

Biology

Administered May 2015

RELEASED

Biology

DIRECTIONS

Read each question carefully. Determine the best answer to the question from the four answer choices provided. Then fill in the answer on your answer document.

- 1 In the European roe deer (*Capreolus capreolus*), implantation of embryos after breeding is delayed. The deer breed in July or August but do not give birth until the following May or June. From summer to late December, the embryo rests in a state of dormancy as a 30-cell blastocyst. In late December or early January, the embryo sends a signal that causes the female to release hormones, allowing the embryo to continue to develop normally.

Roe Deer Fawn



Why is delayed implantation an advantageous adaptation for the European roe deer?

- A Delayed implantation allows the mother to continue to breed with other males.
- B Without delayed implantation, the females would not be able to carry a pregnancy to full term.
- C Delayed implantation enables the female to give birth to more fawns each year.
- D Without delayed implantation, the fawns would be born in the winter when food is scarce and the weather is harsh.

- 2 Parrotfish are herbivores that are found in coral reefs. To escape predation, a parrotfish will graze with a rabbitfish, which has venomous spines at the end of its pelvic fins. The rabbitfish does not benefit from this relationship. Which type of relationship do the parrotfish and the rabbitfish have in the coral-reef environment?

- F Commensal
- G Mutualistic
- H Predator-prey
- J Parasitic

- 3 A segment of DNA produces methionine, threonine, histidine, aspartate, and glycine when translated. A substitution mutation occurs and causes the synthesis of the segment as shown.

New DNA strand: 3'-TACAGGGTGCTACCCACT-5'

Codon Chart

		Second Letter				
		U	C	A	G	
First Letter	U	Phenylalanine	Serine	Tyrosine	Cysteine	U
		Phenylalanine	Serine	Tyrosine	Cysteine	C
		Leucine	Serine	(STOP)	(STOP)	A
		Leucine	Serine	(STOP)	Tryptophan	G
	C	Leucine	Proline	Histidine	Arginine	U
		Leucine	Proline	Histidine	Arginine	C
		Leucine	Proline	Glutamine	Arginine	A
		Leucine	Proline	Glutamine	Arginine	G
	A	Isoleucine	Threonine	Asparagine	Serine	U
		Isoleucine	Threonine	Asparagine	Serine	C
		Isoleucine	Threonine	Lysine	Arginine	A
		Methionine (START)	Threonine	Lysine	Arginine	G
	G	Valine	Alanine	Aspartate	Glycine	U
		Valine	Alanine	Aspartate	Glycine	C
		Valine	Alanine	Glutamate	Glycine	A
		Valine	Alanine	Glutamate	Glycine	G

Which is the new peptide chain when the new DNA segment is translated?

- A Methionine, leucine, histidine, aspartate, glycine
- B Methionine, phenylalanine, histidine, aspartate, glycine
- C Methionine, proline, histidine, aspartate, glycine
- D Methionine, serine, histidine, aspartate, glycine

- 4 As ecosystems move through the stages of succession, the populations of organisms in them change. Which of the following describes the stage of succession likely to have the most species diversity?
- F A newly formed volcanic island
 - G An agricultural field that has not been plowed for one year
 - H A temperate forest that has never been cleared by logging
 - J A field that is regularly mowed

-
- 5 Frogs and toads belong to the order Anura. The smallest organism in this order is about 7 millimeters long, while the largest member is about 30 centimeters long. Which of these lists best describes this order?

A

Order Anura

- 338 families
- 28 genera
- 4,360 species

C

Order Anura

- 338 families
- 4,360 genera
- 28 species

B

Order Anura

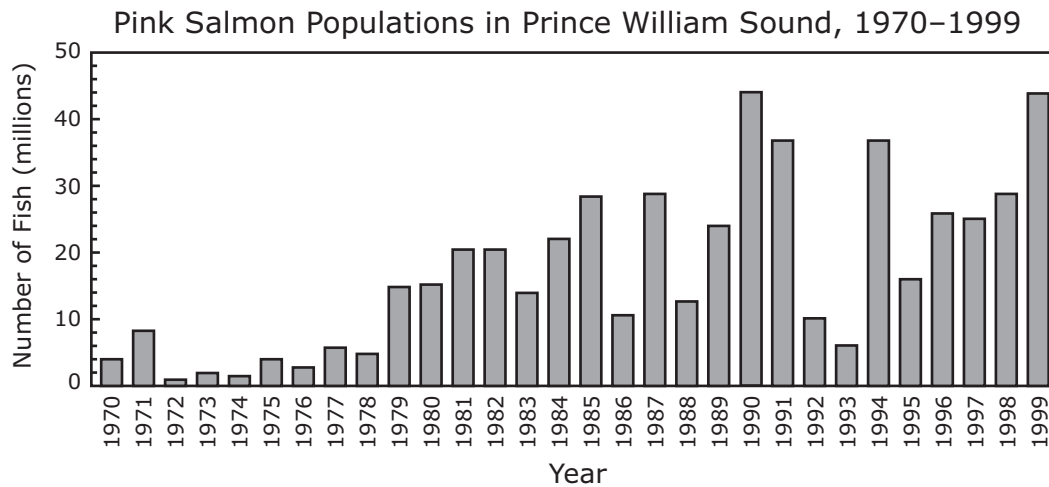
- 28 families
- 338 genera
- 4,360 species

D

Order Anura

- 28 families
- 4,360 genera
- 338 species

- 6 On March 24, 1989, an oil tanker ran aground on Bligh Reef in Prince William Sound, Alaska, and spilled millions of liters of crude oil. The graph shows pink salmon populations in Prince William Sound from 1970 to 1999.



Source: Alaska Department of Fish and Game

What do these data suggest about the effect the oil spill had on pink salmon?

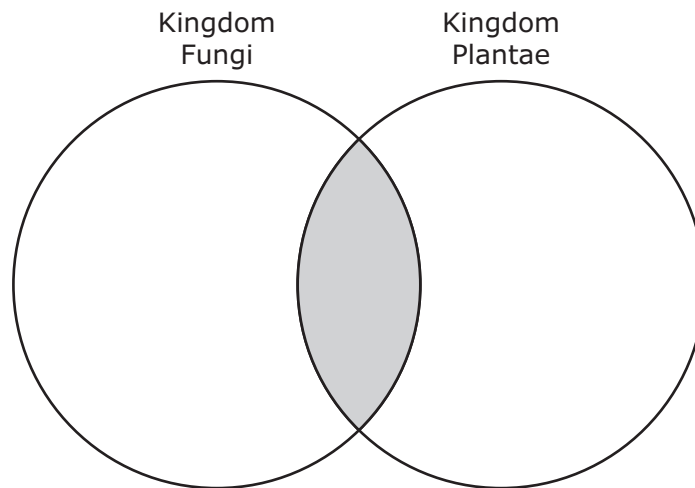
- F Pink salmon were nearly eliminated after the oil spill.
- G Pink salmon populations steadily declined in the 10 years following the spill.
- H Pink salmon populations declined and never fully recovered.
- J Pink salmon populations seemed to be minimally affected.

-
- 7 Cells typically respond to DNA damage in three ways: by ceasing to grow and divide until the damage is repaired, by permanently ceasing to grow and divide, or by dying. In 2010 a group of scientists reported that a certain kind of immune reaction can cause DNA damage that leads to a fourth response. DNA damage can turn off genes involved in cell-signaling pathways. Turning off these genes can cause less-mature cells to divide too rapidly, often leading to the development of —

- A tumors
- B allergies
- C hemophilia
- D cardiovascular disease

- 8** In recent years humans have interfered with the natural balance within deer populations in various ecosystems. The interference includes eliminating predators of the deer. Which of the following statements correctly describes the long-term outcome of this interference?
- F** The deer that are the fastest and most agile will survive and reproduce.
 - G** The deer population will be too large to be supported by producers.
 - H** Other browsing species will thrive and outcompete the deer.
 - J** The producers will evolve into species that are less palatable to the deer.

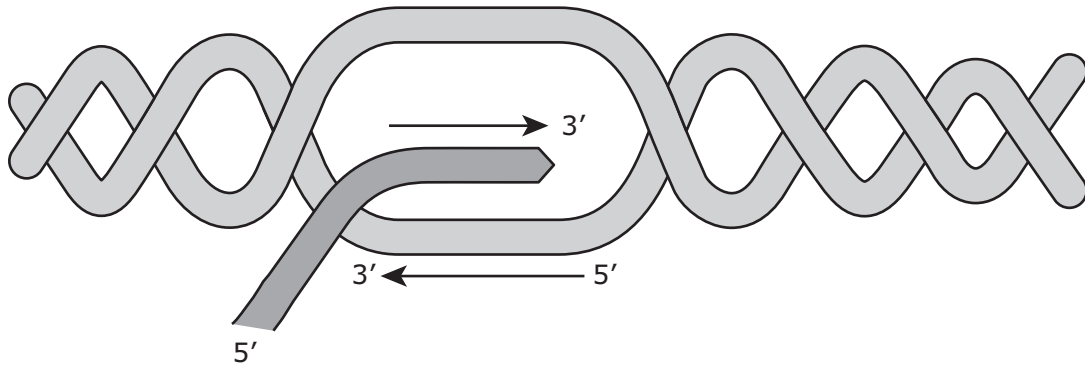
-
- 9** A student wants to use the Venn diagram below to show the characteristics of two kingdoms of organisms. The characteristics that the two kingdoms share will be listed in the shaded area where the circles intersect.



Which of these is a characteristic that the student should list in the shaded part of the diagram?

- A** Heterotrophic
- B** Mobile
- C** Prokaryotic
- D** Multicellular

10 Part of an important cellular process involving a DNA strand is modeled below.



What is the purpose of this cellular process?

- F Preserving genetic information for future generations
- G Deleting the information in the sequence produced from the DNA template
- H Transcribing information in the DNA sequence for use by the cell
- J Producing more nucleotides for the DNA sequence

- 11 A student preparing for a hike wants to pack a snack that has biomolecules that provide quickly available energy but few excess calories. Which nutrition label lists the best combination of biomolecules that provide quickly available energy while providing the fewest calories from other types of biomolecules?

A

Nutrition Facts	
Serving Size: 1 Tbsp (6g)	
Amount Per Serving	
Calories: 20	Calories from Fat 0
% Daily Value*	
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 60mg	2%
Potassium	
Total Carbohydrate 0g	0%
Dietary Fiber 0g	0%
Sugars 0g	
Protein 5g	

C

Nutrition Facts	
Serving Size: 1 cup (250g)	
Amount Per Serving	
Calories: 975	Calories from Fat 752
% Daily Value*	
Total Fat 83.5g	128%
Saturated Fat 12.25g	61%
Trans Fat	
Cholesterol 65mg	22%
Sodium 1775mg	74%
Potassium 22.5mg	1%
Total Carbohydrate 59.5g	20%
Dietary Fiber 0.25g	1%
Sugars 50.28g	
Protein 2.25g	

B

Nutrition Facts	
Serving Size: 1 package (50g)	
Amount Per Serving	
Calories: 180	Calories from Fat 75
% Daily Value*	
Total Fat 8g	13%
Saturated Fat 1g	5%
Cholesterol 0mg	0%
Sodium 55mg	2%
Total Carbohydrate 13g	5%
Fiber 1g	
Sugars 9g	
Protein 15g	

D

Nutrition Facts	
Serving Size: 1 bar	
Amount Per Serving	
Calories: 140	Calories from Fat 40
% Daily Value*	
Total Fat 4g	6%
Saturated Fat 1g	5%
Trans Fat 1g	0%
Cholesterol 0mg	0%
Sodium 90mg	4%
Total Carbohydrate 22g	7%
Dietary Fiber 2g	10%
Sugars 10g	
Protein 5g	8%

12 Organisms can be classified based on homology, which is shared characteristics inherited from a common ancestor. In the past, homologies were based on studies of anatomical structures and patterns of embryonic development. In more recent years, the use of molecular biology techniques has allowed homologies to be compared at the level of nucleotide sequences. Nucleotide sequence comparisons are possible because all organisms share which of the following?

- F** DNA bases
- G** Cellular organelles
- H** Division of the nuclear chromosomes
- J** Types of proteins needed for cellular functions

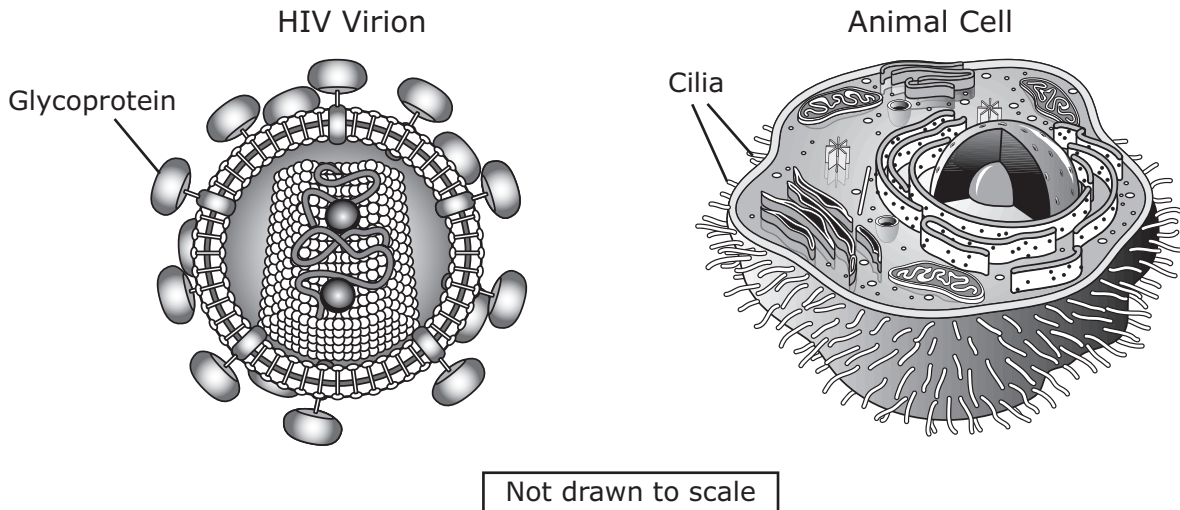
13 An informational pamphlet in a health clinic describes an interaction between body systems.

An ovum moves from an ovary into the uterine tube where its migration toward the uterus is aided by the peristaltic contractions of the smooth tissues of the uterine tube's walls.

Which statement identifies the body systems that are directly involved in the interaction described and explains how they accomplish the interaction?

- A** The nervous system produces hormones that stimulate the ovum, and the circulatory system moves the ovum into the uterine tube.
- B** The circulatory system supplies the uterine wall with oxygenated blood, and the immune system prevents damage to the ovum.
- C** The reproductive system produces the ovum, and the muscular system causes the migration of the ovum by peristaltic contractions.
- D** The excretory system expels the ovum from the ovary, and the nervous system causes the contractions of the smooth tissues of the uterine wall.

14 Models of the human immunodeficiency virus (HIV) and an animal cell are shown below.



What is the difference in the function of the glycoprotein structures of an HIV virion and the cilia of an animal cell?

- F The glycoprotein structures are used for attachment, and the cilia are used to move fluids surrounding the cell.
- G The glycoprotein structures are used to obtain nutrition, and the cilia are used to secrete proteins.
- H The glycoprotein structures are used to provide physical support for the viral envelope, and the cilia strengthen the cell membrane.
- J The glycoprotein structures are used for defense, and the cilia are used for locomotion.

15 Diatoms are one of the most common types of phytoplankton in marine habitats. Like plants, diatoms contain chlorophyll and produce glucose from which of the following?

- A O_2 and ATP
- B CO_2 and O_2
- C ATP and H_2O
- D CO_2 and H_2O

16 A genome-wide association study involves searching the genomes of many people in order to find genetic variations associated with common diseases such as cancer, asthma, and diabetes. These studies are possible because of computer databases that allow researchers to compare the genomes of people who do not have a particular condition with the genomes of people who have the condition. In order to do this type of testing, researchers need blood samples or cheek swabs from people. Obtaining these samples is necessary because blood and cheek cells contain —

- F** plasma and platelets
- G** a complete set of DNA
- H** essential proteins and amino acids
- J** a large number of neutrophils

17 When the level of carbon dioxide in the blood is too high, the excess carbon dioxide reacts with water and produces carbonic acid. The carbonic acid causes the blood pH to become more acidic. When the blood pH becomes too acidic, chemoreceptors in the brain instruct the body to react and maintain homeostasis in blood pH. Which of these responses by the body would eliminate the excess carbon dioxide and help maintain homeostasis in blood pH?

- A** Increasing the body temperature by shivering
- B** Increasing glucose levels in the blood
- C** Breathing more deeply and frequently
- D** Decreasing the heart rate

- 18** Two populations of mice living in the same forest are separated by a large water-filled ditch. After a rainstorm, flooding brings several mice from one population to the other population. When the mice from the first population reproduce with members of the second population, which of the following will likely occur?
- F** All the offspring will die as a result of reproductive mutations.
 - G** The offspring will be forced to leave the second population.
 - H** The offspring will be genetically identical to their parent from the first population.
 - J** The offspring in the second population will have greater genetic variety.
-

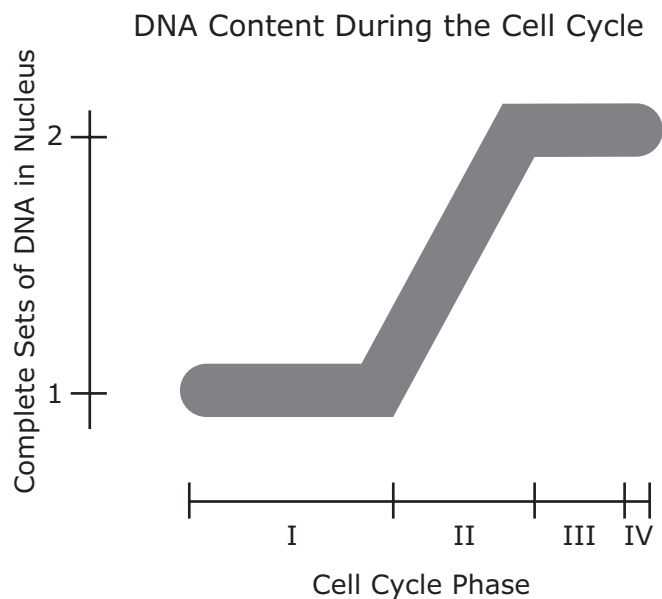
- 19** The mimosa plant displays thigmotropism by collapsing its leaves in response to touch, as shown in the pictures below. The plant on the left is undisturbed. The upper stem of the plant on the right has been touched.



What is the most likely benefit of this mechanism for the plant?

- A** Protection from a loss of minerals to the environment
- B** Protection from poor light availability
- C** Protection from herbivores by becoming less attractive
- D** Protection from overwatering

20 The model represents the change in the DNA content of a cell during the cell cycle.



Which part of the model represents the S phase?

- F I
- G II
- H III
- J IV

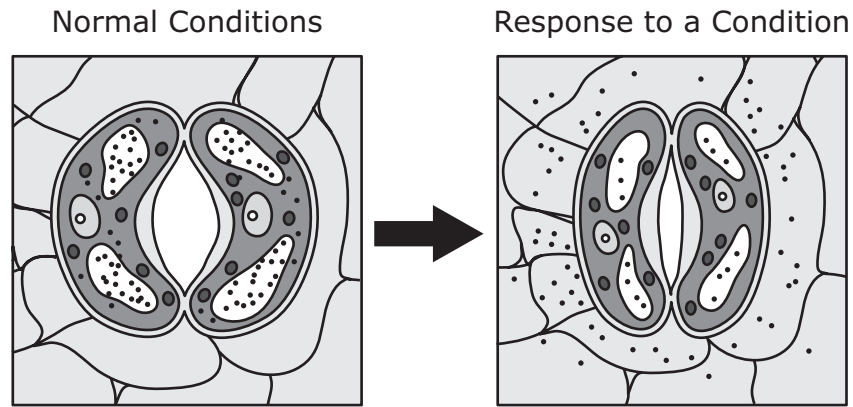
21 *Coracias garrulus* is a blue bird with an orange-brown back. The offspring of this bird have an effective defense mechanism. The young birds vomit and cover themselves in a foul-smelling orange liquid when they sense a threat by predators. Which two systems alert the young bird to the danger and help produce the vomit it uses as a defense?

- A** Nervous and digestive systems
- B** Integumentary and muscular systems
- C** Immune and respiratory systems
- D** Excretory and reproductive systems

22 Cells can generate as many as 36 to 38 molecules of adenosine triphosphate (ATP) from the metabolism of one molecule of glucose. Which cellular process results in this amount of ATP production?

- F** Anaerobic cellular respiration
- G** Protein synthesis
- H** Aerobic cellular respiration
- J** Photosynthesis

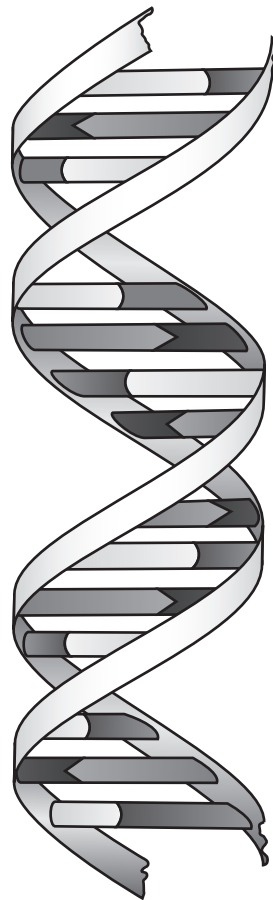
- 23** Structures represented in the illustration below are found in the lower epidermis of a plant leaf. The illustration at right shows the response to a certain environmental condition.



The response represented in the illustration would most likely be caused by —

- A** a reduced supply of oxygen
- B** long periods of rainfall
- C** high concentrations of glucose
- D** little available water

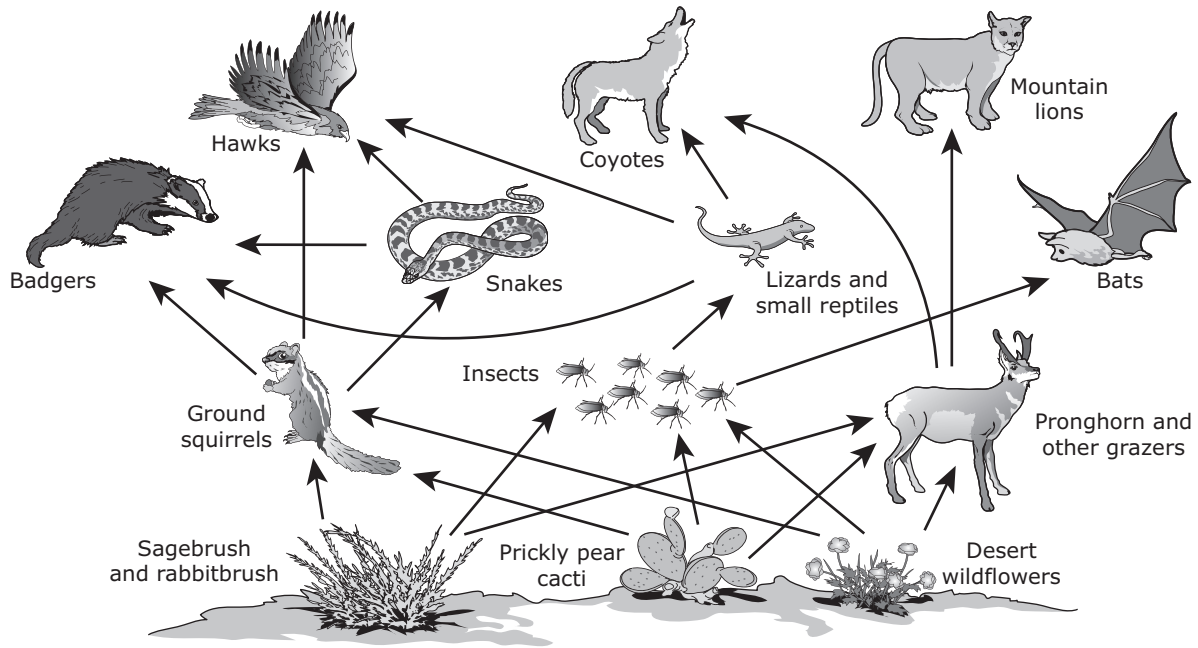
24 A segment of DNA is represented in the illustration.



How is information for a specific protein carried on the DNA molecule?

- F** As a sequence of nucleotides
- G** In the double-helix shape of the condensed chromosome
- H** In the ratio of adenines to thymines
- J** As a pattern of phosphates and sugars

25 The food web shows the flow of energy through a sagebrush-steppe ecosystem.



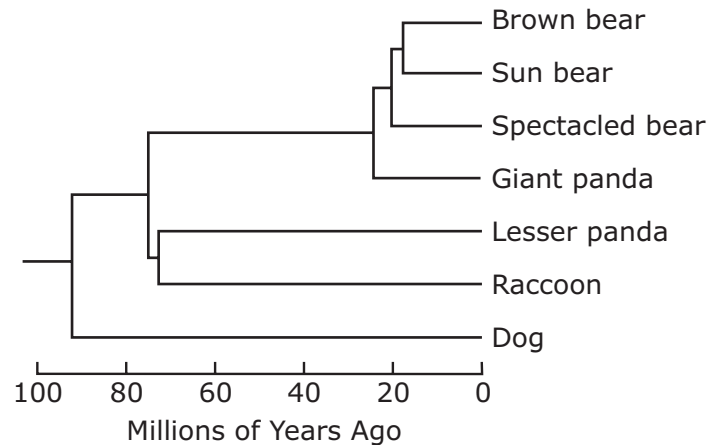
Which of these organisms are in a trophic level that receives a larger percentage of the energy captured by the producers than the percentage received at the bats' trophic level?

- A Mountain lions
- B Snakes
- C Hawks
- D Ground squirrels

26 Fireflies emit light. The production of light by an organism is called bioluminescence. To generate visible light, cells in a firefly's tail produce thousands of luciferase enzymes. Luciferase binds to a chemical called luciferin. Once bound, the luciferase enzyme speeds up a chemical reaction that combines an oxygen molecule and luciferin to produce oxyluciferin. This reaction requires energy and releases light. Which of the following best describes how the luciferase enzyme speeds up the chemical reaction?

- F Luciferase increases the amount of time the light is visible.
- G Luciferase decreases the amount of energy required for the reaction to start.
- H Luciferase increases the number of sites on luciferin that must bind to oxygen.
- J Luciferase decreases the temperature of the environment inside the body of the firefly.

- 27** An analysis of DNA and RNA sequences can be used to classify organisms. A dendrogram, such as the one shown below, is based on molecular data. It can be used to represent evolutionary relationships within a group of organisms that are hypothesized to have descended from a common ancestor.



Which statement is best supported by the information in this dendrogram?

- A** Lesser pandas are more genetically similar to giant pandas than they are to raccoons.
- B** Brown bears are more genetically similar to giant pandas than they are to sun bears.
- C** Lesser pandas are more genetically similar to raccoons than they are to giant pandas.
- D** The bear species are all more genetically similar to dogs than they are to giant pandas.
-
- 28** Facial dimples and free earlobes are both considered dominant human traits. What are the expected phenotypes of the offspring of a female with dimples and free earlobes (DDFf) and a male with no dimples and attached earlobes (ddff)?
- F** 50% with dimples and free earlobes and 50% with dimples and attached earlobes
- G** 50% with dimples and free earlobes and 50% with no dimples and attached earlobes
- H** 75% with dimples and free earlobes and 25% with no dimples and attached earlobes
- J** 75% with dimples and attached earlobes and 25% with no dimples and free earlobes

- 29** Adult mountain lions (*Puma concolor*) are almost 2 meters long. They have a black spot over each eye. The common names used throughout the United States for this species are listed below.

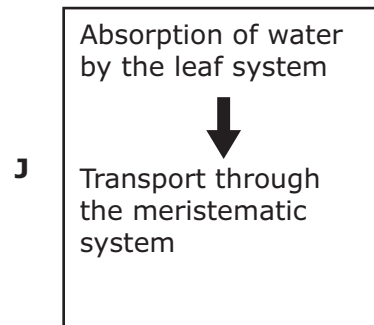
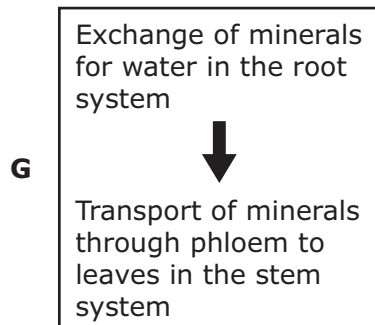
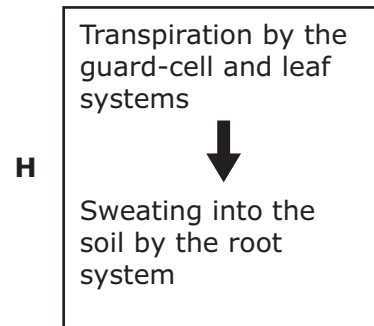
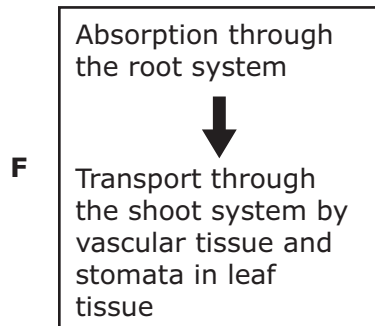
Common Names for
Puma concolor

- Mountain lion
- Cougar
- Puma
- Panther
- Yuma puma
- Florida panther
- Eastern cougar
- Wisconsin puma
- Texas panther

Why is it best for scientists to use the name from the standardized taxonomic system?

- A** The standardized name differentiates mountain lions and pumas.
- B** The standardized name is less descriptive of the animal that has been observed.
- C** Communication with other scientists about mountain lions will be reduced.
- D** All scientists will be using one name for mountain lions.

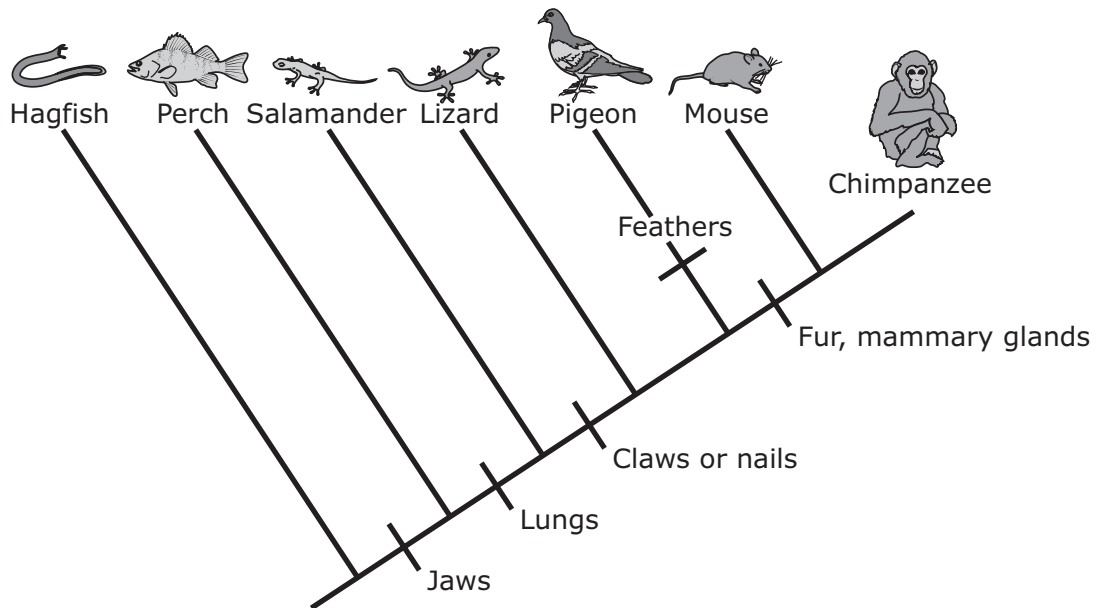
- 30** The internal transport of water and minerals in plants requires that two systems work together. Which diagram correctly describes how the two systems accomplish this?



-
- 31** At birth Himalayan rabbits are usually white over their entire bodies. But when parts of their bodies reach temperatures below 35°C, a pigment that causes these parts to turn black is produced. Which of the following is most likely the cause of this phenomenon?

- A** Poor blood circulation
- B** Infection caused by cold temperatures
- C** Gene expression that is regulated by temperature
- D** A trait that is both sex-linked and hormone-dependent

32 A cladogram is shown below.





All the animals to the right of the hagfish would have the common characteristic of —

- F fur
- G claws or nails
- H lungs
- J jaws

33 The differences between two molecules include the type of sugar that forms a section of the molecules and the identity of one of the four nitrogenous bases that make up another section of the molecules. These two molecules are —

- A proteins
- B lipids
- C nucleic acids
- D complex carbohydrates

- 34** Plants have developed many methods of seed dispersal. The table below shows seeds of two different plants.

Plant	Mass of Seed (g)	Seed Shape
Milkweed	0.00588	
Dandelion	0.0026	

How has the seed dispersal method developed by these plants given them a reproductive advantage?

- F** The method ensures that offspring will be dispersed and reduces competition for resources.
- G** The method reduces the chance that herbivores will consume the seeds.
- H** The method lengthens the life cycle of each of these plants.
- J** The method reduces the plants' need for water and other nutrients.

- 35** The table below lists the types of white blood cells found in humans, indicates how abundant they are, and describes their functions.

Type	Percentage of Total White Blood Cell Count	Function
Basophils	<1%	Involved in inflammation
Eosinophils	1%–6%	Involved in allergic responses
Lymphocytes	25%–33%	Produce antibodies against toxins
Monocytes	2%–10%	Remove foreign particles and prevent germ invasion
Neutrophils	54%–62%	Attack and engulf microorganisms

The two most abundant types of white blood cells may both be involved in a response to which of these?

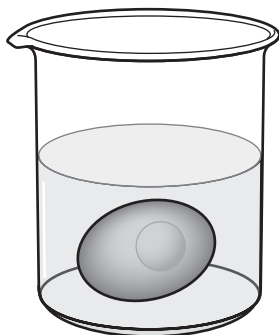
- A** Injury
- B** Heat
- C** Allergens
- D** Bacterial infection

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- 36** A science class is planning a field trip to a local farm that has a large pond. Which of the following lists the order of biological organization from smallest to largest that the students can expect to find at the pond?

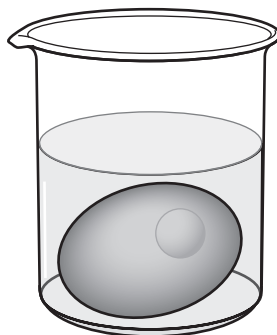
- F** Organism, community, population, ecosystem
- G** Organism, population, community, ecosystem
- H** Population, organism, community, ecosystem
- J** Population, organism, ecosystem, community

- 37** Some students used vinegar to dissolve away the shells of three eggs and used these eggs as models of human red blood cells. The students observed the changes in the eggs when they were placed in different solutions.

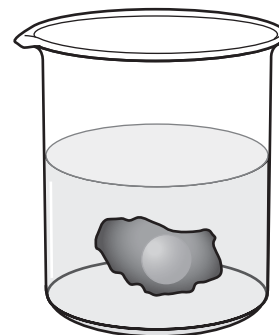
Red Blood Cell Model in Different Solutions



300 mL of
5% vinegar solution



300 mL of
pure water

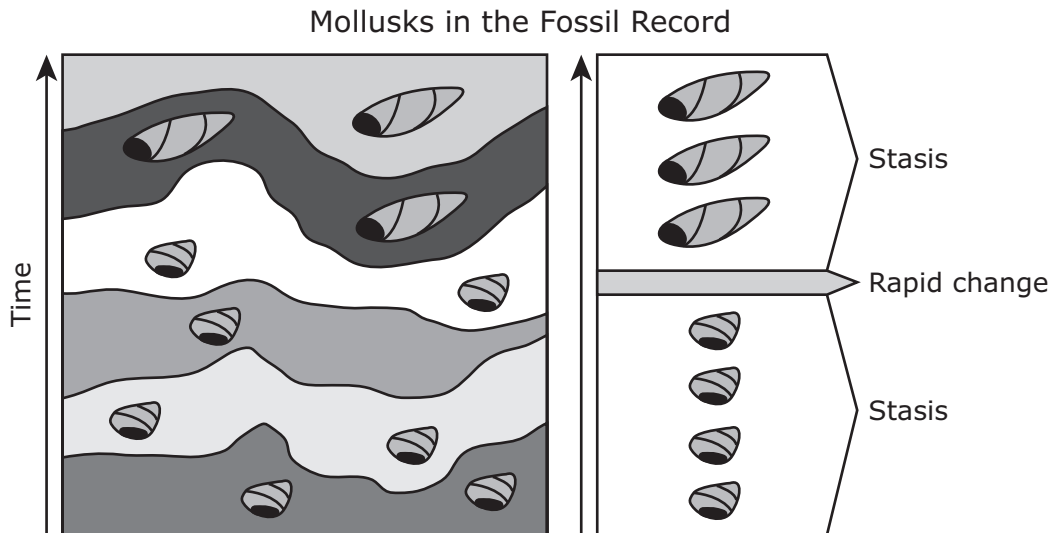


300 mL of
corn syrup solution

Which statement best describes the role of the cell membrane in this model?

- A** The cell membrane is an impermeable barrier that prevents water from entering the cell.
- B** The cell membrane allows solutes to enter the cell, which causes the cell to shrink.
- C** The cell membrane allows water to enter and leave the cell.
- D** The cell membrane removes solutes from the environment.

38 This diagram of the fossil record represents changes in mollusks over millions of years.



How can the pattern of change in the fossil record best be explained?

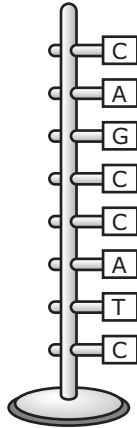
- F** The mollusks were well adapted to their stable environment. A large, sudden change occurred in their environment. After the change the mollusks with the bigger shells were better adapted for the new environment.
- G** The mollusks were well adapted to their stable environment. The mollusks hybridized with a smaller species of mollusk. A new species of mollusk with a bigger shell resulted.
- H** The mollusks were not well adapted to their environment. The length of the mollusks' shells changed gradually over time. The mollusks in the original population that had small shells died over a period of many years.
- J** The mollusks were well adapted to their environment. Humans introduced a new species of mollusk that was not adapted to this environment. The introduced mollusk outcompeted the native mollusk species.

- 39** Animal body systems often coordinate their actions to carry out specific functions for the whole animal. Which of these correctly describes the interaction of two biological systems for a specific purpose in the human body?

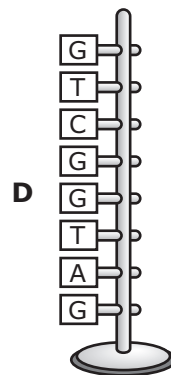
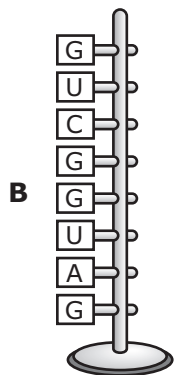
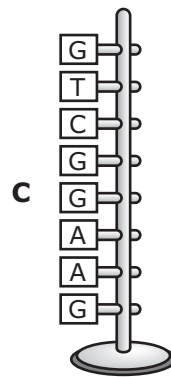
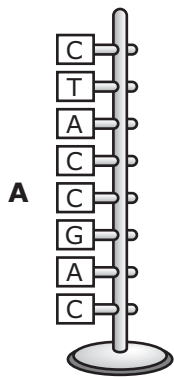
A	Temperature Regulation		C	Nutrient Absorption	
	The nervous system secretes hormones that cause smooth and skeletal muscles to contract.	The endocrine system responds to shivering by causing sweat glands to produce sweat.		The digestive system transports digested materials to areas of the body where they are needed.	The circulatory system breaks down food into usable materials mechanically and chemically.
B	Infection Defense		D	Reproduction	
	As parts of the integumentary system, skin and nostril hairs help keep invading pathogens out.	Within the immune system, antibodies are produced by B lymphocytes to defend against invaders that enter.		The endocrine system produces sex hormones (or pheromones) for the animal.	The reproductive system controls the endocrine system by regulating hormone levels in the bloodstream.

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- 40** A student is asked to draw a food web in which the same organism is a primary consumer as well as a secondary consumer. How should the organism be represented in the food web?
- F** The organism must have an arrow pointing from it to a tertiary consumer and another arrow pointing from it to a decomposer.
 - G** The organism must have an arrow pointing from it to a secondary consumer and another arrow pointing to it from the top predator.
 - H** The organism must have an arrow pointing to it from a producer and another arrow pointing to it from a primary consumer.
 - J** The organism must have an arrow pointing from it to a primary consumer and another arrow pointing away from it to a decomposer.

41 A student builds a model of a DNA strand.



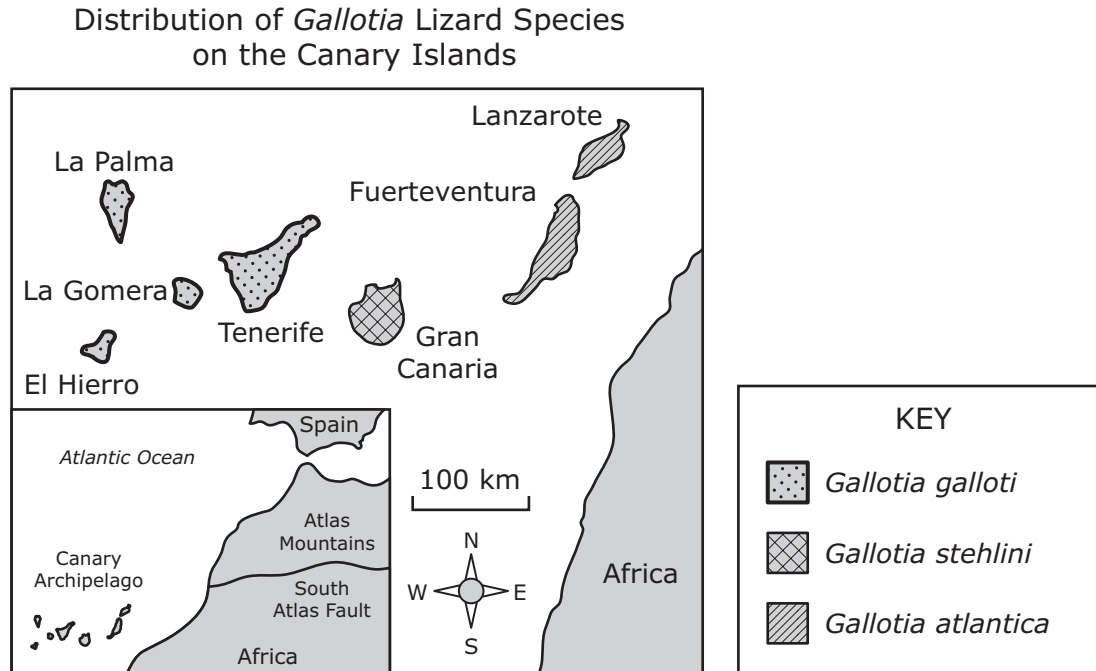
Which of these models of a DNA strand shows bases that are complementary to the ones on the student's DNA model?



42 Bats eat insects that damage crops and mosquitoes that are vectors for disease. One million bats can eat several tons of insects per night, saving billions of dollars in pesticides yearly. Agricultural and public health scientists are concerned about the spread of white-nose syndrome (WNS). WNS is a result of a fungus that can infect cave-dwelling bats. While bats hibernate during winter months, the fungus covers the bats' face and wings. WNS has a near 100% mortality rate, and 5.7 million bats have died since the discovery of the fungus in 2006. Many scientists are searching for ways to protect these bats. The relationship between this fungus and bats can best be defined as —

- F** commensal, because the bats provide a surface for the fungus to grow
- G** parasitic, because the fungus obtains nutrients and shelter from the bats
- H** competitive, because both organisms use caves as shelter during the winter
- J** mutualistic, because the relationship involves two distinct species living together

- 43** Three species of lizards of the genus *Gallotia* are found on the Canary Islands, a chain of seven volcanic islands off the west coast of Africa. The easternmost island, Lanzarote, is the oldest, while the westernmost island, El Hierro, is the youngest. The distribution of lizard species is shown on the map below.



Which statement about the ancestry of the lizards from the genus *Gallotia* is best supported by this information?

- A** The common ancestor of the lizards first colonized the island of El Hierro.
- B** The ancestors of each species came from different continents at different times.
- C** The common ancestor of the lizards probably came from Africa.
- D** The ancestors of each species evolved in Spain and were brought to the islands at the same time.
-
- 44** Human body cells each have 46 chromosomes in their nuclei. Meiosis is necessary in order to ensure that each gamete produced in the human body has —
- F** 12 chromosomes
- G** 23 chromosomes
- H** 46 chromosomes
- J** 92 chromosomes

- 45** How do an increase in the organic matter in soil and an increase in soil depth affect the population of plants in an area?
- A** Larger plants become the dominant organisms.
 - B** Mosses replace flowering plants.
 - C** Nitrogen-fixing bacteria kill young trees.
 - D** Grasses become diseased.

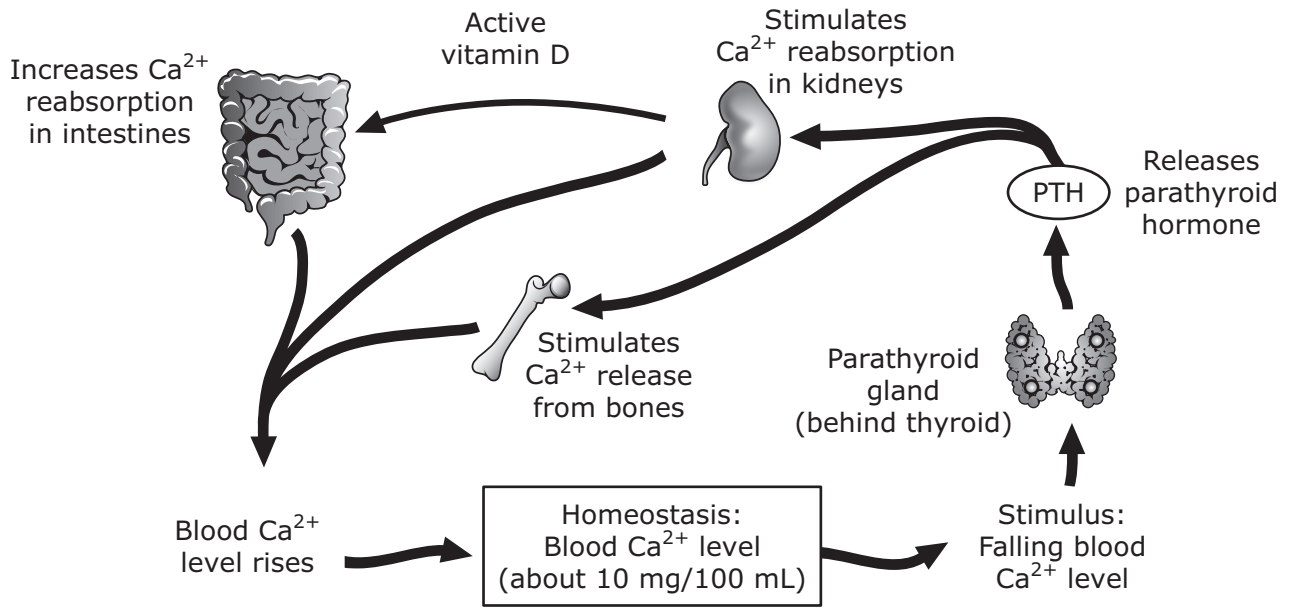
-
- 46** Some students used information they gathered from lab investigations to prepare a table. They entered the table in their lab notebooks.

Cell 1	Cell 2
Is smaller than 5 micrometers	Is larger than 10 micrometers
Does not have a nucleus	Has a membrane-bound nucleus
Does not have membrane-bound organelles	Has membrane-bound organelles
Has circular DNA	Has linear DNA

Which of these correctly identifies the two cells described in the table?

- F** Cell 1 is eukaryotic, and Cell 2 is prokaryotic.
- G** Cell 1 is prokaryotic, and Cell 2 is eukaryotic.
- H** Both Cell 1 and Cell 2 are eukaryotic.
- J** Both Cell 1 and Cell 2 are prokaryotic.

47 The diagram shows the internal feedback mechanism that maintains blood-calcium (Ca^{2+}) homeostasis.



If a person has a blood-calcium (Ca^{2+}) level of 8 mg/100 mL of blood, which of the following mechanisms does the body use to maintain blood-calcium homeostasis?

- A The kidneys take up more Ca^{2+} and release vitamin D.
- B The bones release Ca^{2+} .
- C The intestines increase reabsorption of Ca^{2+} .
- D All of the above

48 In dry desert areas poor drainage can lead to a buildup of salt in water supplies. A student performed an investigation to study the effects of salinity on the germination rates of seeds. The student placed seeds in several solutions containing 0% to 3% salt. The length of the radicle, which is the root of the germinating seed, ranged from 49 mm in the 0% salt solution to 0 mm in the 3% salt solution. The data from this investigation suggest that increased salinity in more areas may lead to a decrease in which of the following?

- F** Air pollution
- G** Food production
- H** Oceanic evaporation
- J** Nonrenewable resources

49 In the 1960s the molecular biologist George Streisinger developed the strand-slippage hypothesis. Streisinger noticed that mutations occurred in areas of DNA that contained many repeated sequences. When a strand-slippage error occurs, an insertion mutation can result. How does the insertion mutation affect the DNA?

- A** Nitrogenous bases are added.
- B** Nitrogenous bases are exchanged.
- C** Nitrogenous bases are damaged.
- D** Nitrogenous bases are deleted.

- 50** H1N1 flu is a highly contagious viral infection caused by the influenza A (H1N1) virus. The symptoms of H1N1 flu are listed in the box below. An antiviral agent administered within 48 hours of the appearance of symptoms can reduce the severity of the illness.

H1N1 Flu Symptoms

- Acute respiratory illness
- Fever
- Cough
- Sore throat
- Body aches
- Headaches
- Chills and fatigue
- Diarrhea and vomiting

Why is it important to administer an antiviral agent to an infected person within 48 hours of the appearance of symptoms?

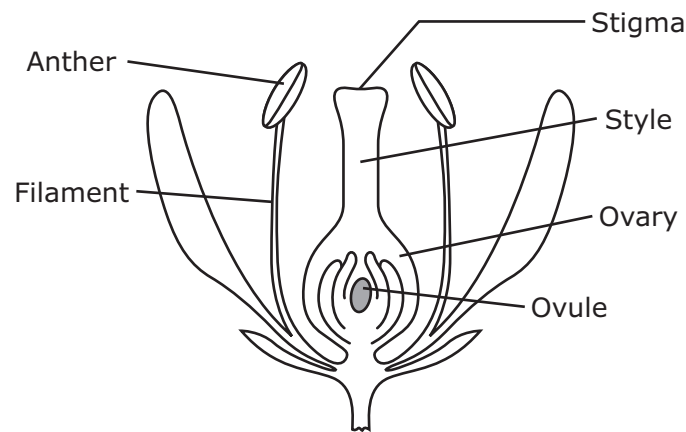
- F** The H1N1 virus is dormant in cells.
- G** The H1N1 virus replicates quickly.
- H** The H1N1 virus does not mutate.
- J** The H1N1 virus is transmitted through a vector host, such as a mosquito.

-
- 51** Normal fruit flies have brownish-yellow bodies, and this body color is dominant. A mutation in the gene for body color can produce flies with an ebony body color. A homozygous normal fruit fly (e^+e^+) is crossed with a homozygous ebony fruit fly (ee). What is the predicted outcome of this genetic cross?

- A** All the offspring will have ebony bodies.
- B** Of the offspring, 75% will have brownish-yellow bodies, and 25% will have ebony bodies.
- C** All the offspring will have brownish-yellow bodies.
- D** Of the offspring, 75% will have ebony bodies, and 25% will have brownish-yellow bodies.

- 52** Scientists can bioengineer skin in a laboratory to treat severe burns and other types of skin injuries. This bioengineered tissue is grown from living cells. The cellular process that enables the cells to grow and develop into tissue is —
- F** conjugation
 - G** meiosis
 - H** budding
 - J** mitosis

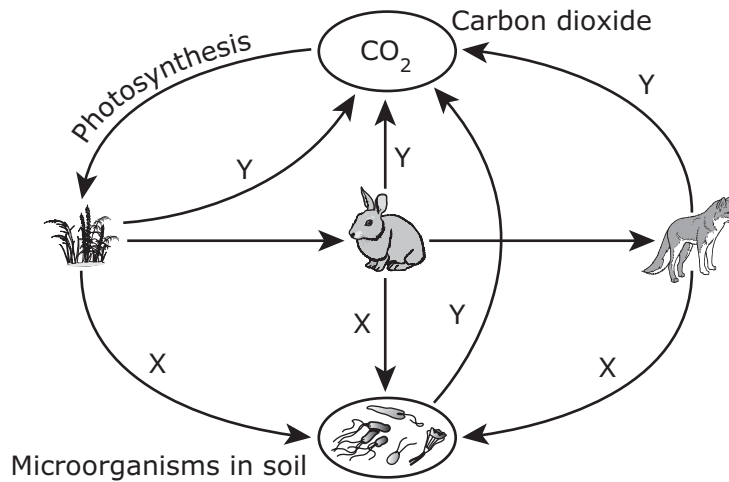
-
- 53** The diagram shows the reproductive system of a plant.



Which of the following best describes the interaction that occurs between a plant's reproductive parts during self-fertilization?

- A** Pollen is released from the anther and is transferred to the stigma. A pollen tube forms and grows through the style. The pollen tube reaches the filament, where the sperm fertilizes the egg.
- B** Pollen moves from the ovule up through the style and is released from the stigma. The pollen is transferred to the anther, where the sperm fertilizes the egg.
- C** Pollen is released from the anther and is transferred to the stigma. A pollen tube forms and grows through the style. The pollen tube reaches an ovule within the ovary, where the sperm fertilizes the egg.
- D** Pollen is released from the stigma and is transferred to the anther. A pollen tube grows down from the anther through the filament and fuses with the ovule, where the sperm fertilizes the egg.

- 54 The diagram shows the flow of organic molecules through an ecosystem. One process that occurs in this ecosystem is labeled X, and another process that occurs is labeled Y.



Which two processes are identified by the labels X and Y?

- F** X: Respiration
Y: Predation
- G** X: Adaptation
Y: Decomposition
- H** X: Fermentation
Y: Nitrogen fixation
- J** X: Decomposition
Y: Respiration

**STAAR
Biology
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