MASSACHUSETTS COMPREHENSIVE ASSESSMENT SYSTEM

PRACTICE TEST

Biology

High School

Student Name

School Name

District Name

MASSACHUSETTS
Department of Elementary and Secondary Education

High School Biology

PRACTICE TEST

SESSION 1

This practice session contains 21 questions.

Directions

Read each question carefully and then answer it as well as you can. You must record all answers in this Practice Test Booklet.

For some questions, you will mark your answers by filling in the circles in your Practice Test Booklet. Make sure you darken the circles completely. Do not make any marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

If a question asks you to show or explain your work, you must do so to receive full credit. Write your response in the space provided. Only responses written within the provided space will be scored.

If you do not know the answer to a question, you may go on to the next question. When you are finished, you may review your answers and go back to any questions you did not answer.

1 Blood glucose levels rise after a person eats. When blood glucose levels rise, insulin from the pancreas is released. Insulin increases the transport of glucose into cells and stimulates the liver and muscle cells to store glucose as glycogen. As a result, blood glucose levels decrease and return to a normal level.

Blood glucose levels returning to a normal level is an example of

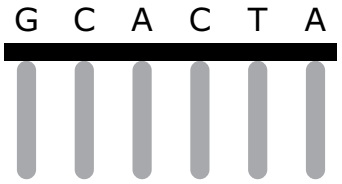
Ⓐ homeostasis.

Ⓑ osmosis.

Ⓒ reflex.

Ⓓ respiration.

2 A student created a model of a sequence of DNA nucleotides using craft sticks to represent nucleotides. One strand of the DNA model is shown.



What is the corresponding mRNA sequence for the DNA sequence?

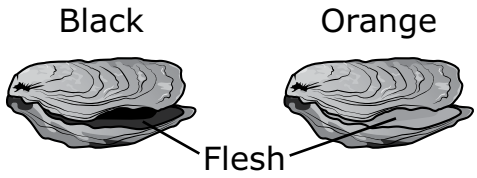
Ⓐ

Ⓑ

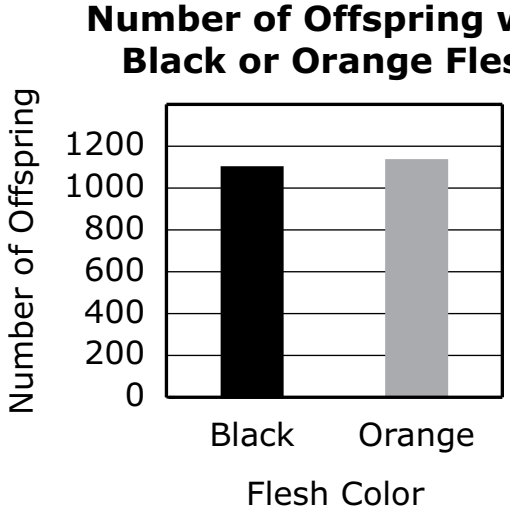
Ⓒ

Ⓓ

3 In a species of oyster, the color of the oysters' flesh is controlled by a single gene with two alleles, **B** and **b**. The allele for black flesh (**B**) is dominant to the allele for orange flesh (**b**). The diagram shows each type of oyster.



An oyster with black flesh was crossed with an oyster with orange flesh. The graph shows the number of offspring produced with each flesh color.



Which cross most likely produced the number and type of offspring represented in the graph?

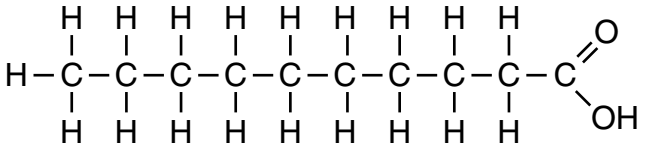
Ⓐ **Bb** × **bb**

Ⓑ **Bb** × **Bb**

Ⓒ **BB** × **bb**

Ⓓ **BB** × **Bb**

4 The chemical structure of a fatty acid is shown.



This fatty acid is a building block of which type of organic molecule?

Ⓐ carbohydrate

Ⓑ lipid

Ⓒ nucleic acid

Ⓓ protein

5 Pronghorn antelope are herbivores that live in an area that includes much of the western United States. Wild horses and domestic sheep that also live in the area eat the same types of grasses as the pronghorn antelope. Coyotes and bobcats in the area prey on the antelope.

Which of the following would most likely **increase** the carrying capacity for the pronghorn antelope?

Ⓐ a ban on hunting bobcats in the area

Ⓑ a new law that allows more sheep to be raised in the area

Ⓒ a dry winter that decreases the number of plants that grow in the area

Ⓓ a viral disease that decreases the population size of the wild horses in the area

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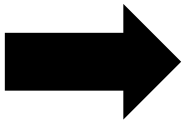
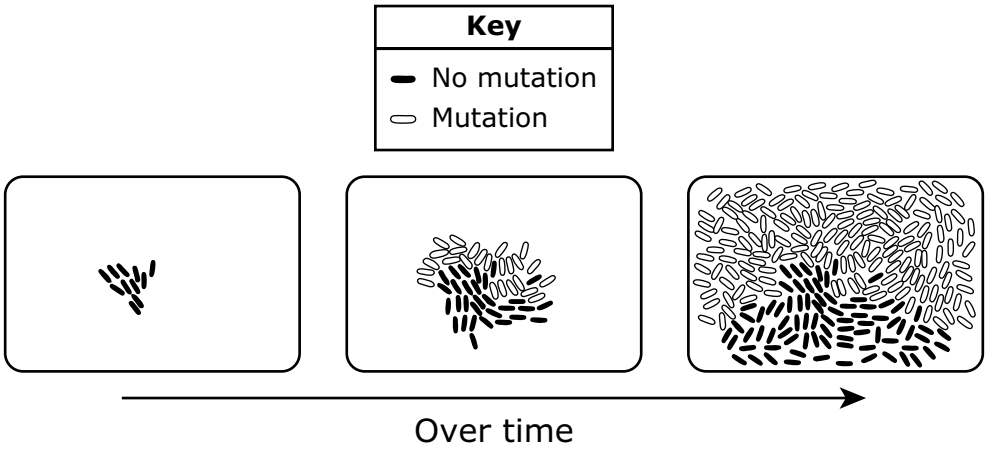


This question has two parts.

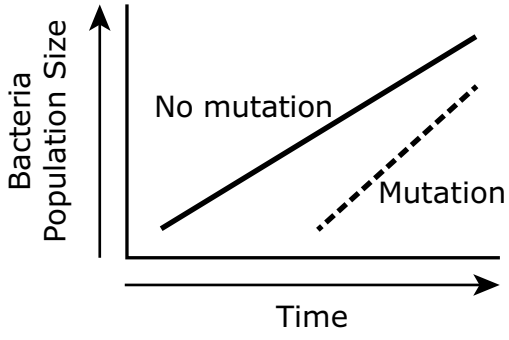
6 The diagrams show a change in a population of bacteria over time. A mutation is introduced into the population. The key shows bacteria with and without the mutation. Natural selection is occurring in the population.



Part A

Which of the following graphs best represents the change in the population of bacteria from the beginning to the end of the diagrams?

Ⓐ



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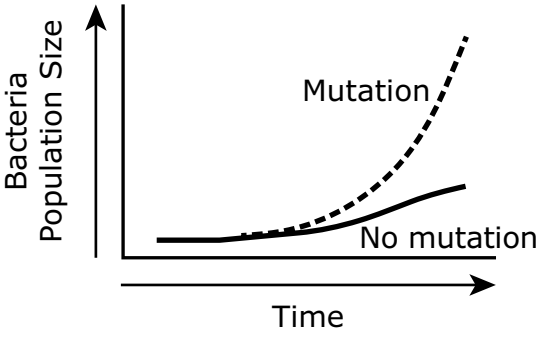

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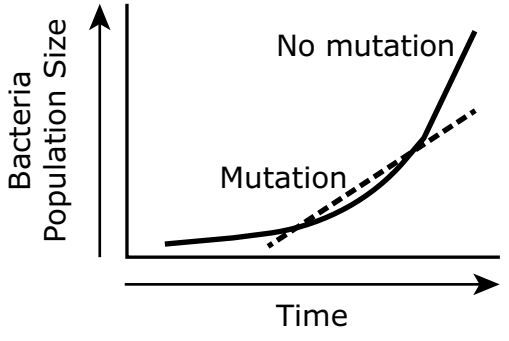

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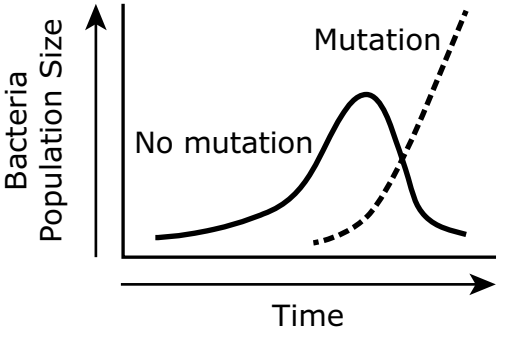


Part B

Which of the following best explains the difference in the numbers of bacteria with and without the mutation in the last diagram?

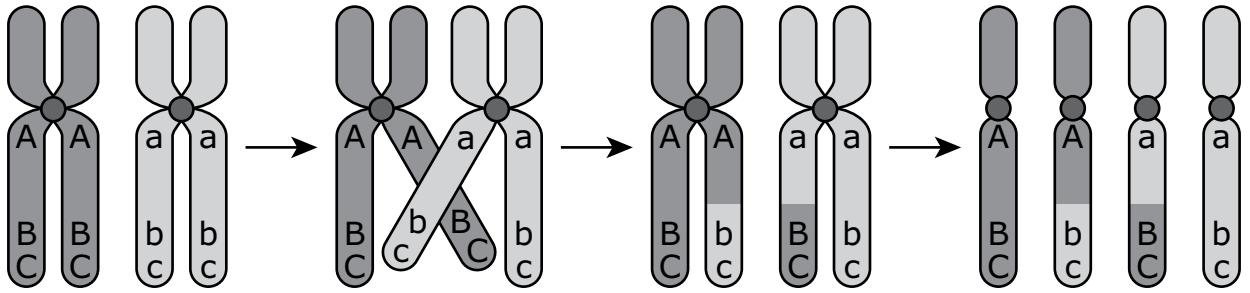
Ⓐ The bacteria with the mutation move faster than the bacteria without the mutation.

Ⓑ The bacteria with the mutation infect host cells more rapidly than the bacteria without the mutation.

Ⓒ The bacteria with the mutation have a reproductive advantage over the bacteria without the mutation.

Ⓓ The bacteria with the mutation have double the number of genes as the bacteria without the mutation.

7 The diagram represents a process that occurs in chromosomes during meiosis. The letters represent different genes with different alleles.



This process is important for the survival of a species because it helps introduce which of the following into a population?

Ⓐ dominant genes

Ⓑ gene mutations

Ⓒ genetic variation

Ⓓ polygenic traits

8 Keratin is a protein found in hair, nails, and feathers of animals. Which of the following elements is most abundant in keratin?

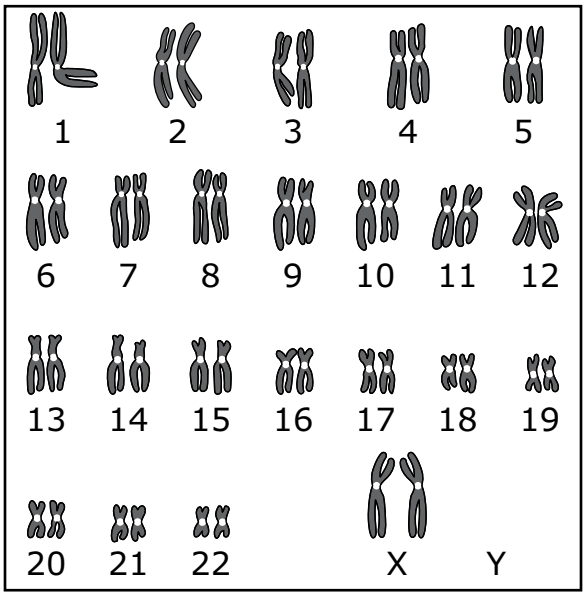
Ⓐ aluminum

Ⓑ carbon

Ⓒ iron

Ⓓ zinc

9 The karyotype diagram shows a full set of human chromosomes.



Which of the following describes the karyotype diagram?

Ⓐ The karyotype diagram shows the diploid number of chromosomes that would be found in gametes of a human female.

Ⓑ The karyotype diagram shows the haploid number of chromosomes that would be found in gametes of a human female.

Ⓒ The karyotype diagram shows the diploid number of chromosomes that would be found in body cells of a human female.

Ⓓ The karyotype diagram shows the haploid number of chromosomes that would be found in body cells of a human female.

10 When a person has pneumonia, fluid accumulates in the alveoli. This fluid accumulation directly results in which of the following problems?

Ⓐ limited production of antibodies

Ⓑ decreased ability to regulate body temperature

Ⓒ slower diffusion of glucose into the bloodstream

Ⓓ reduced gas exchange between the lungs and the blood

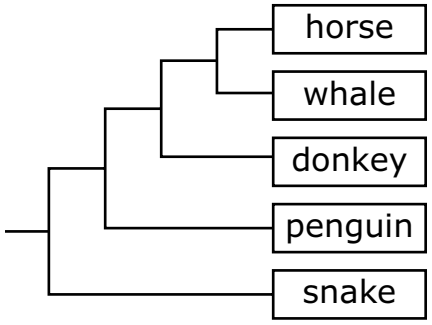
11 The amino acid sequence of a certain protein in a horse was compared to the amino acid sequence of the same protein in four other animals. The results of those comparisons are shown in the table.

Differences in Amino Acids

Animals Compared	Number of Amino Acids That Differ
horse and donkey	1
horse and penguin	13
horse and snake	21
horse and whale	5

Based on the results, which diagram best shows the evolutionary relationships among these animals?

Ⓐ



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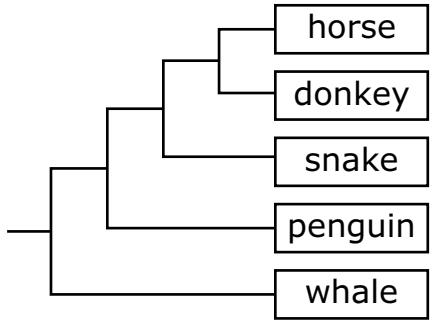

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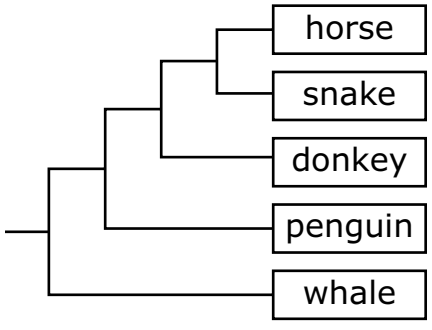

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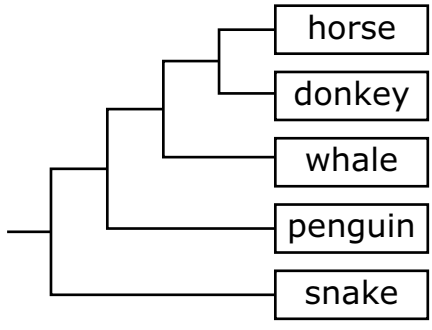


The following section focuses on island foxes.

Read the information below and use it to answer the selected-response questions and the constructed-response question that follow.

The island fox is a small fox that lives on Santa Cruz Island off the coast of California. It is a descendant of the gray fox that is found on the mainland in California. From 1994 to 2000, the island fox population on Santa Cruz Island declined from 1,465 to only 62 individuals.

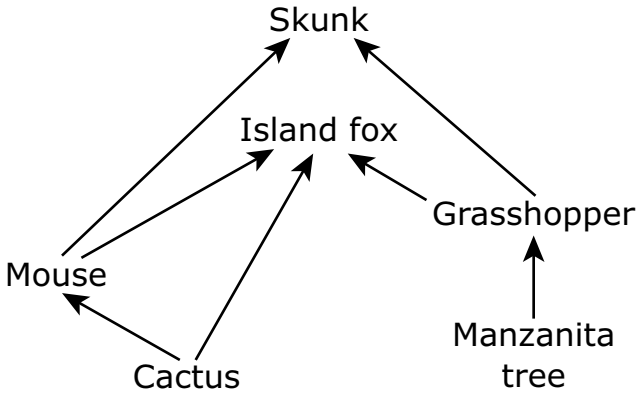
Several events on Santa Cruz Island caused the island fox population to decrease. In the 1800s, people introduced non-native plants and farm animals, including pigs, to the island. Some of the pigs escaped and reproduced in the wild, eventually producing a large population of feral (wild) pigs. The feral pigs dug up and ate native plants, including cactus plants and manzanita trees.

Young, small feral pigs on the island became a food source for visiting golden eagles. However, golden eagles were unable to nest on the island because the bald eagles living there chased them away. The bald eagles hunted fish from the ocean, but they did not eat feral pigs or island foxes. Other small mammals that lived on the island included mice and skunks. The sizes of these animal populations were not directly affected by the visiting golden eagles.

From 1950 to 1980, the bald eagle population on the island was greatly reduced as a result of the use of the chemical DDT. By 1994, there were no longer any bald eagles on the island. Golden eagles then began nesting on the island and hunting island foxes as well as the young feral pigs.

Since 2000, humans have helped restore the island fox population on Santa Cruz Island by removing feral pigs and golden eagles from the island and reintroducing bald eagles.

A food web **after** the island fox population was restored on the island is shown.



12 One type of plant that was introduced to Santa Cruz Island was fennel. The fennel spread and began growing in the wild. Fennel seeds are spread by wind, and fennel plants can grow up to two meters tall.

Which of the following **best** explains how fennel most likely affected smaller native plants when it began to grow in the wild?

Ⓐ Fennel decreased the amount of sunlight that was available to native plants.

Ⓑ Fennel increased the number of native plant seeds that were spread by wind.

Ⓒ Fennel decreased the likelihood that native plants would be eaten by bald eagles.

Ⓓ Fennel increased the amount of energy that native plants used during cellular respiration.

13 After the golden eagles started nesting on the island, the skunk population began to increase. Which of the following **best** explains why the skunk population increased as the island fox population decreased?

Ⓐ The skunk preyed on the island fox.

Ⓑ The skunk competed with the island fox.

Ⓒ The skunk and the island fox had a parasitic relationship.

Ⓓ The skunk and the island fox had a mutualistic relationship.

14 Which of the following describes the genetic diversity in the island fox population from 1994 to 2000?

Ⓐ Genetic diversity increased as the foxes ate more mice.

Ⓑ Genetic diversity remained unchanged as the foxes stayed on the island.

Ⓒ Genetic diversity decreased as the foxes were preyed upon by golden eagles.

Ⓓ Genetic diversity remained unchanged as the number of mutations in the foxes stayed the same.

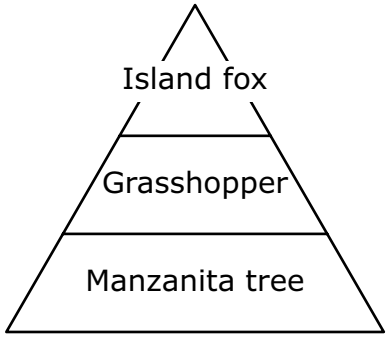
This question has two parts.

15 Island foxes play a role in the transfer of energy in the Santa Cruz Island ecosystem.

Part A

Which of the following best shows an energy pyramid for the Santa Cruz Island ecosystem?

Ⓐ



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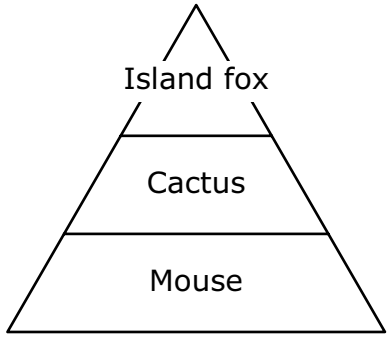

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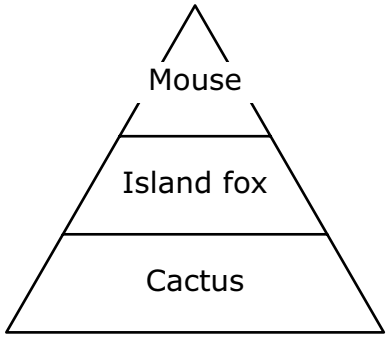
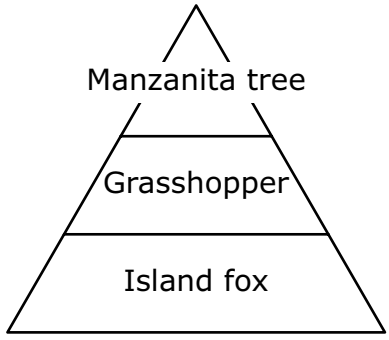


Ⓓ



Part B

What percentage of energy from producers is stored in the trophic level of the island fox?

Ⓐ 100%

Ⓑ 10%

Ⓒ 1%

Ⓓ 0.1%

This question has three parts. Write your response on the next page. Be sure to label each part of your response.

16 Humans helped increase the island fox population on Santa Cruz Island by removing feral pigs and golden eagles from the island and by reintroducing bald eagles.

A. Explain how reintroducing bald eagles helped to increase the island fox population.

B. Describe one way the island ecosystem benefited from the removal of feral pigs. Explain how removing feral pigs helped to increase the island fox population.

C. Other than reintroducing bald eagles and removing feral pigs, describe another action that humans could take to increase the island fox population. Explain how this action would increase the size of the island fox population.

16

17 Pine trees are pollinated when the wind carries pollen grains from male pinecones to female pinecones. The female pinecones contain egg cells.

Which statement describes what happens in a female pinecone during fertilization?

Ⓐ A diploid sperm cell and a diploid egg cell fuse together to form a zygote.

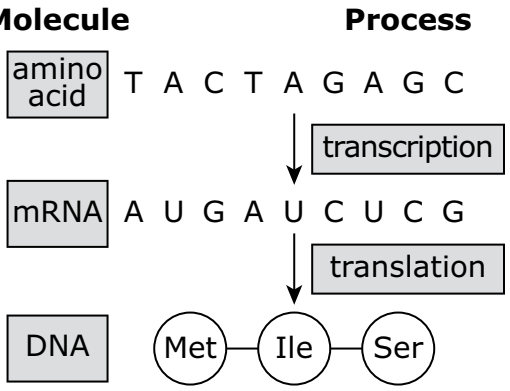
Ⓑ A haploid sperm cell and a haploid egg cell fuse together to form a zygote.

Ⓒ A diploid sperm cell and a diploid egg cell undergo rapid meiosis to form an embryo.

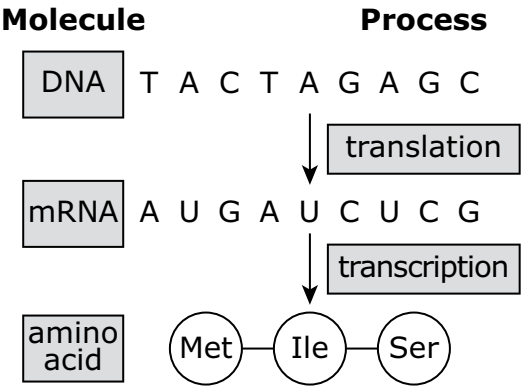
Ⓓ A haploid sperm cell and a haploid egg cell undergo rapid meiosis to form an embryo.

18 Which of the following models of protein synthesis is labeled with the correct molecules and processes?

Ⓐ



Ⓑ



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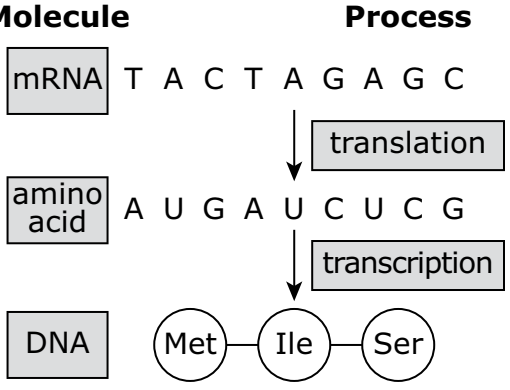

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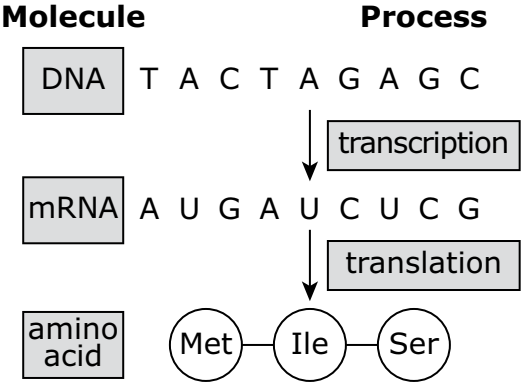
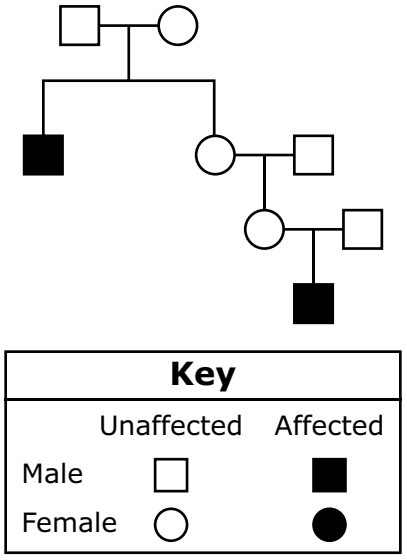


19 A single gene with two alleles is responsible for a certain genetic condition in humans. Females that are heterozygous for the condition are called carriers and do not have symptoms of the genetic condition. Males cannot be carriers. The pedigree models the pattern of inheritance for this genetic condition.



Which of the following best describes the allele that causes this genetic condition?

Ⓐ It is a recessive allele on the X chromosome.

Ⓑ It is a recessive allele on the Y chromosome.

Ⓒ It is a dominant allele on the X chromosome.

Ⓓ It is a codominant allele on the Y chromosome.

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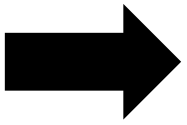


This question has three parts. Write your response on the next page. Be sure to label each part of your response.

20 A student is studying how flowering plants and insects affect oxygen (O_2) and carbon dioxide (CO_2) concentrations in the air.

A. Identify the cellular process performed **only** by the flowering plants that affects the concentrations of O_2 and CO_2 in the air.

B. Identify the cellular process performed by both the flowering plants and the insects that affects the concentrations of O_2 and CO_2 in the air.

C. During an experiment, the student measured the initial concentrations of O_2 and CO_2 in three flasks, added organisms to some of the flasks, sealed the flasks, and placed them under a light. After 12 hours, the student measured the concentrations of O_2 and CO_2 in the flasks. The results for each flask are shown in the table.

Row	Flask Contents	Initial O_2 Concentration (%)	Final O_2 Concentration (%)	Initial CO_2 Concentration (ppm)*	Final CO_2 Concentration (ppm)*
1	?	20.8	20.8	373	375
2	?	20.9	19.6	371	454
3	?	20.7	22.1	374	267

*parts per million

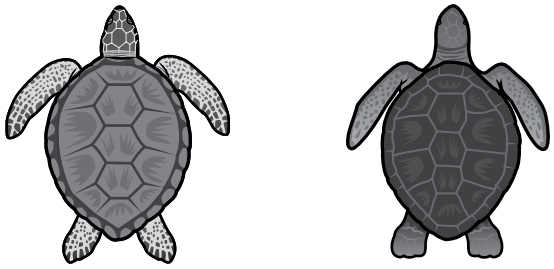
During the experiment, the student had forgotten to identify the contents of each flask. Each of the three flasks contained one of the following: two plants and one insect; one insect; or no organisms.

Identify the contents of **each** flask based on the data in rows 1, 2, and 3. Explain your reasoning using data from the table and the processes you identified in Parts A and B. Include the row numbers in your response.

20

This question has four parts. Write your response on the next page. Be sure to label each part of your response.

21 While most green sea turtles have tan skin and shells, a small population of green sea turtles in the eastern Pacific Ocean have evolved to have black skin and shells. These turtles are commonly known as black sea turtles. The diagram shows a green sea turtle and a black sea turtle.



Green sea turtle Black sea turtle

A. A scientist wonders whether the black color in this sea turtle population is a result of natural selection.

Write a testable question that scientists could answer to determine whether natural selection plays a role in the black sea turtle's color.

B. Some scientists think that green sea turtles and black sea turtles are separate species.

Besides physical characteristics, identify **one** piece of evidence that scientists can use to determine whether green sea turtles and black sea turtles are separate species.

C. Explain how the type of evidence you identified in Part B can be used by scientists to determine whether the green sea turtles and black sea turtles are separate species.

D. Other scientists think that green sea turtles and black sea turtles may become separate species because they are geographically isolated from each other.

Explain how geographically isolating a small group of turtles from a larger population of turtles can lead to the two populations becoming separate species.

21

STOP!

High School Biology

PRACTICE TEST

SESSION 2

This practice session contains 21 questions.

Directions

Read each question carefully and then answer it as well as you can. You must record all answers in this Practice Test Booklet.

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22 Which of the following explains why a human infant is genetically similar to, but not identical to, its mother?

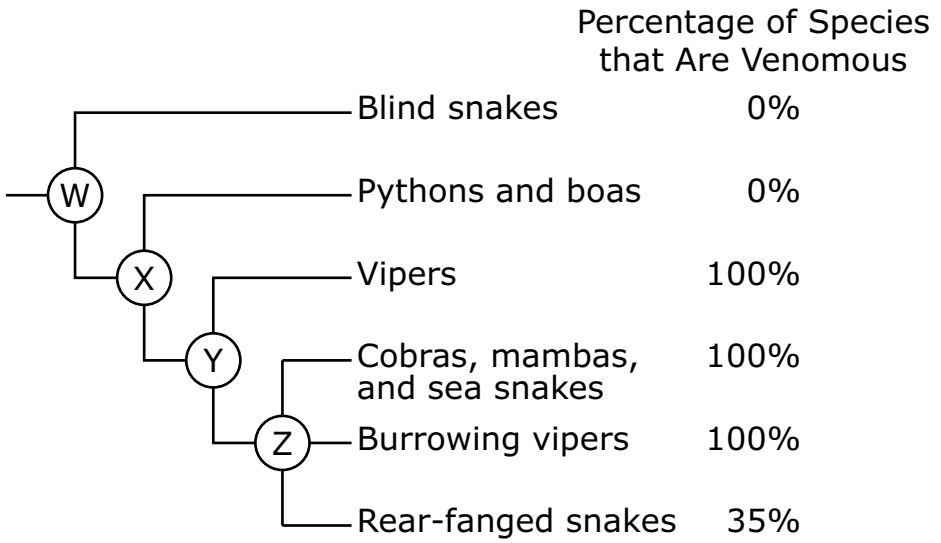
Ⓐ The infant's cells undergo mitosis as it develops from fertilization to birth.

Ⓑ The set of chromosomes that an infant inherits is determined by natural selection.

Ⓒ The infant's genetic material is translated by both the mother's and the father's cells.

Ⓓ Half of the infant's genetic material comes from the mother and half comes from the father.

23 Some species of snakes can produce a toxin known as venom. Scientists have identified specific genes responsible for producing venom. The cladogram shows groups of snakes and the percentage of venomous species in each group.



Which of the following locations on the cladogram shows where the ability to produce venom most likely originated?

Ⓐ location W

Ⓑ location X

Ⓒ location Y

Ⓓ location Z

24 A human gamete typically contains 23 chromosomes. Two human gametes combine to produce a zygote.

Which of the following is the **best** evidence that an error occurred during the formation of one of these gametes?

Ⓐ The zygote has two copies of chromosome 21.

Ⓑ The zygote has three copies of chromosome 21.

Ⓒ The zygote has 23 chromosomes from each gamete.

Ⓓ The zygote has some of the same chromosomes as the gametes.

This question has two parts.

25 The flamingo is a type of bird. Young flamingos have white and gray feathers. By the time they are 3–6 years old, their feathers have become pink. The pink color is caused by the flamingo's diet. Flamingos eat shrimp, which have red and orange pigments. When a flamingo stops eating shrimp, its feathers lose their pink color over time.

Part A

Which of the following best describes the cause of feather color in flamingos at different ages?

Ⓐ Pink feather color in adult flamingos and white and gray feathers in young flamingos are both most directly caused by genetic factors.

Ⓑ Pink feather color in adult flamingos and white and gray feathers in young flamingos are both most directly caused by environmental factors.

Ⓒ Pink feather color in adult flamingos is most directly caused by genetic factors, and white and gray feathers in young flamingos are most directly caused by environmental factors.

Ⓓ Pink feather color in adult flamingos is most directly caused by environmental factors, and white and gray feathers in young flamingos are most directly caused by genetic factors.

Part B

The pink color of flamingo feathers demonstrates that the phenotype for feather color

Ⓐ changes.

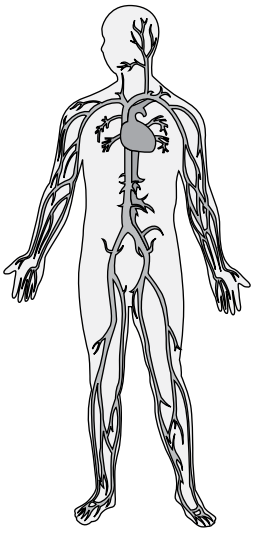
Ⓑ stays the same.

However, the genotype for feather color

Ⓐ changes.

Ⓑ stays the same.

26 A diagram of a body system is shown.



What is the primary function of this system?

Ⓐ transmitting sensory nerve impulses

Ⓑ preventing viruses from entering the body

Ⓒ circulating nutrients and wastes through the body

Ⓓ exchanging gases between the body and the environment

27 As an ant population moves across the forest floor, flying insects move away. Some birds follow the ants, catching and eating the flying insects.

Which of the following **best** explains the relationship between the birds and the ants?

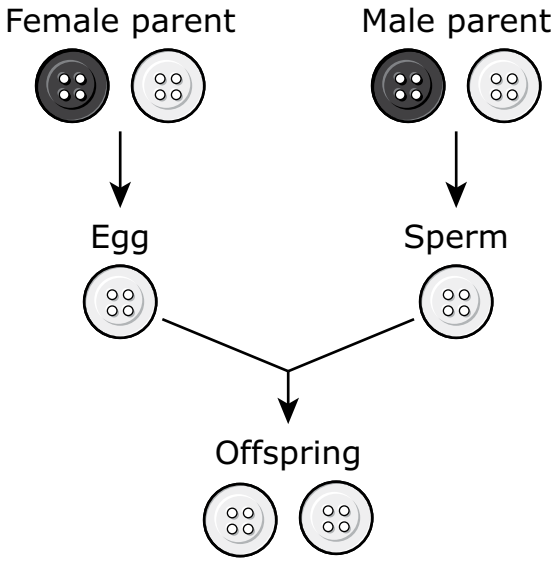
Ⓐ It is commensal because it benefits the birds and has no effect on the ants.

Ⓑ It is commensal because it benefits the ants and has no effect on the birds.

Ⓒ It is parasitic because it benefits the birds and has a negative effect on the ants.

Ⓓ It is parasitic because it benefits the ants and has a negative effect on the birds.

28 Students use buttons to model the inheritance of a genetic trait. Black and white buttons represent alleles of a single gene. The diagram shows part of the students' model.



Which of the following is **best** illustrated by this model?

Ⓐ A gene's alleles segregate when sex cells form.

Ⓑ All of the parents' alleles are passed on to the offspring.

Ⓒ Alleles of a gene can be dominant, recessive, incompletely dominant, or codominant.

Ⓓ Dominant alleles occur on the X chromosome and recessive alleles occur on the Y chromosome.

29 In a laboratory, cell parts were separated using a centrifuge. The table shows four samples of cell parts that were isolated.

Sample	Isolated Cell Parts
A	nuclei
B	mitochondria
C	cell membranes
D	ribosomes

After the cell parts were isolated, RNA and amino acids were added to each sample. After some time, the samples were tested for proteins.

Which sample most likely contained newly made proteins?

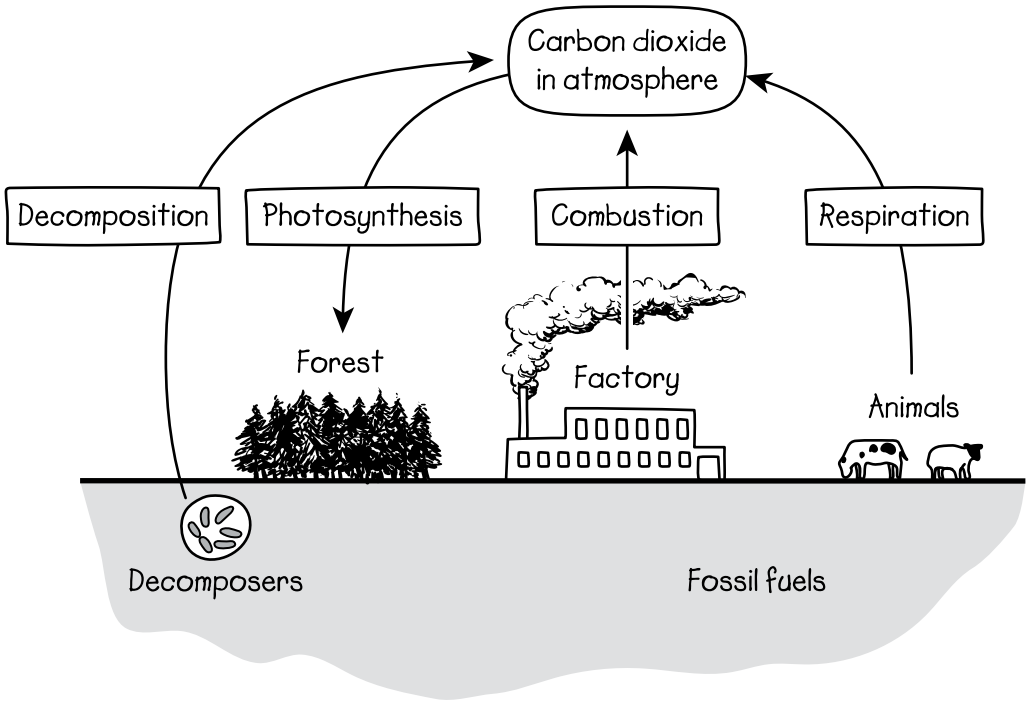
Ⓐ sample A

Ⓑ sample B

Ⓒ sample C

Ⓓ sample D

30 A student drew a model to represent the carbon cycle, as shown. The arrows represent four processes in the carbon cycle.



Select **two** changes the student could make to improve the model.

Ⓐ Draw an arrow from the fossil fuels pointing to the factory, since fossil fuels provide energy to the factory.

Ⓑ Draw an arrow from the forest pointing to the carbon dioxide in the atmosphere, since plants perform photosynthesis.

Ⓒ Draw arrows from the forest and animals pointing to the decomposers, since decomposers break down dead organisms.

Ⓓ Draw an arrow from the carbon dioxide in the atmosphere pointing to the animals, since animals perform cellular respiration.

31 For the human body to function normally, blood pH must be maintained between 7.35 and 7.45. When carbon dioxide levels in the blood rise, the pH of the blood decreases. The body then reacts to restore normal blood pH.

A feedback loop that maintains blood pH is activated when a person exercises. Which of the following shows how this feedback loop works to maintain blood pH?

Ⓐ
1. Person starts running.
2. Brain cells detect decreasing blood pH.
3. Blood pH decreases.
4. Brain sends messages to the muscles that control breathing.
5. Muscle cells release more carbon dioxide into the blood.
6. Breathing rate increases, more carbon dioxide is exhaled, and blood pH increases.

Ⓑ
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32 Heritability estimates are used to describe the extent to which a trait is determined by genetics compared to other factors. Heritability estimates range from 0 (the trait is not due to genes) to 1 (the trait is only due to genes). The heritability estimates of some traits in female sheep are shown in the table.

Trait	Heritability Estimates
adult body weight	0.40
birth weight	0.15
milk production	0.10

If a sheep farmer wanted to breed sheep for traits, the farmer would be **least** successful when selectively breeding for

Ⓐ birth weight and milk production.

Ⓑ adult body weight and birth weight.

Ⓒ milk production and adult body weight.

The farmer would be least successful when selectively breeding for those traits because they are mostly a result of

Ⓐ genetics.

Ⓑ the environment.

The following section focuses on rock pocket mice.

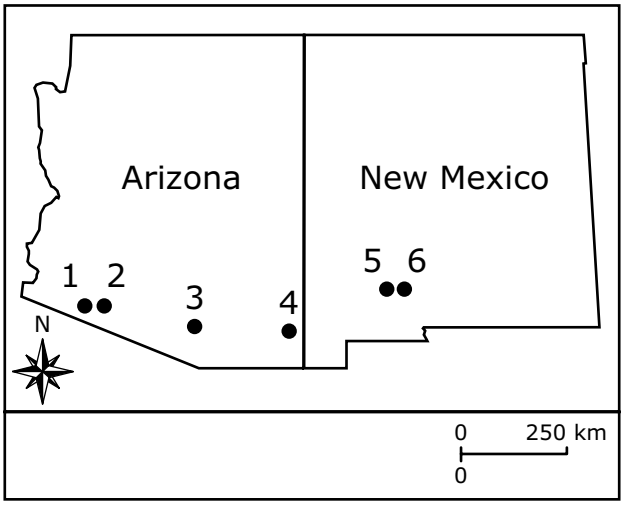
Read the information below and use it to answer the selected-response questions and constructed-response question that follow.

Rock pocket mice are small rodents that live in Arizona and New Mexico. They can have either light-colored fur or dark-colored fur. Fur color is determined by a group of pigments called melanin. Two types of melanin are pheomelanin and eumelanin. Mice with light-colored fur mostly have pheomelanin, whereas mice with dark-colored fur mostly have eumelanin.

In rock pocket mice, the *Mc1r* gene controls whether eumelanin or pheomelanin is produced. Scientists have identified two alleles, **D** and **d**, for the gene. The allele for dark-colored fur (**D**) is dominant to the allele for light-colored fur (**d**).

Most of the habitat for rock pocket mice consists of light-colored rock called granite. However, there are several areas where the mice live that are made up of dark-colored rock called basalt. Basalt rock formed when lava flowed over granite rock and cooled. Owls and other predators use their sense of sight to hunt rock pocket mice.

The map shows six study sites where scientists have observed these mice.



Scientists collected data on the fur color of rock pocket mice and the type of rock at each study site. The table shows the type of rock, the number of mice with light-colored fur, and the number of mice with dark-colored fur at each study site.

Study Site	Type of Rock	Light-Colored Fur	Dark-Colored Fur
1	basalt	2	6
2	granite	10	1
3	granite	15	0
4	granite	5	0
5	granite	12	0
6	basalt	1	7

33 Scientists think that fur color in mice evolved through natural selection. Which of the following would have been necessary for natural selection to occur?

Ⓐ variation in the alleles for fur color in mice

Ⓑ migration of mice with different fur colors

Ⓒ identical genetic sequences in mice

Ⓓ small populations of mice

34 Researchers want to determine whether the mice at site 5 have become a different species from the mice at site 6. An investigation designed to answer which of the following questions would **best** help researchers determine whether the mice at these two sites have become different species?

Ⓐ Do the mice at sites 5 and 6 eat the same types of food?

Ⓑ Do the mice at sites 5 and 6 have similar population sizes?

Ⓒ Do the mice at sites 5 and 6 interbreed and produce fertile offspring?

Ⓓ Do the mice at sites 5 and 6 spend more time underground or above ground?

35 The pigment eumelanin contains the elements hydrogen and oxygen. What other two elements make up eumelanin?

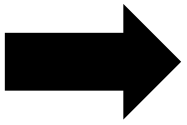
Ⓐ iron and nitrogen

Ⓑ carbon and nickel

Ⓒ carbon and nitrogen

Ⓓ calcium and potassium

PLEASE GO ON
TO THE NEXT PAGE



This question has two parts.

36 Predation of rock pocket mice plays a role in their population sizes.

Part A

Scientists concluded that the primary selection pressure affecting fur color in rock pocket mice is predation. Which of the following best supports this conclusion?

Ⓐ Mice with dark-colored fur have fewer offspring on basalt rock.

Ⓑ Mice with dark-colored fur have decreased fitness on basalt rock.

Ⓒ Mice with light-colored fur are more likely to survive and reproduce on granite rock.

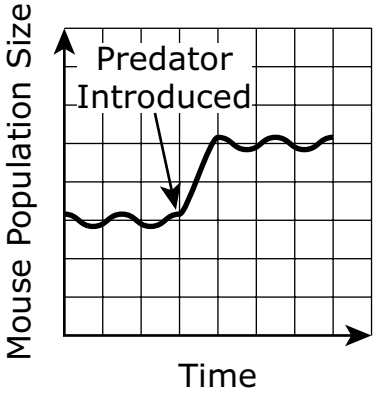
Ⓓ Mice with light-colored fur are more likely to mate with mice with dark-colored fur on granite rock.

Part B

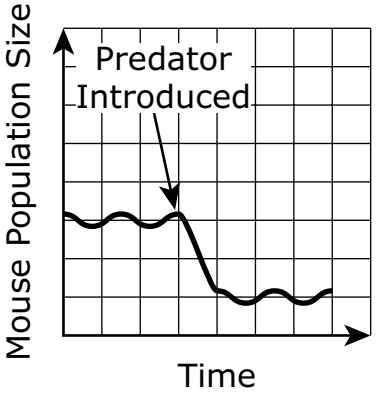
A new predator that hunts rock pocket mice moves into site 3.

Which of the following graphs shows what will most likely happen to the rock pocket mouse population size at site 3 after 40 generations?

Ⓐ



Ⓑ



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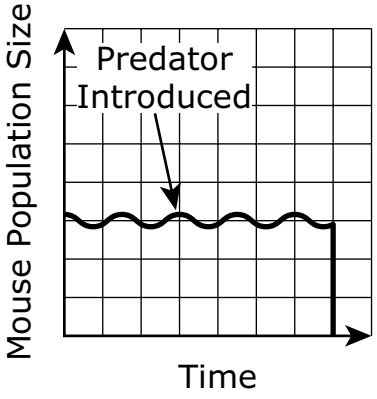
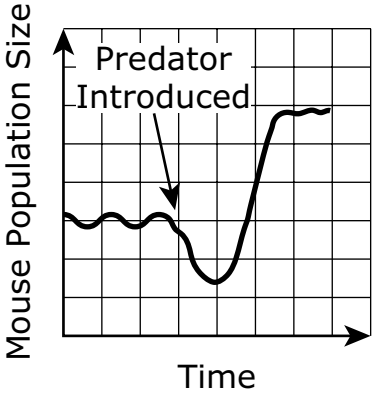


Ⓓ



This question has three parts. Write your response on the next page. Be sure to label each part of your response.

37 Fur color in rock pocket mice is primarily controlled by the *Mc1r* gene.

A. Two mice that are heterozygous for the *Mc1r* gene mate and produce offspring.

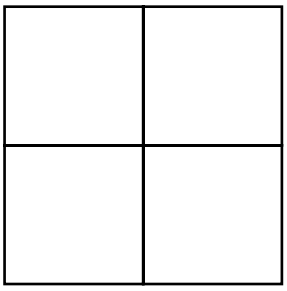
Using the allele symbols **D** and **d**, complete the Punnett square in Part A on the next page to show this cross.

B. Based on the Punnett square, determine the percentage of offspring from this cross that are expected to have light-colored fur. Explain your answer.

C. A student claims that having genotype **DD** or **Dd** would increase the fitness of a mouse living on granite rock.

Explain why this student's claim is **not** supported by the information provided.

37 A.



38 Two species of birds, the pied flycatcher and the collared flycatcher, are found in eastern and central Europe. In areas where the birds are geographically isolated from each other, the two species have similar color patterns. In areas where the birds' ranges overlap, each species has a different color pattern.

In the overlapping areas, the birds usually mate with birds of their own species. Occasionally the two species mate with each other, but these offspring are usually not fertile.

Which of the following **best** explains why natural selection would favor different color patterns in areas where the two flycatcher species overlap?

Ⓐ The different color patterns help the birds avoid predators.

Ⓑ The different color patterns help the birds eat a healthy, varied diet.

Ⓒ The different color patterns help increase the amount of heat the birds absorb.

Ⓓ The different color patterns help increase the reproductive success of the birds.

39 When a person is dehydrated, a hormone called ADH is produced that increases the reabsorption of water into the bloodstream. As a result, less water leaves the body.

Which organ does ADH most **directly** affect?

Ⓐ heart

Ⓑ kidney

Ⓒ liver

Ⓓ stomach

40 An offspring with a genetic mutation had a lower amount of muscle mass than expected. The offspring's parents did not have the allele for the mutation.

Which of the following is the most likely cause of the offspring's mutation?

Ⓐ random pairing in the parents' gametes

Ⓑ a dominant gene in the offspring's DNA

Ⓒ a replication error in the offspring's DNA

Ⓓ chromosomes crossing over in the parents' body cells

This question has two parts.

41 Emperor penguins can dive underwater for over 20 minutes. While underwater, the penguins use oxygen that is stored in their bodies.

Part A

Which of the following **best** describes the importance of oxygen in the penguins' body systems?

Ⓐ Oxygen allows the lungs to grow underwater.

Ⓑ Oxygen diffuses from the muscles to other body parts.

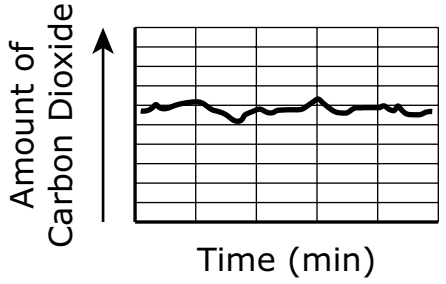
Ⓒ Oxygen is converted into other gases in the bloodstream.

Ⓓ Oxygen is used to produce energy for muscle movement.

Part B

Which of the following graphs shows the amount of carbon dioxide produced over time in a penguin's body as it swims underwater?

Ⓐ



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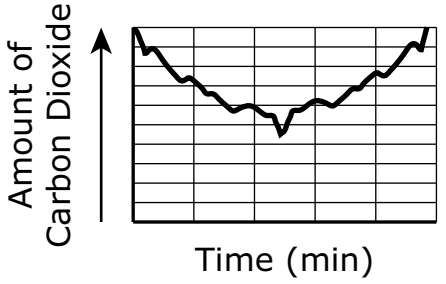

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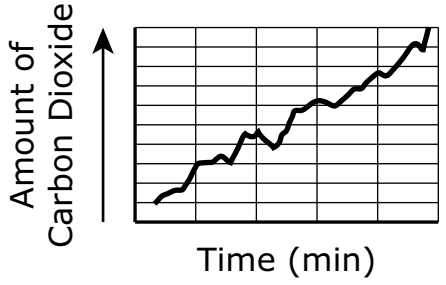
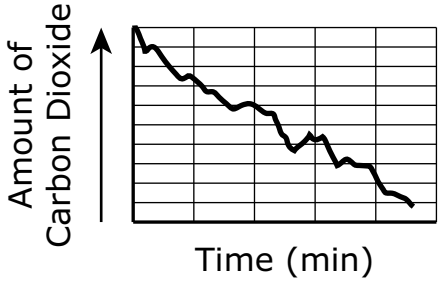
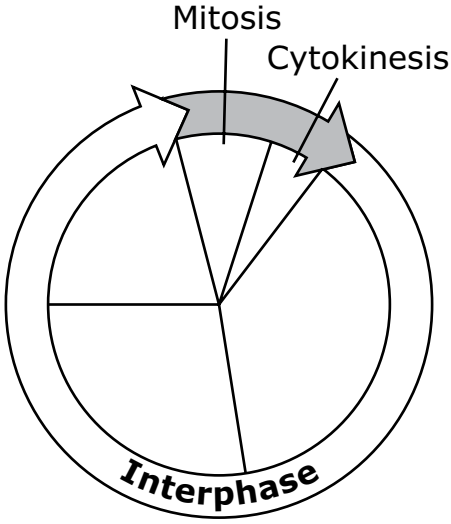


Ⓓ



This question has three parts. Write your response on the next page. Be sure to label each part of your response.

42 An adult human body contains trillions of cells. Body cells go through the stages of the cell cycle. A diagram of the cell cycle is shown.



A. Describe **two** events that occur during the interphase stage of the cell cycle.

B. Mitosis and cytokinesis are important stages of the cell cycle.

Explain why mitosis must occur before cytokinesis.

C. Describe one way a person's body would be affected if cells stopped going through mitosis and cytokinesis.

42

STOP!