

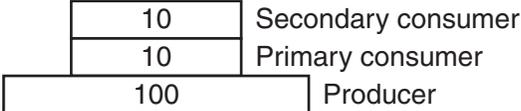
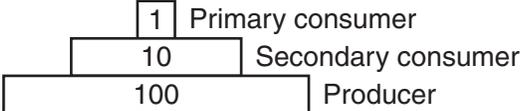
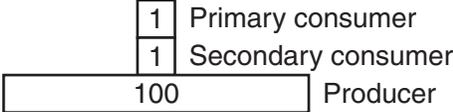
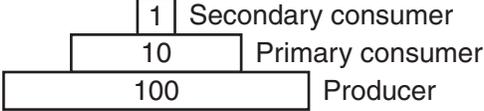
Maine High School Assessment

STUDENT PRACTICE TEST BOOKLET

RELEASED 2013 SCIENCE ITEMS

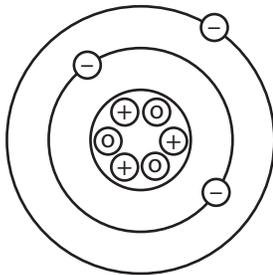
Maine Department of Education

Directions: Read questions 1 through 20 and decide which is the best of the choices given. Fill in the corresponding circle on page 2 in your practice test answer booklet. You may use any available space in your practice test booklet for scratchwork.

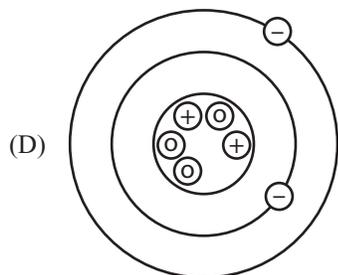
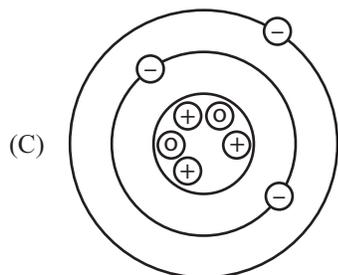
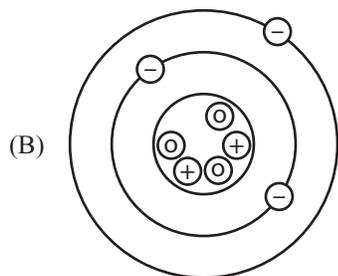
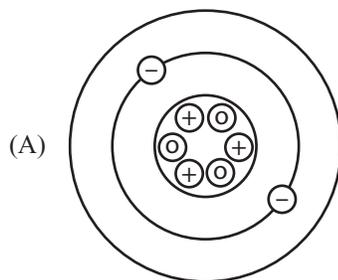
1. Which statement best explains why Earth's tectonic plates move?
- (A) The plates move due to gravity pulling rock and soil from higher to lower elevations.
- (B) The plates move due to the pushing of ocean currents.
- (C) The plates move due to the mantle's convection currents.
- (D) The plates move due to the erosion of rock from one side of a tectonic plate to the other.
2. Which of the following is the best evidence that a piece of DNA is a gene?
- (A) A cell dies when the piece of DNA is removed from it.
- (B) A new protein is produced when the piece of DNA is placed in a cell.
- (C) The piece of DNA contains four different bases.
- (D) The piece of DNA has the same code as RNA.
3. Two textbooks in a classroom have the same mass. One of the textbooks is on the floor and the other textbook is on a table. Which statement best compares the textbook on the floor with the textbook on the table?
- (A) The textbook on the floor has more kinetic energy than the textbook on the table.
- (B) The textbook on the floor has less kinetic energy than the textbook on the table.
- (C) The textbook on the floor has more potential energy than the textbook on the table.
- (D) The textbook on the floor has less potential energy than the textbook on the table.
4. If the chloroplasts of a plant cell are destroyed, which cellular function is immediately lost?
- (A) the ability to excrete waste
- (B) the ability to make proteins
- (C) the ability to produce food
- (D) the ability to transport materials
5. Which biomass pyramid best shows how energy moves through an ecosystem?
- (A)  Secondary consumer
Primary consumer
Producer
- (B)  Primary consumer
Secondary consumer
Producer
- (C)  Primary consumer
Secondary consumer
Producer
- (D)  Secondary consumer
Primary consumer
Producer

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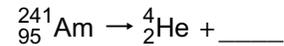
6. The diagram below represents the structure of an atom.



Which diagram best represents the atom after being oxidized and forming a positive ion?



7. In a smoke detector, americium-241 is used to detect smoke particles in the air. This element decays as shown in the nuclear equation below.



How many protons are in the missing element?

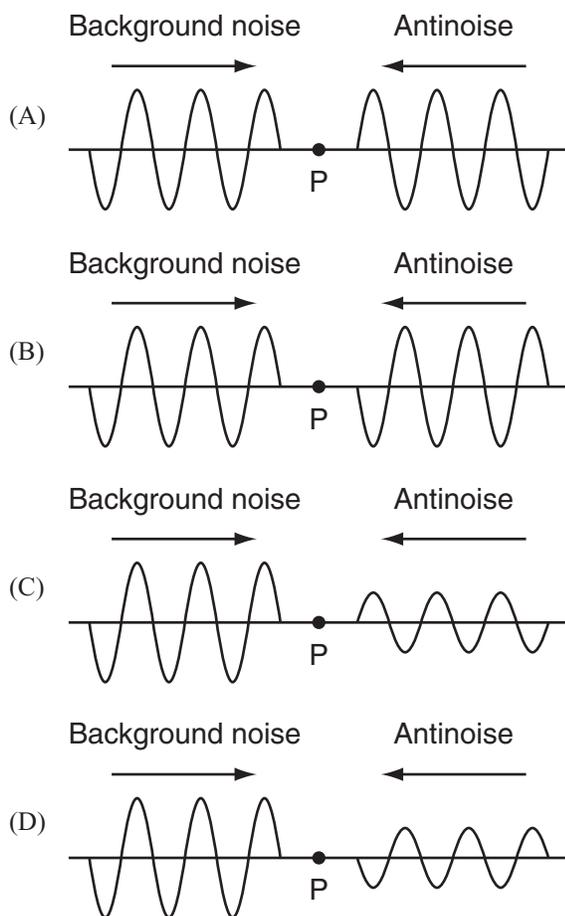
- (A) 245
 (B) 237
 (C) 97
 (D) 93
8. Where does most of the energy needed to move tectonic plates originate?
- (A) the light from the Sun
 (B) the hot interior of Earth
 (C) the gravitational force of the Moon
 (D) the wind created by convection currents
9. A scientist is studying a sample of a radioactive element. The amount of time it takes for 50% of the atoms in the sample to decay describes which characteristic of the element?
- (A) mass defect
 (B) half-life
 (C) binding energy
 (D) reaction rate

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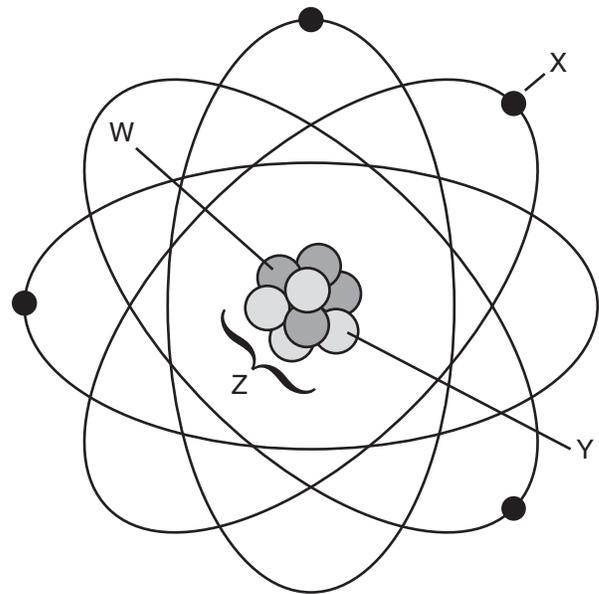
10. Which type of molecule is used to make proteins?

- (A) amino acid
- (B) fatty acid
- (C) glucose
- (D) sucrose

11. Active noise-canceling technology uses a sampling of background noise to generate an antinoise wave (a sound wave that cancels another sound wave). Which graphic represents the lowest level of sound at point P?



12. The diagram below represents an atomic structure.



Which letter in the diagram identifies an electron?

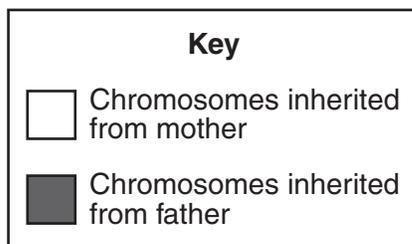
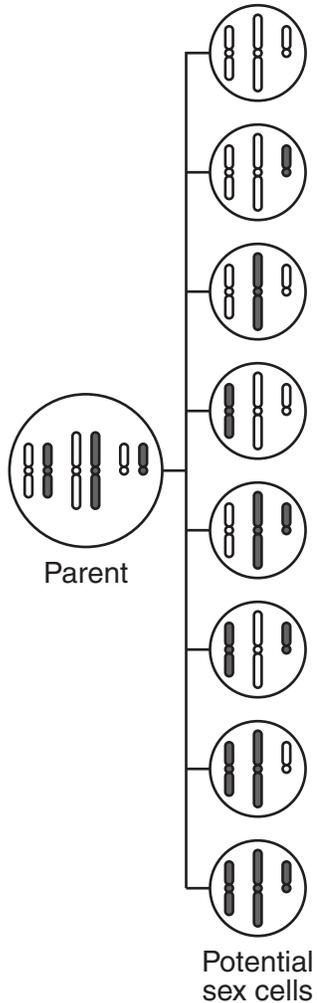
- (A) W
- (B) X
- (C) Y
- (D) Z

13. An electric motor becomes warm over time while it is running. Which statement best explains why the electric motor becomes warm while it is running?

- (A) Heat is generated from the area around the electric motor.
- (B) Heat is gained from converting light to electricity.
- (C) Heat is converted from electricity flowing through the wires.
- (D) Heat is generated from the wires' changing magnetic field.

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14. The diagram below shows the results of independent assortment during sex cell production in animals.



How does independent assortment affect animal populations?

- (A) It increases the genetic variability.
- (B) It increases the size of organisms.
- (C) It increases the chance of disease.
- (D) It increases the likeness of offspring to parents.

15. Which of the following could disrupt the stability of an ecosystem?

- (A) preserving the biodiversity
- (B) sustaining the natural resources
- (C) preventing habitat destruction
- (D) introducing an invasive species

16. Melanoma is a type of skin cancer characterized by an increase in the number of pigment-producing cells. Which cell process is most directly involved in this increase?

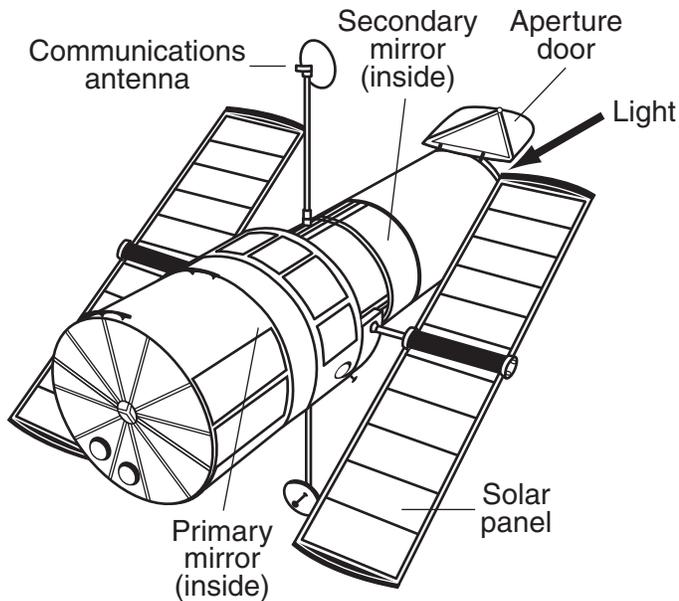
- (A) mitosis
- (B) respiration
- (C) cellular transport
- (D) carbohydrate production

17. A driver notices that the distance between the front of his car and the rear bumper of a truck in front of him is constant when the speedometer in his car reads 50 mph. Using the rear bumper of the truck as the frame of reference, what is the apparent speed of the car when the speedometer reads 50 mph?

- (A) 0 mph
- (B) 50 mph
- (C) 75 mph
- (D) 100 mph

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18. The diagram below shows a scientific instrument that orbits Earth.



How does this instrument increase scientists' understanding of the early universe?

- (A) The instrument uses the infrared to ultraviolet part of the electromagnetic spectrum to create images of Earth from space.
- (B) The instrument detects the decay of atoms into subatomic particles.
- (C) The instrument creates images of planets forming in the farthest regions of the solar system.
- (D) The instrument creates images of distant galaxies that were formed shortly after the big bang.

19. A hydroelectric power plant located next to a river produces electricity. What is the source of energy for the hydroelectric power plant?
- (A) the heat energy in the river water
- (B) the electrical energy in the river water
- (C) the potential energy stored in the chemical bonds in the river water
- (D) the potential energy of the river water located upstream from the power plant
20. The table below shows the different sets of conditions used for the reaction of equal amounts of hydrochloric acid (HCl) with equal amounts of marble (CaCO_3) chips.

Experiment Number	1	2	3	4
Concentration of hydrochloric acid (M)	0.10	0.10	0.20	0.20
Average diameter of marble chips (mm)	2.00	5.00	2.00	5.00
Temperature of hydrochloric acid ($^{\circ}\text{C}$)	20.00	40.00	40.00	20.00

Which experiment would have the highest reaction rate?

- (A) Experiment 1
- (B) Experiment 2
- (C) Experiment 3
- (D) Experiment 4

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Directions: Write your answers to constructed-response questions 21 and 22 in the boxes provided on pages 2 and 3 of your practice test answer booklet. Be sure to answer and label all parts (a, b, c, etc.) of the questions.

21. Mudflats are located in calm coastal waters where large areas of mud are exposed between high and low tides. The mudflat ecosystem supports many organisms, including green algae, crabs, snails, and clams. It is a feeding area for many shorebirds. In recent years, some mudflats have been dramatically changed by an invasive species of marsh grass called spartina. Spartina grows in the mud in large solid clumps and is rapidly changing mudflats into grassy marshland.
- Explain why changes to a mudflat ecosystem could affect the organisms living there. Describe an example.
 - Explain why some populations are more likely to survive a permanent change to the mudflats. Describe an example.
22. A student has a sealed container of helium gas. The student gently heats the container.
- Describe the difference between heat and temperature at the atomic level.
 - Explain how and why the helium gas pressure is affected when the container of helium gas is heated.

STOP