

Student Name _____

OHIO GRADUATION TESTS



Science

Practice Test
for
Ninth Graders

September 2004

SCIENCE TEST

Directions: For multiple-choice items, choose the best answer then blacken the corresponding space on your Answer Document. If you change an answer, be sure to erase the first mark completely. When you respond to the short-answer and extended-response items, you do not have to use the entire area of the space provided. The use of the grid paper in your Answer Document is optional unless otherwise stated. Be sure that your answers are complete and all your work appears in the Answer Document.

-
1. A scientist's paper is rejected by a journal because the paper did **not** reveal key details about the experiment she performed to get her results. What ethical argument could the editor give for this rejection?
- A. Sample collection had been done by a graduate student.
 - B. The scientist's findings were similar to results reported for other species.
 - C. The scientist had repeated her experiment several times with identical results.
 - D. Other scientists would not be able to verify her findings without more information.
2. Architects are working with engineers to build a lecture hall. How can they design it so that echoes are reduced and speech is **not** heard as garbled sounds?
- A. build smooth marble walls, ceilings and polished floors
 - B. construct many flat walls, angled ceilings and smooth floors
 - C. use an ultramodern design of metal walls, pillars and seats
 - D. build walls out of porous materials, upholster the seats and add carpets
3. The feature that identifies an organism as a prokaryote is
- A. the presence of ribosomes.
 - B. the absence of chlorophyll.
 - C. the presence of a cell membrane.
 - D. the absence of a nuclear membrane.

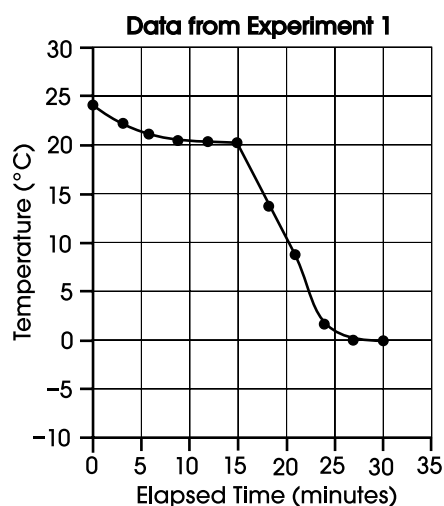
Use the following information to answer questions 4 – 7.

Temperature Experiment

Students pour 250.0 g of water into an open insulated container. The initial temperature of the water inside the container is recorded. The temperature of the contents of the container is recorded every 3.0 minutes. When 73.0 g of ice (at melting point) is added to the container, the students continue to collect temperature data and the mixture is gently stirred. The data from Experiment 1 are listed in the chart below. The data are also plotted on the following graph.

Chart for Experiment 1

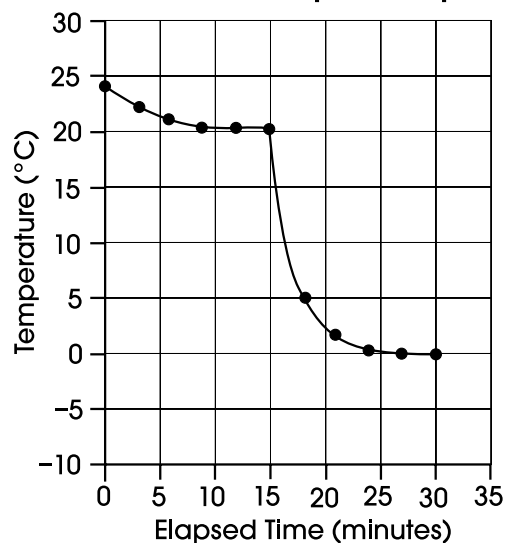
Elapsed Time (minutes)	Temperature of System (°C)	Observations
0	24.3	water added
3	22.1	
6	21.0	
9	20.5	
12	20.3	
15	20.2	ice added
18	13.7	
21	8.2	
24	2.2	
27	0.0	
30	0.0	ice still present



4. If the experiment is repeated and the only difference is that twice as much ice (146.0 g) is added to the container of water, the students will observe what difference from Experiment 1?
- Any remaining ice will sink to the bottom of the container.
 - The water in the container will be colder at the end of the experiment.
 - The temperature will fall faster during the last 15 minutes of the experiment.
 - A significantly larger amount of ice will melt in the last 15 minutes of the experiment.
5. When the ice was added to the water in the container, several energy transfers occurred. Considering only the contents of the container, what would be a likely sequence (order) of energy transfers?
- Water transferred energy to the ice as the ice melted.
 - Water transferred energy to the air as the ice increased in temperature.
 - Ice transferred energy to the air which then lowered the temperature of the water.
 - Ice transferred energy to the water which lowered the temperature of the water.

6. In a proposed experiment using twice as much ice and half as much water as in Experiment 1, a student predicts the values shown in the graph below.

Predicted Values for Proposed Experiment



Compare the shapes of the graphed lines from Experiment 1 and the proposed experiment and explain why the predicted values are probable. Respond in the space provided in your **Answer Document**. (2 points)

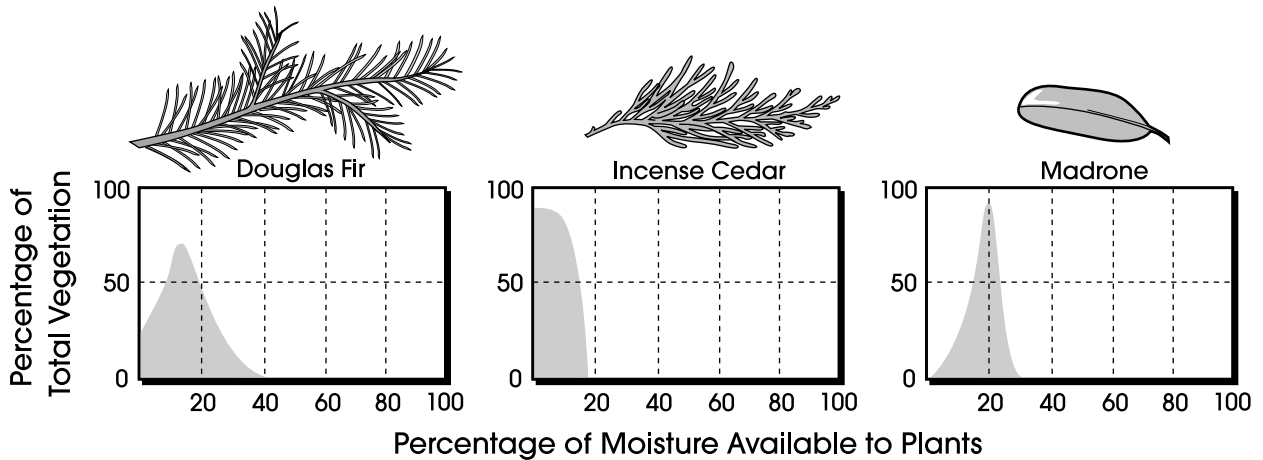
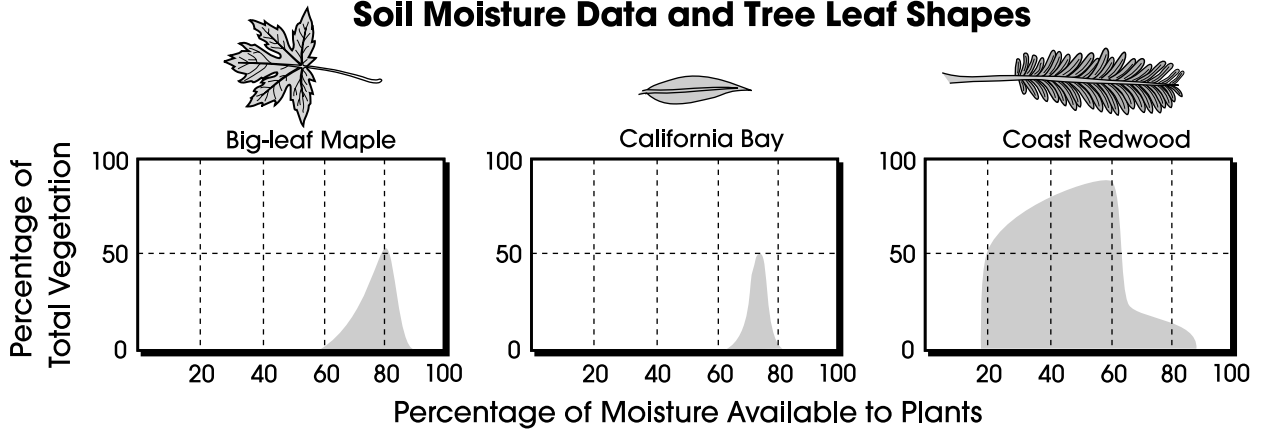
7. During the first 15 minutes of Experiment 1, the water molecules in the container
- decreased in average speed.
 - changed the type of bonds present in the water.
 - changed shape because the temperature changed.
 - increased in oxygen content compared to the hydrogen content.

Use the information to answer questions 8 – 11.

Plant Distribution

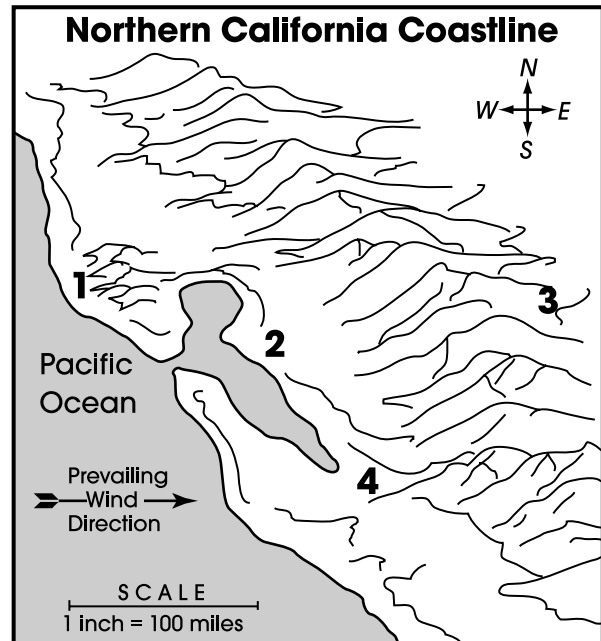
The distribution of plant species depends on many factors, including climate, topography, soil conditions and biological interactions. Data on moisture availability were collected along the coast of Northern California. In this area, each plant community has a dominant tree. The graphs below illustrate a dominant tree’s percentage of the total vegetation compared to the percentage of soil moisture available. Each tree species studied has a distinct preference for a certain kind of habitat.

Soil Moisture Data and Tree Leaf Shapes



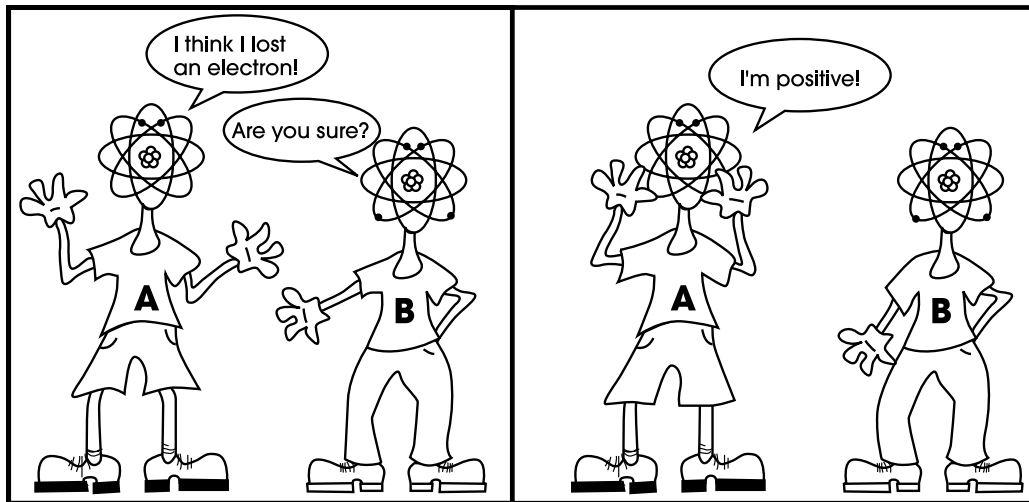
8. An ecologist observes that an area in California has experienced an increase in average soil moisture content. The area was once dominated by incense cedar but is now home to a greater variety of trees. Which types of trees would the ecologist most likely observe in this area if the soil moisture content has risen to 30%?
- madrone and California bay
 - Douglas fir and madrone
 - incense cedar and big-leaf maple
 - coast redwood and big-leaf maple
9. A scientist observes that Douglas fir trees survive better than broadleaf species such as big-leaf maple in a certain area. Which is the best explanation for her observation?
- Big-leaf maple trees require less soil moisture than Douglas fir trees.
 - Douglas fir trees are better at conserving water than big-leaf maple trees.
 - Douglas fir trees and big-leaf maple trees are often found in overlapping habitats.
 - The big-leaf maple trees are experiencing competition with California Bay trees.

Use the map to answer question 10.



10. In which area would you expect incense cedar and madrone to dominate?
- 1
 - 2
 - 3
 - 4
11. A survey of a small coastal valley in California finds only Douglas fir, madrone, and coast redwood. The soil moisture availability in this valley is most likely to be
- 0 – 20%.
 - 20 – 40%.
 - 40 – 80%.
 - 60 – 80%.

Use the cartoon to answer question 12.

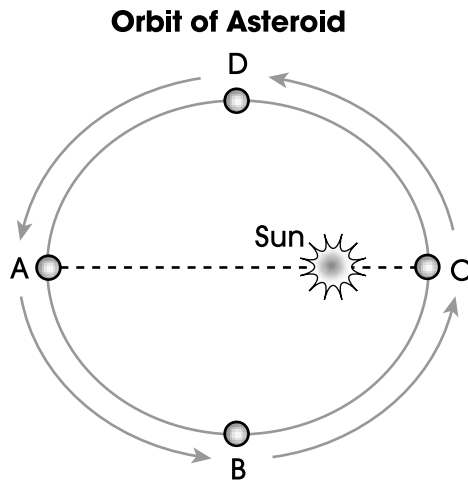


12. Explain the response of atom A in terms of protons and electrons. Describe how protons and electrons affect charge. Respond in the space provided in your **Answer Document**. (2 points)

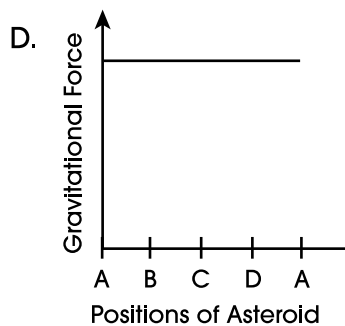
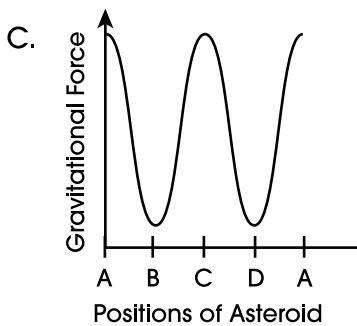
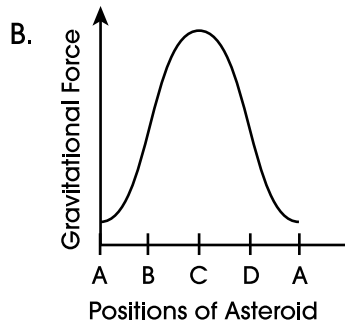
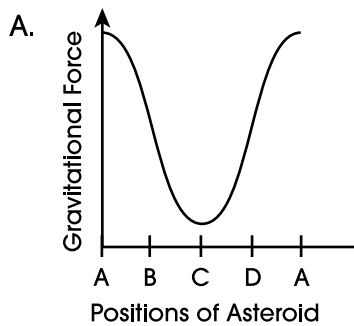
13. In most areas of Ohio, the frost-free growing season is 150 to 180 days. Farms close to Lake Erie have a growing season closer to 200 days. One explanation of this fact is that
- A. crops grown around the lake are frost-resistant.
 - B. industries around the lake prevent early freezes.
 - C. irrigation water from the lake freezes at a lower temperature.
 - D. heat given off by the lake extends the number of frost-free days.

14. A student is constructing a classification scheme to explain the biological relationships between common local animals. What characteristic would be most helpful to the student in classifying the animals?
- A. eye color
 - B. body covering
 - C. performs respiration
 - D. performs photosynthesis

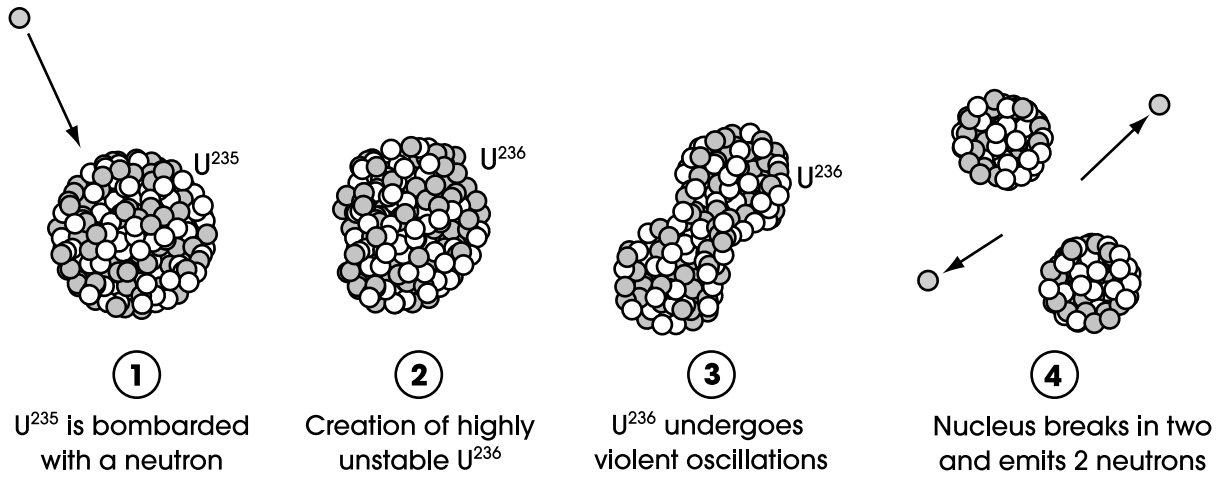
15. Points A, B, C and D in the drawing below represent an asteroid's position during its orbit around the sun.



Which graph shows how the gravitational force between the sun and the asteroid varies with the asteroid's distance from the sun?



Use the sequence of pictures to answer question 16.



16. At what step in the fission process is a massive amount of energy released?

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

17. Two processes that allow cells to release energy from food are

- A. mitosis and meiosis.
- B. excretion and diffusion.
- C. fermentation and cellular respiration.
- D. osmosis and spontaneous generation.

18. Earth's crust is divided into many crustal plates. Their activity is described as plate tectonics. List two effects of plate tectonics and explain how plate tectonics causes each effect. Respond in the space provided in your **Answer Document**. (4 points)

19. What energy transformation occurs in green plants during photosynthesis?

- A. Thermal energy is converted to electrical energy.
- B. Thermal energy is converted to light energy.
- C. Chemical energy is converted to mechanical energy.
- D. Light energy is converted to chemical energy.

20. The 19th-century hypothesis that sedimentary strata were laid down in chronological order had what immediate impact on geologic theory?

- A. It provided proof of continental drift.
- B. It provided calibration of data derived from radioactive decay.
- C. It caused geologists to reconsider estimates about Earth's age.
- D. It allowed geologists to better understand tectonic plate movement.

Use your understanding of the transmission of sound and the table to answer question 21.

**Speed of Sound in Substances
(all substances at 25°C)**

Substance	Speed (m/s)
air	346
water	1498
seawater	1531
silver	2680
aluminum	5000

21. One could conclude that sound is transmitted fastest in

- A. solids.
- B. liquids.
- C. gases.
- D. a vacuum.

22. Yeast cells obtain energy under anaerobic conditions through the process of

- A. photosynthesis.
- B. cell differentiation.
- C. cellular respiration.
- D. alcoholic fermentation.

Use the table to answer question 23.

Data Table

Substance	Number of Protons	Number of Electrons
lithium	3	2
fluorine	9	10
potassium	19	19
sulfur	16	18

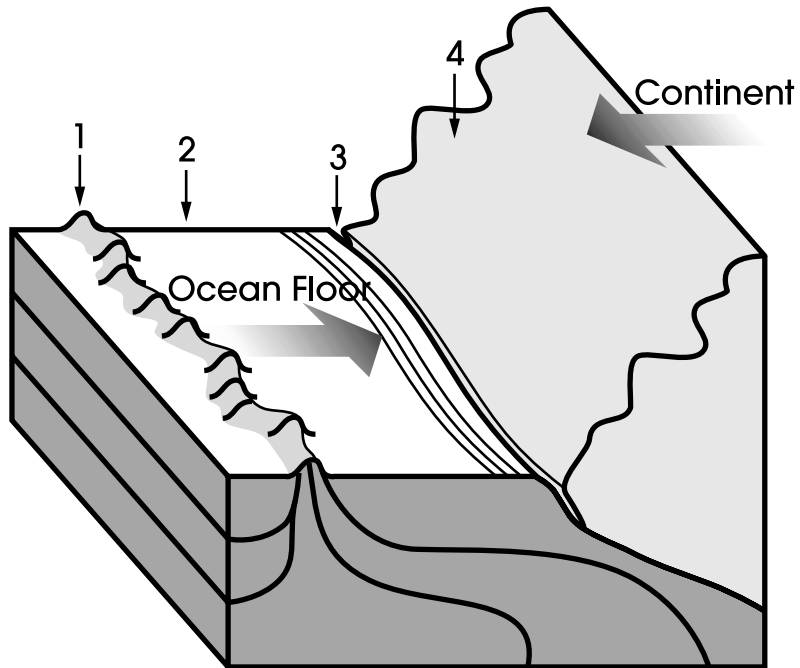
23. Which substance is electrically neutral?

- A. lithium
- B. fluorine
- C. potassium
- D. sulfur

24. Biotechnology is the science of manipulating biological components to develop products that may be beneficial to humans. Identify two different industries in which biotechnology has made major contributions. Describe one contribution for each industry. Respond in the space provided in your **Answer Document**. (4 points)

25. Which area of the diagram shows the subduction zone?

Coastal Cross-Section



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

Use the partial periodic table to answer question 26.

6	— Atomic number
C	— Symbol
Carbon	— Name
12.0107	— Average Atomic Mass

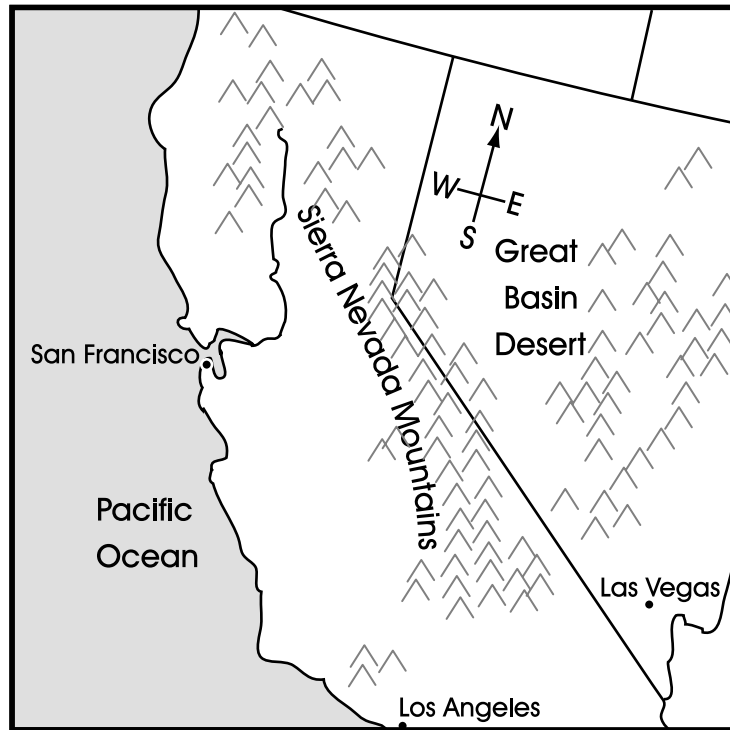
Partial Periodic Table of the Elements

IA 1	IIA 2	IIIA 13	IVA 14	VA 15	VIA 16	VIIA 17	VIII A 18
1 H Hydrogen 1.00794							2 He Helium 4.0026
3 Li Lithium 6.941	4 Be Beryllium 9.0122	5 B Boron 10.811	6 C Carbon 12.0107	7 N Nitrogen 14.0067	8 O Oxygen 15.9994	9 F Fluorine 18.9984	10 Ne Neon 20.1797
11 Na Sodium 22.9898	12 Mg Magnesium 24.3050	13 Al Aluminum 26.98154	14 Si Silicon 28.0855	15 P Phosphorus 30.9738	16 S Sulfur 32.065	17 Cl Chlorine 35.4527	18 Ar Argon 39.948
19 K Potassium 39.0983	20 Ca Calcium 40.078						

The diagram shows a partial periodic table with a legend for Carbon (C) and a larger grid below it representing the rest of the periodic table. The grid is divided into sections by lines, with the top-left section containing elements 1-20 and the top-right section containing elements 13-18. The bottom section is a large empty grid representing the transition metals and other elements.

26. The noble gas neon is used for filling neon signs. Like other noble elements, it has a full octet (complete outer energy level) of electrons, which makes the gas
- freeze at room temperature.
 - react with other gases in the air.
 - unlikely to combine with other elements.
 - solidify at standard pressure and temperature.

Use the map to answer question 27.



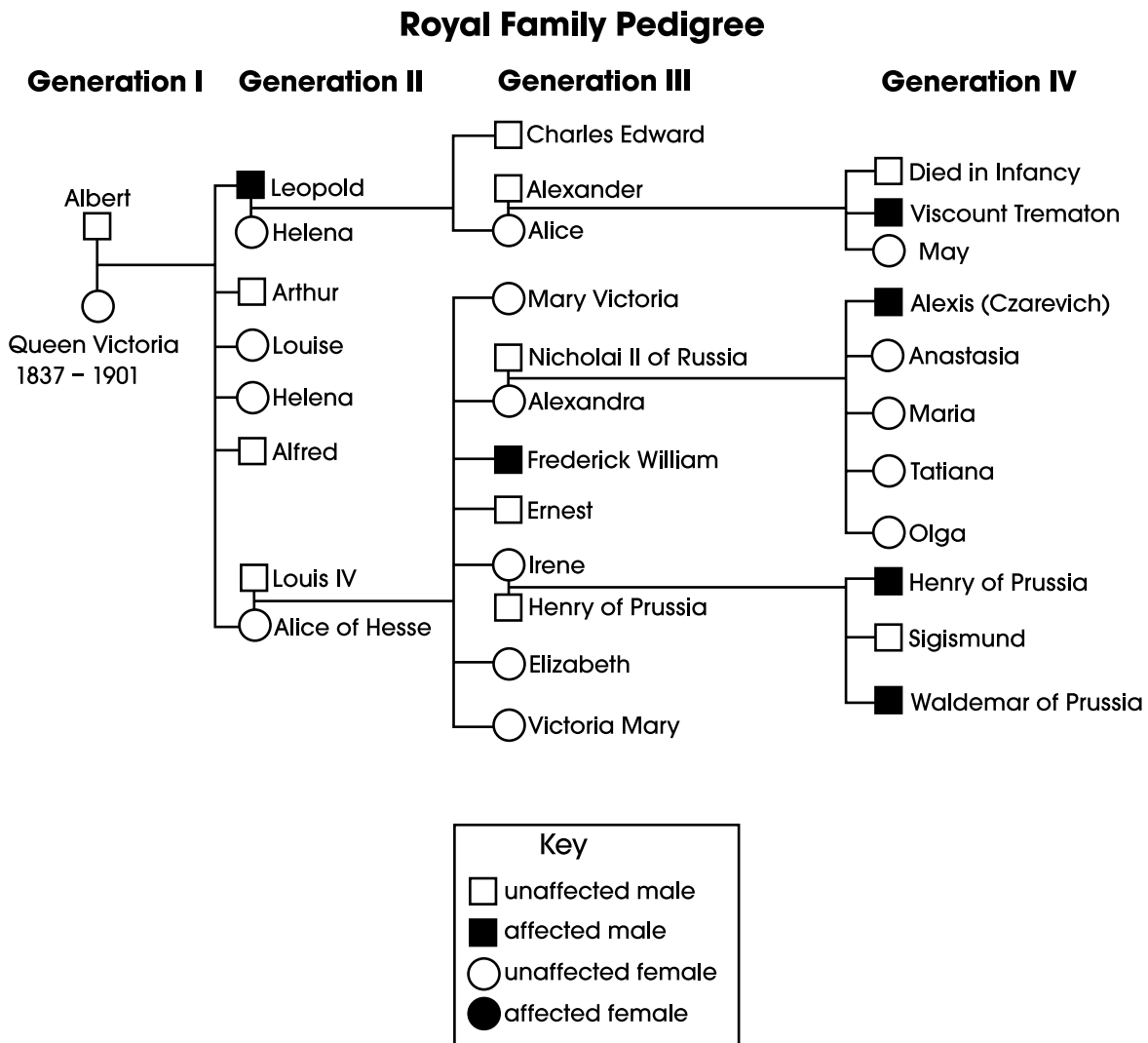
27. The interior of the western United States is arid to semi-arid because the western mountains
- A. produce large amounts of moisture.
 - B. block moisture coming from the west.
 - C. prevent snow from melting.
 - D. reflect solar heat drying the air.
28. When you are driving a car, why is braking less effective on a wet road than on a dry road?
- A. The water reduces friction.
 - B. Kinetic energy is increased by water.
 - C. Friction increases when the brakes are wet.
 - D. Reaction time is reduced during a rainstorm.

Use the information to answer questions 29 – 32.

Hemophilia in the Family

Hemophilia is a disease characterized by excessive bleeding because the blood clots very slowly. This phenotype results from a sex-linked recessive allele which is located on the X chromosome. A male (XY) can only receive the hemophilia allele from his mother (XX). Since males have only one X chromosome, they have a 50% chance of having hemophilia if their mother is a carrier.

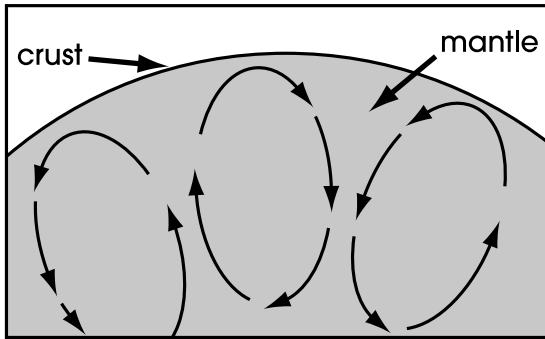
The following diagram shows part of the British royal family's pedigree. All hemophilic males are represented by shaded squares and normal males by unshaded squares. Females are represented by circles, and female carriers of hemophilia are not identified.



29. In generation IV, Alexis has hemophilia. If Alexis married a woman who was a carrier of the hemophilia allele, which proportion of his children (including both males and females) would be expected to have hemophilia?
- A. 25%
 - B. 50%
 - C. 75%
 - D. 100%
30. Some human traits are sex-linked but are inherited on the Y chromosome, unlike hemophilia, which is inherited on the X chromosome. If a man carrying a dominant allele for a disease gene on his Y chromosome has eight children, four boys and four girls, predict the gender and proportion of his offspring that will have the disease gene. Explain how this type of inheritance differs from sex-linked inheritance from a father affected with an X-linked disease. Respond in the space provided in your **Answer Document**. (2 points)
31. Which set of grandparent-parent-child relatives must have all had at least one hemophilia allele on an X chromosome?
- A. Albert-Helena-Alice
 - B. Louis IV-Irene-Sigismund
 - C. Leopold-Alice-Viscount Trematon
 - D. Queen Victoria-Leopold-Charles Edward
32. Irene and Henry of Prussia (generation III) do **not** have hemophilia, yet two of their three offspring are hemophilic. What must be true regarding the genotypes of Irene and Henry?
- A. Irene carries the allele on both X chromosomes, but Henry does not.
 - B. Irene and Henry both carry the allele on one of their X chromosomes.
 - C. Irene carries the allele on one of her X chromosomes, but Henry does not.
 - D. Irene carries the allele on one of her X chromosomes and Henry carries the allele on his Y chromosome.

Use the picture to answer question 33.

Simplified Diagram of Earth's Mantle



33. What is the process shown above by which molten material moves through Earth's mantle?

- A. radiation
- B. convection
- C. plate faulting
- D. continental drift

34. A population of deer existed for centuries in a hilly region of England. The landowners decided to introduce sheep into the same area. Deer and sheep eat some of the same kinds of plants. After the sheep were introduced, the deer population began to decline. How could the decline in the deer population be explained?

- A. Sheep competed with the deer.
- B. The sheep were smaller than the deer.
- C. The food web became too complex.
- D. Sheep are at a higher trophic level than deer.

35. The primary reason an ice cube feels cold to the touch is that

- A. conduction causes coldness to leave the ice.
- B. radiation from the hand enters the ice.
- C. conduction causes heat to leave the hand.
- D. convection currents leave the hand.

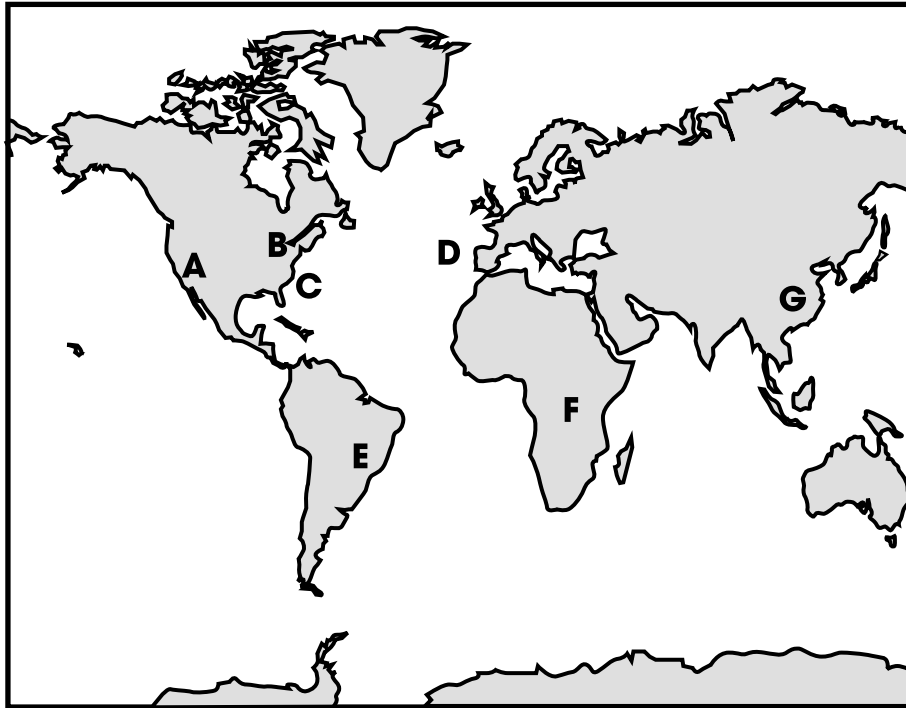
36. Our country depends on energy use. Choose one alternative energy source from among wind power, nuclear power, geothermal power and biomass. Identify your choice and describe one potential benefit and one potential disadvantage if its use is significantly increased. Respond in the space provided in your **Answer Document**. (2 points)

37. Which of these elements would most likely be a shiny, gray-colored solid at room temperature, conduct electricity, and dent when hit with a hammer?

- A. aluminum
- B. argon
- C. chlorine
- D. sulfur

38. The following map shows the position of Earth's continents today.

Map of Earth



Which piece of evidence would provide the strongest support for the hypothesis that Earth's continents were once joined?

- A. Modern crops grown in region E can also be grown in region F.
- B. Fossilized sediments found in region A resemble those found in region B.
- C. Modern marine mammals found in location C are also found in location D.
- D. Fossilized land invertebrates found in location E are also found in location F.

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