Regularity of volcanic activity
 - C. Deforestation in the tropics
 - D. El Nino events
 - E. Seasonal use of fossil fuels
53. The data in the graph can be useful in explaining the greenhouse effect when they are compared with
- A. Annual nitrous oxide production
 - B. Mean global temperatures
 - C. Cycles of flooding and drought
 - D. Sunspot activity
 - E. Volcanic activity
54. Information gathered by a scientist about the toxicity of two chemicals X and Y showed that they had individual safe limits for fish at particular concentrations. But when they were used together at the safe concentrations, there were extensive fish kills. This is an example of
- A. Homeostasis
 - B. Synergism
 - C. Commensalism
 - D. Bio-accumulation
 - E. Antagonism
55. Characteristics that tend to increase the risk of a species becoming endangered include which of the following?
- I. Having a very limited distribution
 - II. Being a specialist at the end of a long food chain
 - III. Having a small population size
- A. I only
 - B. II only
 - C. III only
 - D. II and III only
 - E. I, II, & III

56. A 5-MW wind turbine produces 15 million kWh of electrical energy per year. Assume the average NJ household uses about 10,000 kWh of electricity per year. If a company wishes to install 60 of these 5-MW wind turbines on a wind farm, how many households can be supported in one year?
 A. 600,000 B. 90,000 C. 60,000 D. 50,000 E. 25,000
57. Soils change both through natural processes and as a result of human activity. Which of the following soil change is due only to natural causes?
 A. Degradation of nutrients due to pesticides C. Flooding due to dam construction
 B. Formation of deserts due to tree felling D. Removal of nutrients due to heavy rains
58. The following waste materials are buried in a landfill. Which will break down most quickly?
 A. Steel B. Plastic C. Glass D. Paper E. Aluminum
59. Ecosystems with stable biodiversity have all except:
 A. Very limited and specific food webs C. Great genetic diversity & abundant resources
 B. A variety of ecological roles D. Large number of individuals of different species
60. Which rock type is most effective at buffering acid precipitation?
 A. Granite B. Clay - rich rocks C. Sandstone D. Basalt E. Limestone
61. Which of the following was true of the ban on the use of lead in gasoline?
 A. Despite the ban, lead levels in the air did not change
 B. Lead was never a serious health or environmental hazard
 C. Lead could not be removed without major changes in automobile engines
 D. Once banned, lead levels quickly dropped in the population and the environment.
 E. High lead levels were only a problem in Greenland
62. A chemical in automobile exhaust that the EPA has classified as a known human carcinogen is:
 A. Carbon dioxide B. Nitrogen oxides C. Benzene D. Sulfur oxide E. Particulates
63. Many lakes in Scandinavia, Canada, & the Adirondack Mountains of New York State have been acidified over the past few decades due to acid deposition. Fish mortality in these lakes is high because of
 A. Acids eating away the fish flesh
 B. Elevated sulfur and nitrogen levels in the lake waters poisoning the fish
 C. The acid in the water causes toxic metals to leach from surrounding soils and rocks to build up in the lakes
 D. Overpopulation and a reduction in competing species
64. The major federal law aimed at controlling air pollution and requiring permits for polluters is:
 A. Montreal Protocol C. Greenhouse Gas Reduction Act
 B. Clean Air Act D. Basel Convention E. Kyoto Protocol.
65. Which of the following is not a consequence of extreme ozone layer depletion? More cases of...
 A. Severe sun burning C. Damaged agricultural crops and forest trees
 B. Skin cancer D. Blindness E. Lung cancer

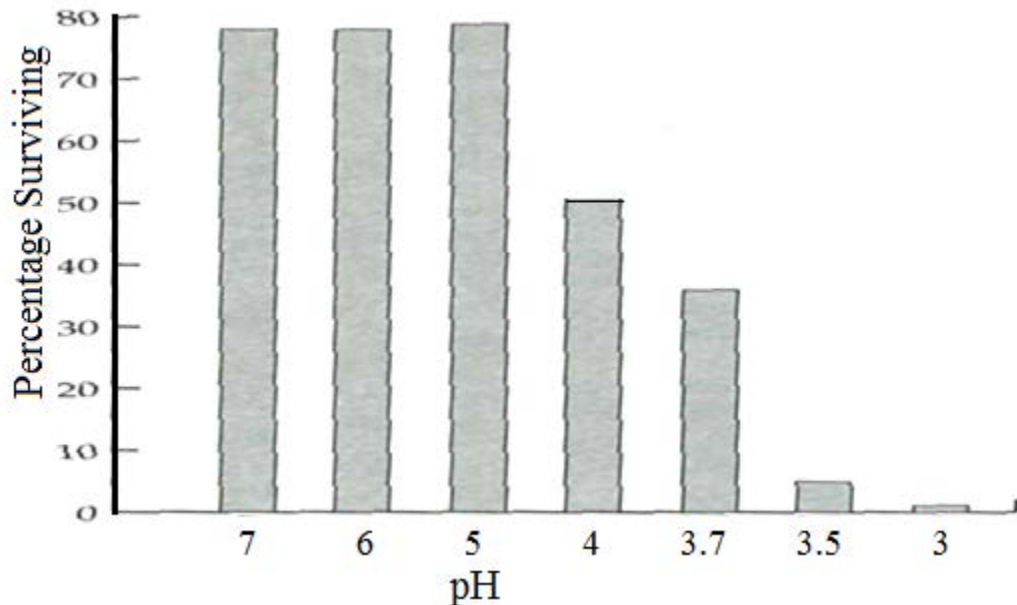
66. Point sources of water pollution

- A. Enter ecosystems from dispersed and often hard-to-identify sources
- B. Include runoff of fertilizers and pesticides from farmlands and suburban lawns
- C. Are more difficult to control than nonpoint sources
- D. Are always found in rural areas
- E. Are cheaper and easier to identify than nonpoint sources

67. Nonpoint sources of water pollution

- A. Enter ecosystems from single identifiable sources
- B. Include smokestacks and automobile exhaust pipes
- C. Are more difficult to control than point sources
- D. Are cheaper & easier to identify than point sources
- E. Are always found in rural areas

Questions 68, 69, and 70 refer to the following passage & graph below. A scientist placed 100 fish eggs into each of seven solutions with different pH values. After 96 hours, the number of survivors were counted & converted into a percent. The percent surviving is given in the graph below.



68. Which of the pH values below best represents the LD₅₀ (LD₅₀ is lethal dose) in this experiment?

- A. 3.0
- B. 3.5
- C. 3.7
- D. 4.0
- E. 5.0

69. At what pH value do the least number of fish survive?

- A. 7.0
- B. 4.0
- C. 3.7
- D. 3.5
- E. 3

70. Which of the following best describes the goal of the above experiment?

- A. To test the hypothesis that the bigger the fish, the smaller the pH tolerance range.
- B. To observe how many fish would hatch at different pH values.
- C. To find out how many fish live in streams with different pH values.
- D. To understand how acid rain affects life in streams.
- E. To see what chemical is best at changing the pH of water.

NEW JERSEY SCIENCE LEAGUE **Corrections**

Environmental Science Answer Key: Green test.

April 13, 2017

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

Environmental Science 70 multiple choice questions per exam. **Open to all students.**

JANUARY TEST: Scientific method, correlations, statistics, models, graphing & interpreting graphs. **Earth** - Geologic time scale; plate tectonics, earthquakes, glaciers, volcanism; seasons; solar intensity & latitude **Systems- Atmosphere, geosphere, hydrosphere:** Composition; structure; weather & climate; air and water circulation & patterns, Biogeochemical cycles (focus on nitrogen & carbon) **Energy** - GPP and NPP, energy webs, pyramids, trophic levels; **Ecosystem Structure** - Biological populations, distribution, ecological niches; species interaction; keystone species; species diversity, major biomes. **Population** - Population concepts, density, carrying capacity; reproductive strategies; survivorship.

FEBRUARY TEST- Human population dynamics: Demographic transition, distribution; growth rates, doubling times; age-structure diagrams. **Succession, Bio-magnification. Soil and Soil Dynamics** - Rock cycle; composition; physical & chemical properties; soil types; types and definitions of erosion and soil triangle graph. **LAND USE - Agriculture – Methods of agriculture;** genetic engineering, crop production; deforestation; irrigation; sustainable agriculture methods, pest control methods including emphasis on IPM; **Public and federal lands Use-** forest, land & fire management and issues like overgrazing; deforestation; desertification; salinization, urbanization, and soil conservation techniques. Plus 5 question review of Jan Topics

MARCH TEST: Mining; methods, and effect of mining on water and soil, **Fishing** – overfishing and techniques, aquaculture, **Water resources, use, pollution** – ocean zones, freshwater/saltwater concepts; understanding eutrophication process, causes and effects, surface & groundwater issues- fracking, irrigation; **Waste-Wastewater treatment process,** point & non-point pollution, water’s role in bioaccumulation and aquatic food webs, environmental health issues **Biodiversity** issues. Plus 10 question review of Jan & Feb 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; negative and positive feedback loops; **Energy** – traditional and renewable forms, advantages/disadvantages; power; conversions; safety issues; radiation & health; radioactive wastes; Plus 15 question review of Jan, Feb, and March topics.

Dates for 2017 Season

Thursday April 13, 2017

All areas and schools must complete the April exam and mail in the results by April 28th, 2017

New Jersey Science League

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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 2018 Season

Thursday January 11, 2018 Thursday February 8, 2018

Thursday March 8, 2018 Thursday April 12, 2018