



MASSACHUSETTS DEPARTMENT OF
ELEMENTARY AND SECONDARY
EDUCATION

*Release of
February 2018
MCAS Biology
Test Items*

**March 2018
Massachusetts Department of
Elementary and Secondary Education**



This document was prepared by the
Massachusetts Department of Elementary and Secondary Education
Jeff Wulfson
Acting Commissioner

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Massachusetts Department of Elementary and Secondary Education
75 Pleasant Street, Malden, MA 02148-4906
Phone 781-338-3000 TTY: N.E.T. Relay 800-439-2370
www.doe.mass.edu



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Commissioner's Foreword

Dear Colleagues:

The Massachusetts Department of Elementary and Secondary Education is committed to working in partnership with schools to support a system that will prepare all students to succeed as productive and contributing members of our democratic society and the global economy. To assist in achieving this goal, the Department regularly releases Massachusetts Comprehensive Assessment System (MCAS) test items to provide information about the kinds of knowledge and skills that students are expected to demonstrate. This publication contains all MCAS February Biology items on which student scores are based.

The Department has banked thousands of MCAS items that are currently posted on the Department website. These items, which are available at www.doe.mass.edu/mcas/testitems.html, will continue to be a rich resource for schools.

This publication is available only on the Department website. The test items can be printed from this site. I encourage educators to use the relevant sections of this document together with their test item analysis reports as guides for planning changes in curriculum and instruction that may be needed to support schools and districts in their efforts to improve student performance.

Thank you for your support as we work together to strengthen education for our students in Massachusetts.

Sincerely,

Jeff Wulfson
Acting Commissioner of Elementary and Secondary Education

I. Document Purpose and Structure

Document Purpose and Structure

Purpose

The purpose of this document is to share with educators and the public the February 2018 MCAS Biology test items on which student results are based. Local educators will be able to use this information to identify strengths and weaknesses in their curriculum and to plan instruction to more effectively meet their students' individual needs.

This document is also intended to be used by school and district personnel as a companion document to test item analysis reports. The reports list, for the school accessing the report, the names of all enrolled students who took the February 2018 Biology test as well as information about how each student answered each common test item contained in this document. The reports also label each item as multiple-choice or open-response and identify the item's MCAS reporting category. Item numbers in this document correlate directly to the item numbers in the test item analysis reports.

Structure

Chapter II of this document contains information for the February 2018 Biology test and has three main sections. The **first section** introduces the chapter by listing the Massachusetts curriculum framework content strands assessed by the Biology MCAS test. These content strands are identical to the MCAS reporting categories under which test results are reported to schools and districts. The first section also provides the Web address for the *Science and Technology/Engineering Curriculum Framework* and the page numbers on which the learning standards assessed by the test items in the chapter can be found. In addition, there is a brief overview of the test (number of test sessions, types of items, and reference materials allowed).

The **second section** contains the test items used to generate February 2018 MCAS student results for Biology. The test items in this document are shown in the same order and basic format in which they were presented in the test booklet.

The **final section** of the chapter is a table that cross-references each item with its MCAS reporting category and with the *Framework* standard it assesses. Correct answers to multiple-choice questions are also listed in the table.

Materials presented in this document are **not** formatted **exactly** as they appeared in student test booklets. For example, in order to present items most efficiently in this document, the following modifications have been made:

- Some fonts and/or font sizes may have been changed and/or reduced.
- Some graphics may have been reduced in size from their appearance in student test booklets; however, they maintain the same proportions in each case.
- All references to page numbers in answer booklets have been deleted from the directions that accompany test items.

II. February 2018 Biology Test

February 2018 Biology Test

The February 2018 high school MCAS Biology test was based on learning standards in the Biology content strand of the Massachusetts *Science and Technology/Engineering Curriculum Framework* (2006). These learning standards appear on pages 54–58 of the *Framework*, which is available on the Department website at <http://www.doe.mass.edu/frameworks/archive.html>.

Biology test results are reported under the following five MCAS reporting categories:

- Biochemistry and Cell Biology
- Genetics
- Anatomy and Physiology
- Ecology
- Evolution and Biodiversity

The table at the conclusion of this chapter indicates each item’s reporting category and the framework learning standard it assesses. The correct answers for multiple-choice questions are also displayed in the table.

Test Sessions

The MCAS high school Biology test included two separate test sessions, which were administered on consecutive days. Each session included multiple-choice and open-response items.

Reference Materials and Tools

The high school Biology test was designed to be taken without the aid of a calculator. Students were allowed to have calculators with them during testing, but calculators were not needed to answer questions.

During both Biology test sessions, the use of bilingual word-to-word dictionaries was allowed for current and former English language learner students only. No other reference materials were allowed.

Biology

SESSION 1

DIRECTIONS

This session contains twenty-one multiple-choice questions and two open-response questions. Mark your answers to these questions in the spaces provided in your Student Answer Booklet. You may work out solutions to multiple-choice questions in the test booklet.

1 The heath hen was a wild bird that was once common from New England to Virginia. By 1900, habitat changes and hunting by humans had reduced the heath hen population size to about 100 birds. The species became extinct in 1932.

Which of the following would have been **most** effective in preventing the decline in the population size of wild heath hens?

- A. vaccinating baby heath hens against human diseases
- B. establishing protected natural areas where heath hens lived
- C. introducing new bird species to put selective pressure on heath hens
- D. attaching metal bands to the legs of heath hens to identify them as a protected species

2 The feather color of Andalusian chickens is controlled by a single gene with two alleles. A cross between a true-breeding, white-feathered Andalusian hen and a true-breeding, black-feathered Andalusian rooster results in 100% blue-feathered Andalusian offspring.

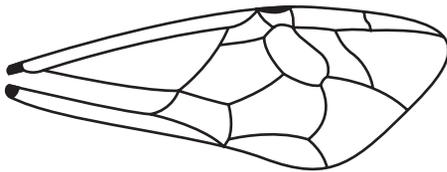
Which of the following describes the inheritance pattern for feather color in these chickens?

- A. It is a polygenic pattern because more than two phenotypes are possible.
- B. It is a dominant-recessive pattern because both parents are true breeding.
- C. It is a sex-linked pattern because the hen and the rooster have different feather colors.
- D. It is a codominant pattern because the heterozygous offspring have a different phenotype than either parent.

3 The cardinal is a type of bird. Which of the following would increase the size of a population of cardinals in a forest?

- A. an increase in the birth rate of cardinals
- B. an increase in the death rate of cardinals
- C. increased emigration of young cardinals from the forest ecosystem
- D. increased immigration of cardinal predators into the forest ecosystem

4 The illustration below shows the wing structure of an insect.



Which of the following animals will most likely have a wing structure that is very similar to this insect's wing structure?

- A. an animal from the same class
- B. an animal from the same genus
- C. an animal from the same phylum
- D. an animal from the same kingdom

5 Which of the following statements describes one way that energy is transferred in a food web?

- A. Plants provide energy to consumers.
- B. Energy is cycled between producers.
- C. Producers store energy made by animals.
- D. Consumers obtain energy directly from sunlight.

- 6 In the presence of the enzyme CPK, the reaction below can occur in muscle cells.



Based on this information, when should the CPK enzyme be most active?

- A. during sleep, when body temperature is low
- B. during exercise, when the need for energy is high
- C. during digestion, when the need for glucose is high
- D. during periods of growth, when nutrient levels are low

- 7 Which of the following is the **best** evidence that two birds belong to the same species?

- A. The two birds eat the same food.
- B. The two birds have common behaviors.
- C. The two birds are the same size and color.
- D. The two birds mate and produce fertile offspring.

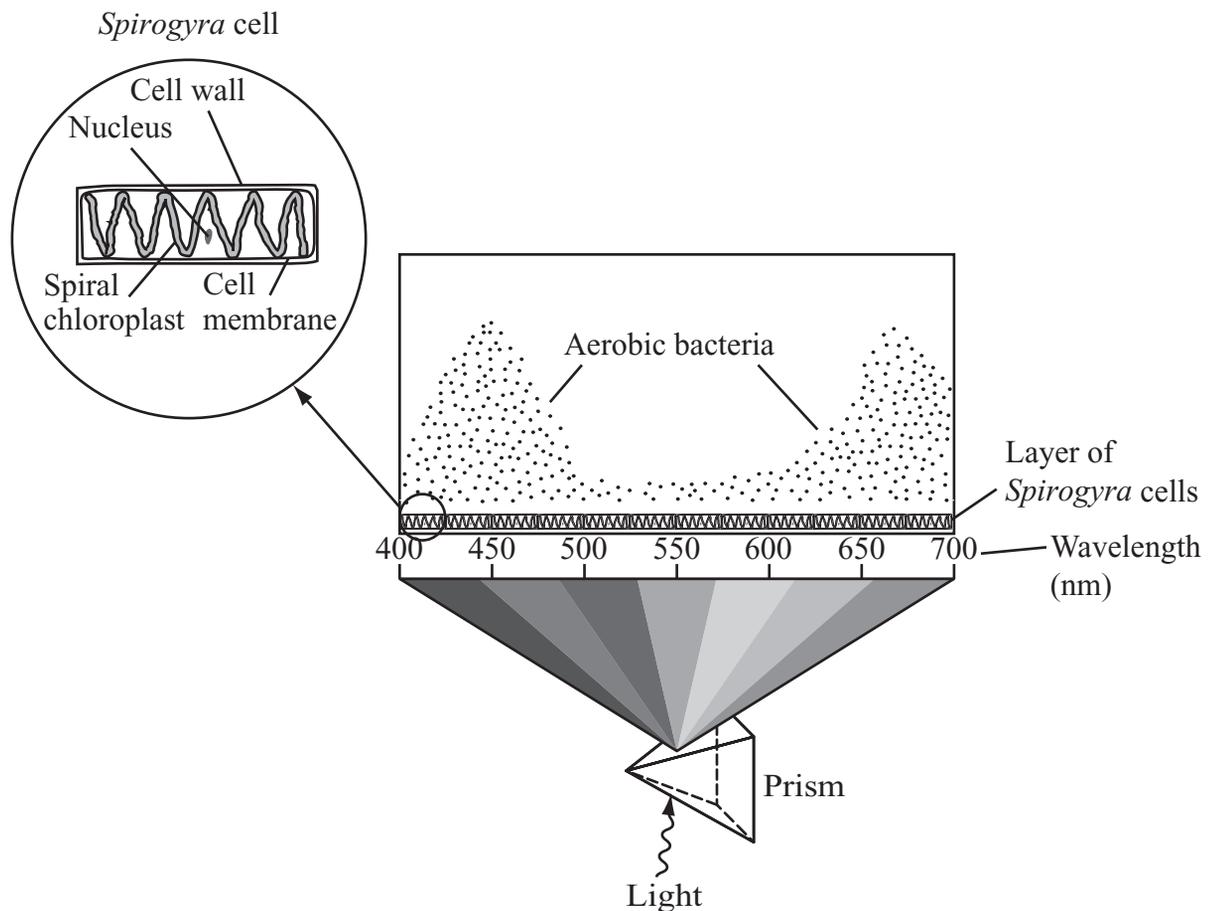
The following section focuses on Engelmann's experiment.

Read the information below and use it to answer the four multiple-choice questions and one open-response question that follow.

The rate of photosynthesis in organisms depends in part on the wavelength of visible light. In the late 1800s, Thomas Engelmann demonstrated the relationship between the wavelength of light and the rate of photosynthesis. His experiment is described below.

- Engelmann used a prism to produce a visible light spectrum of violet, blue, green, yellow, orange, and red light.
- He shined the light spectrum onto cells of the algae *Spirogyra*.
- Once the light was shining on the *Spirogyra* cells, Engelmann added aerobic bacteria to the system. Aerobic bacteria need oxygen to live and grow.
- After adding the bacteria, Engelmann observed the regions of the light spectrum where the bacteria concentrated around the *Spirogyra* cells.

The setup and results of Engelmann's experiment are represented by the diagram below.



Mark your answers to multiple-choice questions 8 through 11 in the spaces provided in your Student Answer Booklet. Do not write your answers in this test booklet, but you may work out solutions to multiple-choice questions in the test booklet.

8 Why are the greatest numbers of aerobic bacteria found at the 400–500 nm and 600–700 nm wavelengths of light?

- A. Photosynthesis rates are highest there, producing large amounts of water.
- B. Photosynthesis rates are highest there, producing large amounts of oxygen.
- C. Photosynthesis rates are lowest there, producing small amounts of glucose.
- D. Photosynthesis rates are lowest there, producing small amounts of carbon dioxide.

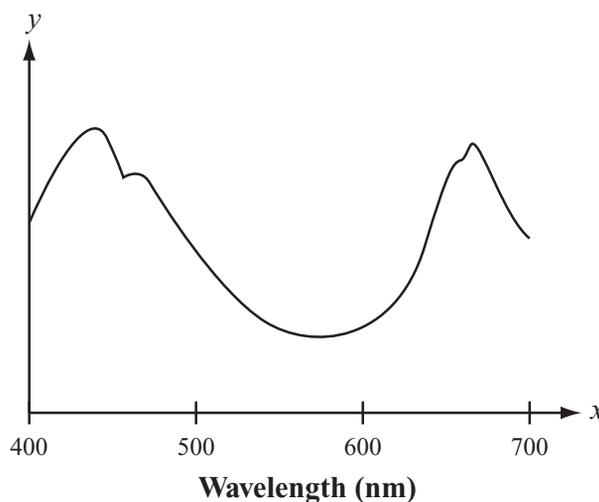
9 What is the role of visible light when *Spirogyra* cells perform photosynthesis?

- A. It provides the energy for the photosynthesis reaction.
- B. It concentrates the photosynthesis products for export.
- C. It activates the DNA that directs the photosynthesis reaction.
- D. It transports photosynthesis reactants across the cell membrane.

10 What is exchanged between the *Spirogyra* and the bacteria in Engelmann's experiment?

- A. DNA and RNA
- B. starch granules and spores
- C. chlorophyll and cytoplasm
- D. oxygen and carbon dioxide

11 A scientist used Engelmann's data to predict how the concentrations of different substances in and around *Spirogyra* cells will change when the cells are exposed to different wavelengths of light. A graph for one substance is shown below.



What is represented on the y-axis?

- A. chlorophyll concentration
- B. hydrogen concentration
- C. oxygen concentration
- D. water concentration

Question 12 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 12 in the space provided in your Student Answer Booklet.

- 12 *Spirogyra* cells have a distinct cell structure, including the four cell parts labeled in the diagram in the introduction.
- Choose **two** of the labeled cell parts in the *Spirogyra* cell diagram **and** describe the function of each part.
 - Identify **two** cell parts that are **not** labeled in the diagram but would be found in a *Spirogyra* cell.
 - Describe the function of **each** cell part you identified in part (b).

Mark your answers to multiple-choice questions 13 through 22 in the spaces provided in your Student Answer Booklet. Do not write your answers in this test booklet, but you may work out solutions to multiple-choice questions in the test booklet.

13 A population of mosquito larvae is living in a large pond. Mosquitofish are a type of fish that eat mosquito larvae.

Which of the following describes a direct effect on the population of mosquito larvae when mosquitofish are introduced to the pond?

- A. births decrease
- B. deaths increase
- C. emigration increases
- D. immigration decreases

14 The shape of songbird wings affects the efficiency of flight. Birds with more pointed wings fly long distances more efficiently, and birds with more rounded wings fly short distances more efficiently.

Over the last 100 years, large portions of forests have been cut down, forcing many songbirds to travel to other forests to find mates. Which of the following evolutionary changes has **most likely** occurred in these bird populations as a result?

- A. Bird wings are more pointed than they previously were.
- B. Bird wings are more rounded than they previously were.
- C. Young birds learn to use their pointed wings later than they previously did.
- D. Young birds learn to use their rounded wings earlier than they previously did.

- 15 Inhalation is the process that draws air into the lungs. How does the muscular system work with the respiratory system to make inhalation possible?
- The chest muscle relaxes to let air flow into the respiratory system.
 - The smooth muscles of the esophagus relax to let air flow into the respiratory system.
 - The diaphragm muscle contracts to expand the chest and draw air into the respiratory system.
 - The skeletal muscles of the neck contract to pull on the pharynx and draw air into the respiratory system.
- 16 Which of the following is **always** part of normal sexual reproduction?
- The male produces gametes by mitosis.
 - An offspring looks identical to the parents at birth.
 - The female carries only one fertilized egg at a time.
 - An offspring receives half its chromosomes from each parent.

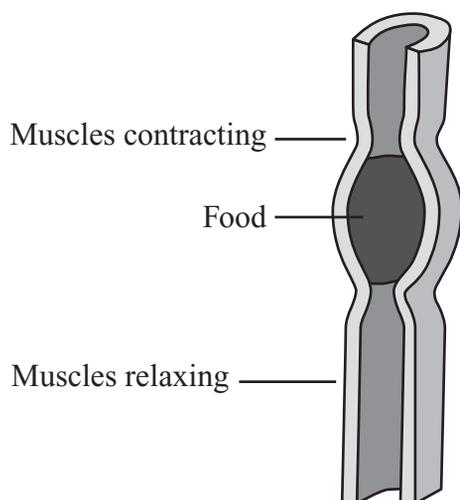
- 17 Fur color in some cats is partially determined by the TYR gene, which has four alleles (**C**, **c^b**, **c^s**, **c**). Expression trends for the TYR alleles are summarized in the table below.

Fur Color	Allele Symbol	Allele Expression
typical color	C	dominant to c^b , c^s , c
Burmese	c^b	dominant to c^s , c
Siamese	c^s	dominant to c
albino	c	recessive to C , c^b , c^s

A male cat with albino fur color is crossed with a female cat with Siamese fur color. Considering only the effect of the TYR gene, which of the following is expected to be observed in the offspring?

- All of the offspring will be albino.
- At least some of the offspring will be Siamese.
- At least half of the offspring will be the typical color.
- Half of the offspring will be Burmese and half will be albino.

- 18 The diagram below shows some food in a structure of the human digestive system.



Which of the following describes the **primary** role of this structure?

- A. to release enzymes that break down food
- B. to make enzymes used in the digestion of food
- C. to mechanically digest food into macromolecules
- D. to push food toward an organ that breaks down macromolecules

- 19 Which of the following describes how a large mouse population with high genetic diversity will **most likely** be affected by a sudden, significant environmental change?

- A. All of the individuals within the population will reproduce at a higher rate, leading to a decrease in genetic diversity.
- B. New traits will arise as a result of new selective pressures in the environment, leading to an increase in genetic diversity.
- C. Only those individuals best adapted to the new environment will survive and reproduce, leading to a decrease in genetic diversity.
- D. Only some individuals will develop traits to help them survive in the new environment, leading to an increase in genetic diversity.

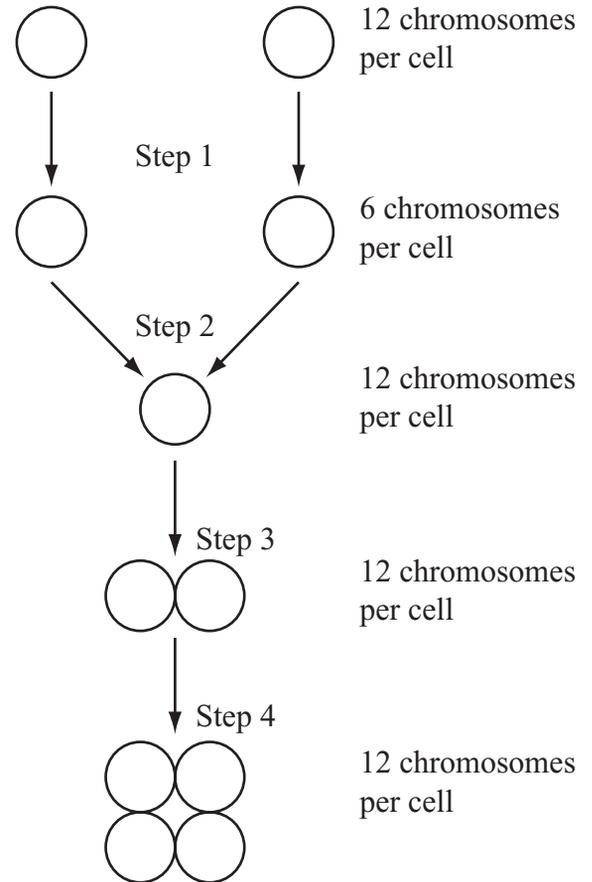
- 20 Which of the following is the **best** example of homeostasis?
- Heart rate increases when a person exercises.
 - The chest cavity expands when the diaphragm contracts.
 - The biceps muscle relaxes when the triceps muscle contracts.
 - Digestive enzymes are secreted when food enters the stomach.

- 21 In pea plants, the allele for smooth seeds (**R**) is dominant to the allele for wrinkled seeds (**r**). Two parent plants are crossed. Almost half of the offspring have smooth seeds, while the rest of the offspring have wrinkled seeds.

Which of the following identifies the **most likely** genotypes of the two parent plants?

- RR** and **Rr**
- RR** and **rr**
- Rr** and **rr**
- Rr** and **Rr**

- 22 The diagram below represents several steps in the reproduction and growth of houseflies. Each circle in the diagram represents a cell.



Which labeled step represents the formation of a zygote?

- Step 1
- Step 2
- Step 3
- Step 4

Question 23 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 23 in the space provided in your Student Answer Booklet.

- 23** Approximately 200 kinds of trees and shrubs are found in Grand Canyon National Park. The chart below lists the common and scientific names of some of the trees in the park.

Common Name	Scientific Name
Arizona walnut	<i>Juglans major</i>
Blue spruce	<i>Picea pungens</i>
Douglas fir	<i>Pseudotsuga menziesii</i>
Fremont cottonwood	<i>Populus fremontii</i>
Gambel oak	<i>Quercus gambelii</i>
Ponderosa pine	<i>Pinus ponderosa</i>
Quaking aspen	<i>Populus tremuloides</i>
Utah juniper	<i>Juniperus osteosperma</i>
White fir	<i>Abies concolor</i>

- Identify the **two** trees listed in the chart that are most closely related. Explain your reasoning.
- Identify **two** types of scientific evidence biologists use to classify living plants in the modern taxonomic system.
- Describe how **each** type of evidence you identified in part (b) could be used by biologists to determine which two trees are more closely related to each other than to the other trees in the chart.

Biology

SESSION 2

DIRECTIONS

This session contains nineteen multiple-choice questions and three open-response questions. Mark your answers to these questions in the spaces provided in your Student Answer Booklet. You may work out solutions to multiple-choice questions in the test booklet.

- 24 In Labrador retrievers, the allele for brown coat color (**b**) is recessive to the allele for black coat color (**B**). Information about two Labrador retrievers is given below.

Dog W	Dog X
	
Male	Female
Black coat	Brown coat
Parents:	Parents:
•Black coat female •Brown coat male	•Brown coat female •Brown coat male

If dog W and dog X were crossed, what percentage of the offspring would be expected to be brown?

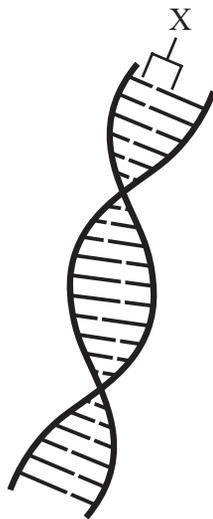
- A. 0%
- B. 25%
- C. 50%
- D. 100%

- 25 African birds called honeyguides eat beeswax. Most bees' nests are inside hollow trees where the honeyguides cannot reach them. The honeyguides lead honey badgers, which also eat beeswax, to bees' nests. The honey badgers then dig out and eat the nests, leaving scraps of wax and honey for the honeyguides.

The relationship between the honeyguides and the honey badgers is an example of

- A. commensalism.
 - B. competition.
 - C. mutualism.
 - D. predation.
- 26 Which of the following is a reason for DNA replication in skin cells?
- A. to produce identical daughter skin cells
 - B. to enable the skin cells to make more proteins
 - C. to allow the skin cells to adapt to a changing environment
 - D. to ensure daughter skin cells will have higher genetic diversity

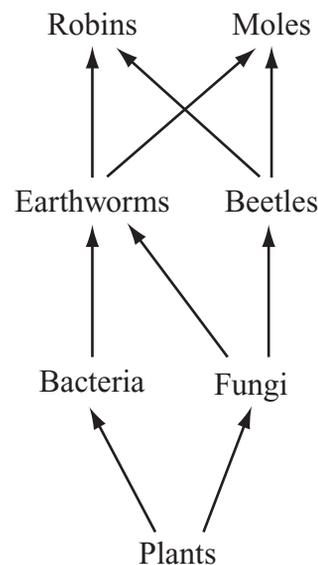
- 27 A simple diagram of a DNA molecule is shown below.



Which of the following is represented by X?

- A. an amino acid
- B. an mRNA bond
- C. a nucleotide base pair
- D. a ribosome binding site

- 28 A partial food web is shown below.



Which of the following describes the relationship between the earthworms and the beetles in the food web?

- A. The earthworms and the beetles both compete for fungi.
- B. The earthworms and the beetles both compete for robins and moles.
- C. The earthworms help the beetles survive, and the beetles do not harm the earthworms.
- D. The earthworms help the beetles survive, and the beetles help the earthworms survive.

29 In Florida, mice that live on the white sands of the barrier islands tend to be lighter in color than mice that live in the vegetation on the mainland. Which of the following statements describes how mice on the barrier islands most likely evolved their light coat color through natural selection?

- A. The light-colored mice were easier prey for birds than the dark-colored mice.
- B. The light-colored mice learned to shed more of their fur than the dark-colored mice.
- C. The light-colored mice had a greater reproductive advantage on the barrier islands than the dark-colored mice.
- D. The light-colored mice migrated from the mainland to the barrier islands more recently than the dark-colored mice.

30 Mammals store extra glucose in the form of a compound called glycogen. Which molecule supplies the energy needed to join glucose molecules together to form a molecule of glycogen?

- A. ATP
- B. RNA
- C. oxygen
- D. carbon dioxide

31 A plant species growing along a coast produces seeds with fluffy hair-like fibers on one end. A seed from one of the plants is shown below.



Some of these seeds were dispersed by the wind to islands off the coast, where new plants grew. Within 10 years, the seeds of the island plants were different from the seeds of the mainland plants. Compared to the mainland seeds, the island seeds were heavier and had shorter hair-like fibers.

Which of the following statements **best** explains why heavier seeds with shorter fibers were favored in the island environment?

- A. These seeds carried more genes than the mainland seeds did.
- B. These seeds were less likely to be blown off the island by wind.
- C. The island plants needed to prevent animals from eating the seeds.
- D. The island plants used more energy to produce heavy seeds than to grow.

Question 32 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 32 in the space provided in your Student Answer Booklet.

- 32** When exposed to bright sunlight, some people involuntarily sneeze. This reaction is known as a photic response. It is controlled by a single gene with two alleles, **H** and **h**.
- A man and a woman who sneeze when exposed to bright sunlight are both heterozygous for the photic response trait.
- Identify the most likely inheritance pattern for this trait (dominant-recessive, codominant, sex-linked, or polygenic).
 - Draw a Punnett square using the allele symbols **H** and **h** to show the expected genotypes of the man and woman's biological children. Identify **all** possible phenotypes of the offspring **and** their expected percentages.
 - Do the allele symbols on the outside of the Punnett square you drew in part (b) represent alleles in gametes or in body cells? Explain your answer.

Mark your answers to multiple-choice questions 33 through 43 in the spaces provided in your Student Answer Booklet. Do not write your answers in this test booklet, but you may work out solutions to multiple-choice questions in the test booklet.

- 33 Students investigated the effect of acid rain on photosynthesis. Several plants were given water with a pH of 4 each day for two months. The results showed that the plants had a reduced rate of photosynthesis.
- How did the acidic water **most likely** reduce the plants' rate of photosynthesis?
- A. by storing excess oxygen produced by the plants
 - B. by changing the effectiveness of enzymes in the plants
 - C. by causing root hairs to grow on the roots of the plants
 - D. by increasing the amount of carbon dioxide taken in by the plants
- 34 Waxes form a waterproof coating over the stems and leaves of many terrestrial plants. The waxes are composed of fatty acids linked to long-chain alcohols.
- Based on this information, waxes are which type of organic molecule?
- A. lipids
 - B. nucleotides
 - C. polysaccharides
 - D. proteins
- 35 Carbon monoxide is a poisonous gas because it competes with the gas that binds to hemoglobin in red blood cells. Which of the following would be **most directly** affected by carbon monoxide poisoning?
- A. fat digestion
 - B. cellular respiration
 - C. synthesis of proteins
 - D. breakdown of wastes
- 36 For many years, biologists disagreed about whether giant pandas are more closely related to raccoons or bears. Which of the following types of evidence was **most** useful in determining the evolutionary relationship of giant pandas to other animals?
- A. diet
 - B. behavior
 - C. genetic sequences
 - D. anatomical features

37 Maltose is a carbohydrate molecule that provides energy to plants early in their life cycle. Which elements are most common in a molecule of maltose?

- A. carbon and hydrogen
- B. copper and nitrogen
- C. iron and phosphorus
- D. magnesium and sulfur

38 Scientists have observed that different species of bats hunt insects at different times of night. Some of these bat species hunt insects high above lakes, and others hunt insects among the trees.

How does hunting at different times of night and at different locations **most likely** benefit the different bat species?

- A. It prevents the bat species from breeding with each other.
- B. It reduces competition among the bat species for food sources.
- C. It protects the bat species from different types of flying predators.
- D. It decreases the diversity of the insect populations bat species prey on.

39 Which of the following observations **most strongly** supports evolutionary links between fossil organisms and modern organisms?

- A. The fossil organisms and modern organisms have identical body sizes.
- B. The fossil organisms and modern organisms have homologous body structures.
- C. The fossil organisms are hundreds of thousands of years old, and modern organisms have been around for hundreds of years.
- D. The fossil organisms are found in many different rock layers, and modern organisms live in many different habitats.

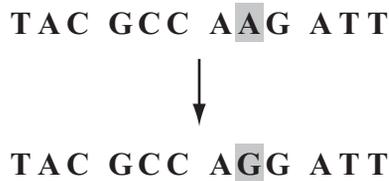
40 A researcher is studying a sample of cells taken from an organism found in the Arctic Ocean. The researcher makes the following observations about the cells:

- They do not make their own food.
- They each have a nucleus.
- They do not have cell walls.

Based on these observations, the organism should be classified as which of the following?

- A. a plant
- B. a fungus
- C. an animal
- D. a bacterium

- 41 A substitution mutation occurs in a DNA sequence, as represented below.



The table below shows the mRNA codons for some amino acids.

mRNA Codon	Amino Acid
AUG	methionine
UAA	STOP
UCC	serine
UUC	phenylalanine
UCG	serine

Based on this information, what is the expected effect of the mutation?

- A. The polypeptide will have fewer amino acids.
- B. The polypeptide will have the same amino acids.
- C. The polypeptide will contain a different amino acid.
- D. The polypeptide will contain an additional amino acid.

- 42 Mice with the same parents can have different traits. Which of the following **best** explains how most of these differences occur?
- A. Gametes join by binary fission.
 - B. Cells divide by asexual reproduction.
 - C. Genes assort independently during meiosis.
 - D. Spontaneous mutations occur during mitosis.

- 43 Which part of the digestive system eliminates solid wastes from the human body?
- A. kidneys
 - B. liver
 - C. pharynx
 - D. rectum

Questions 44 and 45 are open-response questions.

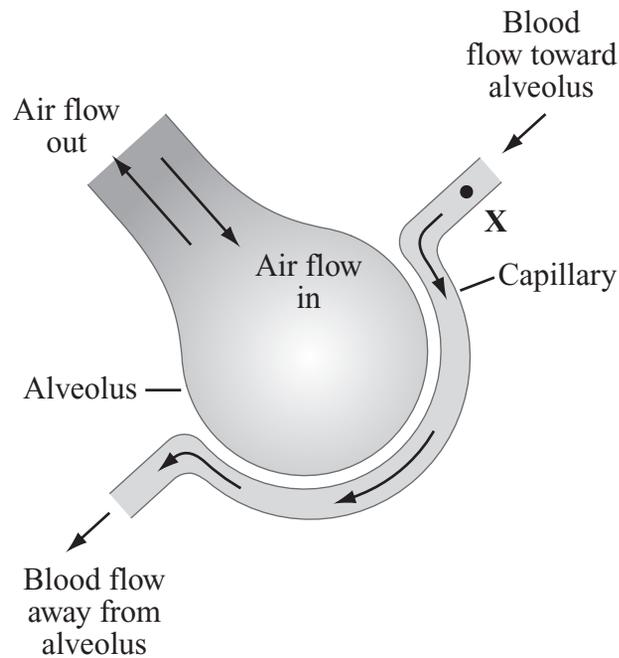
- **BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 44 in the space provided in your Student Answer Booklet.

- 44 Wild red wolves were once common in the southeastern United States. As this area became more developed, the number of wild red wolves was drastically reduced to about 20 individuals by 1967. These remaining wolves were captured and bred. In 1987, some captive-born red wolves were released into an area of North Carolina. Today, there are more than 50 wild red wolves living in North Carolina.
- Identify **two** ways development in the southeastern United States most likely contributed to the decline of the red wolf population. Explain **each** of your answers.
 - Compare the red wolf's genetic diversity before the southeastern United States became more developed to the red wolf's genetic diversity in 1967. Explain your answer.
 - Describe **one** other action, besides capturing and breeding, that could increase the number of red wolves in the southeastern United States. Explain how this action could increase the number of red wolves.

Write your answer to question 45 in the space provided in your Student Answer Booklet.

- 45 Lungs contain clusters of alveoli used for gas exchange. The diagram below shows a simplified model of one alveolus and the capillary that surrounds it.



- Identify the main gas that diffuses from the alveolus to the capillary.
- Explain why the gas you identified in part (a) diffuses in this direction.
- Identify the main gas that diffuses from the capillary to the alveolus.
- Identify the concentration (high or low) of the gas you identified in part (c) at point X, **and** describe what happens in the body cells to produce this concentration.

Biology
February 2018 Released Items:
Reporting Categories, Standards, and Correct Answers*

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC)
1	5	<i>Ecology</i>	STE.Bio.Eco6.2	B
2	5	<i>Genetics</i>	STE.Bio.Gen3.4	D
3	6	<i>Ecology</i>	STE.Bio.Eco6.1	A
4	6	<i>Evolution and Biodiversity</i>	STE.Bio.Evo5.2	B
5	6	<i>Ecology</i>	STE.Bio.Eco6.3	A
6	7	<i>Biochemistry and Cell Biology</i>	STE.Bio.Cell2.5	B
7	7	<i>Evolution and Biodiversity</i>	STE.Bio.Evo5.2	D
8	9	<i>Biochemistry and Cell Biology</i>	STE.Bio.Cell2.4	B
9	9	<i>Biochemistry and Cell Biology</i>	STE.Bio.Cell2.4	A
10	9	<i>Ecology</i>	STE.Bio.Eco6.4	D
11	9	<i>Biochemistry and Cell Biology</i>	STE.Bio.Cell2.4	C
12	10	<i>Biochemistry and Cell Biology</i>	STE.Bio.Cell2.1	
13	11	<i>Ecology</i>	STE.Bio.Eco6.1	B
14	11	<i>Evolution and Biodiversity</i>	STE.Bio.Evo5.3	A
15	12	<i>Anatomy and Physiology</i>	STE.Bio.AP4.5	C
16	12	<i>Anatomy and Physiology</i>	STE.Bio.AP4.6	D
17	12	<i>Genetics</i>	STE.Bio.Gen3.4	B
18	13	<i>Anatomy and Physiology</i>	STE.Bio.AP4.1	D
19	13	<i>Evolution and Biodiversity</i>	STE.Bio.Evo5.3	C
20	14	<i>Anatomy and Physiology</i>	STE.Bio.AP4.8	A
21	14	<i>Genetics</i>	STE.Bio.Gen3.6	C
22	14	<i>Biochemistry and Cell Biology</i>	STE.Bio.Cell2.7	B
23	15	<i>Evolution and Biodiversity</i>	STE.Bio.Evo5.2	
24	16	<i>Genetics</i>	STE.Bio.Gen3.6	C
25	16	<i>Ecology</i>	STE.Bio.Eco6.3	C
26	16	<i>Genetics</i>	STE.Bio.Gen3.2	A
27	17	<i>Genetics</i>	STE.Bio.Gen3.1	C
28	17	<i>Ecology</i>	STE.Bio.Eco6.3	A
29	18	<i>Evolution and Biodiversity</i>	STE.Bio.Evo5.3	C
30	18	<i>Biochemistry and Cell Biology</i>	STE.Bio.Cell2.5	A
31	18	<i>Evolution and Biodiversity</i>	STE.Bio.Evo5.3	B
32	19	<i>Genetics</i>	STE.Bio.Gen3.6	
33	20	<i>Biochemistry and Cell Biology</i>	STE.Bio.CL1.3	B
34	20	<i>Biochemistry and Cell Biology</i>	STE.Bio.CL1.2	A
35	20	<i>Biochemistry and Cell Biology</i>	STE.Bio.Cell2.4	B
36	20	<i>Evolution and Biodiversity</i>	STE.Bio.Evo5.1	C
37	21	<i>Biochemistry and Cell Biology</i>	STE.Bio.CL1.1	A
38	21	<i>Ecology</i>	STE.Bio.Eco6.3	B
39	21	<i>Evolution and Biodiversity</i>	STE.Bio.Evo5.1	B
40	21	<i>Biochemistry and Cell Biology</i>	STE.Bio.Cell2.3	C
41	22	<i>Genetics</i>	STE.Bio.Gen3.3	C
42	22	<i>Genetics</i>	STE.Bio.Gen3.5	C
43	22	<i>Anatomy and Physiology</i>	STE.Bio.AP4.1	D
44	23	<i>Ecology</i>	STE.Bio.Eco6.2	
45	24	<i>Anatomy and Physiology</i>	STE.Bio.AP4.3	

* Answers are provided here for multiple-choice items only.

