

New Jersey Science League
Environmental Science Exam Jan 2012

Answer the following questions on the answer sheet provided. Each correct response is worth 4 points. Use the letters for your answers. Choose the letter that best completes or answers the item. Be certain that erasures are complete. Please **PRINT** your name, school area code, and which test you are taking on the scan-tron.

1. Which of the following is a biotic factor of an environment?
A) calcium carbonate in rocks
B) leaf growth
C) nitrogen in the air
D) water content of soils
E) carbon monoxide from a furnace
2. Which of the following is a nonrenewable resource?
A) wind
B) food
C) water
D) fossil fuels
E) sunlight
3. The idea that uncontrolled exercise of individual self-interest will result in destruction of land that is held in common is called
A) philosophy of Thomas Malthus
B) Garrett Hardin's philosophy
C) common self-interest
D) philosophy of Paul Ehrlich
E) the tragedy of economic growth
4. The study of the impact of pollutants and chemicals on human bodies is
A) chemistry
B) ecology
C) toxicology
D) environmental science
E) evolution
5. Which statements about the terms theory and hypothesis are correct?
A) theories predict new discoveries
B) a theory is an educated guess as of a phenomenon
C) a hypothesis becomes a theory when confirmed
D) a hypothesis must be testable and falsifiable while a theory is only testable
E) the discoveries of science as known as facts
6. Protecting the environment is important because _____
A) humans are biologically programmed to protect their environment
B) sustaining our environment is a moral imperative
C) the environment is always damaged by economic activity
D) the survival of humans and all species of plants and animals is in the balance
E) humans will destroy their environment unless controlled.
7. Which statement describes or follows from the concept of sustainability?
A) human population must hereafter decline to maintain the earth's natural resources
B) sustainability means that we regenerate the degraded ecosystems
C) sustainability means that water extracted from underground resources be equal to that water that recharges the underground resources by percolation.
D) sustainability means that the forests that we have today will be preserved
E) sustainability means that no economic growth is not possible.
8. Which statement best describes individuals in a subsistence economy?
A) choose to refrain from participation in advanced society and trade
B) meet most of their needs from nature and from trading local goods made by different clans or families.
C) means that the individuals try to acquire wealth
D) live in harmony with their environment
E) none of these

9. The Navaho nation in northeastern Arizona live in an area where coal is mined and combusted to generate electricity. The Navaho largely herd animals, farm and make silver jewelry. Which of the following environmental problems would the Navaho be most concerned with?
- A) loss of biodiversity
B) acid rain
C) water pollution
D) coal resource depletion
E) clouds of eye-stinging (ozone) that fog villages
10. Which process serves to tell consumers, which brands use processes believed to be environmentally beneficial and which brands do not?
- A) green labeling
B) ecodocumentation
C) ecolabeling
D) envirolabeling
E) EPA protection labeling
11. The Mirrar aborigines in Australia value land, plants and animals as sacred. This philosophy is closest to
- A) egocentrism
B) biocentrism
C) anthropocentric
D) ecocentrism
E) transcendentalism
12. The development of the conservation ethic is attributed to which person?
- A) Emerson
B) Muir
C) Pinchot
D) Leopold
E) Carson
13. What were the initial laws that gave the federal government the right to manage western lands?
- A) US Constitution
B) Bill of Rights
C) Homestead Act of 1862
D) general land ordinances
E) Mineral Lands Act of 1866
14. The book, Silent Spring, by Rachel Carson warns of
- A) the use of fungicides and their effects upon fungae
B) the use of insecticides and the loss of insects
C) herbicides with loss of crop producing plants
D) the use of pesticides with the loss of birds
E) the use of DDT and the extinction of the golden frog
15. Which statement is true of radioisotopes?
- A) are charge atoms
B) are atoms with differing number of protons
C) emit radiation as they decay into more stable atoms
D) emit only radio waves
E) atoms of an element that have a greater number of electrons than the most stable form of the element.
16. The origin of energy for most ecosystems is
- A) the sun
B) glucose
C) the primary producer
D) the heterotrophy
E) autotrophs
17. Photosynthesis occurs within which cell organelle?
- A) ribosomes
B) chloroplast
C) chlorophyll
D) nucleus
18. Which of the following reactions represents photosynthesis?
- A) glucose + oxygen + sunlight → food + carbon dioxide
B) plants + water + sunlight → oxygen + food
C) seeds + water + soil → tree + oxygen + carbon dioxide
D) carbon dioxide + water + sunlight → glucose + oxygen
E) nitrogen + minerals + sunlight → glucose + proteins

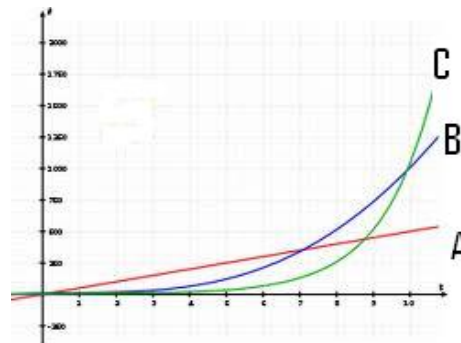
19. What is the most important measure of fitness of an organism over time?
- A) success of reproduction and survival of the offspring
 B) strength
 C) ability to acquire and defend territory
 D) reproduction only
 E) survival of mutations
20. What is a community?
- A) a group of individuals of the same species
 B) a group of interacting populations living in the same area at the same time.
 C) a group of species and their abiotic environment in which they interact
 D) all members of one species
 E) all members of one species interacting
21. Hound dogs have large floppy ears and have been used in hunting because of their sense of smell. Which statement most accurately represents the process that produced these dogs from the wild dog, *Canis Lupus*?
- A) natural selection directed the gene mutations and reproductive success of the dogs.
 B) gene mutations in dogs arose spontaneously and were isolated where the hounds then replaced the wild dogs.
 C) humans noticed dogs with large floppy ears and a keen sense of smell and bred them with similar dogs.
 D) natural selection has evolved the wild-type dog into several separate species.
 E) since natural selection is a totally random process the hounds would have appeared.
22. Biological diversity most closely resembles which ecological level?
- A) population
 B) species
 C) the sum total of all populations of specific organisms
 D) habitat
 E) the grand total of all individuals, populations and communities.
23. The Horse latitudes are located between 30 and 35° north and south of the equator. The same is true of the deserts of the Earth. Which is true of these latitudes?
- A) areas of high pressure and above average rainfall
 B) areas of generally warm ocean currents
 C) descending air currents
 D) areas of enhanced solar radiation
 E) areas of slow moving jet streams
24. The Florida Everglades has a major problem with pet boa constrictors having been released into the environment. The reason for the large population growth of these pythons is
- I. the boa constrictors are resistant to pesticides
 II there is a large underutilized food sources in the new environment
 III the pythons have few natural predators
- A) I and II only
 B) II and III only
 C) III only
 D) I, II, and III
 E) II only
25. Which statement is NOT true of oxygen?
- A) the chemical formula is O₂.
 B) it is a product of photosynthesis
 C) it is the largest by mass in the atmosphere
 D) it has a double bond between the atoms
 E) it is a very reactive molecule.
26. Which of the following is not a characteristics of food webs?
- A) food web are made of many food chains
 B) when diagramming food chains and food web arrows are drawn from the lower tropic level to the higher tropic levels.
 C) decomposers break down organic waste to return nutrients to the ecosystem
 D) a food web shows energy from producers to consumers then to decomposers
 E) as energy moves up a food web, most of it is conserved by the species in the next tropic level.

27. A flood caused a river to alter its course. With the change a population of chip monks became separated. Over time the divided population developed new adaptations and eventually created new species. This is an example of

- A) allopatric speciation
- B) directional selection
- C) stabilizing selection
- D) sympatric speciation
- E) disruptive selection

28. The graph to the right has 3 lines labeled A, B, and C. Which line or lines illustrate exponential growth rate?

- A) A
- B) B
- C) C



For questions 29, 30 and 31 use the following terms

- A. predation
- B. mutualism
- C. competition
- D. herbivory
- E. parasitism

29. Bacteria that make vitamins in the human intestine.

30. Plants like marigolds make an insecticide that repels predatory insects.

31. Organisms feed on another for nutrients, which also harms the organism being feed upon.

32. In food chains and food webs, which of the following statements is incorrect?

- A) algae in aquatic ecosystems capture energy and pass on to primary consumers.
- B) mice are primary consumers if they eat seeds and grasshoppers
- C) a hawk that preys on mice and snakes is a secondary and tertiary consumer
- D) fungi and bacteria are producers that make biomass
- E) a producer obtains and uses energy that was originally obtained from sunlight

33. Which is not a characteristic of a climax community?

- A) tends to have a stable mix of species
- B) rapid changes in the energy balance
- C) more organisms than a successional community
- D) increasing complexity and energy efficiency
- E) all of these are characteristics of a climax community

34. The dominant species in a terrestrial pioneer community are

- A) grasses
- B) beetles
- C) lichens
- D) conifers
- E) none of these

35. Which list of biomes is placed in the order of increasing rainfall?

- A) tropical rainforest, temperate deciduous forest, grassland, desert
- B) grassland, desert, tropical rainforest, temperate deciduous forest
- C) desert, grassland, temperate deciduous forest, tropical rainforest
- D) desert, grassland, tropical rainforest, temperate deciduous forest
- E) desert, temperate deciduous forest, grassland, tropical rainforest

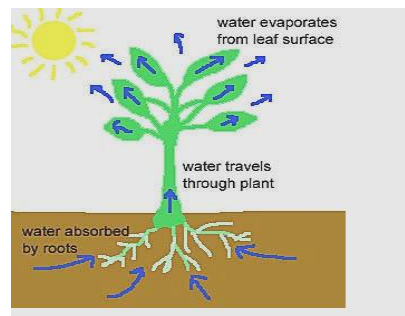
36. Below is a list of abiotic factors that affect biomes. Of those listed which two have the greatest influence on a biome?

- I. temperature
- II. Precipitation
- III wind
- IV soil characteristics
- V. atmospheric circulation
- A) I only
- B) II only
- C) III and IV only
- D) I and II
- E) III and V

37. Which statement is an accurate description of a keystone species?
- A) If the keystone species disappears, then the ecosystem will also cease to exist
 - B) If a keystone species is a predator, then it will control the herbivore populations.
 - C) Keystone species have the largest body size in a community
 - D) Keystone species are always predators
 - E) When the keystone species decrease, then species diversity increases

38. The sum total of the planet's living organisms and abiotic systems is called?
- A) a biome
 - B) an ectone
 - C) the lithosphere
 - D) the biomass
 - E) the biosphere

39. The process illustrated to the right is called?
- A) leaching
 - B) infiltration
 - C) condensation
 - D) transpiration
 - E) evaporation



40. Which Earth cycle has the greatest impact on biome distribution?
- A) the nitrogen cycle
 - B) the biogeochemical cycle
 - C) the nitrogen cycle
 - D) the phosphorus cycle
 - E) the hydrologic cycle

41. Most carbon on Earth is stored in what location?
- A) sedimentary rock
 - B) carbon dioxide in the atmosphere
 - C) carbon in fossil fuels
 - D) carbon in living plants and animals
 - E) diamond and graphite

42. Where do plants obtain most of their phosphorus?
- A) gases in the atmosphere
 - B) decomposition of plants and animals
 - C) Detritivores consuming nonliving organic matter
 - D) rocks and soils
 - E) from fertilizers applied by humans

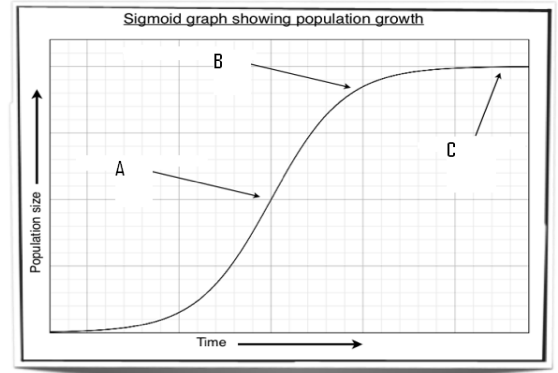
43. The "Dead Zone" in the Gulf of Mexico represents a condition which is called?
- A) hypothermia
 - B) hypoxia
 - C) hyperoxia
 - D) anoxia
 - E) carbon dioxide poisoning

44. What term is used to describe the movement of substances through the environment?
- A) biogeochemical cycles
 - B) biological cycles
 - C) decomposition cycles
 - D) metamorphic cycles
 - E) geochemical cycles

45. Nitrogen is an almost inert gas found in the atmosphere. What process makes nitrogen available for plants?
- A) fertilizing
 - B) nitrification
 - C) decomposition
 - D) denitrification
 - E) nitrogen fixation

46. What is the natural rate of population change?
- A) the rate of population change due to birth and death alone
 - B) the rate of population change with all females in a community
 - C) the rate of population change with natural disaster
 - D) the rate of population change due to migration
 - E) the rate of population change is calculated using the total fertility rate of women.

47. Which lettered section of the graph to the right represents the carrying capacity of the population?
 A) A B) B C) C



48. What are the four factors that affect population size?
 A) birth rate, death rate, poverty, culture
 B) birth rate, death rate, immigration, emigration
 C) poverty, culture, immigration, emigration
 D) poverty, female empowerment, ethnicity, disease
 E) birth rate, death rate, disease, culture

49. If a population has a growth rate of 2% per year, then how many years will it take to double the population?
 A) 2 D) 35
 B) 10 E) 70
 C) 20

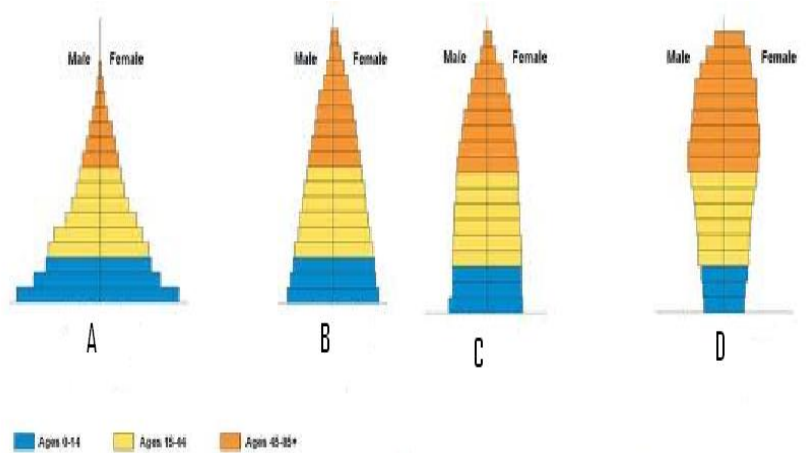
50. Of the following limiting factors of a population, which is NOT a density-dependent factor?
 A) temperature fluctuations D) availability of mates
 B) disease E) predators
 C) soil nutrients

Use the age structure diagrams to the right to answer questions 51, 52, 53.

51. Which diagram shows a negative growth rate?
 A) A B) B C) C D) D

52. Which diagram shows a zero growth rate?
 A) A B) B C) C D) D

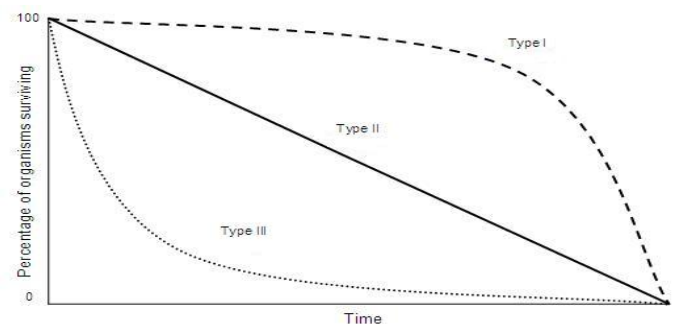
53. Which diagram shows a slow growth rate?
 A) A B) B C) C D) D



54. Use the survivorship curve to the right. Which curve represents human survivorship?
 A) I B) II C) III

55. Which organism below shows a type III survivorship?
 A) lizard B) Oak tree C) elephant
 D) mosquito E) Panda

56. What is a watershed?
 A) a large of the materials arriving in one area at one time
 B) all of the land from which water drains into a river
 C) all of the water that drains from a single agricultural field
 D) all of the water that drains from a single county
 E) all of the ecosystem goods that drain into a river



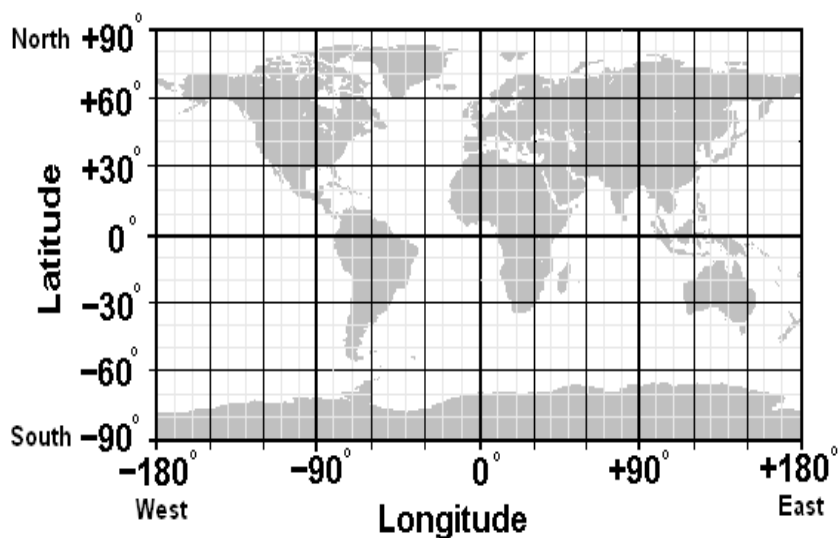
57. Which statement best describes the role of autotrophs in an ecosystem?
- A) they produce their own organic molecules, which can be broken down for energy
 - B) they produce their own inorganic molecules, which can be broken down for energy
 - C) they consume other organisms for energy
 - D) they consume decomposers for energy
 - E) C and D best describe autotrophs

58. Which statement below is the reason for the loss of energy as one moves up a food web?
- A) First Law of Thermodynamics
 - B) Second Law of Thermodynamics
 - C) Law of Conservation of energy
 - D) Law of Conservation of Mass
 - E) Law of Conservation of Momentum

59. Of the four categories for energy consumption, which consumes the largest amount of energy?
- A) transportation
 - B) industry: production of economic goods
 - C) residential: home use
 - D) commercial: goods and services exchanged for money

60. The largest number of bird species in the northern hemisphere is located between which latitudes? Use the globe to the right.

- A) 0 to 20°
- B) 20 to 40°
- C) 40 to 60°
- D) 60 to 80°



61. Species diversity is
- A) the number of individuals within one community
 - B) the number of individuals of one species in a biome
 - C) the number of geographically isolated populations of a single species
 - D) the number of species in the biosphere
 - E) the number of all species held in seed banks
62. The sixth mass extinction event
- A) has not happened
 - B) was caused by a meteor 62 million years ago
 - C) happened during the K-T event
 - D) is ongoing and has been caused by humans
 - E) occurred because of increasing volcanic activity and dust screening out sunlight

63. Which of the following is not a product of the combustion of fossil fuels?
- A) carbon dioxide
 - B) carbon monoxide
 - C) water
 - D) energy
 - E) all are products of combustion

64. The gasoline stored in an automobile gas tank is a form of what type of energy?
A) potential
B) kinetic
C) electrical
D) nuclear
E) electromagnetic
65. A population of mule deer was growing very quickly until starvation began to reduce the numbers. The mule deer growth passed what point?
A) overcrowding
B) exponential growth
C) limited growth
D) carrying capacity
E) extirpation
66. Which country has the largest ecological footprint?
A) Mexico
B) India
C) Japan
D) England
E) United States
67. Which is the most abundant greenhouse gas in the atmosphere?
A) carbon dioxide
B) water vapor
C) methane
D) nitrogen dioxide
E) sulfur dioxide
68. Species that fill a narrow niche and depend on specific requirements for survival are called
A) specialists
B) K-selected
C) generalists
D) survivors
E) R-selected
69. What is an innate reproductive capacity of a species?
A) logistic growth
B) carrying capacity
C) environmental resistance
D) crude death rate
E) biotic potential
70. Spiders, fish, and frogs are examples of
A) R-selected species
B) K-selected species
C) density-dependent organisms
D) density interdependent carrying capacity organisms
E) IPAT species
71. Which an adaptation of K-selected species?
A) long gestation periods
B) small body size
C) lay large number of eggs
D) have short a short life span
E) unstable population level
72. Which of the following is the greatest overall threat to the survival of terrestrial species?
A) habitat loss
B) resource extraction
C) invasive species
D) overgrazing
E) pollution

NEW JERSEY SCIENCE LEAGUE

Environmental Science

January 2012

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|----|---|----|---|----|---|----|---|
| 1 | B | 19 | A | 37 | B | 55 | D |
| 2 | D | 20 | B | 38 | E | 56 | B |
| 3 | B | 21 | C | 39 | D | 57 | A |
| 4 | C | 22 | E | 40 | E | 58 | B |
| 5 | A | 23 | C | 41 | A | 59 | B |
| 6 | D | 24 | B | 42 | D | 60 | A |
| 7 | C | 25 | C | 43 | B | 61 | D |
| 8 | B | 26 | E | 44 | A | 62 | D |
| 9 | E | 27 | A | 45 | E | 63 | E |
| 10 | C | 28 | C | 46 | A | 64 | A |
| 11 | D | 29 | B | 47 | C | 65 | D |
| 12 | C | 30 | D | 48 | B | 66 | E |
| 13 | D | 31 | E | 49 | D | 67 | B |
| 14 | D | 32 | B | 50 | A | 68 | A |
| 15 | C | 33 | B | 51 | D | 69 | E |
| 16 | A | 34 | C | 52 | C | 70 | A |
| 17 | B | 35 | C | 53 | B | 71 | A |
| 18 | D | 36 | D | 54 | A | 72 | A |

ENVIRONMENTAL SCIENCE: 72 questions per exam.

JANUARY TEST: Environmental Science and ecology, fields of study, historical environmental science (hunter-gathers, agriculture, industrial revolution) 3 major environmental problems, renewable and non-renewable resources, ecological footprints, Hardin The Tragedy of the Commons, Sustainability, scientific method, correlations, statistics, models, environmental decision-making model, graphing and interpreting graphs, geosphere, atmosphere, hydrosphere and biosphere and earth cycles with the spheres. Organization of life: biotic abiotic, population, species, habitats, evolution, adaptation, artificial selection, resistance, biological diversity, Ecosystems: energy flow, cycling of material, ecosystems change Biomes: climate, latitude, longitude, altitude. Types of biomes, forest, grassland, desert, and tundra biomes.

FEBRUARY TEST: Aquatic ecosystems: freshwater ecosystem, salt water ecosystems. Populations, human population, biodiversity, ecological footprints plus Jan topics

MARCH TEST: Water, air, atmosphere, climate change, land, food and agriculture, ecological footprints, Plus Jan and Feb Topics.

APRIL TEST: Minerals, mining, nonrenewable energy, renewable energy, waste, ecological footprints, plus Jan, Feb, and March topics.

Testing Dates for 2012

Thursday January 12, 2012, Thursday Feb 9, 2012;

Thursday March 8, 2012; *Thursday April 12, 2012

*The April 2011 exam can be changed based upon the School's spring break.

New Jersey Science League

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New Jersey Science League
Environmental Science Exam February 2012

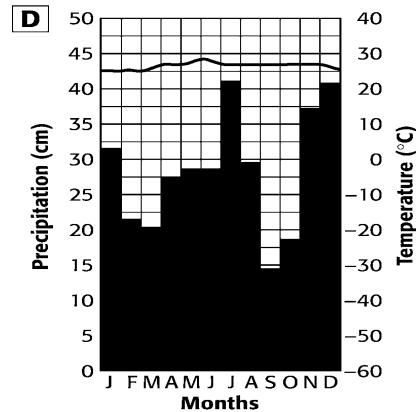
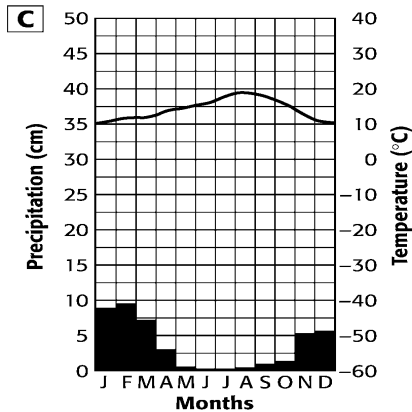
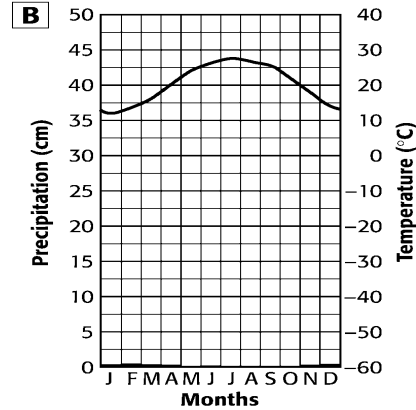
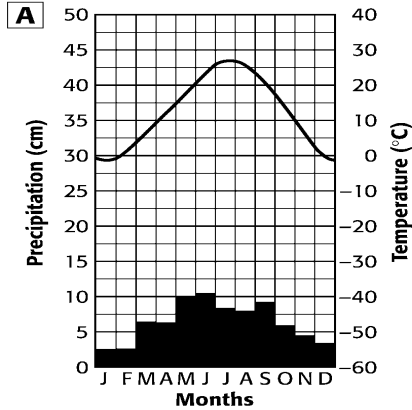
Answer the following questions on the answer sheet provided. Each correct response is worth 1 point. Use the letters for your answers. Choose the letter that best completes or answers the item. Be certain that erasures are complete. Please PRINT your name, school, area, and which test you are taking onto the scantron.

- Most of today's environmental problems began during
 - the hunter-gatherer period
 - the agricultural revolution
 - the Industrial Revolution
 - the Middle Ages
 - both (b) and (d)
- Population growth can have which of the following effects on the environment?
 - resource depletion
 - habitat destruction
 - pollution
 - loss of biodiversity
 - all of the above
- When performing a scientific investigation, it is important that you ensure that the number of objects or events being sampled is
 - small and easily managed.
 - large enough to give an accurate representation of the entire population.
 - equal to the mean number of individuals in the population.
 - equal to the total statistical population.
 - a guess of how likely an unwanted outcome will occur.
- Which organism would occupy the level on an energy pyramid with the most energy?
 - Owl
 - Ladybug
 - Sparrow
 - Clover
 - Snake
- If a grasshopper eats some grass and a blue jay eats the grasshopper, about how much energy from the grass is stored in the grasshopper for the blue jay to use?
 - 90%
 - 50%
 - 25%
 - 10%
 - 1%
- Which of the following best describes a population?
 - Members of the same species living in the same place at the same time
 - All the red birds in a forest
 - The organisms that live and interact together in a given ecosystem
 - All the members of the same species
 - The number of individuals living in a given unit of area.
- Which of the following ecosystem components is abiotic?
 - Plants
 - Bacteria
 - Fungi
 - Lichens
 - Minerals
- Natural selection is the unequal survival of individuals in a population due to the presence or absence of
 - Breeding patterns
 - Particular traits
 - Learned behaviors
 - Recessive genes
 - Competitive pressure
- If you visited a savanna, you might expect to see
 - a humid tropical environment.
 - a dense forest.
 - snow and ice.
 - an area full of lush vegetation.
 - large herds of grazing animals

10. The tundra

- A) has a layer of permafrost beneath the topsoil.
- B) is located next to coastal regions.
- C) is resistant to environmental damage because it is usually frozen.
- D) cannot support life because temperatures are too low.
- E) None of the above

The graphs below show average temperature and precipitation for four biomes. The lines across the tops of the graphs represent temperature, and the bars represent precipitation.



11. Refer to Graph C. It represents a biome with mild, wet winters, and hot, dry summers. This biome is likely the

- A) tundra
- B) chaparral
- C) temperate grassland
- D) temperate rainforest
- E) taiga

12. Which of the following best identifies a biome with heavy, year-round precipitation and constant, warm temperatures?

- A) Graph A, temperate forest
- B) Graph A, chaparral
- C) Graph C, temperate forest
- D) Graph D, tropical rainforest
- E) Graph D, tropical savanna

13. Which of the following is NOT an environmental function of wetlands?

- A) Acting as a breeding ground for migratory bird species
- B) Increasing runoff
- C) Filtering pollutants from water
- D) Trapping carbon that would otherwise be released into the atmosphere
- E) Controlling floods

14. Which of the following factors is an important advantage for an organism living near the surface of an aquatic ecosystem?

- A) Cooler temperatures
- B) Less competition
- C) Presence of decomposing organisms
- D) Higher oxygen level
- E) Absence of phytoplankton

15. Which aquatic ecosystem is negatively affected by runoff?

- A) Lakes
- B) Rivers
- C) Oceans
- D) Estuaries
- E) All of the above

16. Photosynthetic organisms are found mainly in shallow water due to the availability of

- A) Oxygen
- B) Minerals
- C) Nutrients
- D) Sunlight
- E) Salt

17. In which zone is aquatic life the most diverse and abundant?

- A) Benthic
- B) Eutrophic
- C) Littoral
- D) Profundal
- E) Abyssmal

18. Which of the following does not currently threaten coral reefs?

- A) Oil spills
- B) Global warming
- C) Sewage
- D) Pesticides
- E) Phytoplankton

19. Estuaries are such productive ecosystems because they receive a continuous supply of fresh nutrients from

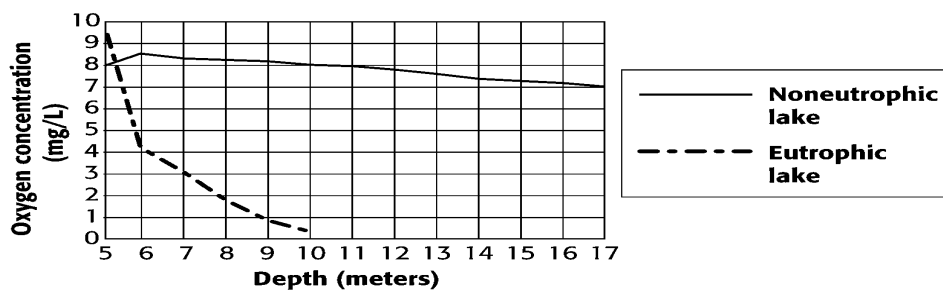
- A) rivers and oceans
- B) marshes and rivers
- C) lakes and ponds
- D) marshes and swamps
- E) streams and natural springs

20. What causes most coastal pollution in the United States?

- A) Activities on land
- B) Hazardous waste dumping
- C) Over-fishing
- D) Off-shore drilling
- E) Temperature change

Use the following graph to answer questions 21 and 22.

Comparison of Oxygen Concentration in Two Lakes



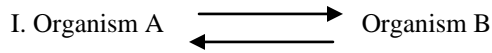
21. How does oxygen concentration vary with depth in a noneutrophic lake?

- A) oxygen decreases slowly as depth increases
- B) oxygen decreases rapidly as depth increases
- C) oxygen increases slowly as depth increases
- D) oxygen increases rapidly as depth increases
- E) oxygen concentration does not vary with depth

22. What might be a potential cause for the trend represented by the dotted line?
 A) pesticide contamination
 B) heavy metal pollution
 C) introduction of phosphates from detergents
 D) fertilizer runoff
 E) both (c) and (d)
23. Which of the following would be an example of population dispersion?
 A) the number of deer per square kilometer in a forest
 B) a herd of water buffalo clustered around a river bank
 C) the number of wolves in a pack
 D) the number of offspring born per thousand females in a population
 E) none of the above
24. If over many generations each pair of adults in a population had only two children and those children lived to produce offspring, the population would
 A) decrease
 B) stay the same
 C) disperse randomly
 D) increase slowly
 E) increase rapidly
25. Which of the following species has the highest reproductive potential?
 A) elephants
 B) humans
 C) rabbits
 D) cockroaches
 E) deer
26. Which of the following is not an example of exponential growth?
 A) the cane toad population after being introduced to an area with no predators
 B) giant pandas in China after eating most of the bamboo in the region
 C) the human population in the last century
 D) bacterial growth on a Petri dish after 24 hours
 E) mold appearing on bread overnight
27. What determines the carrying capacity of an ecosystem?
 A) birthrate of the population
 B) distribution of the population
 C) number of individuals in the species
 D) reproductive potential of the species
 E) supply of the most limited resources
28. Competition for resources cannot occur
 A) among members of the same species.
 B) between populations in different ecosystems.
 C) within a single population.
 D) between two populations.
 E) among populations with overlapping niches.
29. Two species of rodent feed on the same seed source, however one is active during the day while the other is nocturnal. What is this an example of?
 A) Direct competition
 B) Mutualism
 C) Indirect competition
 D) Commensalism
 E) Indirect commensalism
30. Which of the following least represents a symbiotic relationship?
 A) A cardinal building a nest in an oak tree
 B) A wasp pollinating and laying its eggs on an orchid
 C) Bacteria in your digestive system that help you digest food
 D) A lion hunting and eating zebra
 E) An oxpecker eating ticks off an antelope's body

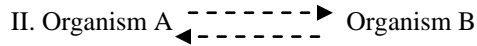
31. Which relationship has likely coevolved the most?
A) field mice and house mice
B) wolves and their coyote competitors
C) frogs and toads
D) flowering plants and their pollinators
E) mule deer competing for mates
32. Which of the following would be considered a population?
A) All the organisms in a forest
B) All the plants in a forest
C) All the rodents in a forest
D) All the trees in a forest
E) All red oak trees in a forest
33. What is the density of a population?
A) The number of individuals living in cities
B) The number of individuals born each year
C) The ratio of males to females in a population
D) The number of individuals per unit area
E) The arrangement of individuals within a space
34. A large number of density-independent deaths in a population might be caused by
A) limited resources
B) disease-carrying insects
C) natural disaster
D) predators
E) a virus
35. A species of invasive grass experiences exponential growth after being introduced to a new region. Which statement best describes what is going on?
A) The population declines.
B) The population quickly increases dramatically.
C) The species' reproductive potential decreases.
D) Each plant is able to grow larger.
E) The plants produce more offspring than can survive.
36. Which of the following statements is true?
A) Parasites are always microorganisms.
B) Parasites only occur within host organisms.
C) Parasites can cause their hosts to become more vulnerable to predators.
D) Parasites kill their hosts immediately.
E) All parasites must spend their entire lifecycle inside a host.
37. Which of the following statements is incorrect?
A) An organism's niche includes the role it plays within its environment.
B) The niches of two organisms can overlap.
C) The niches of two different species can overlap.
D) Habitat and niche are the same thing.
E) An organism's niche includes its habitat.

The diagrams below show four types of species interactions. The arrows pointing from one organism to another show the effect they have on each other. Use the diagrams to answer the following questions.

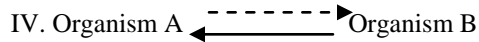
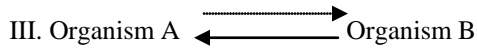


_____ = positive effect

----- = negative effect



_____ = no effect



38. The first diagram could represent

- A) a flower and a bee
- B) bears fighting over the same territory
- C) a mountain lion and a deer
- D) a tick and a dog
- E) a barnacle and a sea turtle

39. The second diagram shows

- A) mutualism
- B) commensalism
- C) competition
- D) predation
- E) parasitism

40. The third diagram could represent

- A) a frog and a fly
- B) a bird nesting in a tree
- C) a squirrel and an acorn
- D) a human and a tapeworm
- E) birds eating from the same bird feeder

41. The fourth diagram shows

- A) parasitism
- B) commensalism
- C) predation
- D) mutualism
- E) both (a) and (c)

42. The high incidence of water-borne illness in developing areas could be alleviated by

- A) adequate sewage treatment facilities for growing populations.
- B) rapid growth of large cities.
- C) sufficient fuel wood.
- D) Both (a) and (b)
- E) water desalination

43. Which statement is true regarding human demographic trends?

- A) Birth rates and death rates are high in pre-industrial societies.
- B) When the death rate declines, the total population decreases.
- C) A population will stabilize when death rates exceed birth rates.
- D) Death rates rise as a country progress through the demographic transition.
- E) A population will grow rapidly when birth rates and death rates are both high.

44. Between 1880 and 1930 human population doubled due to

- A) advances that came about during the Industrial Revolution.
- B) improvements made in societal infrastructure and services.
- C) a combination of decreased birth rates and rising death rates.
- D) Both (a) and (b)
- E) All of the above

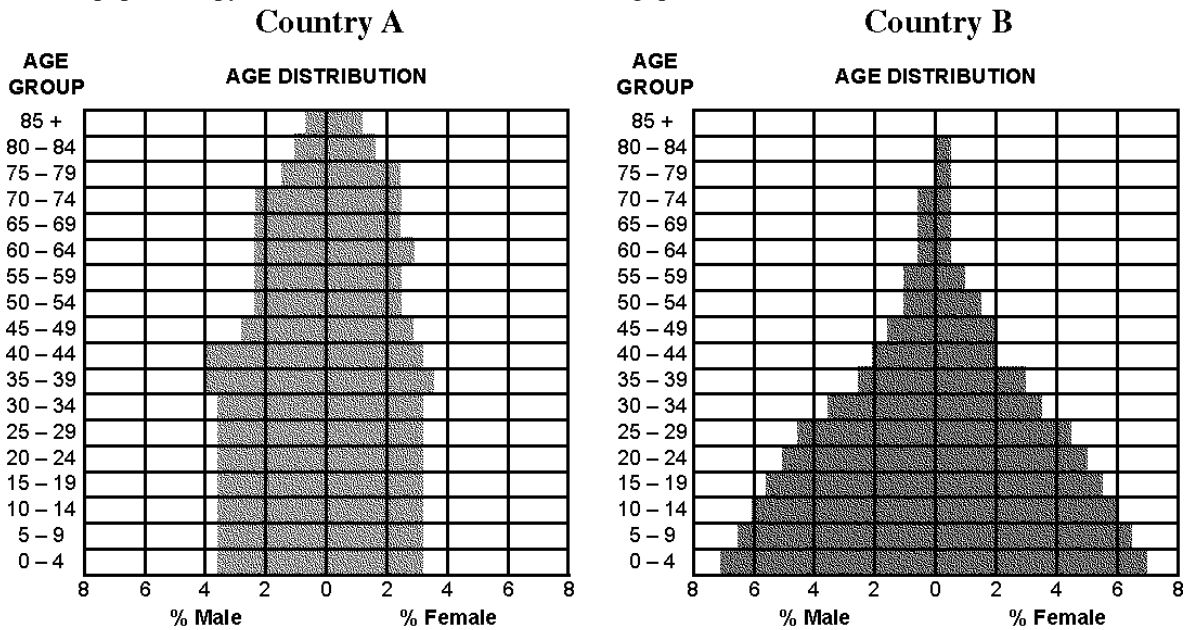
45. Countries in the later stages of demographic transition are typically characterized by

- A) agriculturally-based economies.
- B) populations with a high proportion of young people.
- C) societal conditions that favor smaller families.
- D) a more stable population.
- E) Both (c) and (d).

46. Which strategy would be effective in reducing population size?
 A) Increased education for women
 B) Economic incentives
 C) Public advertising
 D) Providing access to family planning services
 E) All of the above
47. What do scientists use to predict population sizes?
 A) survivorship, emigration, death rate, and replacement structure.
 B) life expectancy, age structure, fertility rate, and migration.
 C) replacement rate, fertility rate, age rates, and death rate.
 D) age structure, survivorship, fertility rate, and migration.
 E) survivorship, migration, life expectancy, and replacement structure.
48. Age structure data include all of the following except
 A) individuals in a population between the ages of 10 and 16 years old.
 B) the ratio of males to females in a population.
 C) the amount of immigration versus emigration.
 D) the relative amount of older people to younger people in a population.
 E) the distribution of ages in a population at a certain time.
49. The age structure of a population is represented by a
 A) population pyramid.
 B) survivorship curve.
 C) demographic curve.
 D) total fertility rate.
 E) migration rate.
50. All of the following are part of a community's infrastructure except
 A) public water supply
 B) power lines
 C) sewer lines
 D) waste disposal facilities
 E) arable land
51. Suburban sprawl can result in
 A) traffic jams.
 B) lowered standard of living
 C) inadequate infrastructure.
 D) reduction in open space.
 E) All of the above
52. Which continent currently has the fastest-growing populations?
 A) Europe
 B) Asia
 C) North America
 D) Australia
 E) South America
53. Because birth rates have started to fall, Earth's population is projected to
 A) decrease to pre-industrial levels.
 B) stabilize at the current level of about 7 billion.
 C) begin to decrease until it reaches 6 billion again.
 D) increase exponentially indefinitely.
 E) potentially stabilize somewhere around 9 billion by 2050.
54. Water-borne illness is a problem in developing regions because
 A) alum is omitted in the abundant water-treatment facilities.
 B) it is used for cooking, drinking, washing and sewage disposal.
 C) there are adequate water-treatment facilities.
 D) desalination is used to treat the water.
 E) None of the above

55. An example of a country with a more stabilized population is
- A) Italy.
 - B) India.
 - C) China.
 - D) Uganda.
 - E) Congo.

Use the population pyramids below to answer the following questions 56 and 57.



56. What can you infer about countries A and B from the above population pyramids?

- A) Country A is a less developed nation while country B is more developed
- B) Country A is a more developed nation while country B is less developed
- C) Country A has a more stable population while that of country B is increasing
- D) Country A has an increasing population while that of country B is decreasing
- E) Both (b) and (c)

57. What problems are typically associated with the growth pattern seen in country B?

- A) Poor infrastructure
- B) Low literacy rate
- C) Low economic status
- D) All of the above
- E) None of the above

In 1869, the gypsy moth was imported from Europe into Massachusetts. Each gypsy moth caterpillar can eat more than 1 square meter of leaf tissue in its 8-week life, so by 1889 the residents of Boston began to notice many leafless trees.

Every few years, the population of gypsy moths rapidly increases in a season. In the course of two growing seasons, the number of eggs can range from 100 per acre to as many as 1 million per acre. In 1981, about 13 million acres of trees were defoliated (lost their leaves) in the American northeast, and many valuable oak trees died. Between 1979 and 1983, the cost of trying to control these pests totaled 24.2 million dollars. These attempts at control failed.

Rapid growth of a population occurs when there is an abundance of food or when an important environmental factor has been removed. Gypsy moth populations are normally kept in check by phenol chemicals that trees make and release into their leaves. These defensive chemicals stunt caterpillar growth and reduce the number of eggs a female can lay. After several years without caterpillars, the trees stop making these phenols. When this happens, the females eating the phenol-free leaves grow bigger and lay more eggs. Suddenly, a gypsy moth outbreak occurs again, and the cycle is repeated.

When a gypsy moth outbreak occurs, the surrounding ecosystem begins to change as well. Cuckoos, starlings, grackles, mice, and skunks feast on the extra caterpillars, and their numbers increase. All these natural enemies cannot stop the gypsy moth. Trees are stripped of their leaves, weaker trees die at once, and others grow a second set of leaves. If the trees that survive are attacked repeatedly, they also may be weakened beyond recovery.

58. What term best describes the gypsy moth in this case?
- A) endemic species
 - B) invasive species
 - C) endangered species
 - D) threatened species
 - E) advanced species
59. Which of the following statements is not true according to the article?
- A) An outbreak of gypsy moths can change an ecosystem
 - B) There is insufficient natural predation to control the moth population
 - C) We can control the problem by spraying phenol compounds on the trees.
 - D) Trees able to initially survive may eventually succumb to repeated attack.
 - E) An increase in gypsy moths can lead to increases in other species' populations.
60. Why does the gypsy moth cycle continue to repeat?
- A) Trees stop making phenol compounds when there are very few caterpillars.
 - B) Females that eat phenol-free leaves are able to grow bigger and lay more eggs.
 - C) Gypsy moths are continually imported from Europe.
 - D) Predator populations rapidly decrease.
 - E) Both (a) and (b)
61. Which groups of organisms are least in danger of extinction?
- A) organisms with small populations
 - B) migrating species
 - C) species that require special habitats or resources
 - D) those with large populations that breed quickly
 - E) those that inhabit biodiversity hotspots
62. What human activities impact the rate of extinctions?
- A) habitat destruction
 - B) rapid population growth
 - C) introducing exotic species
 - D) poaching
 - E) all of the above

63. All of the following are reasons for preserving biodiversity except
 A) isolating unique genetic material for crop engineering.
 B) increasing the chances of discovering plants with medicinal value.
 C) preserving genetic diversity within animal populations.
 D) finding new plants that can supplement the world's food supply.
 E) preventing natural evolution of undesirable traits.
64. Efforts to save an individual species could be problematic because
 A) small populations are less likely to be affected by disease.
 B) inbreeding in existing small populations might result in genetic disorders.
 C) captive species always reproduce successfully in the wild.
 D) organisms in captivity always do better than their wild counterparts.
 E) strict laws prevent scientists from tagging and tracking animals.
65. Preserving entire ecosystems is an effective conservation strategy because
 A) exotic species will be introduced to the area. D) captive breeding programs always fail.
 B) protective laws are rarely enforced. E) only endangered animals will be saved
 C) more than one species can be saved.
66. Where would you expect to find most biodiversity hotspots?
 A) cities and developed areas D) desert and prairie environments
 B) islands, tropical rain forests, and coastal areas E) desert and arctic environments
 C) in the open ocean
67. Biodiversity hotspots can be found in the United States. They exist in
 A) the Pacific Northwest and California D) both (a) and (b)
 B) the Florida Everglades and Hawaii E) none of the above
 C) New Jersey
68. How did the CITES treaty reduce the slaughter of elephants?
 A) It offered a reward for catching poachers.
 B) It created a captive breeding program for the African Elephant.
 C) It increased sales of ivory to the antique market.
 D) It banned ivory trade worldwide.
 E) It put a tax on ivory.
69. What is the germ plasm of a species?
 A) its overall phenotype D) its ability to reproduce
 B) its genetic material E) none of the above
 C) an infection cause by microorganisms
70. Which of the following would be most effective in slowing the loss of biodiversity?
 A) decreasing the number of protective laws
 B) requiring every country to maintain seed banks
 C) freezing the sperm of endangered animals in case the species goes extinct
 D) creating large preserves in biodiversity hotspots
 E) preserving small tracts of land in various ecosystems worldwide
71. Where are the greatest number of extinctions presently occurring?
 A) in deserts D) in polar regions
 B) in Europe and North America E) in China
 C) in tropical rain forests
72. Habitat destruction accounts for most extinctions because
 A) organisms are adapted to survive in particular environments.
 B) captive breeding programs are rarely successful.
 C) non-native plant species never thrive in new environments.
 D) poaching is strictly controlled all over the world.
 E) pollution controls have become more tightly regulated.

NEW JERSEY SCIENCE LEAGUE
Environmental Science Answer Key
February 2012

| | | | | | | | |
|----|---|----|---|----|-------|----|---|
| 1 | C | 19 | A | 37 | D | 55 | A |
| 2 | E | 20 | A | 38 | A | 56 | E |
| 3 | B | 21 | A | 39 | C | 57 | D |
| 4 | D | 22 | E | 40 | B | 58 | B |
| 5 | D | 23 | B | 41 | A (E) | 59 | C |
| 6 | A | 24 | B | 42 | A | 60 | E |
| 7 | E | 25 | D | 43 | A | 61 | D |
| 8 | B | 26 | B | 44 | D | 62 | E |
| 9 | E | 27 | E | 45 | E | 63 | E |
| 10 | A | 28 | B | 46 | E | 64 | B |
| 11 | B | 29 | C | 47 | D | 65 | C |
| 12 | D | 30 | D | 48 | C | 66 | B |
| 13 | B | 31 | D | 49 | A | 67 | D |
| 14 | D | 32 | E | 50 | E | 68 | D |
| 15 | E | 33 | D | 51 | E | 69 | B |
| 16 | D | 34 | C | 52 | B | 70 | D |
| 17 | C | 35 | B | 53 | E | 71 | C |
| 18 | E | 36 | C | 54 | B | 72 | A |

ENVIRONMENTAL SCIENCE: 72 questions per exam.

JANUARY TEST: Environmental Science and ecology, fields of study, historical environmental science (hunter-gathers, agriculture, industrial revolution) 3 major environmental problems, renewable and non-renewable resources, ecological footprints, Hardin The Tragedy of the Commons, Sustainability, scientific method, correlations, statistics, models, environmental decision-making model, graphing and interpreting graphs, geosphere, atmosphere, hydrosphere and biosphere and earth cycles with the spheres.

Organization of life: biotic abiotic, population, species, habitats, evolution, adaptation, artificial selection, resistance, biological diversity, Ecosystems: energy flow, cycling of material, ecosystems change Biomes: climate, latitude, longitude, altitude. Types of biomes, forest, grassland, desert, and tundra biomes.

FEBRUARY TEST: Aquatic ecosystems: freshwater ecosystem, salt water ecosystems. Populations, human population, biodiversity, ecological footprints plus Jan topics

MARCH TEST: Water, air, atmosphere, climate change, land, food and agriculture, ecological footprints, Plus Jan and Feb Topics.

APRIL TEST: Minerals, mining, nonrenewable energy, renewable energy, waste, ecological footprints, plus Jan, Feb, and March topics.

TESTING DATES FOR THE NEW JERSEY SCIENCE LEAGUE

Thursday January 12, 2012, Thursday Feb 9, 2012;

Thursday March 8, 2012; *Thursday April 12, 2012

The April exam must be completed by April 30th. No area may take the April exam during the first week of April or during the first week of May.

New Jersey Science League

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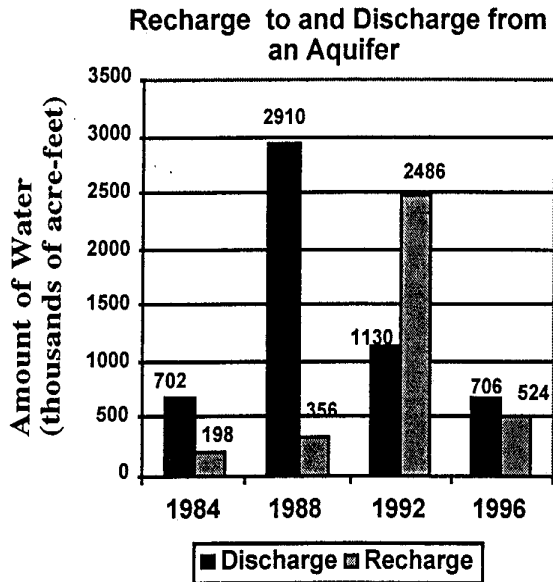
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New Jersey Science League
Environmental Science Exam March 2012

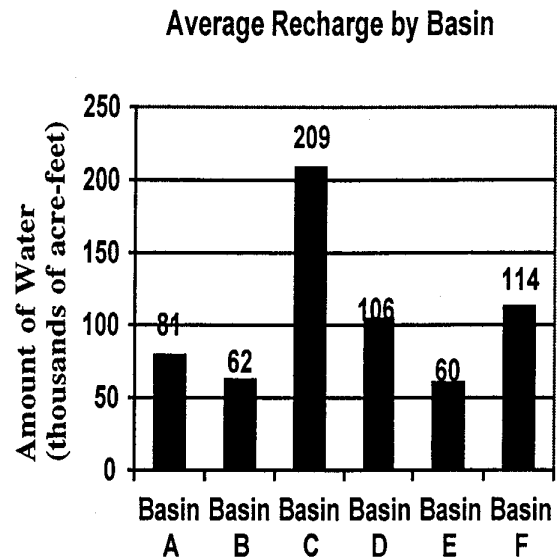
Answer the following questions on the answer sheet provided. Each correct response is worth 1 point. Use the letters for your answers. Choose the letter that best completes or answers the item. Be certain that erasures are complete. **Please PRINT your name, your school, area, and which test you are taking onto the scan-tron.**

1. What percentage of the world's water is found as fresh water?
A) 75% D) 12%
B) 50% E) 3%
C) 27%
2. Where does most ocean pollution come from?
A) offshore waste storage facilities D) cruise liners
B) activities on land E) personal boats and yachts
C) commercial barges
3. How did the 1990 Oil Pollution Act help decrease water pollution?
A) It banned ocean drilling in the United States.
B) It made all offshore dumping illegal.
C) It stated that leaking underground storage facilities must be repaired within 90 days.
D) It required double hulling of all oil tankers in U.S. waterways by 2015.
E) It stated that underground storage facilities must be constructed of specific materials.
4. What is the largest watershed in the United States?
A) Mississippi River D) Ohio River
B) Colorado River E) Rio Grande
C) New River
5. Chlorine is added to water during the water treatment process to
A) remove debris D) improve flavor
B) remove unwanted gases E) form flocs
C) stop bacterial growth
6. Many areas of the world do not have enough fresh water naturally, however people are able to live there because of
A) extreme water conservation techniques.
B) increased rainfall due to new weather patterns.
C) water management projects that have diverted water to the area.
D) continued overuse of natural aquifers.
E) icebergs that have been towed to the area.
7. A cheap way to insure a greater supply of fresh water is
A) desalination. D) building more dams.
B) water conservation. E) creating more aquifers.
C) drilling more wells.
8. Why are detergents with high levels of phosphates banned in some places?
A) phosphates cause chemical reactions that kill phytoplankton
B) phosphates cause the water temperature to rise
C) excessive phosphates in lakes can lead to eutrophication
D) phosphates kill algae and aquatic plant life
E) phosphates do not make good detergents

Graph A



Graph B



Use the graphs to answer the following questions #s 9, 10, 11,

9. What is a possible cause of the discharge trend observed from 1988 to 1996?

- A) overuse of groundwater resources
- B) increased rainfall
- C) increased population
- D) water conservation efforts
- E) additional well drilling

10. In what year did recharge exceed discharge?

- A) 1984
- B) 1988
- C) 1992
- D) 1996
- E) recharge never exceeded discharge

11.) Which basin could contribute the most pollution to the area's water supply?

- A) basin A
- B) basin E
- C) basin C
- D) basin D
- E) basin F

12. Which term refers to water pollution that becomes more concentrated at successive levels of the food chain?

- A) biomagnification
- B) eutrophication
- C) sophistication
- D) salination
- E) desalination

13. Which of the following is the easiest way a person can conserve water?

- A) hand wash all dishes instead of using a dishwasher
- B) wash laundry in small, multiple loads
- C) use a low-flow shower head
- D) water the lawn at mid-day
- E) use a water filter instead of purchasing bottled water

14. Which of the following is a source of nonpoint-pollution?
 A) a leaking oil tank
 B) a cruise-ship illegally dumping offshore
 C) an unlined landfill
 D) runoff from roadways
 E) polluted waste-water from a factory
15. Parasitic microorganisms are what kind of water pollutant?
 A) pathogen
 B) particulate matter
 C) inorganic chemicals
 D) organophosphates
 E) organic matter
16. A decrease in the toad population of the nearby lake was observed by local residents. They traced the problem to a local pesticide plant. This is an example of
 A) nonpoint-source pollution
 B) point-source pollution
 C) eutrophic pollution
 D) groundwater pollution
 E) thermal pollution
17. All of these are possible long-term illnesses due to air pollution **except**
 A) heart disease.
 B) lung cancer.
 C) headaches.
 D) emphysema.
 E) All of the above
18. What is the biggest contributor to the formation of acid precipitation?
 A) the burning of fossil fuels.
 B) changing weather patterns
 C) temperature inversions.
 D) the hole in the ozone
 E) particulate matter pollution
19. What can happen when the acidity of soil increases due to acid precipitation?
 A) the pH can reach levels as high as 9 or 10.
 B) nutrients are leached away.
 C) the number of bacteria and fungi increase.
 D) Both (a) and (b)
 E) none of the above
20. The 1991 Canada-U.S. Air Quality Agreement had the goal of
 A) reducing the acidic emissions crossing the Canada-U.S. boundary.
 B) protecting the ozone layer.
 C) slowing global warming
 D) setting up a joint climate control committee.
 E) increasing the use of renewable fuel sources.
21. If 20 decibels is ten times louder than 10 decibels, and 10 decibels is ten times louder than 0 decibels, then how much louder is a sound that measures 80 decibels compared to a sound of 40 decibels?
 A) 100,000 B) 10,000 C) 100 D) 10 E) 2
22. How are vehicle emissions controlled?
 A) diesel fuel
 B) automatic transmissions
 C) catalytic converters
 D) scrubbers
 E) electrostatic precipitators

23. Which of the following pH measurements would be indicative of acid precipitation?
- A) pH 10.0
 - B) pH 9.1
 - C) pH 7.4
 - D) pH 6.2
 - E) pH 4.3
24. Most air pollution comes from
- A) burning fossil fuels
 - B) natural sources
 - C) temperature inversions
 - D) global warming
 - E) the hole in the ozone layer
25. Which of the following is not a primary air pollutant?
- A) particulate matter
 - B) carbon monoxide
 - C) volatile organic compounds
 - D) sulfur oxides
 - E) nitric acid
26. A city in a nearby valley is on high alert due to unusually high levels of air pollution due to a temperature inversion. What could be happening in the atmosphere to cause this to occur?
- A) cross-flow is keeping the pollutants close to ground level
 - B) cool air is being trapped close to earth by a warmer air mass above
 - C) solar radiation is not being absorbed by the surrounding air masses
 - D) warm air is being trapped close to earth by a cooler air mass above
 - E) the mixing-effect is preventing the pollutants from dispersing naturally
27. Over time, acid precipitation can cause all of the following **except**
- A) nutrient leaching in the soil.
 - B) a decrease in an area's standard of living.
 - C) an increase in biodiversity.
 - D) degradation of buildings and monuments.
 - E) an increase in respiratory health problems.
28. Which would have the **poorest** indoor air quality?
- A) a building that has not been repainted in several years
 - B) a building in which windows are often open
 - C) an older building that recently updated its ventilation system
 - D) a new office building that is tightly-sealed and uses air conditioning
 - E) a building in a warm climate that circulates air from inside with exterior air.
29. How are weather and climate different?
- A) Weather describes atmospheric conditions on a given day while climate refers to long-term, prevailing atmospheric conditions.
 - B) Only climate is influenced by ocean currents.
 - C) Climate describes atmospheric conditions on a given day while weather refers to long-term, prevailing atmospheric conditions.
 - D) Only weather takes into account the elevation of a region.
 - E) Weather and climate are the same.
30. When cold air sinks,
- A) it retains its pressure and temperature.
 - B) it compresses and warms.
 - C) it expands and warms.
 - D) it always releases water vapor.
 - E) it expands and cools.

31. Why is the ozone layer essential to living organisms on Earth?
- A) It prevents water vapor from escaping.
 - B) It enhances the solar energy that reaches Earth.
 - C) It blocks solar ultraviolet radiation.
 - D) It blocks harmful gamma radiation.
 - E) The ozone layer is not essential to living organisms on Earth.
32. Which of the following statements is true?
- A) Ozone holes appear over equatorial regions where concentrated solar energy causes the chemical reaction between chlorine and O₃ to happen most rapidly.
 - B) Ozone holes appear in polar regions during springtime when ozone-destroying Cl atoms are released from polar stratospheric clouds as temperatures warm.
 - C) Ozone-destroying chlorine atoms are captured and inactivated by polar stratospheric clouds as temperatures increase.
 - D) Ozone destroying CFC molecules are made in polar stratospheric clouds.
 - E) CFCs magnify ultraviolet light thus creating the hole in the ozone.
33. Why do CFCs continue threaten the ozone despite the fact that their production and use have been discontinued?
- A) CFCs molecules have a short half-life.
 - B) CFCs return to Earth's surface.
 - C) CFCs do not readily break down and continue to destroy ozone for years.
 - D) CFCs destroy ozone for only a short period of time.
 - E) None of the above.
34. Which of the following reduces CO₂ in the atmosphere?
- A) CO₂ captured in boreal forests
 - B) CO₂ dissolved in oceans
 - C) CO₂ captured in tropical rain forests
 - D) CO₂ captured in wetlands and swamps.
 - E) All of the above
35. Recordings of annual average atmospheric CO₂ concentration have revealed
- A) a steady increase only in the last decade.
 - B) a steady decrease since 1958.
 - C) a steady overall increase since 1958.
 - D) a pattern where CO₂ decreases in Northern spring and increases in Northern fall
 - E) Both (C) and (D).
36. A rise in global temperature could cause all of the following **except**
- A) an increase in polar ice masses
 - B) a rise in sea level
 - C) an increase in the occurrence of major droughts
 - D) an increase in the occurrence of major storms
 - E) an increase in the occurrence of coral bleaching
37. During winter in the Northern Hemisphere, the Southern Hemisphere experiences
- A) winter.
 - B) spring.
 - C) summer.
 - D) autumn.
 - E) a tilt away from the sun.

38. When stratospheric ozone decreases,
- A) global temperatures increase.
 - B) there is an increased chance of acid precipitation.
 - C) more UV light is able to reach the surface of the planet.
 - D) the amount of CFCs present in the atmosphere decreases.
 - E) less solar energy reaches Earth.
39. You are currently visiting a hypothetical location on the equator, yet it is snowing. How can this be possible?
- A) It is an El Nino year.
 - B) It is a La Nina year.
 - C) You are on a mountain top.
 - D) It is being caused by climatic change due to global warming.
 - E) It is due to the Coriolis effect.
40. Seasonal changes in day-length and climatic conditions are a consequence of
- A) lunar cycles.
 - B) ocean currents.
 - C) the annual change in the distance from the Earth to the sun.
 - D) the tilt of Earth's axis.
 - E) global warming.
41. It's a cool clear autumn day in November. As night falls however, the humidity increases and the sky becomes cloudy. What do you expect the next morning might be like as a result of the overnight humidity and cloud-cover?
- A) significantly colder because of the humidity
 - B) cooler than if the sky had remained clear
 - C) there would be no change in the atmospheric conditions
 - D) warmer than if the sky had remained clear
 - E) none of the above
42. Parks and preserves
- A) provide areas where all wildlife can be hunted for sport.
 - B) provide recreation for people.
 - C) are not protected by government regulations.
 - D) are not affected by air and water pollution.
 - E) serve as sources of wood for industries.
43. One benefit of preserving open space is
- A) increased CO₂ production.
 - B) decreased recreation.
 - C) increased climate regulation
 - D) decreased crop production.
 - E) increased urban sprawl.
44. In cities, traffic jams, substandard housing, and pollution can be the result of
- A) global warming
 - B) heat islands
 - C) open space
 - D) urban crisis
 - E) infrastructure.
45. Wilderness is
- A) land used to grow crops.
 - B) land used to harvest lumber.
 - C) land that is protected from exploitation.
 - D) land that is used for development.
 - E) land that is used to graze livestock.

46. Why should rural areas be preserved if most people live in cities?
- A) Most people eventually leave the city and move to rural areas.
 - B) Rural areas provide ecosystem services.
 - C) Rural areas provide infrastructure.
 - D) Rural areas are needed for waste disposal sites.
 - E) Cities have more natural resources than rural regions.
47. All of these are effects of deforestation except
- A) soil erosion
 - B) loss of biodiversity
 - C) habitat destruction
 - D) natural resource improvement
 - E) natural resource depletion
48. What causes heat islands in cities?
- A) The city generates and traps heat
 - B) There is an increase in precipitation.
 - C) There is an overall lowering in atmospheric pressure and temperature.
 - D) There is a decrease in solar energy.
 - E) The cooling effect of urban areas
49. What is an important environmental benefit of including open spaces in cities?
- A) hotter, humid summers due to plant transpiration.
 - B) contamination of water sources by runoff of soil and animal wastes.
 - C) the improvement in air quality resulting from filtering of pollutants by plants.
 - D) decreasing the aesthetic quality of the city
 - E) All of the above
50. Which of the following statements about tree harvesting is not true?
- A) Deforestation impacts climate.
 - B) Deforestation impacts biodiversity.
 - C) Mostly, forests are cleared for lumber, agriculture, or development.
 - D) Clear-cutting causes the least soil erosion.
 - E) Selective cutting and replanting decreases the impact on forest ecosystems.
51. Urbanization and urban sprawl would lead to all of the following **except**
- A) increased traffic
 - B) loss of arable land
 - C) suburbs
 - D) overgrazing
 - E) heat islands
52. Which of the following is an impact of urbanization?
- A) increased temperature in cities
 - B) increased crop production
 - C) ecosystem destruction
 - D) decreased development on marginal lands
 - E) Both (A) and (C)
53. Which of the following is true of land-use plans?
- A) Land-use plans aim to use land efficiently while decreasing impact on the environment.
 - B) They require the cooperation of developers, environmentalists, citizens, business people, and public officials.
 - C) Projects can be rejected if environmental impacts are considered too great.
 - D) Projects in environmentally sensitive areas may be controversial.
 - E) All of the above.

Read the article below and answer the questions #s 54 and 55.

Excerpts taken from:

Rapid warming boosted ancient rainforest

Increased temperatures and carbon dioxide caused burst of evolution.

Scientific American, November 11, 2012, 13

Joseph Milton

Most scientists have assumed that, as carbon dioxide levels increase and the Earth warms, plant species diversity in the rainforests will start to dwindle, with plants unable to adapt to the heat. But a new study suggests that the opposite may be true. In the past, rising atmospheric carbon dioxide and higher temperatures actually drove the evolution of far greater numbers of new rainforest plant species than were wiped out.

For clues to how rainforest diversity will be affected by increasing atmospheric carbon dioxide and the corresponding rise in temperatures, Carlos Jaramillo, a palaeobiologist at the Smithsonian Tropical Research Institute in Panama, and his colleagues decided to look at what happened during similar conditions in the past.

One such episode in Earth's history occurred 56.3 million years ago and is called the Palaeocene-Eocene Thermal Maximum (PETM). Within 10,000-20,000 years, the world warmed by 3-5 degrees Celsius and atmospheric carbon dioxide doubled to around two and a half times the levels we see today. These unusually warm conditions lasted for around 200,000 years.

To find out how this ancient climate change affected rainforest plants, Jaramillo and his team analyzed fossilized pollen trapped in rock cores from rainforests in Colombia and Venezuela.

They found that, although some plant species disappeared, many more new species arose. That included entire families, suggesting that the increased temperatures and carbon dioxide levels actually boosted biodiversity. "What we found was exactly the opposite of what we were expecting," says Jaramillo. "The diversity of the tropical forest increased really fast over a very short amount of time."

This might sound like good news for the rainforest in the face of contemporary climate change. However, Guy Harrington, a palaeobiologist at the University of Birmingham, UK, warns that any positive effects on plant diversity could be canceled out if temperatures rise too quickly for plants to adapt. "It's the rate--how fast you're turning up the heater--that's the most important thing," he says.

The availability of water could be critical too, he adds. There was no shortage of water during the PETM, but the effects of future climate change on rainfall in the tropics are uncertain.

The beneficial effects of a hotter and more carbon dioxide-rich world may also be limited to the tropics. Harrington has studied fossil deposits from the period in North America, and says that many native species died out there as temperatures rose. He adds that higher latitudes are more likely to suffer from extreme conditions or lack of water.

54. What did most scientists previously assume about CO₂ levels and species diversity?

- A) As CO₂ levels decrease, plant species diversity in rainforests will decrease.
- B) As CO₂ levels increase, plant species diversity in rainforests will decrease.
- C) As CO₂ levels increase, plant species diversity in rainforests increase.
- D) As CO₂ levels increase, plant species diversity in rainforests will not change.
- E) None of the above.

55. How did Jaramillo and his team look at the relationship between climate change and rainforest diversity?

- A) They made correlations with data collected from similar conditions in the past.
- B) They carried out experiments in a greenhouse replication of the rainforest.
- C) They analyzed fossilized pollen trapped in rock cores.
- D) They collected fossils of different mammal species from the PETM.
- E) Both (A) and (C)

56. Although species diversity could increase, rising temperatures could still be an issue
 A) because higher latitudes would likely suffer from extreme conditions.
 B) because higher latitudes would likely suffer from lack of water.
 C) because it is unknown how future climate change would affect rainfall in the tropics.
 D) if temperatures rise too quickly.
 E) All of the above.
57. Using new crop varieties and applying modern agriculture to increase yield defined
 A) the Farmer's movement
 B) the Green revolution
 C) the Industrial revolution
 D) the Agricultural party
 E) None of the above.
58. Many people in the world are malnourished, in part because
 A) food production is sufficient, but distribution is inconsistent.
 B) modern agriculture is dependent on using genetically engineered plants.
 C) traditional agricultural techniques are less harmful to the environment.
 D) modern agriculture is dependent on heavy fertilizer use.
 E) grain crops are the primary food source in most areas.
59. Which agricultural product requires the least amount of energy and resources?
 A) chickens
 B) beef cattle
 C) wheat
 D) dairy cows
 E) both (B) and (D)
60. Which is typical of traditional agriculture?
 A) synthetic fertilizers and pesticides
 B) manual or animal plowing
 C) organic fertilizers like manure
 D) mono-cropping on very large tracts of land
 E) both (B) and (C)
61. A potential problem associated with pesticide use in the U.S. is
 A) some pesticides persist in the environment and continue to cause problems.
 B) the banning of DDT.
 C) biological pest control is more widely used than chemical controls.
 D) there are no human health concerns.
 E) pests do not become resistant to pesticides.
62. Erosion is most likely to occur when the soil is
 A) treated with organic fertilizers.
 B) bare and exposed to wind and rain.
 C) plowed along the contour of the land.
 D) covered with native plants.
 E) covered with forest.
63. Arable land is decreasing because of
 A) over-development.
 B) rapid growth of human populations.
 C) soil erosion.
 D) desertification.
 E) All of the above
64. A false statement about the nutritional requirements of humans is that
 A) vitamin and mineral deficiencies can be a sign of malnutrition.
 B) the human body is capable of producing all amino acids on its own.
 C) carbohydrates are an important energy source for the body.
 D) vitamins are important in growth and development.
 E) as long as you eat enough calories you have a perfectly healthy diet.

65. Which of the following factors would **not** contribute to famine?
- A) crop failure due to drought
 - B) new higher-yielding crop varieties
 - C) failure of food production to keep up with population growth
 - D) relying on one crop variety as the population's primary food source
 - E) distribution problems caused by war or political strife.
66. Agricultural pests
- A) can include mammals, fungi, insects, and plants.
 - B) breed more quickly in cold climates.
 - C) are usually inefficient at attacking crop plants.
 - D) can become resistant to pesticides via natural selection.
 - E) both (A) and (D).
67. Salinization may be caused by
- A) limiting herd size on the land.
 - B) crop rotation.
 - C) long-term and irresponsible irrigation.
 - D) high rainfall.
 - E) using compost as fertilizer
68. All of the following are negative consequences of the Green Revolution **except**
- A) Small-scale farmers that cannot afford the new technologies go bankrupt.
 - B) New crop varieties require the use of increased fertilizers, pesticides, and irrigation.
 - C) Many of the modern farming techniques lead to soil degradation.
 - D) Higher yielding crops are able to feed a larger population.
 - E) Large-scale farming can lead to overuse of arable land.
69. Which of the following is **not** a biological method of pest control?
- A) Pheromones that inhibit the ability of a pest to reproduce
 - B) Using *Bacillus thuringiensis* (BT) to control insect larvae.
 - C) Growth regulators that disrupt the life cycles of pests.
 - D) Applying organophosphate chemicals to crop plants.
 - E) Engineering plants with inherent defenses.
70. Your garden is overrun with caterpillars that are eating your tomato plants. You are thinking about spraying a chemical pesticide to rid yourself of the problem, however you aren't sure that this is the best solution. What might be a reason to use an alternative form of pest control?
- A) Some of the caterpillars might have a mutation that protects them from the pesticide.
 - B) The caterpillars and tomato plants will co-evolve.
 - C) The tomato plants will start to produce their own natural defenses.
 - D) You may be promoting the evolution of resistance in the caterpillar population where successive generations will not be affected by the chemical.
 - E) Both (A) and (D)
71. A harmful material that cannot be broken down by natural processes is
- A) a non-biodegradable pollutant
 - B) a compost heap
 - C) a non-renewable resource
 - D) a biodegradable pollutant
 - E) a renewable resource
72. Risk refers to
- A) the probability of an unwanted outcome
 - B) damage being done to the environment
 - C) a logical statement about what will happen
 - D) the chance that an event will happen
 - E) a systematic process for making decisions

NEW JERSEY SCIENCE LEAGUE
Environmental Science Answer Key
March 2012

| | | | | | | | |
|----|---|----|---|----|---|----|---|
| 1 | E | 19 | B | 37 | C | 55 | E |
| 2 | B | 20 | A | 38 | C | 56 | E |
| 3 | D | 21 | B | 39 | C | 57 | B |
| 4 | A | 22 | C | 40 | D | 58 | A |
| 5 | C | 23 | E | 41 | D | 59 | C |
| 6 | C | 24 | A | 42 | B | 60 | E |
| 7 | B | 25 | E | 43 | C | 61 | A |
| 8 | C | 26 | B | 44 | D | 62 | B |
| 9 | D | 27 | C | 45 | C | 63 | E |
| 10 | C | 28 | D | 46 | B | 64 | E |
| 11 | C | 29 | A | 47 | D | 65 | B |
| 12 | A | 30 | B | 48 | A | 66 | E |
| 13 | C | 31 | C | 49 | C | 67 | C |
| 14 | D | 32 | B | 50 | D | 68 | D |
| 15 | A | 33 | C | 51 | D | 69 | D |
| 16 | B | 34 | E | 52 | E | 70 | E |
| 17 | C | 35 | E | 53 | E | 71 | A |
| 18 | A | 36 | A | 54 | B | 72 | A |

ENVIRONMENTAL SCIENCE: 72 questions per exam.

JANUARY TEST: Environmental Science and ecology, fields of study, historical environmental science (hunter-gathers, agriculture, industrial revolution) 3 major environmental problems, renewable and non-renewable resources, ecological footprints, Hardin The Tragedy of the Commons, Sustainability, scientific method, correlations, statistics, models, environmental decision-making model, graphing and interpreting graphs, geosphere, atmosphere, hydrosphere and biosphere and earth cycles with the spheres. Organization of life: biotic abiotic, population, species, habitats, evolution, adaptation, artificial selection, resistance, biological diversity, Ecosystems: energy flow, cycling of material, ecosystems change Biomes: climate, latitude, longitude, altitude. Types of biomes, forest, grassland, desert, and tundra biomes.

FEBRUARY TEST: Aquatic ecosystems: freshwater ecosystem, salt water ecosystems. Populations, human population, biodiversity, ecological footprints plus Jan topics

MARCH TEST: Water, air, atmosphere, climate change, land, food and agriculture, ecological footprints, Plus Jan and Feb Topics.

APRIL TEST: Minerals, mining, nonrenewable energy, renewable energy, waste, ecological footprints, plus Jan, Feb, and March topics.

Testing Dates for 2012

Thursday March 8, 2012; *Thursday April 12, 2012

*The April 2012 exam can be changed based upon the School's spring break.

New Jersey Science League

PO Box 65 Stewartsville, NJ 08886-0065

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Testing Dates 2013

Thursday January 10, 2013, Thursday Feb 14, 2013;

Thursday March 14, 2013; *Thursday April 11, 2013

*The April 2013 exam can be changed based upon the School's spring break.

New Jersey Science League
Environmental Science Exam April 2012

Please PRINT your name, school area code, and which test you are taking on the scan-tron.

Answer the following questions on the answer sheet provided. Choose the letter that best completes or answers the item. Be certain that erasures are complete.

1. Which of the following is included in the study of environmental science?
A) how humans use natural resources
B) how humans relate to the nonliving environment
C) how human actions alter the environment
D) All of the above
E) None of the above
2. Which environmental issues are accelerated by population growth?
A) resource depletion
B) loss of biodiversity
C) habitat destruction
D) pollution
E) all of the above
3. Loss of biodiversity is a cause for concern because
A) humans depend on other organisms for food and oxygen.
B) ecosystems are not affected by species loss.
C) species extinctions have been rare throughout history.
D) Loss of biodiversity is not a concern because extinctions are common.
E) both (A) and (C)
4. The law of supply and demand describes
A) how to make economic gains
B) the relationship between the availability and worth of resources.
C) the availability of abundant resources.
D) a reduced demand resulting from lack of available resources.
E) the worth of nonrenewable resources.
5. Which of the following is characteristic of a developing nation?
A) greater dependence on fossil fuels.
B) higher standard of living.
C) larger ecological footprint.
D) shorter life span.
E) strong social support
6. To achieve a sustainable world there must be
A) responsible consumption on the part of the individual.
B) cooperation between governments, industry, and citizens.
C) a higher standard of living in developing countries.
D) Both (A) and (B)
E) A, B, and C are true.
7. Which atmospheric gas is unusable by plants unless "fixed" by bacteria first?
A) Nitrogen
B) Oxygen
C) Hydrogen
D) Phosphorous
E) Carbon dioxide

8. Which organism is most likely to be a pioneer species?
- A) Maple tree
 - B) Shrub
 - C) Grass
 - D) Moss
 - E) Lichen
9. Primary succession
- A) occurs in an area where an ecosystem previously existed.
 - B) occurs on a surface where no ecosystem previously existed.
 - C) occurs on abandoned farmland
 - D) occurs following a forest fire
 - E) none of the above
10. What kind of consumer eats only producers?
- A) Carnivore
 - B) Omnivore
 - C) Detritivore
 - D) Autotroph
 - E) Herbivore
11. The maximum population an ecosystem can support indefinitely is its
- A) population.
 - B) growth rate.
 - C) density.
 - D) carrying capacity.
 - E) reproductive potential.
12. Demographic transition is
- A) the movement of individuals into or out of a population.
 - B) the distribution of ages in a specific population.
 - C) movement of people into cities from rural areas.
 - D) the study of population.
 - E) a model that describes how changes in a population will occur.
13. Which of the following most frequently results in rain?
- A) when warm, dry air sinks
 - B) when cold, moist air rises
 - C) when warm, moist air rises
 - D) when cold, dry air sinks
 - E) when cold, dry air rises
14. How can a mountain range affect the climate of a region?
- A) Temperatures decrease as elevation increases up the side of a mountain.
 - B) A desert is often found on the inland side of a mountain range.
 - C) The coastal side of a mountain range usually has high levels of rain.
 - D) All of the above
 - E) None of the above
15. Climate is largely influenced by latitude because _____ solar energy falls on areas that are _____ the equator than to the poles
- A) equal, closer to
 - B) more, farther from
 - C) less, farther from
 - D) less, closer to
 - E) more, closer to

16. Which of the following statements is true of ozone layer thinning?
- A) it will take many years to reverse
 - B) it occurs over polar regions
 - C) it is related to seasonal changes
 - D) All of the above
 - E) None of the above
17. Which of the following actions does not contribute to soil erosion?
- A) prolonged irresponsible irrigation practices
 - B) driving farm machinery over fields
 - C) using compost as fertilizer
 - D) too much farming and not enough fallow
 - E) all practices contribute to soil erosion
18. Desertification of farmland can occur if
- A) too many crops are grown on the land and the land gradually loses its fertility.
 - B) because of erosion, there is no fertile soil left to grow plants.
 - C) domestic animals are allowed to overgraze the land.
 - D) the soil is left bare and exposed to wind and rain.
 - E) All of the above
19. Subsurface waters are considered hydrothermal solutions if they contain?
- A) ore minerals
 - B) dissolved minerals
 - C) inorganic minerals
 - D) crystallized minerals
 - E) pasteurized minerals
20. All of the following are ways that ore minerals may form except
- A) evaporation of water that contains salts
 - B) cooling of magma
 - C) circulation of hydrothermal solutions through rocks
 - D) flooding of empty streambeds and rivers
 - E) none of the above
21. Which property helps to distinguish metallic minerals from nonmetallic minerals?
- A) electrical conductivity
 - B) carbon content
 - C) market value
 - D) cost to extract
 - E) fracture capacity
22. Minerals that contain valuable substances are
- A) gangue minerals
 - B) shortwalls
 - C) ore minerals
 - D) foreign minerals
 - E) native minerals
23. Which of the following is a characteristic of a mineral?
- A) manmade
 - B) typically an organic solid
 - C) orderly internal structure
 - D) atoms in random geometric patterns
 - E) all are commercially valuable

24. What is the first step in surface coal mining?
- A) to take core samples using heavy machinery
 - B) to test to see if quarrying would be more effective.
 - C) to blast larger deposits into smaller sections.
 - D) to break up the coal for easier removal.
 - E) to remove and set aside the soil that covers the area being mined
25. Which of the following is true of acid mine drainage
- A) It harms or kills aquatic life.
 - B) It causes acid rain.
 - C) It purifies streams.
 - D) It harms the ecosystem the least.
 - E) It is unregulated in the United States.
26. Mining companies must follow all of the following regulations except
- A) the Safe Drinking Water Act
 - B) the Hazardous Products Act
 - C) the Endangered Species Act
 - D) the Clean Water Act
 - E) None of the above
27. Before mining a site, mining companies have to obtain permits from
- A) a bonding company
 - B) the state government only
 - C) federal agencies only
 - D) public works
 - E) state and federal agencies
28. What is reclamation?
- A) Protecting habitats from mining companies
 - B) The process of removing ore from a subsurface seam.
 - C) Returning land to its original condition after mining.
 - D) The process of extracting ore minerals from gangue minerals.
 - E) The process of extracting gangue minerals from ore minerals.
29. Solution mining is not used for
- A) Gypsum
 - B) Sulfur
 - C) Salt
 - D) Potash
 - E) Granite
30. During smelting a layer of impurities forms on top of the molten metal called
- A) sludge.
 - B) dredge.
 - C) slag.
 - D) smelt.
 - E) carp.
31. Acid mine drainage can be caused by which of the following water contaminants?
- A) Chlorine
 - B) Carbon dioxide
 - C) Methane
 - D) Sulfuric acid
 - E) Nitric oxide
32. During dredging, a river may be contaminated by
- A) sea water
 - B) potash
 - C) sewage
 - D) muddy sediments
 - E) placer deposits

33. The suitability of a fuel is dependent on all the following factors except
- A) energy content.
 - B) availability.
 - C) viscosity
 - D) cost.
 - E) efficiency
34. Which country consumes the most energy per person?
- A) Chile
 - B) Uganda
 - C) United States
 - D) Uruguay
 - E) Norway
35. Which best describes the formation of coal?
- A) Dead marine organisms sink to the ocean floor and are covered with sediment. There, heat converts them into complex, energy-rich carbon molecules.
 - B) Deposits of methane are subjected to high pressure until they condense into coal.
 - C) Swamplands are buried by sediment, and over time, the added weight creates heat and pressure, which converts the organic matter into coal.
 - D) Organic remains that are trapped in nonporous rock merge into large bodies of complex carbon fuel molecules.
 - E) Over time oil and natural gas deposits solidify into coal.
36. During the process of nuclear fission,
- A) electrons are released as two heavy nuclei collide to form a single nucleus.
 - B) a neutron splits uranium-235, and new nuclei, neutrons, and energy are released.
 - C) radioactivity causes the neutron of a uranium-235 atom to split in two.
 - D) a neutron splits a uranium-235 daughter cell, thus creating two atoms of uranium-234.
 - E) two lightweight atoms combine to create a single, stable heavy atom.
37. An advantage of nuclear energy is that
- A) it is inexpensive
 - B) it does not produce solid waste.
 - C) it does not produce air pollution.
 - D) it poses no risks to human safety.
 - E) it poses no risks to the environment.
38. Which of the following statements is accurate regarding the use of fossil fuels?
- A) Fossil fuels produce all of the electricity generated in the United States.
 - B) Burning fossil fuels releases large amounts of CO₂ into the atmosphere.
 - C) Burning fossil fuels releases pollutants other than CO₂ into the atmosphere.
 - D) Fossil fuel use is not a concern since they form naturally in the environment.
 - E) Both (B) and (C)
39. How does an electric generator work?
- A) A generator turns turbines in a dam.
 - B) It rubs aluminum against a substance that does not conduct electricity.
 - C) It converts natural gas into electricity.
 - D) It uses heat to create electricity.
 - E) It converts mechanical energy into electrical energy.
40. Which use consumes most of the energy in the United States?
- A) small business use
 - B) industrial purposes
 - C) household electrical needs
 - D) residential transportation
 - E) commercial cooking

41. Which of the following is true of nuclear fusion?
- A) Nuclear fusion is when lightweight nuclei are combined to form a heavier nucleus.
 - B) Fusion must take place at extremely high temperatures.
 - C) Nuclear fusion is when an atom splits to release new nuclei, neutrons, and energy.
 - D) Fusion does not release a large amount of energy.
 - E) Both (A) and (B)
42. Which of the following is true of storage sites for nuclear waste?
- A) They should be able to undergo transmutation
 - B) They will always leak lethal amounts of nuclear radiation.
 - C) They should be located only in areas that are extremely geologically stable.
 - D) They can only be located in deep ocean trenches.
 - E) They can be located in municipal landfills.
43. How is electricity generated in a power plant that uses fossil fuels?
- A) The heat generated from burning coal, oil, or natural gas turns water into steam, which turns a turbine, which runs an electric generator.
 - B) Coal, oil, or natural gas is burned to release hydrogen, which heats water and turns the electric generator's turbine.
 - C) Fuel is heated until it vaporizes and the vapor is distilled in a combustion chamber, which powers the electric generator.
 - D) Coal, oil, or natural gas is burned and heats the air, which then rises and turns the electric generator's turbine.
 - E) The turbine liquefies the fuel, which powers the electric generator and produces an electric current.
44. A large percentage of fossil fuel energy is converted into
- | | |
|--------------------|-------------|
| A) magnetic fields | D) uranium |
| B) electricity | E) hydrogen |
| C) power plants | |
45. What are sunlight, wind, moving water, and heat from Earth's interior sources of?
- | | |
|--------------------------|------------------------|
| A) alternative energy. | D) renewable energy. |
| B) geothermal energy. | E) Nonrenewable energy |
| C) ocean thermal energy. | |
46. What is the most common source of biomass fuel in developing countries?
- | | |
|---------|---------------|
| A) wood | D) dung |
| B) corn | E) food waste |
| C) oil | |
47. Which of the following is not a disadvantage of hydroelectric power?
- A) Flooding of habitats
 - B) Displacement of people and communities
 - C) Produces no air pollution
 - D) Reduced productivity of farmland
 - E) Disruption of downstream ecosystems

48. Energy efficiency in the United States could be increased by
- A) using public transportation
 - B) insulating homes
 - C) using energy-star or equivalent devices
 - D) turning thermostats down in winter and up in summer
 - E) all of the above
49. The percentage of energy put into a system that does useful work is
- A) energy efficiency.
 - B) energy conservation.
 - C) renewable energy.
 - D) energy conversion.
 - E) potential energy.
50. Air pollution, habitat loss, and soil erosion are disadvantages of which energy source?
- A) Biomass fuel
 - B) Wind power
 - C) Hydroelectricity
 - D) Solar power
 - E) Geothermal power
51. Which statement is true regarding renewable energy sources?
- A) All renewable energy comes from organic sources.
 - B) Renewable energy comes from sources that are constantly being formed.
 - C) Renewable energy comes from manmade sources.
 - D) Renewable energy sources are easily depleted.
 - E) Renewable energy sources are expensive and inefficient.
52. How is biomass fuel currently being used?
- A) Dung-fired power stations produce electricity.
 - B) Biogas digesters ferment manure and produce methane.
 - C) Ethanol from fermenting corn is added to gasoline.
 - D) All of the above
 - E) None of the above
53. A hybrid car uses
- A) an electric motor and a fuel cell.
 - B) a photovoltaic cell and an electric motor.
 - C) a fuel cell and a solar cell.
 - D) an efficient gasoline engine and an electric motor.
 - E) an efficient gasoline engine and a fuel cell.
54. Which would be an example of cogeneration?
- A) using hydroelectric power to generate electricity
 - B) using ocean thermal energy conversion to turn a turbine
 - C) using the waste heat from a furnace to power a steam turbine
 - D) driving a car that gets good gas mileage
 - E) using biomass fuel to power a farm
55. As a fuel source, hydrogen
- A) can be burned as a fuel or used to produce electricity chemically.
 - B) is inexpensive to generate.
 - C) releases large amounts of pollution when burned.
 - D) is rare and difficult to find on Earth.
 - E) is relatively un-reactive.

56. Which term relates to reducing the amount of energy we use?

- A) Energy conservation
- B) Renewable energy
- C) Energy efficiency
- D) Energy conversion
- E) Energy generation

Read the article and use it to answer questions # 57, 58, 59

Excerpt taken from:

'Poop to power' program turns pig manure into sustainable energy

By John Platt

Tue, Dec 27 2011 at 4:42 PM EST, MNN.com

The nearly 9,000 hogs at Loyd Ray Farms in Yadkin County, N.C., produce 400,000 gallons of manure every week. Since the waste had too high a nitrogen content to be used as fertilizer, owner Loyd Bryant used to pump the waste into a local lagoon, where it released methane, ammonia and "an unholy stink," according to the Los Angeles Times.

But now all of that waste is going to good use. Thanks to Duke University's new Carbon Offsets Initiative, the 154-acre farm now gets half of its electricity from a new waste-to-fuel system that has also solved the environmental problems caused by the manure. It reduces emissions from the waste, improves the health of Loyd's hogs, and creates a fertilizer he will use to grow corn, wheat and beans.

The system has several components. First, the hog waste is placed in an anaerobic digester, which contains bacteria that consume the manure and release methane gas. The methane is then burned to power a 65-kilowatt microturbine, which generates electricity to power support the entire waste management system and much of the farm's normal operations. After the manure is processed in the digester, liquid waste enters an aeration bin, where it is treated for ammonia and other pollutants. The resulting water can be used for irrigation or for flushing out barns. By the time the system is done, it has met all of North Carolina's environmental standards for reduction of odors and emissions.

57. Which renewable energy source is the main focus of the above article?

- A) solar power
- B) wind energy
- C) biomass fuel
- D) geothermal energy
- E) hydroelectric power

58. Which of the following is not a benefit of the waste-to-fuel system?

- A) improved hog health
- B) fertilizer is created as a byproduct of the system
- C) disposal of the liquid waste is problematic
- D) reduced emissions from the waste
- E) None of the above

59. Over a one-month period, how many gallons of waste can be put through this system?

- A) 4,000,000
- B) 1,600,000
- C) 1,000,000
- D) 400,000
- E) 100,000

60. Which is an example of something that is biodegradable?

- A) a plastic water bottle in a landfill.
- B) a banana peel in a compost pile.
- C) a polystyrene coffee cup in a trash can.
- D) soda can on the side of the road.
- E) All of the above

61. What is a problem associated with landfills?
- A) source reduction
B) leachate
C) methane production
D) surface impoundment
E) both (B) and (C)
62. How can an individual use consumer power to reduce solid waste?
- A) Shop only at discount stores.
B) Use paper bags instead of plastic bags.
C) Buy products that use less packaging.
D) Buy single-use products when available.
E) Buy products only when they are on sale.
63. Which steps are part of the recycling process?
- A) sorting, crushing, aging, re-selling
B) composting, decomposing, and burning
C) burning, aging, and deep-well injection
D) crushing, cooling, melting, and manufacture into new products
E) sorting, cleaning, crushing, manufacture into new products
64. All of the following are acceptable ways to manage hazardous waste except
- A) converting it using chemical treatment
B) surface impoundment
C) deep-well injection
D) diluting it in large bodies of water
E) None of the above
65. All of the following are wastes materials. Which is/are hazardous?
- I. Paint thinner II. Rotting meat III. Municipal solid waste
IV. Metals such as lead and mercury V. paper
- A) I and III only
B) I, II, and V only
C) IV and V only
D) I and IV only
E) I, III, and IV only
66. What would be an example of source reduction?
- A) recycling
B) composting
C) using canvas shopping bags
D) drinking bottled water
E) All of the above
67. Making products from recycled materials
- A) uses so much energy that it is not economically viable.
B) is limited to metals.
C) is limited to glass and plastics.
D) often saves energy and other resources during the manufacturing process.
E) is undesirable to the consumer.
68. Which regulation requires producers of hazardous wastes to document how their wastes are hand
- A) the Resource Conservation and Recovery Act
B) the Landfill Act
C) the Radioactivity Act
D) the Hazardous Waste Act
E) the Superfund Act

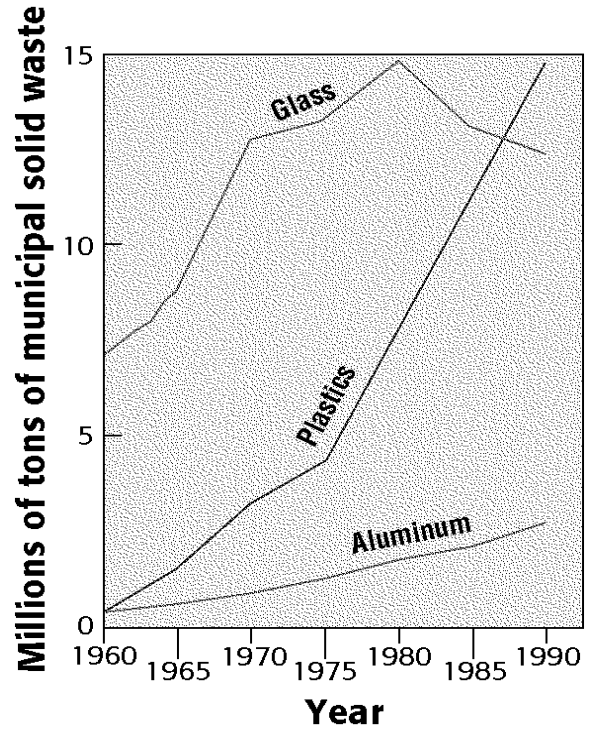
Use the graph to the right for questions # 69 and 70

69. In which year was the greatest amount of glass thrown away?

- A) 1960
- B) 1970
- C) 1980
- D) 1985
- E) 1990

70. When was the amount of plastic trash equal to the amount of glass thrown away?

- A) 1960
- B) 1970
- C) 1975
- D) 1985
- E) 1990



71. What is /are possible reason (s) that glass waste has been declining in recent years?

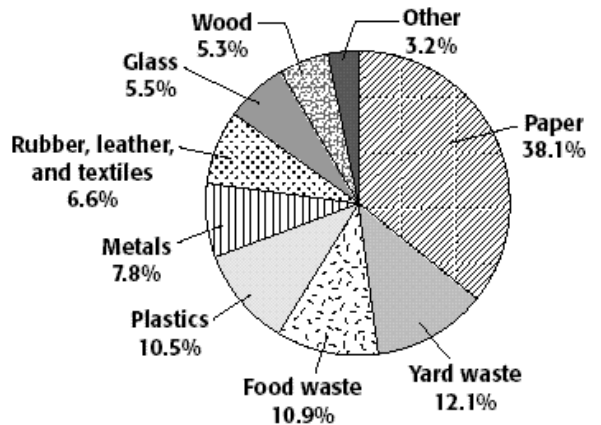
- I. More glass is being recycled
 - II. Aluminum is replacing glass.
 - III. More plastic is being used
 - IV. Mining of glass has decreased.
- A) I only B) I and III only C) II and IV only D) II and III only E) IV only

Use the chart to the side to answer the question #72

72. If every home in the United States had a compost pile, the amount of municipal waste could be reduced by what percentage?

- A) 19.9%
- B) 38.1%
- C) 23%
- D) 8.5%
- E) 50%

United States Municipal Solid Waste (Percentage by Weight)



Source: U.S. Environmental Protection Agency.

**NEW JERSEY SCIENCE LEAGUE
Environmental Science Answer Key
April 2012**

| | | | | | | | |
|----|---|----|----|----|---|----|-----------|
| 1 | D | 19 | B | 37 | C | 55 | A |
| 2 | E | 20 | D | 38 | E | 56 | A |
| 3 | A | 21 | A | 39 | E | 57 | C |
| 4 | B | 22 | C | 40 | B | 58 | C |
| 5 | D | 23 | C | 41 | E | 59 | B |
| 6 | D | 24 | E | 42 | C | 60 | B |
| 7 | A | 25 | A | 43 | A | 61 | E |
| 8 | E | 26 | B | 44 | B | 62 | C |
| 9 | B | 27 | E | 45 | D | 63 | E |
| 10 | E | 28 | C | 46 | A | 64 | D |
| 11 | D | 29 | A | 47 | C | 65 | D |
| 12 | E | 30 | C | 48 | E | 66 | C |
| 13 | C | 31 | D | 49 | A | 67 | D |
| 14 | D | 32 | D | 50 | A | 68 | A |
| 15 | E | 33 | C | 51 | B | 69 | C |
| 16 | D | 34 | C | 52 | D | 70 | D(E also) |
| 17 | C | 35 | C | 53 | D | 71 | B |
| 18 | E | 36 | CB | 54 | C | 72 | C (B) |

ENVIRONMENTAL SCIENCE: 72 questions per exam.

JANUARY TEST: Environmental Science and ecology, fields of study, historical environmental science (hunter-gathers, agriculture, industrial revolution) 3 major environmental problems, renewable and non-renewable resources, ecological footprints, Hardin The Tragedy of the Commons, Sustainability, scientific method, correlations, statistics, models, environmental decision-making model, graphing and interpreting graphs, geosphere, atmosphere, hydrosphere and biosphere and earth cycles with the spheres. Organization of life: biotic abiotic, population, species, habitats, evolution, adaptation, artificial selection, resistance, biological diversity, Ecosystems: energy flow, cycling of material, ecosystems change Biomes: climate, latitude, longitude, altitude. Types of biomes, forest, grassland, desert, and tundra biomes.

FEBRUARY TEST: Aquatic ecosystems: freshwater ecosystem, salt water ecosystems. Populations, human population, biodiversity, ecological footprints plus Jan topics

MARCH TEST: Water, air, atmosphere, climate change, land, food and agriculture, ecological footprints, Plus Jan and Feb Topics.

APRIL TEST: Minerals, mining, nonrenewable energy, renewable energy, waste, ecological footprints, plus Jan, Feb, and March topics.

Testing Dates 2013

Thursday January 10, 2013, Thursday Feb 14, 2013;

Thursday March 14, 2013; *Thursday April 11, 2013

*The April 2013 exam can be changed based upon the School's spring break.

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**Please review the topics above. Considering that the last test is in April
which topics would you leave out?**

How would you arrange the topics?

Please send your comments to newjsl@ptd.net