XVIII. Biology, High School

High School Biology Test

The spring 2019 high school Biology test was based on overlapping learning standards in the October 2006 and April 2016 versions of the *Massachusetts Science and Technology/Engineering Curriculum Framework*. The 2006 and 2016 versions of the framework are available on the Department website at www.doe.mass.edu/frameworks/.

Biology test results are reported under the following five legacy 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 2006 and 2016 framework learning standards each item assesses. The correct answers for multiple-choice questions are also displayed in the table.

Test Sessions

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

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 learner students only. No other reference tools or 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 soybean aphid was introduced to the United States in 2000. The aphid killed many soybean plants. In 2004, scientists discovered that some soybean plants were resistant to the aphid. This resistance was genetically based. The scientists wanted to determine whether the resistant trait in these soybean plants has a dominant inheritance pattern.

Which of the following would provide the best evidence that the trait is dominant?

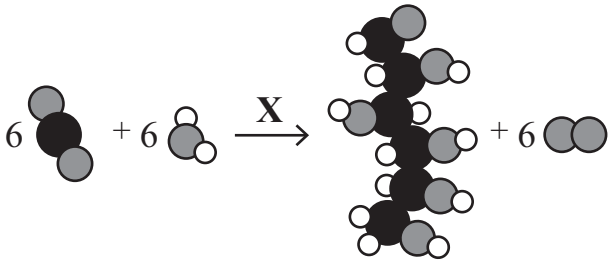
A. Two resistant plants are crossed, and none of the offspring are resistant.

B. Two plants that are not resistant are crossed, and all of the offspring are resistant.

C. A resistant plant and a plant that is not resistant are crossed, and all of the offspring are resistant.

D. A resistant plant and a plant that is not resistant are crossed, and none of the offspring are resistant.

2 The model represents the reaction that occurs when plants make sugar.



What does **X** represent in this model?

A. air

B. light energy

C. oxygen gas

D. water

3 Which of the following statements best describes how an increase in the size of a mammal population could be related to a large surplus of food?

A. With an abundance of food, adults now outnumber predators.

B. With enough to eat, more females are healthy and the birth rate increases.

C. Since there is no competition for food, most individuals develop mutualistic relationships.

D. Since they no longer need to hunt, some males increase their territories and cause other males to move away.

4 Which of the following would be **most** useful in determining how modern-day lions, tigers, and domestic cats are related?

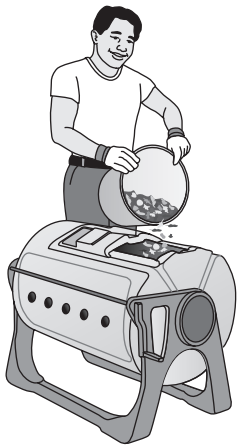
A. finding fossils from each species at a certain location

B. analyzing differences in the population size of each species

C. measuring the heights of adult males and females of each species

D. comparing amino acid sequences of a specific protein from each species

5 A composter speeds up the decomposition of dead plant material. The illustration below shows a person putting plant material into a composter.



Which of the following is one result of the decomposition of the plant material?

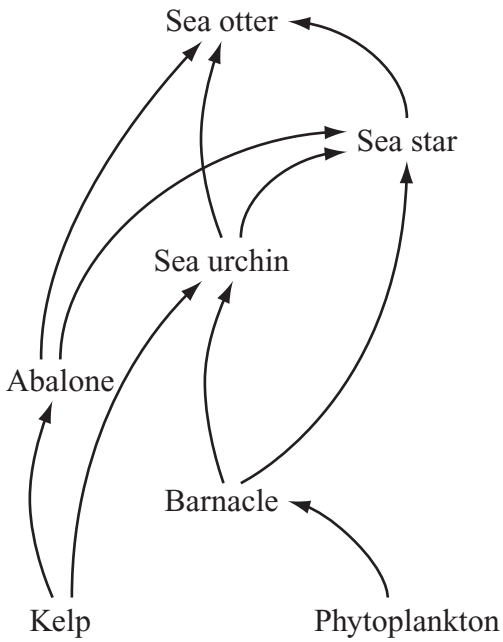
A. Photosynthesis produces starches.

B. A mixture of water and salt is created.

C. All bacteria and other microorganisms die.

D. Carbon dioxide is released to the atmosphere.

6 A marine food web is shown.



A large decrease in the sea otter population would most likely cause the size of which of the following populations to **increase** the most?

A. abalone
B. barnacle
C. kelp
D. sea star

7 Which two body systems carry signals from one part of the body to another part of the body?

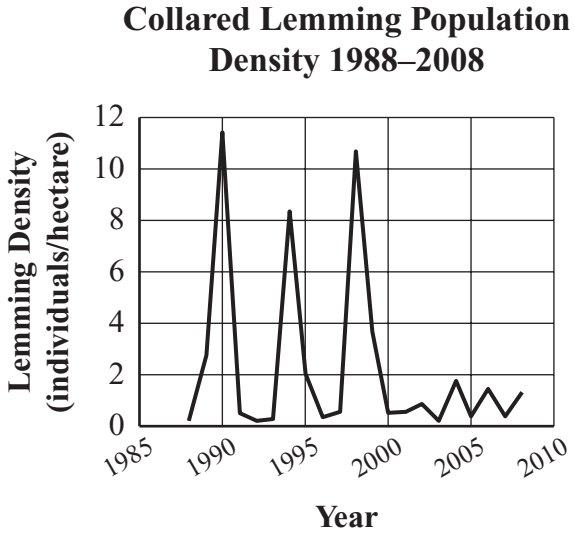
A. circulatory and nervous
B. digestive and respiratory
C. excretory and circulatory
D. excretory and nervous

The following section focuses on lemmings and the arctic ecosystem.

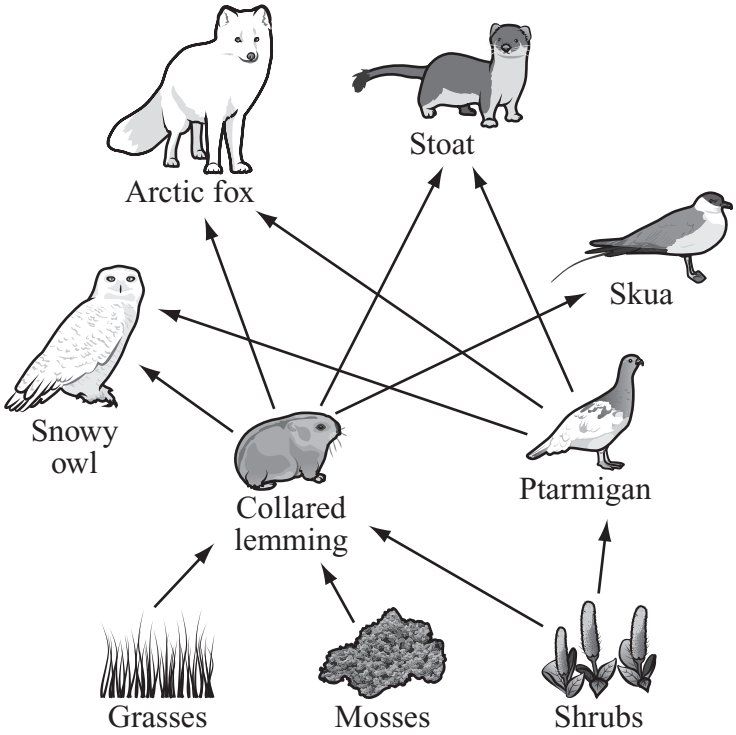
Read the information below and use it to answer the four multiple-choice questions and one open-response question that follow.

The collared lemming is a small mammal that lives in the arctic tundra. Collared lemmings have white fur in winter and brown fur in summer. For most of the year, the arctic tundra is covered by snow. During this time, collared lemmings remain active in tunnels they make in the snow. The snow provides insulation and a place where the lemmings raise several litters of 3–5 offspring each year.

Scientists studying the arctic ecosystem found that the collared lemming population in a certain area changed as shown in the graph.



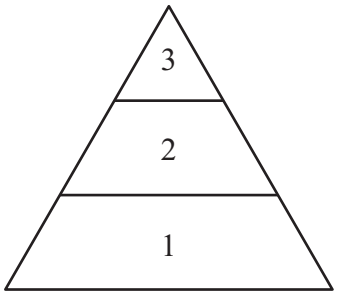
Collared lemmings play a key role in the arctic food web, as shown.



The primary food source of snowy owl chicks is the collared lemming. Snowy owls can lay 3–11 eggs per year, depending on the availability of food. Stoats also eat collared lemmings year-round.

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 Different levels in the arctic food web are represented in the energy pyramid.



Based on the food web, which of the following identifies the organisms in each level of the pyramid?

A. 3: snowy owl, arctic fox, stoat, skua
2: mosses, grasses, shrubs
1: collared lemming, ptarmigan

B. 3: mosses, grasses, shrubs
2: snowy owl, collared lemming, ptarmigan
1: arctic fox, stoat, skua

C. 3: shrubs, ptarmigan, skua
2: mosses, collared lemming, stoat
1: grasses, snowy owl, arctic fox

D. 3: arctic fox, stoat, skua, snowy owl
2: collared lemming, ptarmigan
1: grasses, mosses, shrubs

9 The brown lemming is another type of lemming that lives in the arctic. Brown lemmings and collared lemmings are closely related species. Which of the following describes how scientists can **best** study the differences between these two species?

A. Crossbreed the lemming species and count the differences observed.

B. Determine the genome of each lemming species and look for differences.

C. Give lemmings from each species different foods and observe how they react.

D. Compare the types of plants in the habitat of each lemming species and record the differences.

10 Scientists studied genetic variation in collared lemming populations that live in different locations. Scientists found that there was less genetic variation than expected between two of the lemming populations.

Which of the following most likely resulted in less genetic variation between these two populations?

A. The plants that the two populations ate were similar.

B. There was interbreeding between the two populations.

C. There were frequent genetic mutations in each population.

D. The two areas where the populations lived were similar in size.

11 Based on the food web, which of the following are competitors in the arctic tundra?

A. mosses and ptarmigans

B. shrubs and collared lemmings

C. skuas and ptarmigans

D. skuas and stoats

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 The fur color of collared lemmings changes to white at a certain time of the year.

a. Explain how the change in fur color is an advantage to collared lemmings.

When temperatures rise above freezing, snow melts, which causes changes in the collared lemmings' habitat.

b. Describe **two** ways warming temperatures could cause the size of the collared lemming population to decrease.

c. Describe how fur color in the collared lemming population will likely change over time as temperatures increase because of climate change. Explain your answer using the principles of natural selection.

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 Mutations can change an organism's phenotype by directly affecting which of the following?

A. lipid structure

B. water–salt balance

C. nucleic acid sequence

D. carbohydrate structure

14 The list below shows some processes that take place during and after digestion in the human body. Each numbered process takes place in a different organ of the digestive system.

1. Food is transported to another organ.
2. Wastes are eliminated from the body.
3. Food is mechanically broken down into smaller parts; some foods are also broken down chemically.
4. Macromolecules are chemically broken down into simpler molecules.
5. Simple molecules are absorbed into the circulatory system.

Which of the following shows the order of the processes that take place after food enters the mouth?

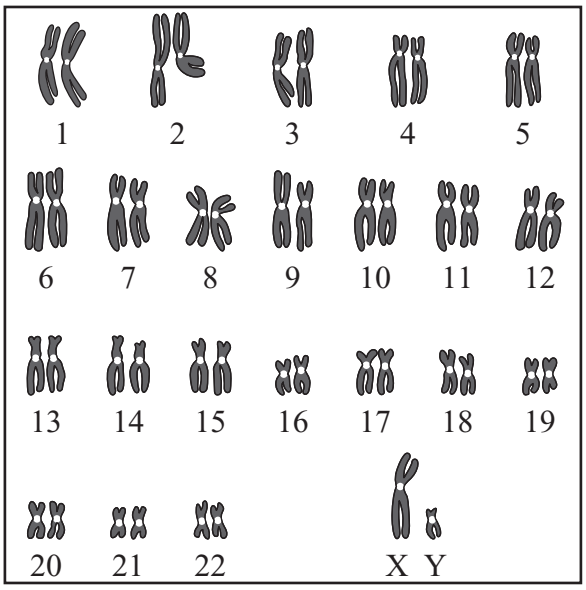
A. $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5$

B. $3 \rightarrow 1 \rightarrow 4 \rightarrow 5 \rightarrow 2$

C. $4 \rightarrow 3 \rightarrow 2 \rightarrow 1 \rightarrow 5$

D. $3 \rightarrow 5 \rightarrow 1 \rightarrow 4 \rightarrow 2$

15 The paired chromosomes of a human male are shown below. The last pair, labeled X and Y, are the sex chromosomes.



Which chromosomes did this man pass on to his daughter?

A. all 46 chromosomes from all pairs, including the X chromosome

B. one chromosome from each of the first 22 pairs, and the X chromosome

C. one chromosome from the first 22 pairs, but none of the sex chromosomes

D. all 44 chromosomes from the first pairs, but only one of the sex chromosomes

16 Some scientists have concluded that the legs of modern land vertebrates evolved from the fins of ancient fish. What most likely provided the evidence for this conclusion?

A. studying the fossils of ancient fish and ancient land vertebrates

B. identifying the numbers of ancient fish and ancient land vertebrates

C. comparing the number of genes in modern fish to the number of genes in modern land vertebrates

D. comparing the movements of modern fish fins to the movements of the limbs of modern land vertebrates

17 Narcolepsy is a sleep disorder found in some breeds of dogs. The gene linked to narcolepsy has two alleles. Two dogs, both without narcolepsy, breed and produce a litter of four puppies: one male and one female with narcolepsy, and one male and one female without narcolepsy.

Which of the following identifies and explains the probability that another puppy with the same parents will have narcolepsy?

A. 0%, because the parents already have two puppies with narcolepsy

B. 25%, because narcolepsy is a recessive trait

C. 50%, because $\frac{1}{2}$ of the puppies from the first litter had narcolepsy

D. 75%, because narcolepsy is a dominant trait

18 The sodium-potassium pump in a cell membrane moves particles from an area of low concentration to an area of high concentration. What **directly** supplies the energy for the sodium-potassium pump?

A. amino acids

B. ATP

C. DNA

D. fatty acids

19 Which of the following types of cells is a **direct** product of meiosis?

A. egg

B. muscle

C. nerve

D. skin

20 Which process is directly responsible for the formation of new root cells as a plant grows larger?

A. meiosis

B. mitosis

C. nitrogen fixation

D. osmosis

21 During dry years on a remote island chain, small seeds become rare while large seeds in hard shells remain fairly abundant. The large seeds in hard shells can be eaten only by birds with large beaks.

Which of the following **best** describes how natural selection will most likely affect seed-eating birds on the island chain during an extended dry period?

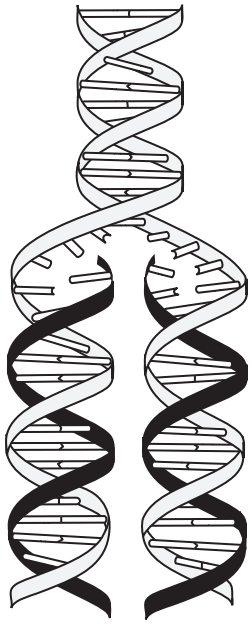
A. Birds with small beaks will adapt and develop large beaks.

B. Birds with large beaks will interbreed with birds with small beaks.

C. Birds with large beaks will produce more offspring than birds with small beaks.

D. Birds with small beaks will immigrate in greater numbers than birds with large beaks.

22 A cellular process is shown in the diagram below.



What is shown in the diagram?

A. New proteins are being produced.

B. Cell walls are being broken down.

C. New DNA molecules are being produced.

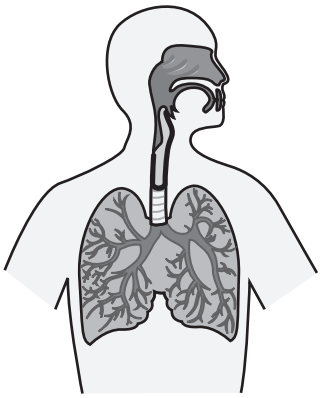
D. RNA is being made from two DNA molecules.

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 The diagram below shows how air passageways branch in the human lungs.



a. Identify the **two** main gases that are exchanged between the respiratory and circulatory systems.

b. Identify the structure in lungs where gas exchange with capillaries occurs.

c. Describe how the **two** gases are exchanged between the structure you identified in part (b) and the capillaries.

d. Explain why the branching of the air passageways in the lungs is important for efficient respiratory system functioning.

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 Two populations of rodents prefer to live in different soil types in the same area. One soil type is light-colored and the other soil type is dark-colored. There is no physical barrier between the two soil types. However, the rodents living in the light soil only mate with one another, and the rodents living in the dark soil only mate with one another.

Which of the following will most likely happen to these rodent populations over time?

A. The populations will become two different species.

B. The populations will learn to live on top of the soil.

C. The populations will become more genetically similar to each other.

D. The population with the highest birth rate will move to the other soil type.

25 Remora fish can attach themselves to larger aquatic animals, such as whales. When the whales eat, the fish detach themselves and eat leftover scraps of food. These fish do not harm or help the whales.

What is the ecological relationship between the remora fish and the whales?

A. commensalism

B. competition

C. parasitism

D. predation

26 Fructose is a simple sugar that can be a source of energy for the body. What type of organic molecule is fructose?

A. carbohydrate

B. lipid

C. nucleic acid

D. protein

27 A student created the table shown.

Scientific Name	Presence of Organelles	Genome Size (bases)	Genetic Material	Mutation Rate per 1,000 Genome Replications
E. coli, a bacterium	no	4,600,000	DNA	2.5
S. cerevisiae, a yeast	yes	12,000,000	DNA	2.7
N. crassa, a fungus	yes	42,000,000	DNA	3.0
bacteriophage M13, a virus	no	4,600	DNA	4.6

Based on this information, the student claims that bacteriophage M13 will adapt more quickly to a changing environment than the other organisms listed in the table.

Which of the following pieces of evidence **best** supports the student's claim?

A. Bacteriophage M13 lacks organelles.

B. Bacteriophage M13 has the smallest genome.

C. Bacteriophage M13 has the highest mutation rate.

D. Bacteriophage M13 is unable to reproduce on its own.

28 The Karner blue butterfly has been listed as an endangered species since 1992. Karner blue butterfly larvae feed only on wild lupine plants, which require a habitat with dry soil and exposure to direct sunlight.

Which of the following would be the best habitat for wild lupine that could help Karner blue butterfly populations recover?

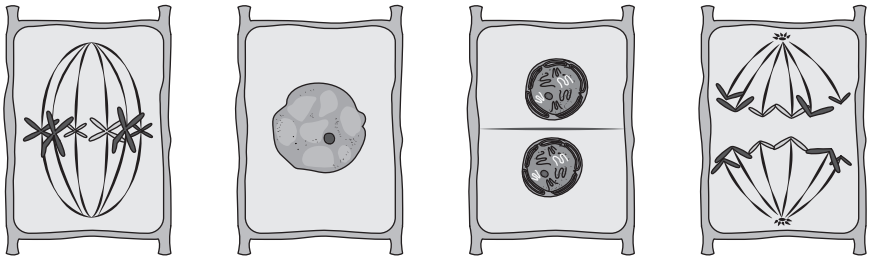
A. a mountain top that is covered in snow

B. a river bank that was flooded by high water

C. an open area in a forest that was cleared by fire

D. an isolated area in a jungle that has many large trees

29 The diagrams below show different stages in a plant cell cycle.



1 2 3 4

Which set of numbers lists the diagrams in the order in which a plant cell changes as it undergoes mitosis?

A. 1, 2, 3, 4

B. 1, 3, 2, 4

C. 2, 4, 1, 3

D. 2, 1, 4, 3

30 Microtubules are groups of proteins that provide structure to cells and are important during cell division. Which of the following pathways produces microtubule proteins in cells?

A. DNA → polypeptide → mRNA → protein

B. DNA → mRNA → polypeptide → protein

C. mRNA → DNA → polypeptide → protein

D. mRNA → polypeptide → DNA → protein

31 The digestive system breaks down carbohydrates, fats, and proteins into smaller molecules. These smaller molecules are used for which of the following?

A. cellular respiration only

B. cellular respiration and cell repair only

C. cellular respiration and cell growth only

D. cellular respiration, cell repair, and cell growth

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 A barley plant has 14 chromosomes in its diploid cells. At a particular stage in its life cycle, the barley plant produces haploid cells (gametes).

a. Identify the expected number of chromosomes in a haploid cell of a barley plant.

b. Identify **and** generally describe the cellular process by which the haploid cells are produced.

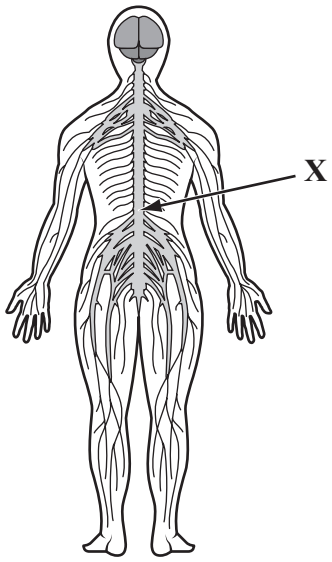
c. Describe what a barley plant uses the haploid cells for **and** explain why the cells must be haploid for this purpose.

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 Which part of a DNA molecule holds the information that is eventually translated into a protein?

A. deoxyribose sugar
B. hydrogen bonds
C. nitrogenous bases
D. phosphate ions

34 Some drugs can block the function of the spinal cord. The diagram shows the human nervous system with a location on the spinal cord labeled X.



Which of the following will be affected when the spinal cord is blocked at location X?

A. the legs
B. the head
C. the neck
D. the wrists

35 Scientists studying a certain species of bacteria hypothesize that these bacteria use active transport to take in sugar. Which of the following best supports this hypothesis?

A. Sugar intake rate increases as the use of ATP increases.
B. Sugar intake rate increases as the temperature increases.
C. Sugar intake rate increases as the number of ribosomes inside the bacteria increases.
D. Sugar intake rate increases as the concentration of sugar outside the bacteria increases.

36 Scientists have concluded that teosinte, a type of wild grass, is an ancestor to modern corn plants. Which of the following describes the **best** evidence to support this conclusion?

A. Teosinte and corn both use photosynthesis to obtain energy for cellular processes.
B. Teosinte appears in the fossil record in all areas of North America where corn grows.
C. Corn has seeds that are closer in size to teosinte seeds than to the seeds of other wild grasses.
D. Corn has genetic sequences that are more similar to those of teosinte than to those of other wild grasses.

37 Meteorites that contain organic compounds have been found on Earth. Some scientists think the organic compounds in meteorites may have provided the elements needed for life on Earth.

Which element forms the backbone of organic compounds?

A. carbon
B. nickel
C. phosphorus
D. sodium

38 Glycogen is a polysaccharide stored in animal cells. When glycogen is broken down, glucose is produced. Some people's cells are unable to break down glycogen.

Which of the following would most likely be observed in a person who is unable to break down glycogen?

A. a swelling of the joints
B. an inability to digest proteins
C. a low energy level and muscle weakness
D. a rapid heartbeat and fast metabolism

39 A portion of a DNA strand is shown.

5' – A A T T G C A T A T – 3'

What is the sequence of the complementary DNA strand?

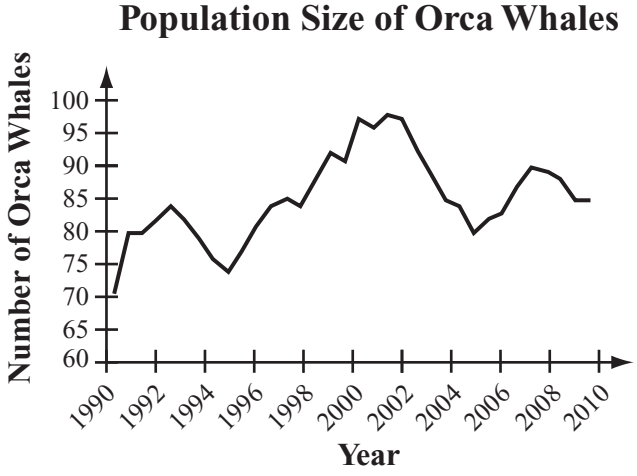
A. T T A A C G T A T A

B. T A T A C G T T A A

C. U U A A C G U A U A

D. C C G G A T G C G C

40 The graph below shows the estimated number of orca whales off the coast of Washington State over a 20-year period.



Which of the following best explains the orca population changes between 1996 and 2002?

A. The number of orcas born was less than the number of orcas that died.

B. The number of orcas emigrating was higher than the number of orcas immigrating.

C. The total number of orca births and immigrants was more than the total number of orca deaths and emigrants.

D. The total number of orca births and deaths was greater than the total number of orca immigrants and emigrants.

41 Individuals with an autosomal recessive genetic disorder called galactosemia cannot properly break down the sugar galactose. What is the percent chance that the biological child of two heterozygous individuals will have galactosemia?

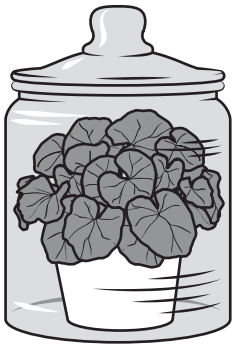
A. 0%
B. 25%
C. 75%
D. 100%

42 Two groups of fruit flies live in the same area. The flies in each group are very similar in appearance, but have some small differences. Scientists observed that males from both groups tried to attract any female for mating, but mating was successful only between members of the same group.

Which statement best explains the relationship between these two groups of fruit flies?

A. Because both groups of fruit flies are found in the same area, they are the same species.
B. Because the groups of fruit flies do not look exactly the same, they are different species.
C. Because males from each group try to attract females from both groups, the two groups are the same species.
D. Because mating was only successful between members of the same group, the two groups are different species.

43 A student places a plant in a closed container, as shown.



The student then places the container in a dark room and measures the amount of carbon dioxide the plant produces over several hours. Which of the following processes is this investigation most likely designed to measure?

A. cellular respiration
B. diffusion
C. mitosis
D. nitrogen fixation

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 Three species of frogs live on the Philippine Islands in different niches. The first species lives on the ground and digs burrows for shelter. The second species lives in small bushes and frequently moves from place to place. The third species spends much of its life in holes in trees. Scientists think the three species have a recent common ancestor that lived only on the ground. They hypothesize that competition played a major role in the frogs' speciation.

a. Identify a factor that may have caused competition among the original ground-dwelling frogs.

b. Explain how the genetic diversity of the original ground-dwelling frogs allowed them to live in different niches.

c. Using your knowledge of natural selection, explain how living in different niches led to the development of the different species of frogs.

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

45 A certain genetic condition in horses is caused by a single base mutation in a gene. Part of the gene sequence containing the mutation is shown.

TAG AAC CTG AAG

a. Determine the mRNA sequence.

The table shows mRNA codons and their corresponding amino acids.

mRNA	Amino Acid
AUC	Ile
AAG	Lys
CUG	Asp
CUC	Leu
GAC	Asp
UUC	Phe
UUA	Leu
UUG	Leu

b. Determine the amino acid sequence that is coded for by the mRNA sequence you determined in part (a).

The mutated gene codes for Leu instead of Phe.

c. Identify a single base change in the DNA sequence shown that would cause this genetic condition in horses. Explain your answer using amino acids, mRNA codons, and DNA triplets.

High School Biology
Spring 2019 Released Operational Items

Item No.	Page No.	Reporting Category	2006 Standard	2016 Standard	Correct Answer (MC)*
1	464	*Genetics*	STE.Bio.Gen3.6	HS.LS.3.3	C
2	464	*Biochemistry and Cell Biology*	STE.Bio.Cell2.4	HS.LS.1.5	B
3	465	*Ecology*	STE.Bio.Eco6.1	HS.LS.2.1	B
4	465	*Evolution and Biodiversity*	STE.Bio.Evo5.1	HS.LS.4.1	D
5	465	*Ecology*	STE.Bio.Eco6.4	HS.LS.2.5	D
6	466	*Ecology*	STE.Bio.Eco6.3	HS.LS.2.6	D
7	466	*Anatomy and Physiology*	STE.Bio.AP4.7	HS.LS.1.2	A
8	469	*Ecology*	STE.Bio.Eco6.3	HS.LS.2.4	D
9	469	*Evolution and Biodiversity*	STE.Bio.Evo5.1	HS.LS.4.1	B
10	470	*Evolution and Biodiversity*	STE.Bio.Evo5.3	HS.LS.4.5	B
11	470	*Ecology*	STE.Bio.Eco6.3	HS.LS.2.1	D
12	471	*Ecology*	STE.Bio.Eco6.2	HS.LS.2.6	
13	472	*Genetics*	STE.Bio.Gen3.3	HS.LS.3.2	C
14	472	*Anatomy and Physiology*	STE.Bio.AP4.1	HS.LS.1.2	B
15	473	*Anatomy and Physiology*	STE.Bio.AP4.6	HS.LS.3.1	B
16	473	*Evolution and Biodiversity*	STE.Bio.Evo5.1	HS.LS.4.1	A
17	474	*Genetics*	STE.Bio.Gen3.4	HS.LS.3.3	B
18	474	*Biochemistry and Cell Biology*	STE.Bio.Cell2.5	HS.LS.1.3	B
19	474	*Biochemistry and Cell Biology*	STE.Bio.Cell2.7	HS.LS.3.1	A
20	474	*Biochemistry and Cell Biology*	STE.Bio.Cell2.6	HS.LS.1.4	B
21	475	*Evolution and Biodiversity*	STE.Bio.Evo5.3	HS.LS.4.2	C
22	475	*Genetics*	STE.Bio.Gen3.2	HS.LS.1.4	C
23	476	*Anatomy and Physiology*	STE.Bio.AP4.3	HS.LS.1.2	
24	477	*Evolution and Biodiversity*	STE.Bio.Evo5.2	HS.LS.4.5	A
25	477	*Ecology*	STE.Bio.Eco6.3	HS.LS.2.1	A
26	477	*Biochemistry and Cell Biology*	STE.Bio.CL1.2	HS.LS.1.6	A
27	478	*Biochemistry and Cell Biology*	STE.Bio.Cell2.8	HS.LS.4.4	C
28	479	*Ecology*	STE.Bio.Eco6.2	HS.LS.2.1	C
29	480	*Biochemistry and Cell Biology*	STE.Bio.Cell2.6	HS.LS.1.4	D
30	481	*Genetics*	STE.Bio.Gen3.2	HS.LS.1.1	B
31	481	*Anatomy and Physiology*	STE.Bio.AP4.1	HS.LS.1.2	D
32	482	*Biochemistry and Cell Biology*	STE.Bio.Cell2.7	HS.LS.3.1	
33	483	*Genetics*	STE.Bio.Gen3.1	HS.LS.1.1	C
34	483	*Anatomy and Physiology*	STE.Bio.AP4.4	HS.LS.1.2	A
35	484	*Biochemistry and Cell Biology*	STE.Bio.Cell2.1	HS.LS.1.3	A
36	484	*Evolution and Biodiversity*	STE.Bio.Evo5.1	HS.LS.4.1	D
37	484	*Biochemistry and Cell Biology*	STE.Bio.CL1.1	HS.LS.1.6	A
38	484	*Biochemistry and Cell Biology*	STE.Bio.Cell2.4	HS.LS.1.7	C
39	485	*Genetics*	STE.Bio.Gen3.2	HS.LS.1.4	A

Item No.	Page No.	Reporting Category	2006 Standard	2016 Standard	Correct Answer (MC)*
40	485	*Ecology*	STE.Bio.Eco6.1	HS.LS.2.2	C
41	486	*Genetics*	STE.Bio.Gen3.6	HS.LS.3.3	B
42	486	*Evolution and Biodiversity*	STE.Bio.Evo5.2	HS.LS.4.5	D
43	486	*Biochemistry and Cell Biology*	STE.Bio.Cell2.4	HS.LS.1.7	A
44	487	*Evolution and Biodiversity*	STE.Bio.Evo5.3	HS.LS.4.5	
45	488	*Genetics*	STE.Bio.Gen3.3	HS.LS.1.1	

* Answers are provided here for multiple-choice items only. Sample responses and scoring guidelines for open-response items, which are indicated by the shaded cells, will be posted to the Department's website later this year.