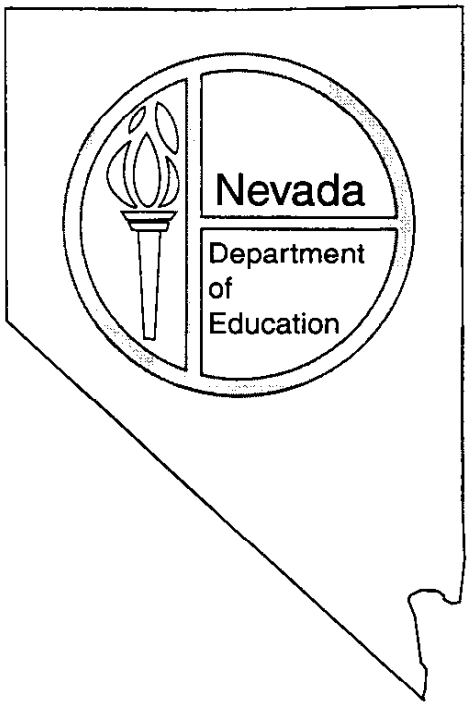
Student's Name _____

Answer Document #

October 1999

Nevada High School Proficiency Examination

PRACTICE TEST IN SCIENCE



FORM A

DO NOT OPEN BOOKLET UNTIL INSTRUCTED TO DO SO.

Nevada Department of Education

Mary L. Peterson
Superintendent of Public Instruction

Nevada High School
Proficiency Examination—Practice Test In Science

48 multiple-choice questions and 2 written-response questions

General Directions

All multiple-choice answers must be indicated on the separate answer document. After you have decided which of the answer choices is best, fill in the corresponding lettered space on the answer document. **Be sure that each mark is heavy and dark, and completely fills the answer space.** Light or partial marks may not be read by the scoring machine.

Example:

Which of the following is the capital of the United States?

A. New York, NY
B. Washington, DC
C. Chicago, IL
D. Sacramento, CA

Sample Answer:

Give only one answer to each question. If you change an answer, be sure that the previous mark is erased **completely.** Incomplete erasures may be read as intended answers.

Work as rapidly as you can without making errors. Do not spend too much time on a question that seems too difficult. Answer the easier questions first; then return to the harder ones. **Try to answer every question, even if you have to guess.**

DO NOT CONTINUE UNTIL YOU ARE TOLD TO DO SO.

Directions: For each of the following multiple-choice questions, decide which of the choices is best and fill in the corresponding space on the answer document.

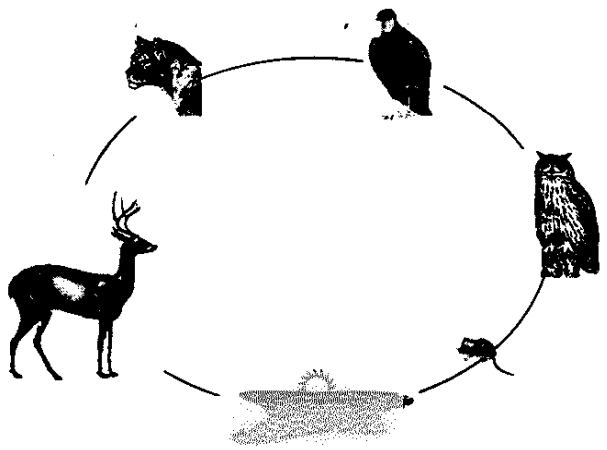
1. Radium, a radioactive element, decays over time. How much would remain of 20 grams of radium after two half-lives have passed?
   A. 0 grams
   B. 5 grams
   C. 7 grams
   D. 10 grams

2. Emily and Sarah observed that the goldfish in their classroom breathed more frequently when the room was warm. What equipment would the girls need to conduct an experiment that would verify their observations?
   A. balance, beakers, thermometers
   B. thermometers, stopwatch, notebook
   C. stopwatch, thermometer, balance
   D. balance, stopwatch, notebook

3. One characteristic of all living things is that they
   A. have eyes.
   B. have legs.
   C. inhale and exhale.
   D. eliminate waste products.

4. Earth has seasons because of
   A. Earth's tilt on its axis.
   B. Earth's distance from the sun.
   C. the moon's gravitational pull.
   D. the sun's temperature changes.

Use the graphic below to answer question 5.



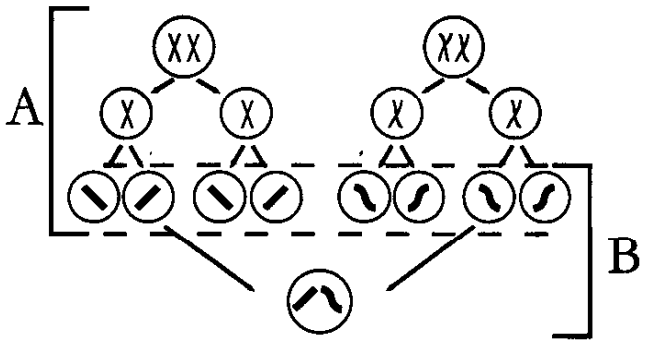
5. The producer in the food web shown above is the
   A. grass.
   B. mouse.
   C. mountain lion.
   D. owl.

6. The long necks of a giraffe may best be explained by
   A. giraffes constantly stretching their necks over time.
   B. short-necked giraffes were less able to compete for food.
   C. the theory of the use and disuse of organs.
   D. the extinction of other long-necked animals due to climate change.

7. Which BEST explains why a lake is frozen on the surface but not below the surface?
   A. Ice floats.
   B. Water freezes at O°C.
   C. Ice lets light through the water.
   D. Water is clear.

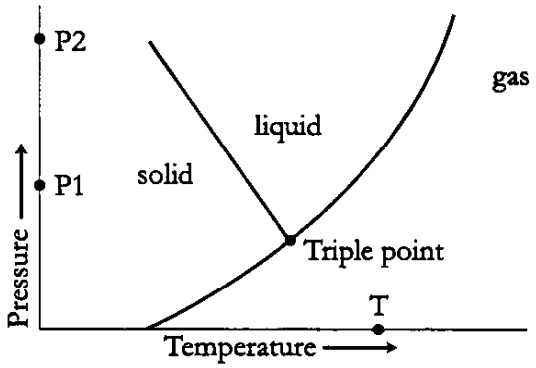
8. How does the heat inside Earth's core affect what happens on Earth's surface?
   A. The heat warms Earth's crust in the world's desert and tropical regions.
   B. The heat causes convection currents in Earth's mantle which move the tectonic plates.
   C. The heat from the core sets up wind patterns in Earth's lower atmosphere.
   D. The heat is slowly melting the glaciers found around the North and South Poles of Earth.

Use the graphic below to answer question 9.



9. What process is represented by the bracketed section B shown above?
   A. cell duplication
   B. asexual reproduction
   C. sex cell formation
   D. egg fertilizaton

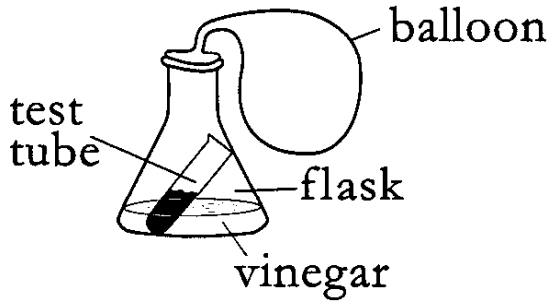
Use the graphic below to answer question 10.



10. The graphic above shows the phase of water at any given temperature and pressure. If the pressure of a sample of water is at a temperature T and is raised from pressure P1 to P2, the water will change from
   A. gas to liquid.
   B. liquid to gas.
   C. solid to liquid.
   D. liquid to solid.

11. Why does the moon only have 1/6 of Earth's gravity?
    A. It is very far away from Earth.
    B. It has no atmosphere.
    C. It has less mass than Earth.
    D. It is made of basalt.

Use the graphic below to answer question 12.

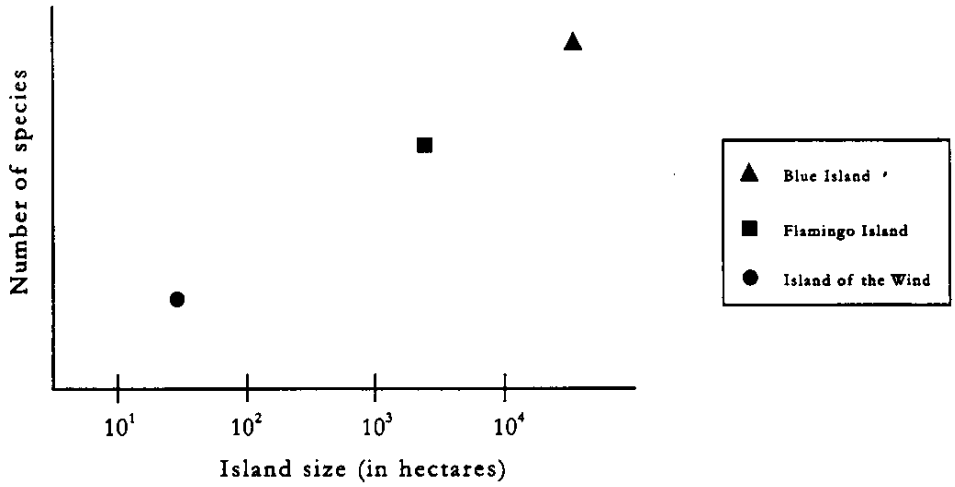


12. The graphic above shows a test tube containing sodium carbonate resting in a flask containing vinegar (acetic acid in water). The flask is sealed with a balloon and weighed. The flask is then tipped so that the sodium carbonate in the test tube reacts with the vinegar. The flask is weighed a second time. Which statement best expresses the relationship between the two weights?
    A. The first weight will be greater.
    B. The second weight will be greater.
    C. The two weights will be the same.
    D. The relationship between the weights is not predictable.

13. A year on Jupiter is 4,344 days long. This tells you how long it takes
    A. Jupiter to orbit the sun.
    B. Jupiter to rotate one time on its axis.
    C. the sun to orbit Jupiter.
    D. Earth to orbit Jupiter.

14. All stars, including our sun, give off heat and light. Which is the best explanation for why, compared to our sun, other stars are so faint and we do not feel their heat?
    A. The other stars are smaller than the sun.
    B. The other stars are much farther away than the sun.
    C. The other stars are not as bright as the sun.
    D. The other stars are not as hot as the sun.

Use the graph below to answer question 15.



15. The graph above shows the relationship between an island's size (in hectares) and the number of plant and animal species on the island. What can be concluded from this graph?
    A. There is no relationship between an island's size and its biodiversity.
    B. Flamingo Island has more diversity of plant and animal species than Blue Island.
    C. Island of the Wind has greater numbers of plant and animal species because it is protected by the two larger islands.
    D. As an island's size increases, the numbers of plant and animal species on the island increase.

16. When you use the brakes on your bike to stop, the energy of the bike's motion is converted into
    A. heat energy.
    B. electromagnetic energy.
    C. potential energy.
    D. kinetic energy.

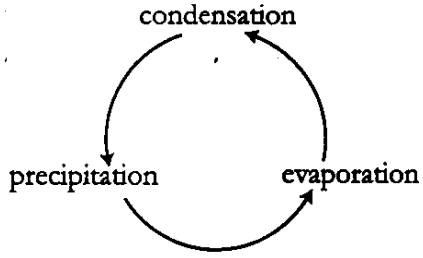
17. Green plants can reduce greenhouse gases by
    A. producing oxygen as a byproduct of photosynthesis.
    B. removing carbon dioxide from the atmosphere during the process of photosynthesis.
    C. absorbing sunlight in the plants' chlorophyll molecules.
    D. providing shade and moisture to cool the air in the lower part of the atmosphere.

18. A biotic factor that might be studied in an ecosystem is the
    A. size of soil particles.
    B. percent of soil moisture.
    C. rate of algae growth.
    D. pH of lake water.

19. In a chemical reaction, the total mass of the reactants equals the total mass of the products. In a nuclear reaction, the total mass of the reactants does not equal the total mass of the products. What is the MOST likely explanation for the change of mass in the nuclear reaction?
    A. The mass was measured inaccurately.
    B. Some energy is converted into mass.
    C. Some mass is converted into energy.
    D. There was no increase in mass.

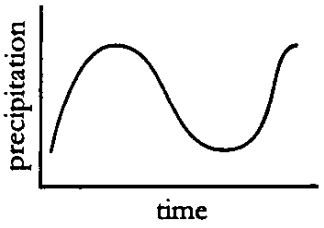
20. Which graphic most clearly represents the cycling of matter?

A.

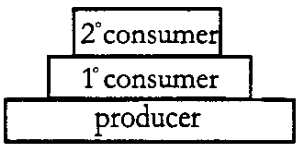


B. grass → rabbit → moon

C.



D.



21. Which are three examples of physical changes?
    A. water freezing, gasoline evaporating, a nail rusting
    B. water boiling, a balloon bursting, a candle melting
    C. wood burning, a marshmallow melting, a paper tearing
    D. gasoline burning, an egg rotting, fireworks exploding

22. A farmer observes that a crop of his strawberries produces different types of fruit. One variety is small but very juicy. Another variety is very large but lacks flavor and juice. You have been asked to give the farmer advice about growing large, juicy strawberries. Which would be the best advice?

A. He should continue to grow his strawberries the same way because his crop has a good variety of fruit.

B. He should select the large plants only because consumers like the large fruit.

C. He should select several of each plant and cross them to see if he can produce strawberries that are both juicy and large.

D. Selective breeding causes strawberries to get more diseases, so he should buy new plants.

23. A tree grows from a tiny seed into a huge, 200-foot tall redwood. Most of the redwood tree's structural mass came from

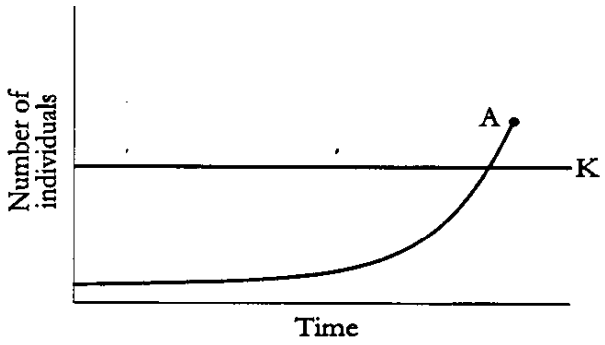
A. minerals in the soil.

B. carbon dioxide in the air.

C. oxygen in the air.

D. nitrogen in the soil.

Use the graphic below to answer question 24.



24. The graphic above represents change in a population over time. The capacity (K) is the number of individuals that can be supported in the system. Point A indicates that this population has exceeded K. What negative impact may be anticipated?

A. depletion or degradation of resources

B. underutilization of alternative resources

C. increased rate of mutations

D. increased population growth

25. The burning of fossil fuels may contribute to all of the following EXCEPT

A. global warming.

B. acid rain.

C. the Coriolis effect.

D. pollution.

26. Which equation is not consistent with the law of conservation of mass?

A. $S + O_2 \rightarrow SO_2$

B. $KClO_3 \rightarrow KCl + O_2$

C. $CaCO_3 \rightarrow CaO + CO_2$

D. $Ca + S \rightarrow CaS$

27. The extinction of a species
   A. is a natural event experienced by most species.
   B. will never happen in a saltwater environment.
   C. cannot occur if a very small gene pool is present.
   D. is almost always caused by human activity.

28. A student has written the following hypothesis:

   As more salt is added to a container of ice, the temperature of the mixture will become lower.

   What are two factors that need to be kept constant to test this hypothesis?
   A. amount of salt and amount of ice
   B. type of salt and amount of ice
   C. size of container and amount of time
   D. air temperature and amount of time

29. A person is standing on a mountain somewhere on Earth. What is the relationship of the person's mass and weight on the top of the mountain versus at sea level?
   A. Mass is the same on top of the mountain and at sea level, and weight is slightly less on the mountaintop.
   B. Weight is the same at both locations and mass is slightly less on the mountaintop.
   C. Weight and mass are the same on top of the mountain and at sea level.
   D. Mass is the same at both locations, and weight is slightly higher on the mountaintop.

30. Fossils of the *Glossopteris*, an extinct plant that lived 250 million years ago, have been found in South Africa, Australia, India, and Antarctica. The seeds of the *Glossopteris* were too large to be carried by wind and too fragile to have been carried by water; therefore, the seeds could not have naturally crossed the water that separates the continents today. How do scientists today explain the occurrence of *Glossopteris* fossils on all four continents?
   A. Land bridges once connected all of the continents.
   B. Man carried the seeds in boats from continent to continent.
   C. The continents were once all part of the same land mass.
   D. A tsunami carried the seeds to new locations.

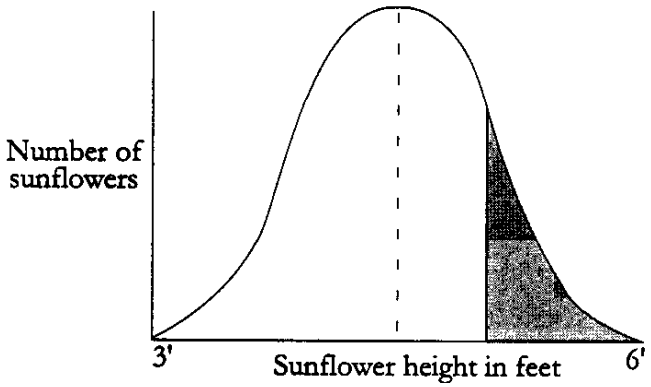
31. A rollerblader is blading along the sidewalk. Which forms of measurement would be the BEST to use to determine the rollerblader's speed?
   A. time and distance
   B. volume and time
   C. density and mass
   D. mass and distance

32. If you get the mumps when you are young, you are not likely to get the disease again. One reason for this is that
   A. the mumps virus cannot enter your body a second time.
   B. the medicine you took for mumps is stored in your body.
   C. the mumps virus is not as harmful when you are older.
   D. your body has formed antibodies against the mumps virus.

PLEASE GO ON TO THE NEXT PAGE →

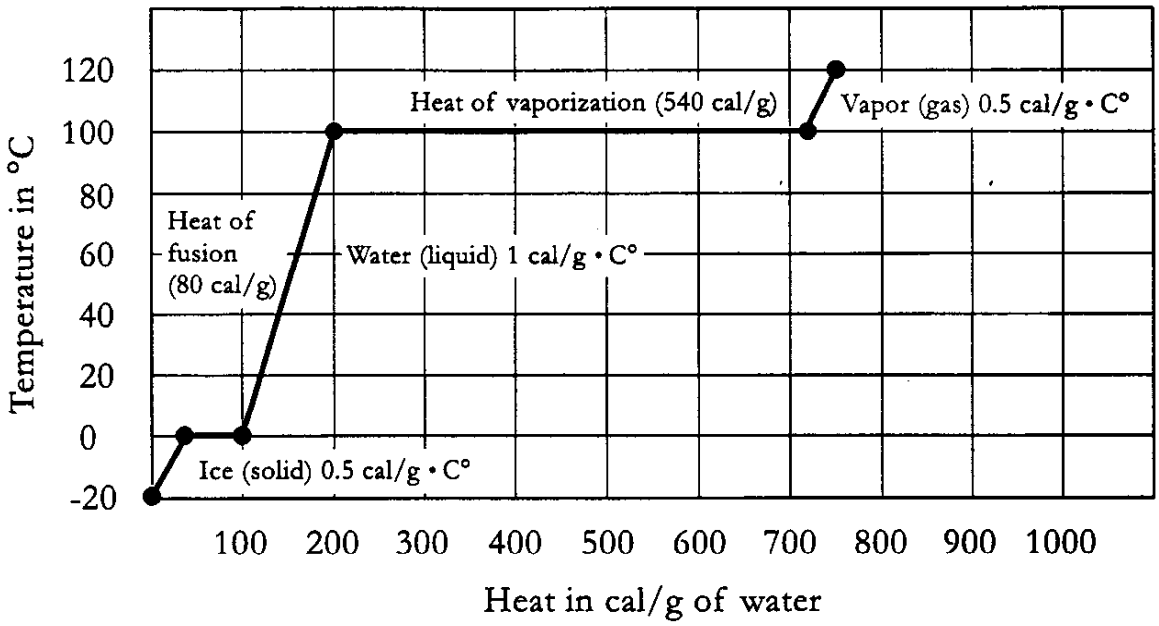
33. Which biome represents the largest ecosystem on Earth?
    A. tropical rainforest
    B. grasslands
    C. marine aquatic
    D. desert

Use the graph below to answer question 34.



34. The graph above shows the heights for a population of sunflowers. If only the sunflowers represented in the shaded area are allowed to reproduce, the mean height of the next generation of sunflowers will
    A. increase.
    B. decrease.
    C. stay the same.
    D. be unpredictable.

Use the graph below to answer question 35.

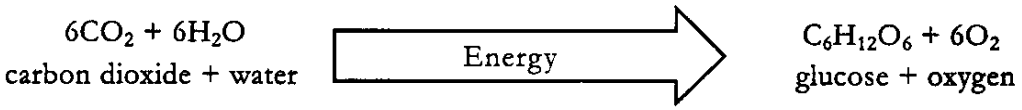


35. The graph above shows the changes in temperature of a sample of ice as it was warmed from –20°C to 120°C. Which phase of the warming process required the most heat energy?
    A. solid to liquid
    B. liquid to gas
    C. gas to liquid
    D. liquid to solid

36. According to the law of conservation of mass, how does the mass of the products in a chemical reaction compare to the mass of the reactants?
    A. The products' mass is greater.
    B. The reactants' mass is greater.
    C. The masses are equal.
    D. There is no relationship.

37. Diamonds and emeralds are gemstones that are mined from the earth. They are very expensive because deposits of both gemstones are
    A. abundant worldwide.
    B. rare worldwide.
    C. only found in North America.
    D. only found in Asia.

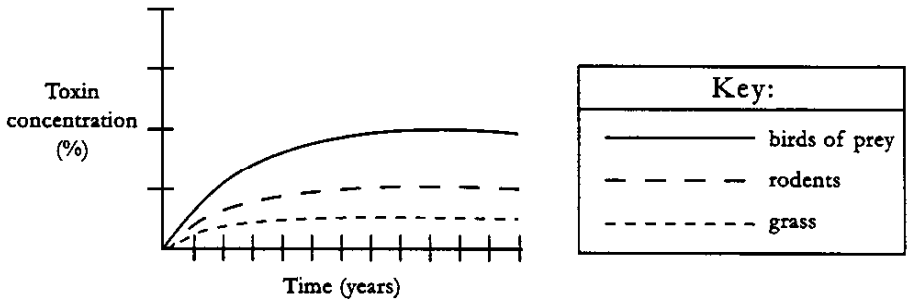
Use the graphic below to answer question 38.



38. The graphic above represents which process?
    A. respiration
    B. transpiration
    C. photosynthesis
    D. fermentation

39. Which is the BEST explanation of why the moon does not always look the same in the night sky?
    A. Earth and the moon both orbit the sun and sometimes the moon is on the opposite side of the sun from Earth.
    B. As the moon orbits Earth, different parts of the moon are visible depending on where it is in its orbit.
    C. As the sun revolves around Earth and the moon, sometimes it is in the wrong place to light up the moon at night.
    D. One side of the moon is dark, and as it rotates it shows different parts of the dark side.

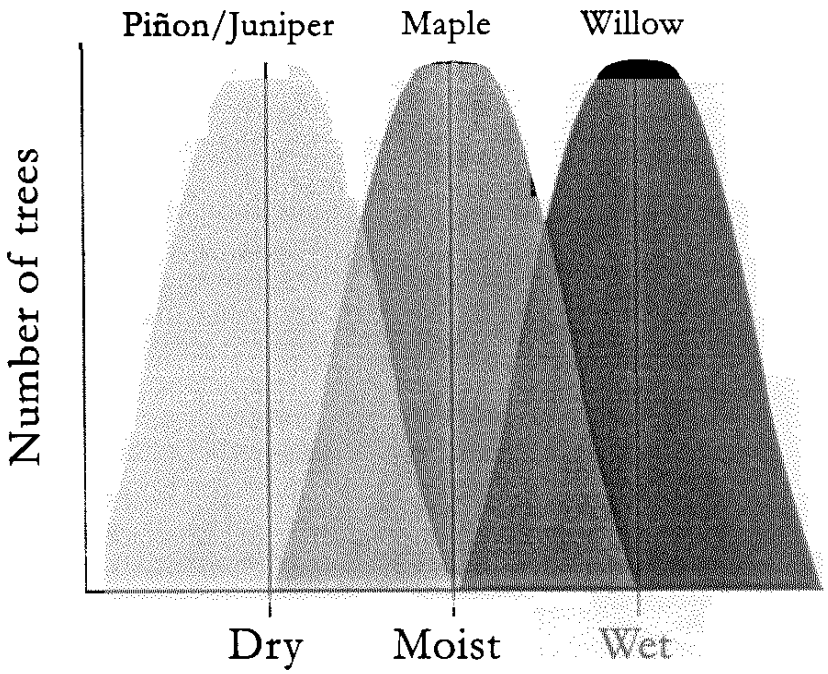
Use the graph below to answer question 40.



40. The graph above represents biological
    A. control.
    B. conversion.
    C. magnification.
    D. economics.

41. Which gas is a major contributor to the greenhouse effect?
    A. carbon dioxide
    B. sulfur dioxide
    C. nitrogen
    D. oxygen

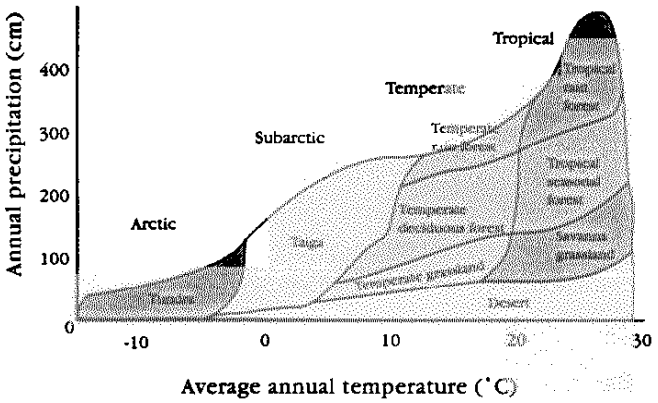
Use the graph below to answer question 42.



42. According to the graph above, which tree or trees would most commonly be found in the Great Basin Desert?
    A. Piñon and Juniper
    B. Maple and Willow
    C. Maple
    D. Willow

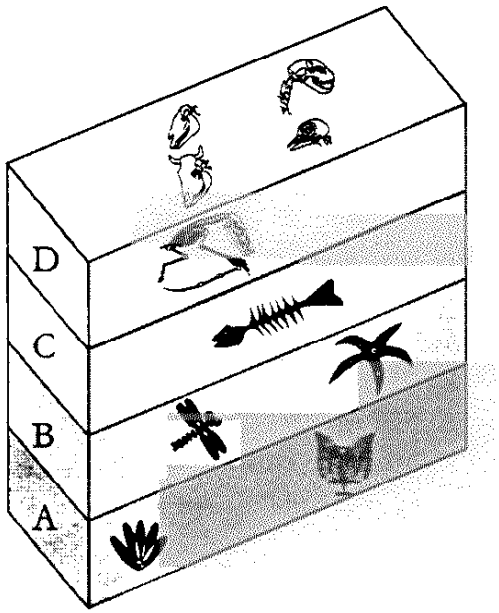
43. What happens when wood in a campfire burns?
    A. Stored energy is released.
    B. Matter is destroyed.
    C. Energy is created.
    D. Matter is created.

Use the graphic below to answer question 44.



44. Which biomes can have less than 25 cm of rain per year?
    A. taiga and savanna grassland
    B. desert and temperate grassland
    C. temperate grassland and tundra
    D. tundra and desert

Use the graphic below to answer question 45.



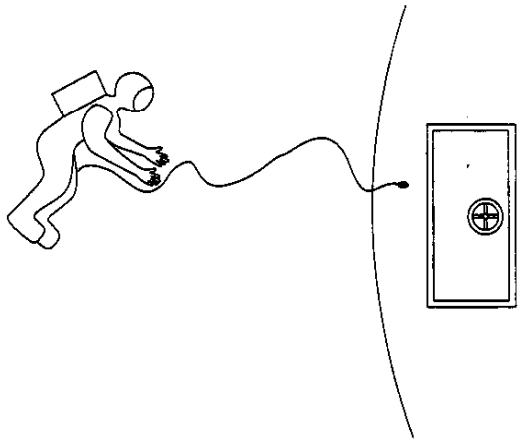
45. The graphic above shows an undisturbed sequence of rock layers which include fossils. Which rock layer would have the oldest fossils?
    A. layer A
    B. layer B
    C. layer C
    D. layer D

46. The formula for density (D) is $D=m/v$, where m is mass in grams and v is volume in cm^3. Use this formula to solve the following problem:

    The density of a substance is 2 g/cm^3. The mass is 4 g. What is the volume?
    A. 2 cm^3
    B. 8 cm^3
    C. 2 grams
    D. 8 grams

47. A farmer is having a problem with his chickens. The chickens' egg shells keep breaking. He has decided to divide the chickens into two groups and to give one group more calcium. All of the chickens are the same breed, live in the same barn and live in the same cages. In addition, they receive the same amount of water and the same type and amount of food. What is the farmer's hypothesis?
    A. If chickens are given more food, their egg shells will become stronger.
    B. If chickens are given extra calcium, their egg shells will become stronger.
    C. If chickens are given extra water, their egg shells will become stronger.
    D. If chickens are given more space, their egg shells will become stronger.

Use the graphic below to answer question 48.



48. Gravity is a force of attraction between all objects. In the graphic above, an astronaut is shown floating on a line attached to a space station. Which statement best explains why the astronaut does not quickly fall toward the space station?
    A. The astronaut and space station do not have sufficient mass for attraction.
    B. The astronaut is too far from Earth to experience any gravity.
    C. Astronauts have no mass in space.
    D. The astronaut and space station are in orbit so they are weightless.

Directions:

- Carefully read the two written-response questions that follow. Your written response should cover all parts of the question and should contain all examples requested.
- You may plan your responses before you begin writing by using the space at the bottom of this page.
- Allow time to review and proofread your work and to make any revisions or corrections. Your responses will be evaluated on the completeness of your answer and your understanding of relevant concepts.
- **Write your responses on pages 15 through 18 of this test form. Writing that appears on this page will not be scored.**

Written-response Question 1

You have an empty balloon of known mass that you inflate with helium gas.

Will the inflated balloon have more or less mass than the empty balloon? Explain your answer.

Written-Response Question 1, cont.

IF YOU NEED ADDITIONAL SPACE TO WRITE YOUR ANSWER, PLEASE USE THE BACK OF THIS PAGE.

Written-Response Question 2

In an experiment designed to test the effects of sunlight on plants, thirty healthy plants about 10 cm tall are separated into two groups of fifteen each. Each group is exposed to the following conditions:

Group 1 is exposed to sunlight eight hours a day and watered daily.
Group 2 is exposed to sunlight four hours a day and watered every other day.

a. Using your knowledge of scientific procedures suggest appropriate revisions in the design of the experiment.
b. Explain how your suggested revisions would improve the experiment.

Written-Response Question 2, cont.

IF YOU NEED ADDITIONAL SPACE TO WRITE YOUR ANSWER, PLEASE USE THE BACK OF THIS PAGE.