GRADE 11

High School
Student Practice Test Booklet

Student Name: _____

MEA

Maine Educational Assessment

Released 2018 Science Items

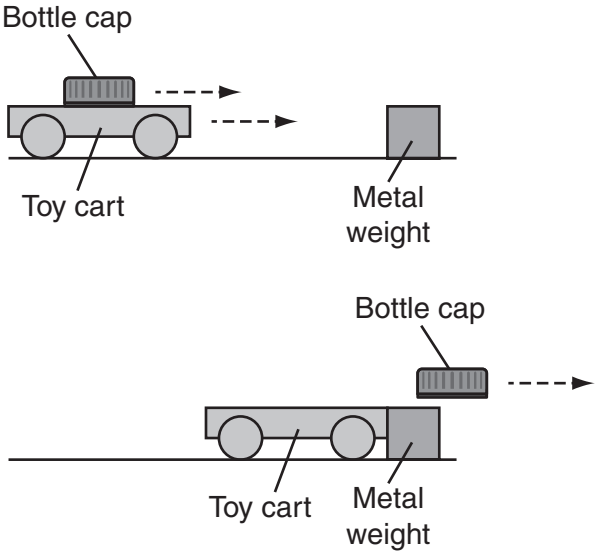
Maine Department of Education

SCIENCE PRACTICE TEST

This practice session has ten multiple-choice and two constructed-response questions.

Choose the best answer for each multiple-choice question and mark your answer choices for questions 1 through 10 in the spaces provided on page 2 of your practice test answer booklet.

1. A student places a bottle cap on a toy cart. The student pushes the toy cart and the bottle cap across a floor toward a metal weight. When the toy cart and the bottle cap reach the metal weight, the cart stops moving but the bottle cap keeps moving, as shown in the diagram below.



Which statement <u>best</u> explains the motion of the bottle cap?

(A) A frictional force acted on the bottle cap but not on the toy cart.

(B) The metal weight applied a force on the toy cart but not on the bottle cap.

(C) A balanced force acted on both the bottle cap and the toy cart.

(D) Neither the bottle cap nor the toy cart experienced a force.

2. The genomes of multicellular organisms contain certain regulator genes that turn other genes on and off. Why is this function important?

(A) It allows cells to copy less DNA during meiosis.

(B) It changes genes from recessive to dominant.

(C) It allows the differentiation of cells into specialized types.

(D) It removes unused information from a genome.

3. Several fruit fly characteristics, including body color and wing size, are determined by single genes with two alleles, as shown in the table below.

Gene	Allele	Characteristic
Body color	B	Black with tan stripes
	b	Solid black
Wing size	N	Normal
	n	Very small

Two fruit flies that are heterozygous for body color and have very small wings are crossed. Which model shows possible combinations of the alleles in the <u>gametes</u> from each of the parents?

(A) Bn and bn

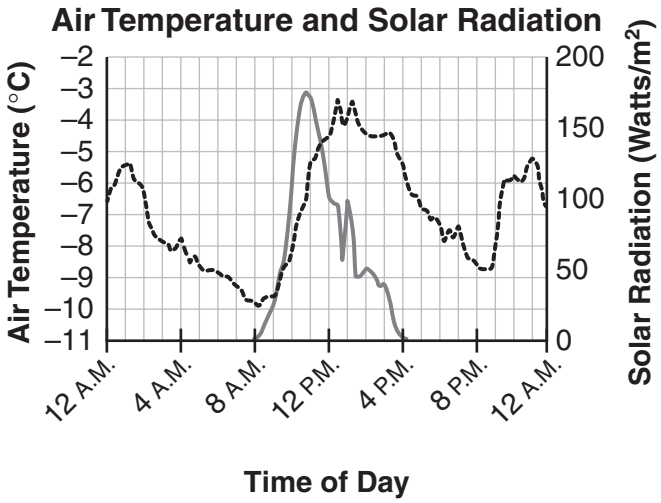
(B) bb and Nn

(C) bN and Bn

(D) BB and nn

PLEASE GO ON →

4. The graph below shows the solar radiation and air temperature at a certain location during the course of one day.



Which statement best explains why the air temperature curve does not exactly match the solar radiation curve?

(A) Air temperature has no relationship to solar radiation.

(B) Winds disperse incoming solar radiation.

(C) Any precipitation that falls decreases the effect solar radiation has on temperature.

(D) Reradiation of heat energy from the ground warms the air.

5. Some traits in humans have little value in helping the human survive or reproduce. Which statement best explains why humans have these traits?

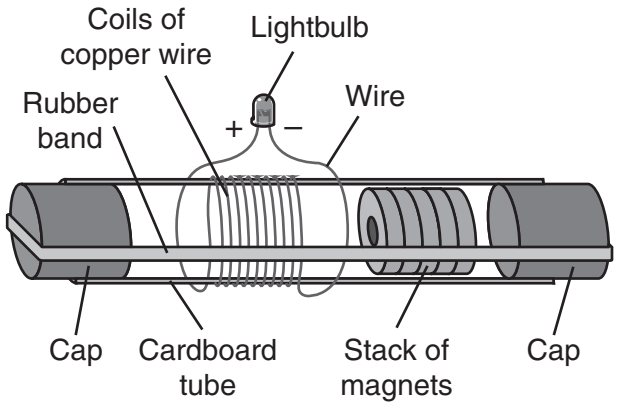
(A) The traits may be useful in the future.

(B) The genes for the traits are resistant to mutation.

(C) There is no selective pressure to get rid of the traits.

(D) The traits were used for communication millions of years ago.

6. Two lab partners build a shake flashlight, as shown in the diagram below.



When the students shake the flashlight, the magnets move through the coil of copper wire, and current flows through the wires and bulb.

The students notice that they must shake the flashlight very fast to light up the bulb. How could the students modify the design so the bulb will light up without having to shake the flashlight as fast?

(A) use longer wires to connect the lightbulb to the coil

(B) increase the number of coils of copper wire

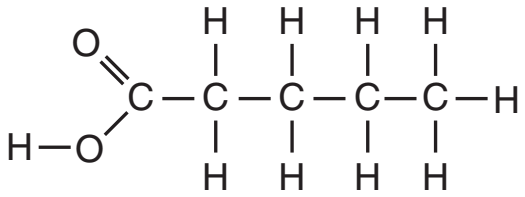
(C) reduce the number of magnets in the stack

(D) add a second lightbulb

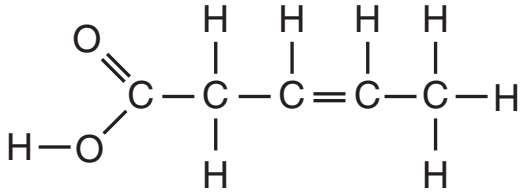
PLEASE GO ON →

7. The models below show the chemical structures of two different types of fats, which are a necessary part of the human diet.

Saturated Fat



Unsaturated Fat



Based on the models, which statement describes how the bonding characteristics of one of the atoms determine the chemical structure of saturated and unsaturated fats?

(A) Oxgen is necessary to ensure both fats have double bonds.

(B) Carbon is the only atom that can bond with both hydrogen and oxygen.

(C) Carbon is essential because it can create up to four bonds with other atoms.

(D) Hydrogen is the backbone of both structures because it has the greatest number of atoms.

8. A scientist makes observations about two compounds. The list below shows some of the information the scientist recorded.

- Compound X is a polar molecule.
- Compound Y is a nonpolar molecule.
- The molecular mass of Compound X is almost the same as the molecular mass of Compound Y.

Which claim is <u>best</u> supported by the scientist's observations?

(A) Compound X has a higher melting point and a lower boiling point than Compound Y because Compound X is highly soluble in water.

(B) Compound Y has a higher melting point and a higher boiling point than Compound X because Compound Y is highly soluble in water.

(C) Compound Y has a higher melting point and a lower boiling point than Compound X because Compound Y has weak intermolecular forces of attraction.

(D) Compound X has a higher melting point and a higher boiling point than Compound Y because Compound X has strong intermolecular forces of attraction.

PLEASE GO ON →

9. In the North Pacific Ocean, there is a floating heap of garbage that is larger than the state of Texas. Plastics dumped from ships or from along shores make up most of the garbage. These plastics remain floating in the ocean for long periods of time until they break down into smaller pieces due to exposure to the Sun.

How do the plastics polluting the oceans most likely impact Earth systems?

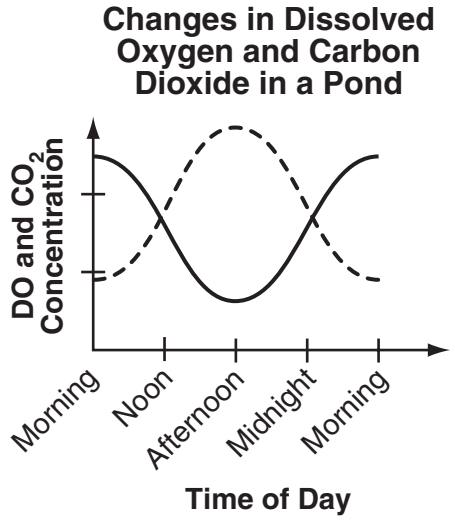
(A) The plastics change the patterns of the ocean's currents.

(B) The plastics increase the evaporation of water.

(C) The plastics block light from reaching plankton and algae below the ocean's surface.

(D) The plastics slow the processes related to global climate change.

10. The graph below shows the changes in the dissolved oxygen and in the carbon dioxide in a pond over a 24-hour period.



Which statement best explains the changes shown in the graph?

(A) Aquatic animals breathe by taking in oxygen from the pond and emitting carbon dioxide.

(B) Aquatic plants produce oxygen during the day and aquatic animals produce carbon dioxide at night.

(C) Cellular respiration in all organisms is constant, while photosynthesis in plants occurs primarily during the day.

(D) Photosynthesis in plants occurs primarily during the day, while cellular respiration in all organisms occurs only at night.

PLEASE GO ON ➔

Write your answers to constructed-response questions 11 and 12 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.

11. The diagram below shows a heavy box just before a student gently pushes it and makes it move down the slide.

a. Define kinetic and potential energy.

b. Explain how potential energy and kinetic energy change as the box goes from the top of the slide to the bottom of the slide.

When the box reaches the bottom of the slide, its kinetic energy is only 45 J. The predicted kinetic energy is 90 J.

c. Describe <u>one</u> reason for the difference between actual and predicted kinetic energy.

PLEASE GO ON →

12. All the members of a population of adult fruit flies are equally exposed one time to a chemical that kills over 70% of the population.

a. Explain why the entire population of fruit flies is not killed by the chemical.

The remaining fruit flies breed and have offspring. Several generations later, the population is exposed to the same amount of the same chemical.

b. Predict what will happen when this generation of fruit flies is exposed to the same chemical. Explain your answer.

c. Describe what will happen if the future generation of fruit flies is exposed to a different poisonous chemical.