**Large-Type Edition**

**REGENTS HIGH SCHOOL EXAMINATION**

# LIVING ENVIRONMENT

**Wednesday,** August 20, 2025 — 12:30 to 3:30 p.m., only

**Student Name** _____

**School Name** _____

**The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.**

**Print your name and the name of your school on the lines above.**

**A separate answer sheet for multiple-choice questions in Parts A, B–1, B–2, and D has been provided to you. Follow the instructions from the proctor for completing the student information on your answer sheet.**

**You are to answer all questions in all parts of this examination. Record your answers for all multiple-choice questions, including those in Parts B–2 and D, on the separate answer sheet. Record your answers for all open-ended questions directly in this examination booklet. All answers in this examination booklet should be written in pen, except for graphs and drawings, which should be done in pencil. You may use scrap paper to work out the answers to the questions, but be sure to record all your answers on the answer sheet or in this examination booklet as directed.**

**When you have completed the examination, you must sign the declaration printed on your separate answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet cannot be accepted if you fail to sign this declaration.**

**Notice …**

**A four-function or scientific calculator must be available for you to use while taking this examination.**

**DO NOT START THIS EXAMINATION UNTIL THE SIGNAL IS GIVEN.**

## Part A

**Answer all questions in this part.** [30]

*Directions* (1–30): For *each* statement or question, record on the separate answer sheet the *number* of the word or expression that, of those given, best completes the statement or answers the question.

1 Which mechanism is used to maintain a stable internal environment in humans?

(1) use of guard cells to control water loss and gas exchange
(2) destruction of the immune system by the AIDS virus
(3) increased perspiration during periods of intense activity
(4) an allergic reaction to pollen from cats

2 Industrial processes often release lead and copper compounds into waterways, which could then have adverse effects on human health. Previously, methods to remove these compounds were expensive and often produced toxins themselves. Researchers have now found that minced banana peels are able to quickly absorb lead and copper from river water. In addition, banana peels are non-toxic and inexpensive. The use of the banana peels in this case is probably a

(1) poor use of resources, because it introduces a new organism into the ecosystem
(2) trade-off, because the more toxic methods might still be used
(3) simple proposal, which will increase the costs of cleaning up the waterways
(4) good use of resources, which can help to restore a natural ecosystem

3 Which abiotic factor would most directly limit the size of a gray squirrel population?

(1) variety of food sources
(2) number of predators
(3) availability of water in the forest
(4) amount of nitrogen in the atmosphere

4 Human chromosomes differ from the chromosomes of fruit flies in that human chromosomes

(1) are made from only four kinds of bases
(2) contain only 46 genes
(3) may be involved in both mitosis and meiosis
(4) have different sequences of bases

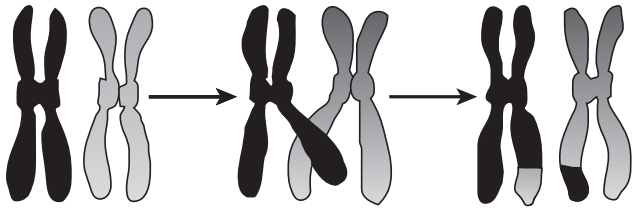
5 One major benefit of the use of water power is that it

(1) does not produce a significant amount of carbon dioxide as a waste product
(2) increases the production of oxygen in the atmosphere
(3) has no impact on the rivers that are used
(4) increases the recycling of nutrients

6 Adding chlorine to drinking water in many modern cities has been credited with reducing outbreaks of diseases, such as cholera. Some scientists claim that adding chlorine may result in by-products in the water that may very slightly increase the risk of cancer. The decision to add chlorine to drinking water most likely involved

(1) an assessment of trade-offs
(2) the elimination of genetic diseases
(3) the removal of all pathogens from water
(4) the disruption of dynamic equilibrium in ponds

7 The diagram below represents a process that can occur when chromosomes are copied in sexually reproducing organisms.



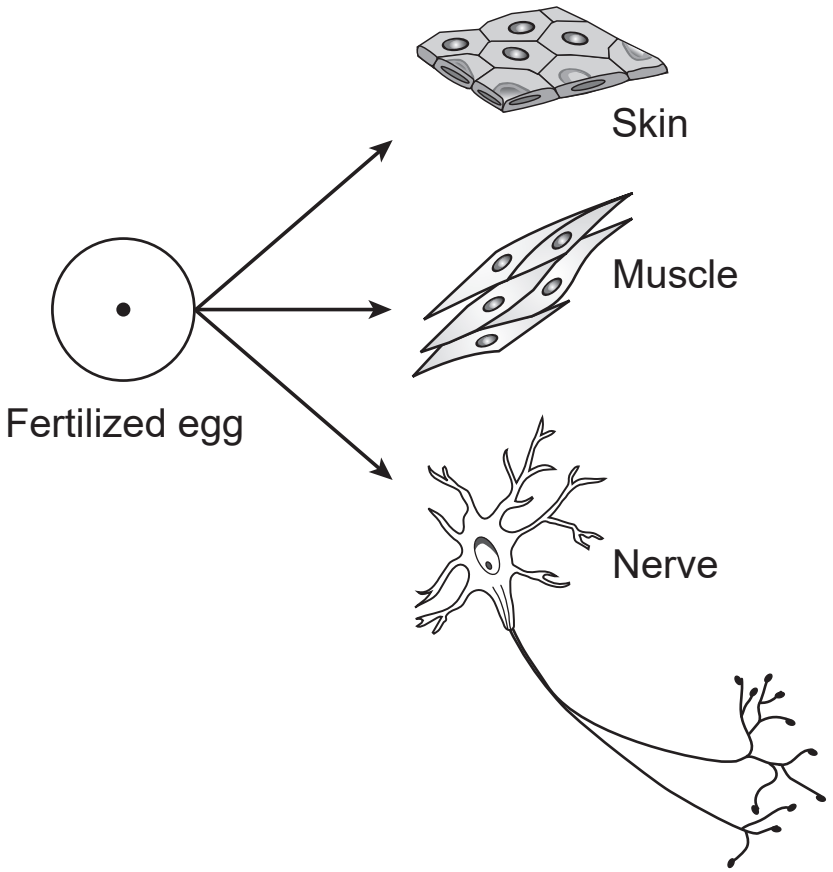
One result of this process is

(1) an increase in the number of chromosomes in the cell to double its original number
(2) an increase in the number of new gene combinations that can be passed on to offspring
(3) an elimination of mutations in reproductive cells and zygotes
(4) the formation of new genes that will decrease variation in future generations

8 Scientists initially studying the decline of certain penguin populations in Antarctic regions found that the penguins' food source, a small animal known as krill, had dropped by 80%. These scientists are now studying the reduction in the number of tiny photosynthetic organisms that are the food source of the krill. The decline of the penguin population was a direct effect of the disruption of a

(1) parasitic relationship
(2) biosphere
(3) food chain
(4) mechanism of evolution

9 The diagram below represents a process that occurs during the development of human body cells.




Which statement is correct regarding these cells?

(1) The fertilized egg and other types of cells all have the same DNA.

(2) The fertilized egg contains half the genetic information of the other types of cells.

(3) Each cell contains only the genetic information necessary for its particular function.

(4) The body cells undergo mitosis and the fertilized egg undergoes meiosis.

10 Which situation would most likely lead to increased diversity in a species?

(1) A population of birds with high variation migrates to a group of islands with different environmental conditions.

(2) Selective breeding is used to develop a species that is only able to live in very specific environmental conditions.

(3) An ecosystem containing few species experiences many centuries of stable climatic conditions.

(4) Asexual reproduction is used to produce more plants of a certain species.

11 Some allergies are inherited. Allergic reactions are often much less severe in adults who were exposed to the allergen (the substance causing the reaction) during infancy. What does this show about some inherited traits?

(1) The effect of allergens can never be predicted.
(2) Developing allergies requires genes from both parents.
(3) Allergies are always caused by DNA.
(4) Gene expression can be influenced by environmental conditions.

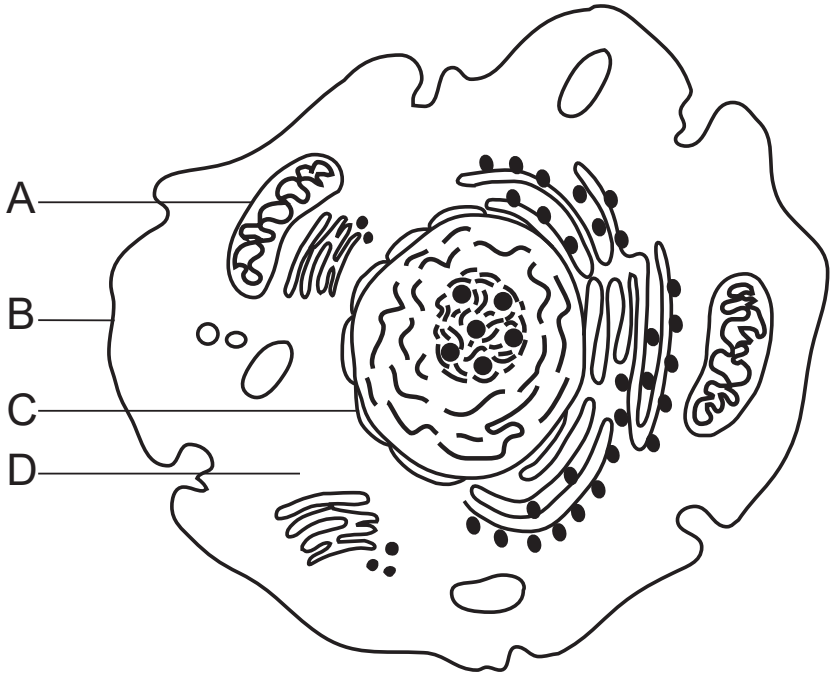
12 A tall building is built on an empty lot. The new building blocks the sunlight on nearby streets for most of the day. Trees and plants grow more slowly or die off because the building has interfered with a

(1) removal of water from the atmosphere
(2) production of finite resources
(3) recycling of solar energy
(4) process that produces organic compounds

13 The Madagascar rose periwinkle, a species of rainforest flower that was used to treat cancer, is now endangered in its native habitat due to deforestation. Continuing the destruction of rainforests is likely to have a negative impact on future medical discoveries because it could cause a decrease in the

(1) growing season for rainforest species
(2) biodiversity of the rainforest ecosystem
(3) land available to cultivate new plants
(4) amount of carbon dioxide in the atmosphere

14 The letters in the diagram below indicate some parts of a cell.



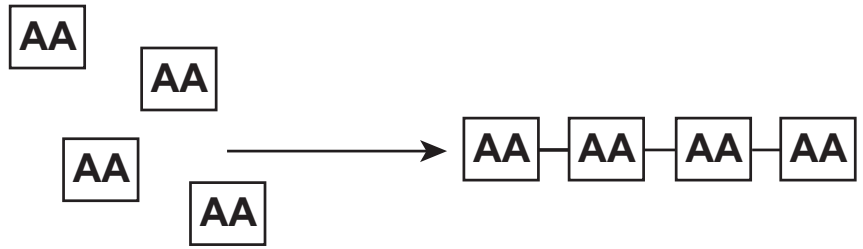

Which structure provides the energy needed for protein synthesis?

(1) *A*
(2) *B*
(3) *C*
(4) *D*

15 One reason why some organisms, such as insects, evolve much faster than others is because they

(1) undergo physical changes during development
(2) have very short reproductive cycles
(3) are sometimes exposed to predators that cause mutations
(4) produce offspring only by asexual reproduction

16 The diagram below represents a metabolic process involving amino acids represented by *AA*.




Where in a cell would this process most likely take place?

(1) ribosome
(2) mitochondrion
(3) chloroplast
(4) vacuole

17 Fossil fuels are considered nonrenewable because

(1) oil and coal are being used at an increasing rate
(2) people are becoming more interested in buying energy-efficient vehicles
(3) oil and coal are no longer being formed at a significant rate
(4) Earth's supply of nuclear fuels is finite

18 The male emperor penguin cares for his unhatched egg for a long period of time by resting it upon his feet and against his body. This behavior in the male penguins most likely developed over time because the behavior

(1) attracted female penguins for mating
(2) increased the rate of natural selection
(3) increased reproductive success
(4) led to increased predation

19 Many advertisements warn pregnant women of the dangers of exposure to certain risk factors because these factors may

(1) cause mutations in the ovary of the mother and thus change the genetic makeup of the developing fetus
(2) cause mutations in the blood cells of the mother and thus change the genetic makeup of the fetus
(3) cause changes in the stomach cells of the mother, which would result in a clone of her fetus
(4) cause organs in the fetus to develop abnormally

20 When a colony of bacteria was exposed to a particular antibiotic, some of the bacteria survived while others did not. Which concept is supported by this example?

(1) Biotic factors in the environment influence gene expression.
(2) Favorable mutations occur as a result of environmental changes.
(3) Overproduction limits genetic variation.
(4) Some variations in a population have an adaptive value.

21 When uncooked meat is tenderized using pineapple juice, specific organic molecules in the meat are broken down. This reaction occurs because the pineapple juice most likely contains

(1) antibodies that preserve the meat
(2) hormones that influence cell division
(3) enzymes that alter the structure of proteins
(4) sugars that metabolize starches

22 One factor that might threaten global stability and alter the equilibrium in an ecosystem is increasing

(1) the rate of reforestation
(2) biodiversity
(3) recycling
(4) the rate of climate change

23 Which group of organisms would be at the greatest risk of extinction if they were infected by a deadly virus?

(1) a small population of a bird species found only on Martha's Vineyard island
(2) a population of squirrels living in Los Angeles, California
(3) all pigeons living in parks in Florida
(4) all the rabbits living in Kinderhook, New York

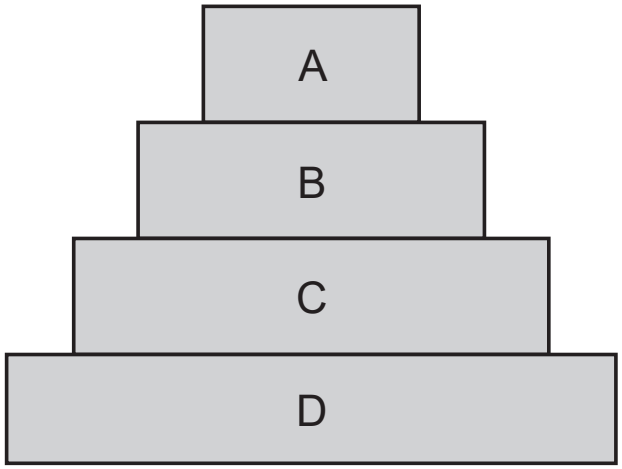
24 When a person gets a tattoo and the needle used is contaminated with a pathogen, how does the human immune system respond?

(1) It produces hormones.
(2) It digests white blood cells.
(3) It produces more white blood cells.
(4) It digests antibiotics.

25 Which row in the chart below correctly pairs the life function with the cell structure and organ that carry out the function?

| Row | Life Function | Cell Structure and Organ |
|---|---|---|
| (1) | excretion | cell membrane and lung |
| (2) | coordination | mitochondrion and pancreas |
| (3) | transport | chloroplast and heart |
| (4) | synthesis | ribosome and stomach |

26 Wolves are carnivores and no organism in their ecosystem preys on them. Which level would they occupy in the energy pyramid shown below?

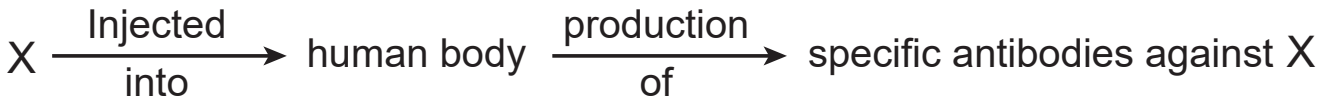



(1) *A*
(2) *B*
(3) *C*
(4) *D*

27 Extinction has been a part of the history of Earth for over 3 billion years. Most of the species that have lived on Earth no longer exist. One reason the extinction of species is so common is that

(1) Earth has experienced many environmental changes
(2) species that are unable to adapt evolve into new species
(3) environmental changes cause harmful mutations in species
(4) most species on Earth reproduce asexually, producing few offspring

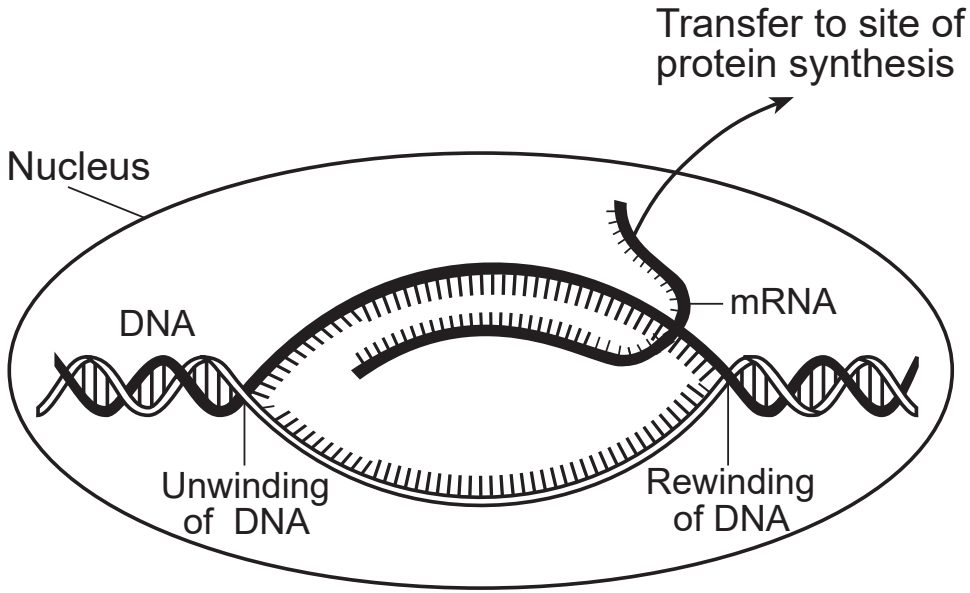
28 The diagram below shows steps in the vaccination of an individual.




Substance *X* most likely contains

(1) white blood cells
(2) weakened microbes
(3) hormones
(4) ATP

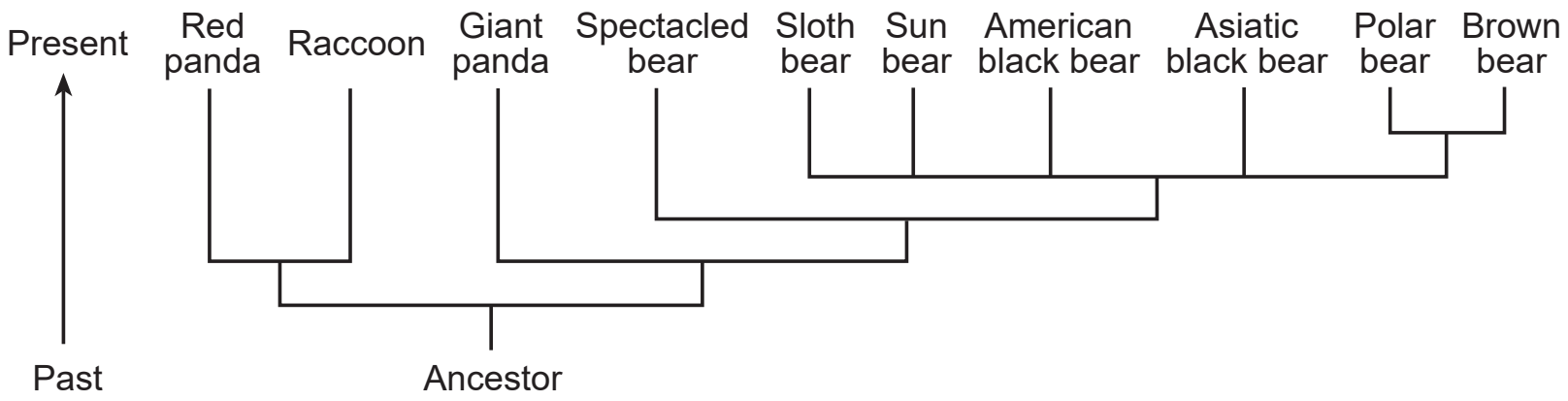
29 The diagram below represents a process that occurs in a cell.




In this process, DNA serves as a

(1) code for meiotic cell division
(2) template required in protein synthesis
(3) code for protein division
(4) template for DNA replication

30 The diagram below shows the relationships between some present-day species of bear.




Which statement best explains why so many bear species arose from a single ancestor?

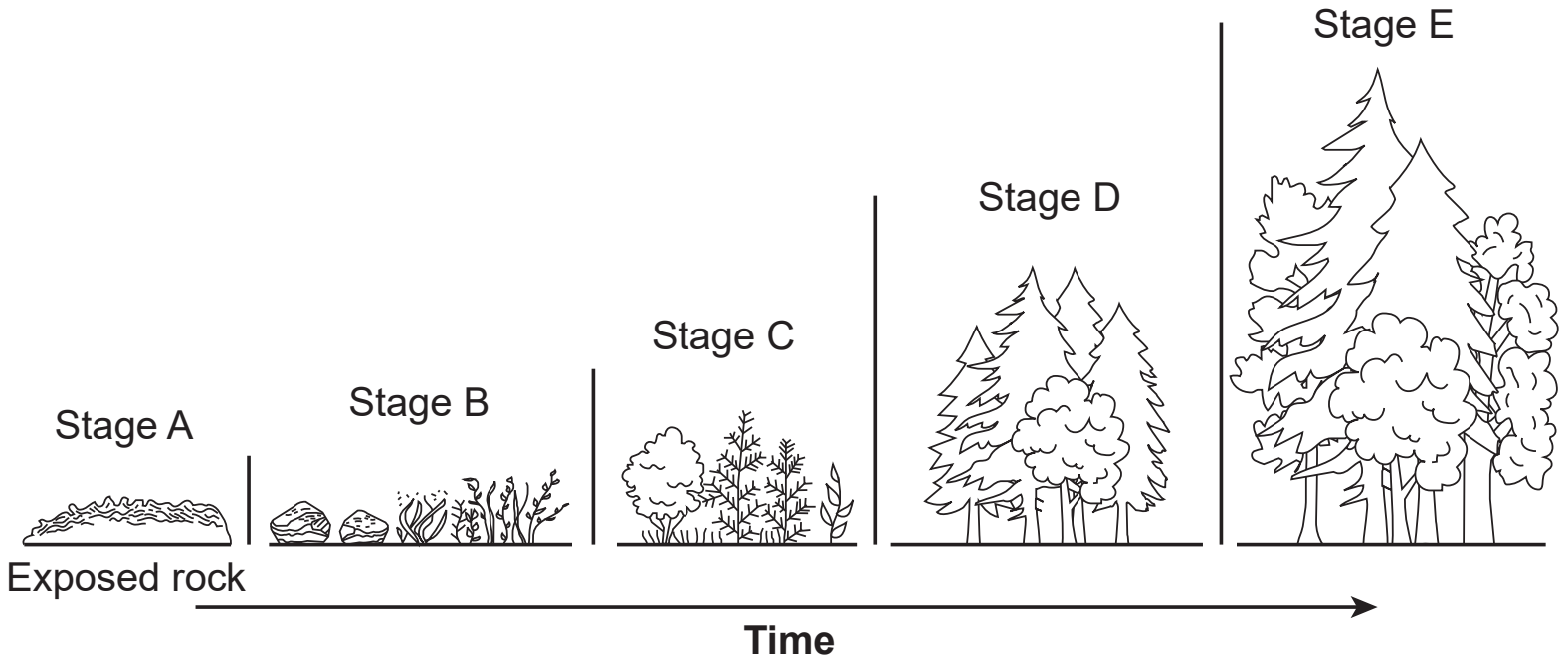
(1) Genetic changes took place within populations because their environment was threatened.
(2) The environment got colder, so bear populations needed to change in order to survive.
(3) The environment selected for some genetic changes within bear populations.
(4) The environment changed genes so that species could survive.

## Part B–1

**Answer all questions in this part.** [13]

*Directions* (31–43): For *each* statement or question, record on the separate answer sheet the *number* of the word or expression that, of those given, best completes the statement or answers the question.

Base your answer to question 31 on the process represented in the diagram below and on your knowledge of biology.




31 The diagram represents the process of

(1) evolution
(2) cultivation
(3) energy transfer
(4) ecological succession

The table below shows the levels of glucose in blood samples taken from two individuals. Samples were taken over a five-hour period, starting right after they ate an average meal. The levels were compared to a medical standard range for blood glucose.

**Glucose in Blood Samples** (mg/100 dl)

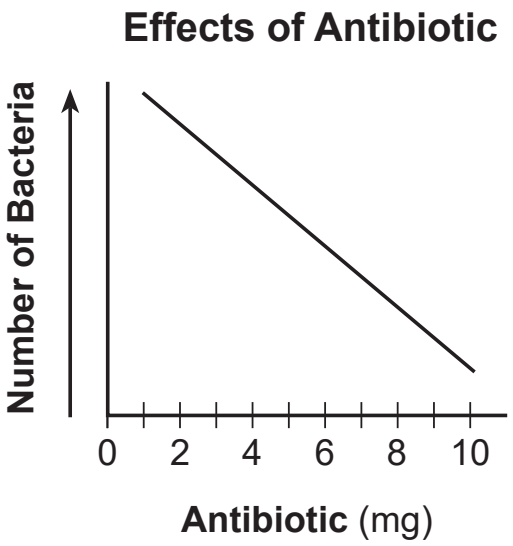
| Time (hours) | Medical Standard Range | Individual 1 | Individual 2 |
|---|---|---|---|
| 0.0 | 80–110 | 75 | 75 |
| 0.5 | < 150 | 120 | 135 |
| 1.0 | < 160 | 140 | 200 |
| 2.0 | 80–110 | 90 | 150 |
| 3.0 | 80–110 | 75 | 120 |
| 4.0 | 80–110 | 60 | 115 |
| 5.0 | 80–110 | 75 | 110 |

Note: < represents less than

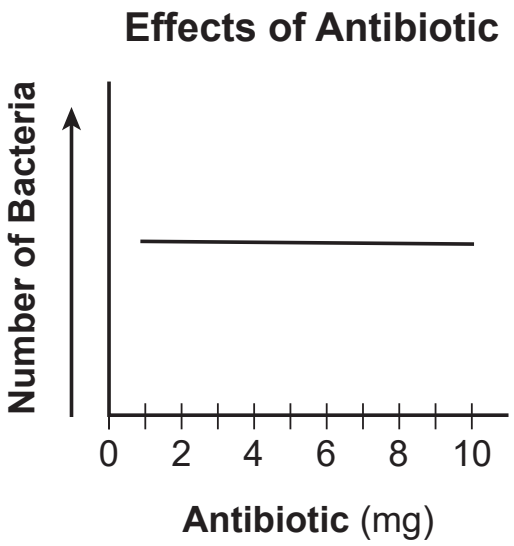
32 The information in the data table best represents regulation by means of

(1) an antigen-antibody reaction
(2) an allergic reaction
(3) a feedback mechanism
(4) an immune response

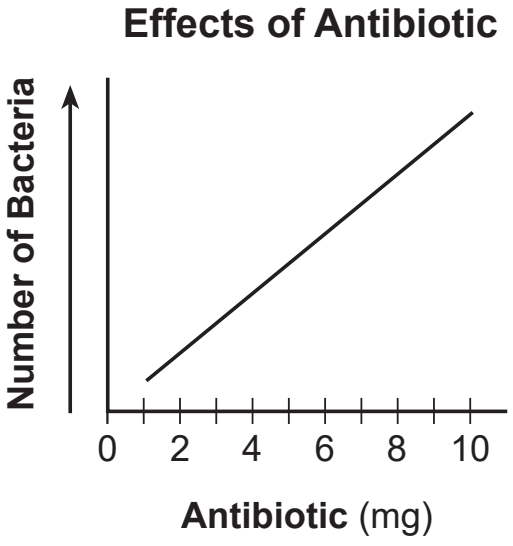
33 Which graph indicates that increasing the amount of antibiotic most effectively reduces the population of bacteria?



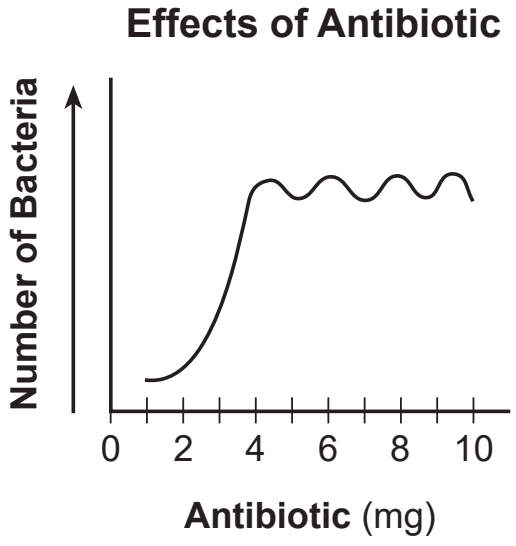

( 1 )




( 3 )




( 2 )




( 4 )

34 A biologist conducted a survey to determine the number of different species of organisms found in each of three different ecosystems. The data are shown in the table below.

**Species in Three Different Ecosystems**

| Type of Species | Ecosystem 1 | Ecosystem 2 | Ecosystem 3 |
|---|---|---|---|
| plant | 14 | 6 | 10 |
| animal | 11 | 3 | 5 |
| fungus | 10 | 12 | 8 |
| bacteria | 35 | 28 | 21 |

All three ecosystems experienced large-scale environmental change. Which statement describes the most likely outcome?

(1) All species in ecosystem 2 would survive because it has the greatest number of decomposers.
(2) Ecosystems 2 and 3 would become extinct due to a lack of biodiversity.
(3) Ecosystem 1 would be able to maintain stability because it has the highest level of biodiversity.
(4) The three ecosystems would merge to produce one ecosystem that is more stable.

35 Bacteria are often used to study how genetic codes function in organisms. One reason these studies are useful is that

(1) all organisms contain the same genetic codes for the production of the same enzymes as bacteria
(2) bacteria use the same molecular bases in their genetic code as other organisms
(3) only bacterial DNA molecules are duplicated in the same way as the DNA molecules of complex organisms
(4) bacterial DNA codes for all of the same traits that are found in complex organisms

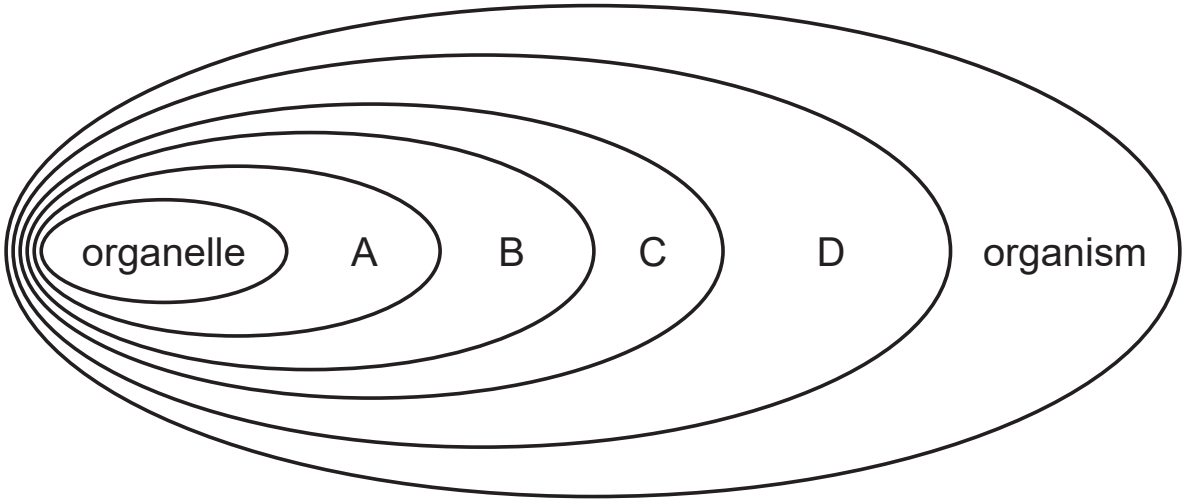
36 A process known as acidification (lowering the pH) has been increasing in the oceans since the Industrial Revolution began. Acidification is related to the amount of carbon dioxide that dissolves in the oceans. *One* possible cause of the increase in carbon dioxide levels over the years is

(1) the production of ozone in the upper atmosphere
(2) an increase in the use of fuels such as gasoline and coal
(3) an increase in the development of nuclear power plants
(4) the use of cars powered by electricity and solar cells

37 In preparing the results of an experiment for publication, the use of a peer review committee would help the researcher to

(1) add new conclusions based on different data
(2) make conclusions based on the opinions of the group
(3) restate the hypothesis as an inference
(4) analyze and evaluate the experimental data

38 The levels of organization for structure and function in living things are shown below.



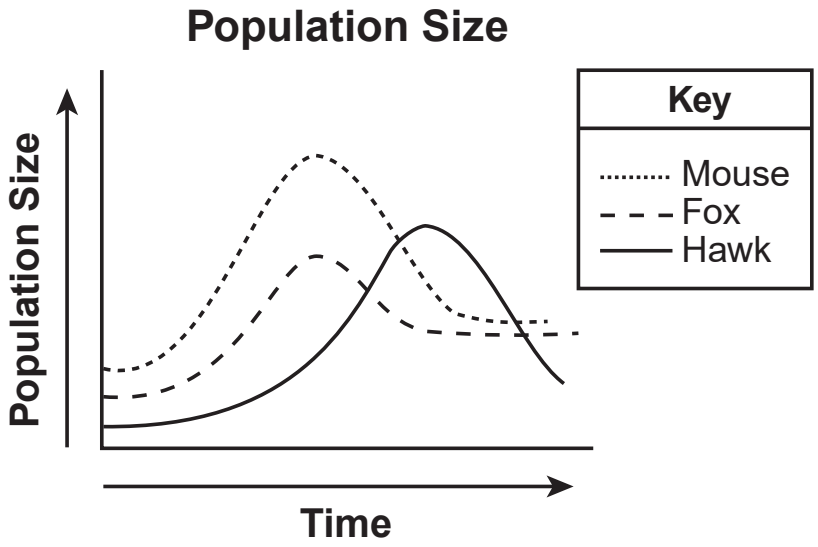

Which choice correctly identifies one of these levels?

(1) *A* is tissue.
(2) *B* is an organ.
(3) *C* is a cell.
(4) *D* is an organ system.

39 Scientists have inserted genes into potato plants, which enable the potatoes to produce a specific vaccine. The technology used to develop the potatoes that produce this vaccine involves

(1) manipulating DNA to alter gene combinations
(2) use of radiation to change genes within an organism
(3) selectively breeding organisms that have both plant and animal traits
(4) developing organisms that contain DNA

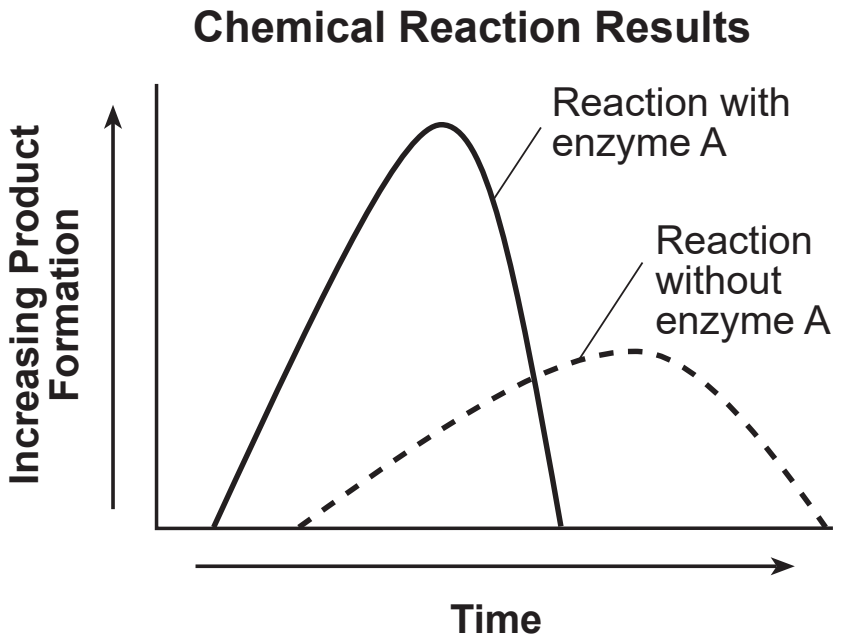
40 Changes in the size of the populations of three different species are shown in the graph below.




Which statement is a valid inference, based on information in the graph?

(1) The fox population is not affected by the population of mice or hawks.
(2) The hawk population increased due to an increase in the population of mice.
(3) The mouse population increased because there were more seeds.
(4) The fox population decreased because the hawks decreased in number.

41 The graph below represents data obtained from an experiment involving a certain chemical reaction.

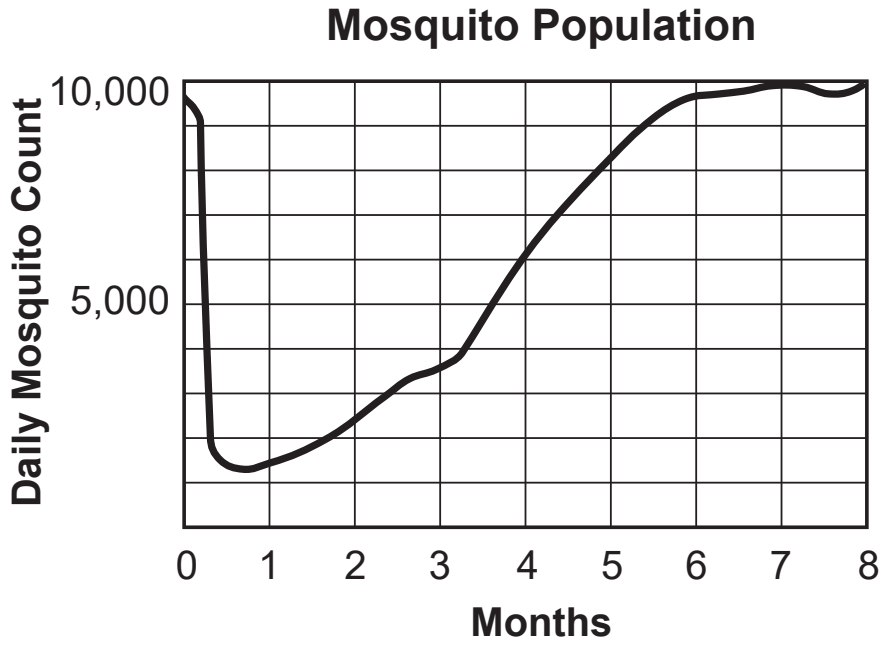



Which statement is a valid conclusion based on information in the graph?

(1) Enzyme shape influences how enzymes function.
(2) Enzyme action is influenced by pH.
(3) Enzyme *A* affects the rate of chemical change.
(4) Enzyme *A* transforms wastes.

**GO RIGHT ON TO THE NEXT PAGE ⇨**

Base your answers to questions 42 and 43 on the graph below and on your knowledge of biology. The graph shows the number of mosquitoes in a certain mosquito population living in a rainforest ecosystem that was sprayed with an insecticide during the first month of an 8-month study.



42 Which statement represents the most likely explanation for the changes in the mosquito population shown in the graph during months 0-5?

(1) The population had many natural variations that directly caused the initial decline, and it never recovered.
(2) Some mosquitoes survived, reproduced, and the population was restored.
(3) Some individual mosquitoes had harmful mutations, but those genes were later repaired.
(4) In the first month, the population was facing extinction and needed to reproduce in greater numbers.

43 If the mosquitoes in the initial population were compared to the mosquitoes surviving after seven months, the mosquitoes would most likely differ slightly in

(1) their genetic makeup
(2) abiotic requirements
(3) their role in the food chain present in the ecosystem
(4) the age at which any young mosquitoes can reproduce

## Part B–2

**Answer all questions in this part.** [12]

*Directions* (44–55): For those questions that are multiple choice, record on the separate answer sheet the *number* of the choice that, of those given, best completes each statement or answers each question. For all other questions in this part, follow the directions given and record your answers in the spaces provided in this examination booklet.

Base your answers to questions 44 through 48 on the information and data table below and on your knowledge of biology.

Students carried out an investigation to determine the time needed to digest egg protein. They used an enzyme similar to one found in the stomach. Four grams of cooked egg white, which is mainly protein, were placed in a test tube and 15 milliliters of a solution containing the enzyme were added to the tube. The test tube was kept at 37°C for 20 hours.

The percentage of protein that was digested over the 20-hour time period was recorded, and this information is shown in the table below.

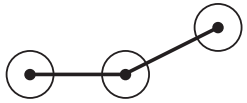
**Digestion of Egg Protein Over Time**

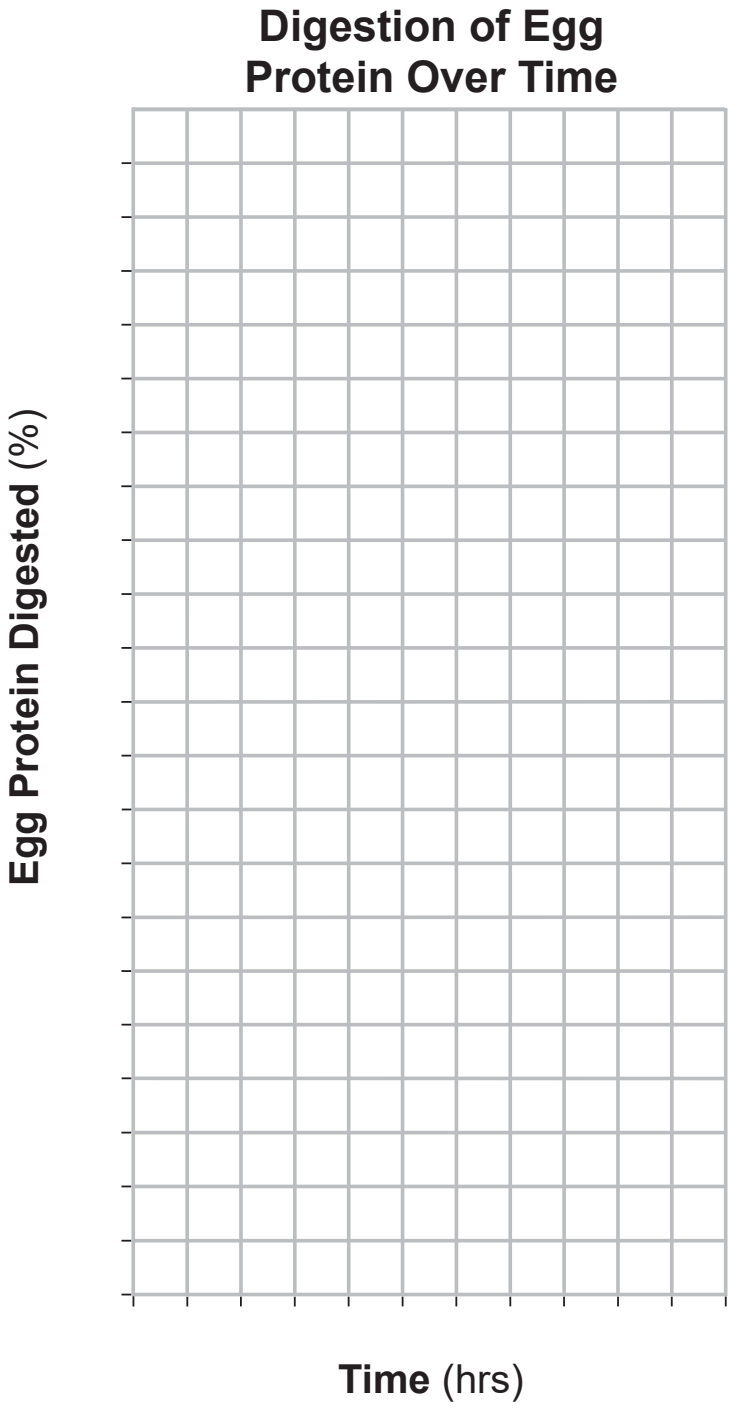
| **Time** (hrs) | **Egg Protein Digested** (%) |
|---|---|
| 0 | 0 |
| 4 | 12 |
| 8 | 28 |
| 12 | 56 |
| 16 | 70 |
| 20 | 82 |

*Directions* (44–45): Using the information in the data table, construct a line graph on the grid provided, following the directions below.

44 Mark an appropriate scale, without any breaks, on each labeled axis. [1]

45 Plot the data on the grid. Connect the points and surround each point with a small circle. [1]

Example: 


Digestion of Egg Protein Over Time
Egg Protein Digested (%)
Time (hrs)

46 State *one* change that could be made to improve the design of this investigation. [1]

47 During which time period was the greatest amount of egg protein digested?

(1) 0–4 hours
(2) 4–8 hours
(3) 8–12 hours
(4) 16–20 hours

48 The same investigation was repeated at a higher temperature. It was expected that more protein would be digested in less time; however, no protein was digested. State *one* possible reason for this result. [1]

49 A company makes a claim about the effectiveness of a new product. Which situation would make the claim *invalid*?

(1) A large amount of test data was collected during field tests of the product.
(2) A review of the product was conducted by a scientific journal.
(3) Conclusions stated about the product were not supported by the data.
(4) Repeated tests of the new product had similar results.

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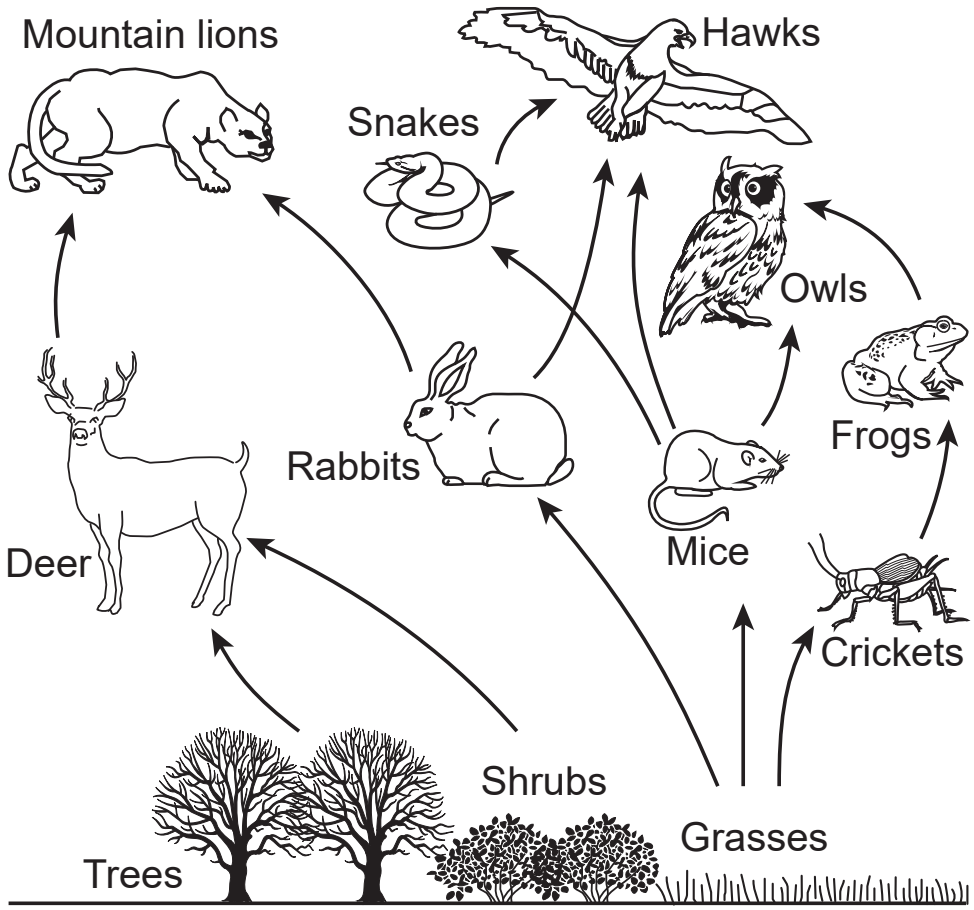
Base your answers to questions 50 through 52 on the diagram of a food web below and on your knowledge of biology.



50 Which statement best describes the effect of a *decrease* in the mouse population on another population in the food web?

(1) The snake population would increase.
(2) The cricket population would be unaffected.
(3) Owls would eat more frogs.
(4) Hawks would eat more deer.

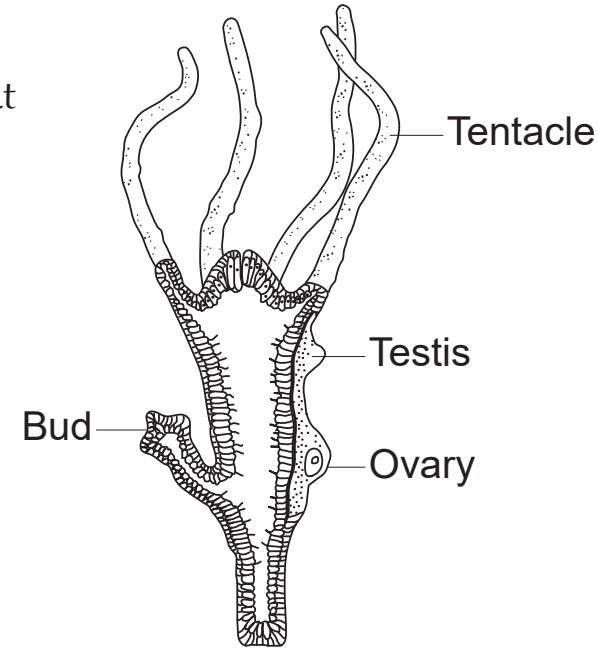
51 Describe the role of the Sun in maintaining this food web. [1]

52 Identify *one* organism from the food web that carries out *both* photosynthesis and respiration. [1]

Base your answers to questions 53 and 54 on the information below and on your knowledge of biology.

Hydra are small aquatic animals that attach themselves to vegetation and rocks in freshwater habitats. They can reproduce by:

- Process *A*: producing an outgrowth known as a bud that later separates from the parent
- Process *B*: producing sperm and eggs that are released in the water



Hydra

53 State which process, *A* or *B*, results in an increase in genetic variation. Support your answer. [1]

Process: _____

_____

_____

54 Explain the importance of having genetic variations in a species. [1]

55 The State of New York is currently banning the transport of untreated firewood, partially due to the presence of the emerald ash borer. The ash borer is an invasive insect that can destroy acres of ash trees. The larvae chew through the bark and damage tissues important to the growth of the tree. State *one* environmental reason for a ban on the transport of untreated firewood. [1]

## Part C

**Answer all questions in this part.** [17]

*Directions* (56–72): Record your answers in the spaces provided in this examination booklet.

Base your answers to questions 56 and 57 on the information below and on your knowledge of biology.

### Acetylcholine Receptors

Acetylcholine receptors are found on the cell membranes of muscle cells. Produced by nerve cells, acetylcholine is an important molecule that allows for communication between nerve and muscle cells.

Many organisms produce poisons that block acetylcholine receptors, causing an inability for muscles to move. An example of this is a neurotoxin found in cobra venom. Cobra venom contains a molecule that blocks acetylcholine molecules from binding to receptors on the diaphragm muscle cells of the prey. The diaphragm is a muscle that controls breathing.

56 State *one* life function that would be affected by cobra venom and explain why it would be affected. [1]

57 Explain how cobra venom interferes with cellular communication. [1]

Base your answers to questions 58 through 60 on the information below and on your knowledge of biology.

The immune system protects the body in multiple ways, one of which is through the swelling of tissue. Upon injury, histamine is released which causes swelling. Swelling helps to prevent an infection from spreading throughout the body. The greater the histamine level, the greater the swelling. Sometimes, harmless substances, such as pollen, will cause histamine to be released and swelling to occur.

The data table below shows the pollen level in the air and the histamine levels in a student for two months in the summer.

**Pollen Levels and Student Histamine Levels for Two Months**

| **Date** | **Tree Pollen** | **Grass Pollen** | **Ragweed Pollen** | **Histamine Level** (mg/mL) |
|---|---|---|---|---|
| 6/30 | high | low | none | 0.3 |
| 7/4 | high | moderate | none | 0.5 |
| 7/19 | moderate | high | none | 0.3 |
| 8/15 | low | moderate | low | 1.2 |
| 8/30 | none | low | high | 2.5 |

58 Identify the type of pollen that caused the greatest histamine level in the student. [1]

_____

59 Explain why exposure to pollen caused the student to have increased histamine levels. [1]

_____

_____

60 Describe *one* way, other than swelling, that the immune system protects the body. [1]

_____

_____

_____

Base your answers to questions 61 through 63 on the information below and on your knowledge of biology.

**Insulin Then and Now**

Before 1978, diabetics were given insulin obtained from animals such as pigs or cows. Scientists then began making human insulin using recombinant DNA technology, where copies of the gene for human insulin are put into bacteria. The bacteria then produce human insulin.

61 Copies of the human gene for insulin are removed from human cells before being placed in bacteria. Identify the specific kind of molecule that is used to cut and transfer the genes. [1]

_____

62 Explain why all the offspring produced by the altered bacteria should be able to make human insulin. [1]

_____

_____

_____

63 State *one* reason why the use of the insulin made by the bacteria might be an advantage for diabetics compared to using insulin obtained from animals. [1]

_____

**GO RIGHT ON TO THE NEXT PAGE ⇨**

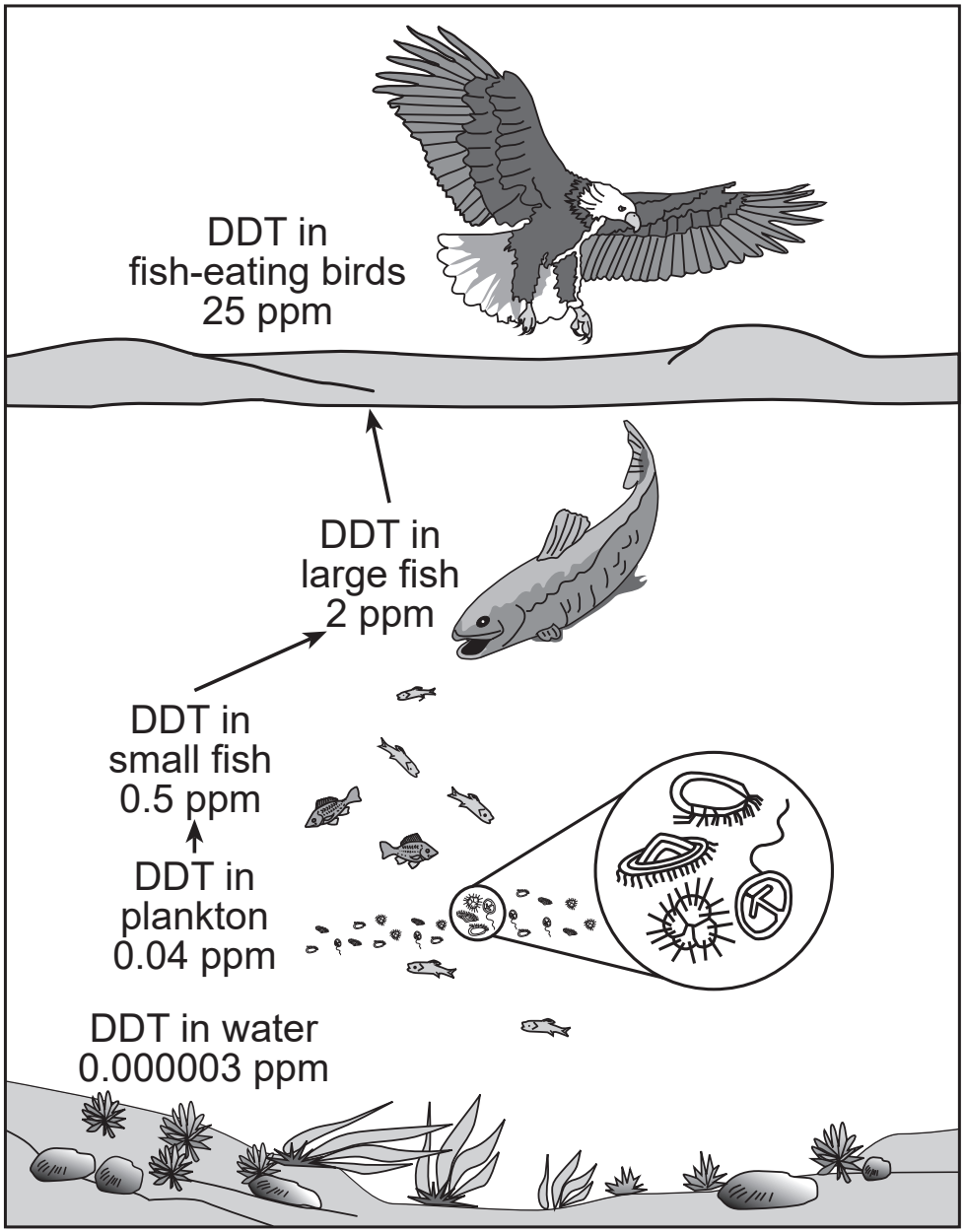
Base your answers to questions 64 through 66 on the diagram, graph, and information below and on the following pages, and on your knowledge of biology.

**Biomagnification of DDT**

From the 1940s until the 1970s, DDT was used to control mosquitoes spreading malaria and lice transmitting typhus, both of which are diseases that might be fatal. The use of DDT resulted in dramatic reductions in the number of people with these diseases.

When DDT enters an aquatic environment, it is taken in by microscopic organisms (plankton) that are eaten by aquatic animals. The DDT is stored in the fatty tissues of aquatic animals, rather than being excreted. This is how DDT becomes part of the food chain.

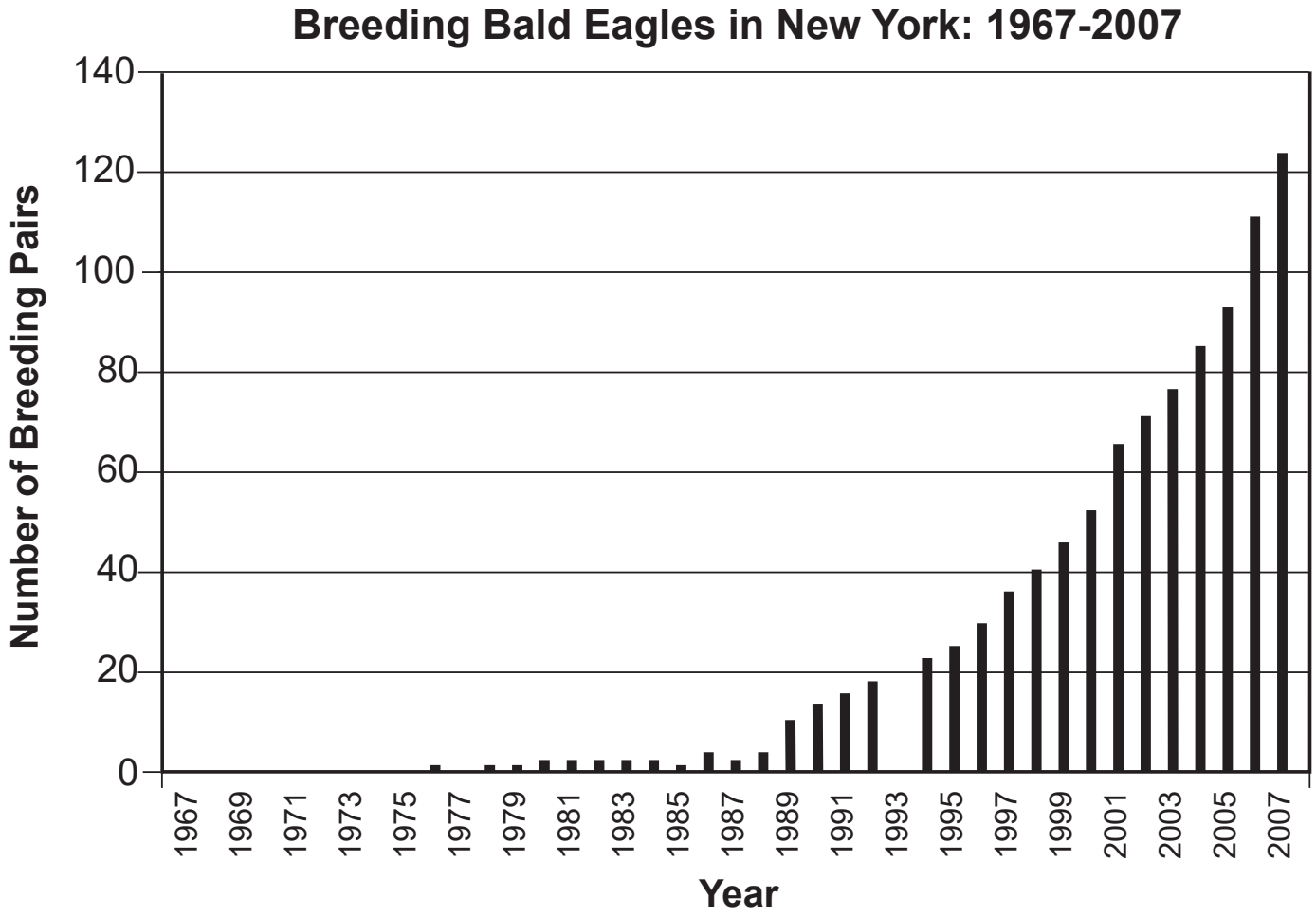
The bald eagle population in New York State began declining in the early 1900s, and by 1952, bald eagles were rare. Scientists learned that this was partially due to the extensive use of DDT. DDT and several other pesticides inhibited eagle reproduction by making the shells of their eggs too thin to support the weight of parent birds attempting to incubate the eggs. The shells broke and the young did not survive. By 1974, the New York State population consisted of a single, non-reproducing pair in Livingston County.


DDT in
fish-eating birds
25 ppm
DDT in
large fish
2 ppm
DDT in
small fish
0.5 ppm
DDT in
plankton
0.04 ppm
DDT in water
0.000003 ppm

64 Explain why the concentration of DDT in the tissues of the animals in this food chain increases (biomagnification) at each level. [1]

**GO RIGHT ON TO THE NEXT PAGE ⇨**

The graph below shows the changes in the New York State bald eagle population from 1967 to 2007.



65 What is the most likely value for the missing data from 1993? [1]

_____

66 The domestic use of DDT was banned in the United States in 1972. Based on the data in the graph, has this ban been successful? Support your answer. [1]

_____

_____

_____

_____

67 Explain how the banning of DDT is an example of a trade-off. [1]

68 State *one* specific action, other than removing DDT from the environment, that will help ensure that the eagle population will continue to increase. [1]

Base your answers to questions 69 through 71 on the passage below and on your knowledge of biology.

**Flying Carp**

The flying carp is a foreign fish that has been introduced by humans into American rivers. These fish feed on native fish populations and some of the same food sources as many native fish populations.

69 Identify *one* relationship that exists between the flying carp and the native fish population. [1]

_____

70 State *one* reason why the flying carp might be successful in the new environment. [1]

_____

71 State *one* specific effect the introduction of flying carp may have on the future of American river ecosystems. [1]

_____

_____

Base your answer to question 72 on the information below and on your knowledge of biology.

**Blackcap Migrations**

The common practice of feeding birds during the winter can have a profound effect on the evolutionary future of a species. Scientists have been studying the blackcap, a bird that is widespread throughout northern Europe. They observed that the original population had split into two groups. These two groups, even though they inhabit the same forests for part of the year, are now unable to interbreed.

Researchers have noticed that, in recent years, large numbers of these birds are spending the winter in backyards and gardens in southern England, instead of migrating to areas around the Mediterranean. It is thought that the easy availability of food from bird feeders compensates for the less-than-desirable climate. It has been reported that those birds wintering in England tend to mate with each other and avoid the birds that spend the winter in warmer areas.

Differences between the two groups are becoming more and more obvious. The wings of blackcaps spending the winter in England are becoming rounder. This allows them to maneuver better, but limits the distance they can fly. Their beaks are longer and narrower than the beaks of the other group, enabling them to more easily feed on the seeds in feeders. The other group feeds on small fruits and insects.

72 State a likely reason why some of the blackcaps that had traditionally migrated to the Mediterranean are now wintering in southern England. [1]

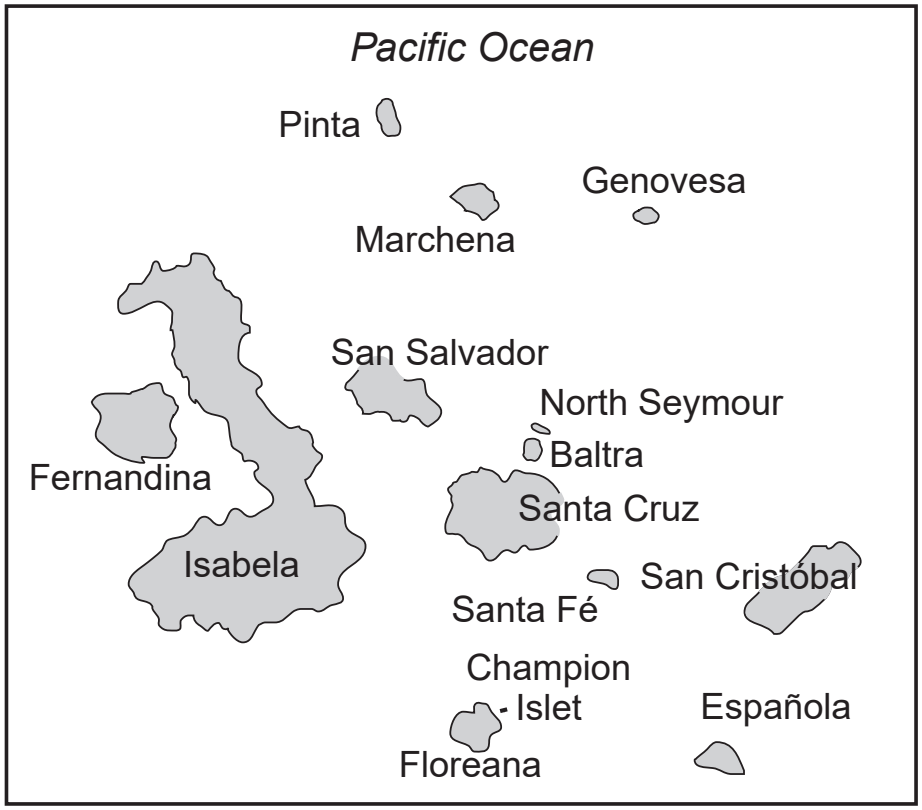
**GO RIGHT ON TO THE NEXT PAGE ⇨**

## Part D

**Answer all questions in this part.** [13]

*Directions* (73–85): For those questions that are multiple choice, record on the separate answer sheet the *number* of the choice that, of those given, best completes each statement or answers each question. For all other questions in this part, follow the directions given and record your answers in the spaces provided in this examination booklet.

Base your answers to questions 73 and 74 on the map below and on your knowledge of biology. The map shows the Galapagos Islands, which is a group of volcanic islands located 600 miles off the coast of South America in the Pacific Ocean.



**Note: The answer to question 73 should be recorded on your separate answer sheet.**

73 Finches found living on Pinta Island have different beak structures than finches found on Española Island. The most likely explanation for these differences is that the

(1) finches on each island evolved from the same original ancestors
(2) finches on each island adapted to different niches
(3) resources necessary for the survival of finches were found only on one island
(4) the environment of the islands changed, depending upon the season

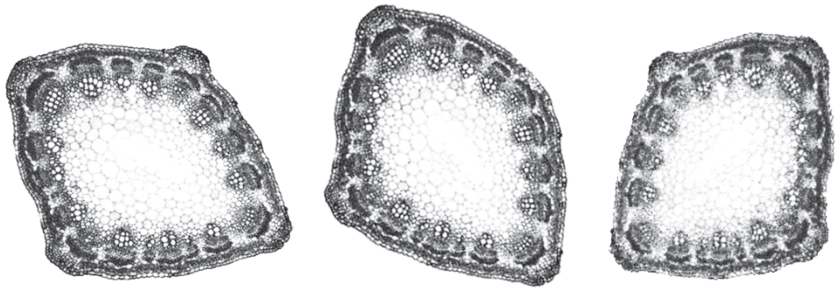
**Note: The answer to question 74 should be recorded on your separate answer sheet.**

74 The type of food available on the Galapagos Islands is thought to have had a major influence on the evolution of finches. Which factor would have the *least* influence on the evolution of the finches?

(1) competition with other birds
(2) predators living in the same area
(3) plant species growing on the islands
(4) stable temperatures on the islands

The diagrams below and on the next page represent some of the types of evidence used to determine evolutionary relationships between three different species.

**Diagram 1**



Species A Species B Species C

**Diagram 2**

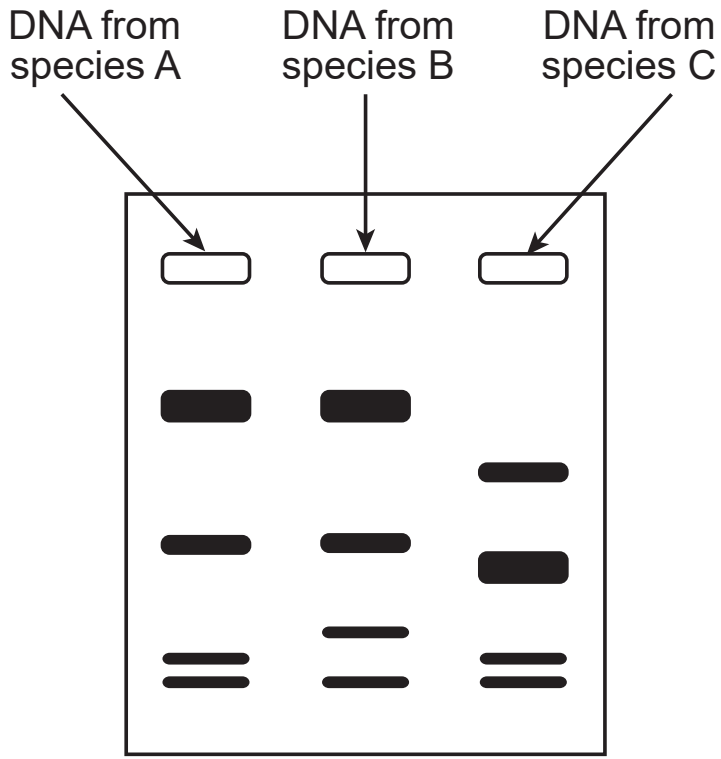
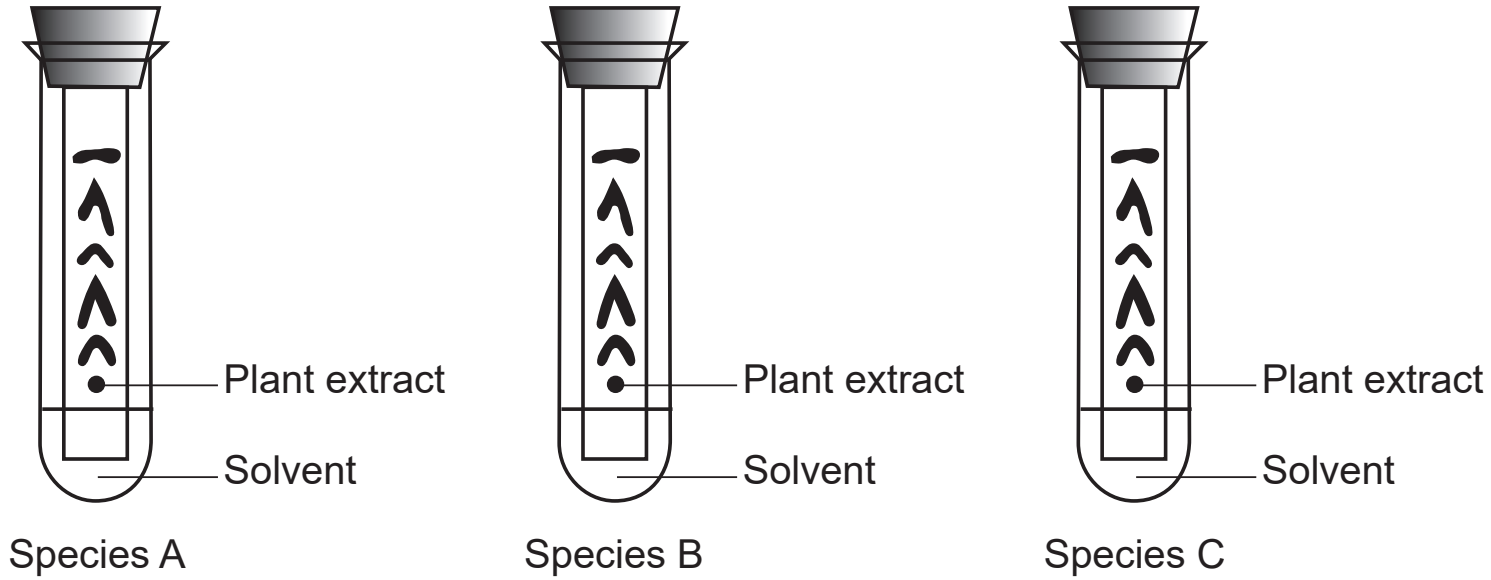


**Diagram 3**




**Note: The answer to question 75 should be recorded on your separate answer sheet.**

75 Which types of evidence do these three diagrams represent?

(1) structural and fossil
(2) chromosomal and molecular
(3) chemical and geographical
(4) structural and molecular

**Note: The answer to question 76 should be recorded on your separate answer sheet.**

76 A student recorded his pulse rate for 20 seconds. He repeated this two more times. In his data table, the results were recorded as 21 beats, 19 beats, and 14 beats. The student's average pulse rate per minute was

(1) 19
(2) 21
(3) 54
(4) 80

Students carried out an investigation using the sequence of steps listed below. After each step, the pulse rate was measured and recorded in a data table.

1. Stand motionless for 1 minute.
2. Walk slowly for 1 minute.
3. Walk quickly for 1 minute.
4. Run slowly for 1 minute.
5. Run quickly for 1 minute.

77 Explain why the independent variable is the level of physical activity, rather than the pulse rate. [1]

78 State *one* change that could be observed in human cells on a microscope slide after they are exposed to salt water. [1]

_____

79 Explain how an increase in heart rate during strenuous activity helps to maintain homeostasis. [1]

_____

_____

_____

Base your answers to questions 80 and 81 on the information and data table below and on your knowledge of biology.

Structural characteristics of four plants were observed and recorded in a data table.

**Plant Characteristics**

| Plant | Flowers | Leaves | Stem Cross Section | Roots |
|---|---|---|---|---|
| A | yellow, 8 petals | simple, opposite, branched veins | circular pattern | tap root |
| B | red, 8 petals | simple, opposite, branched veins | circular pattern | tap root |
| C | yellow, 6 petals | simple, parallel veins | scattered pattern | fibrous root |
| D | yellow, 6 petals | compound, alternate, branched veins | circular pattern | fibrous root |

80 Identify which plant appears to be most closely related to plant *A*. Support your answer. [1]

**Note: The answer to question 81 should be recorded on your separate answer sheet.**

81 A technique that could be used to determine relationships between organisms more accurately than the use of the information in the data table is

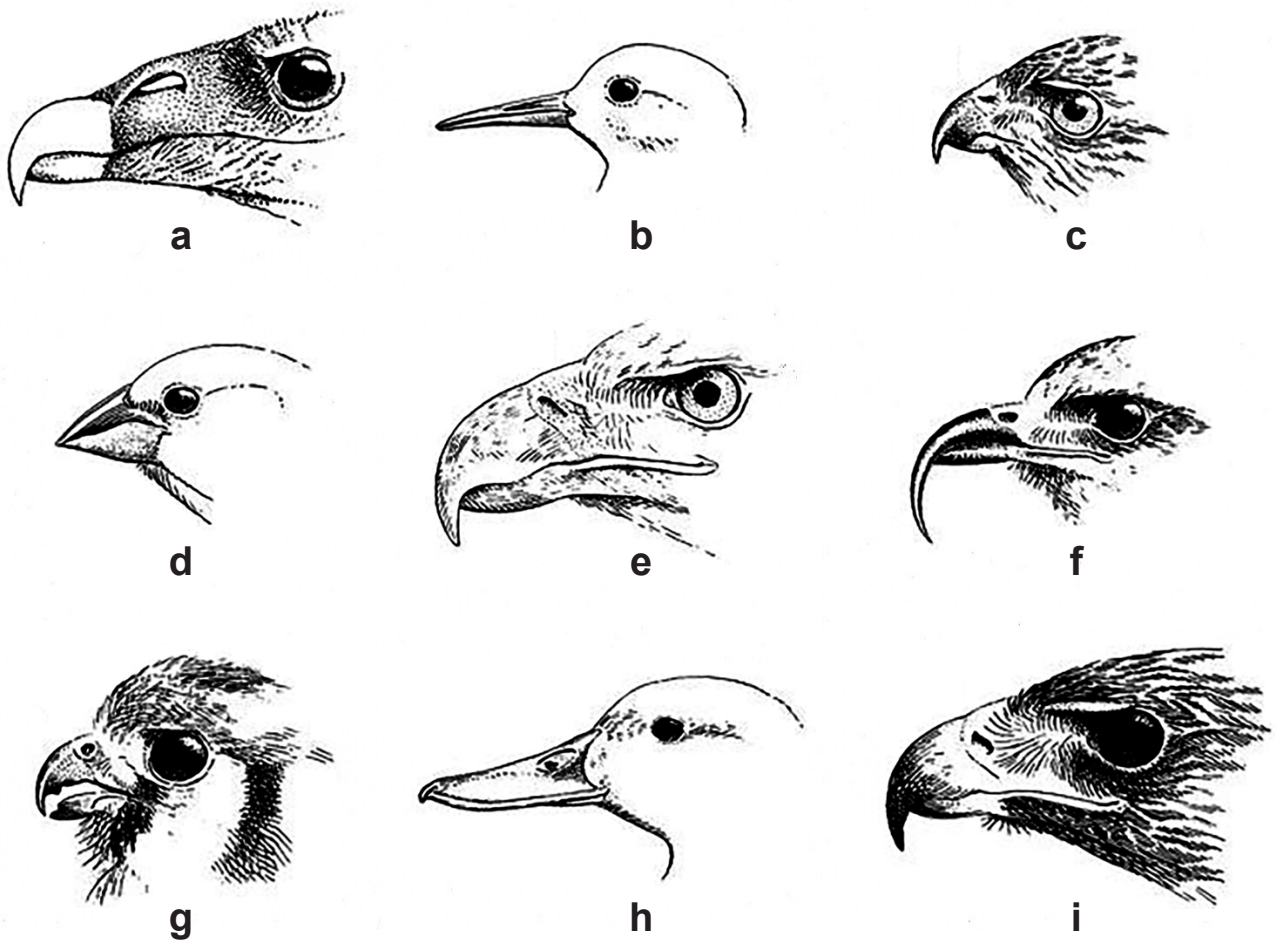
(1) genetic engineering
(2) gene manipulation
(3) protein analysis
(4) cloning

---

82 A student placed one solution in a beaker and another solution inside a dialysis tubing bag that was suspended in the solution in the beaker. In which setup would the contents of the dialysis tubing bag turn blue-black after a few minutes?

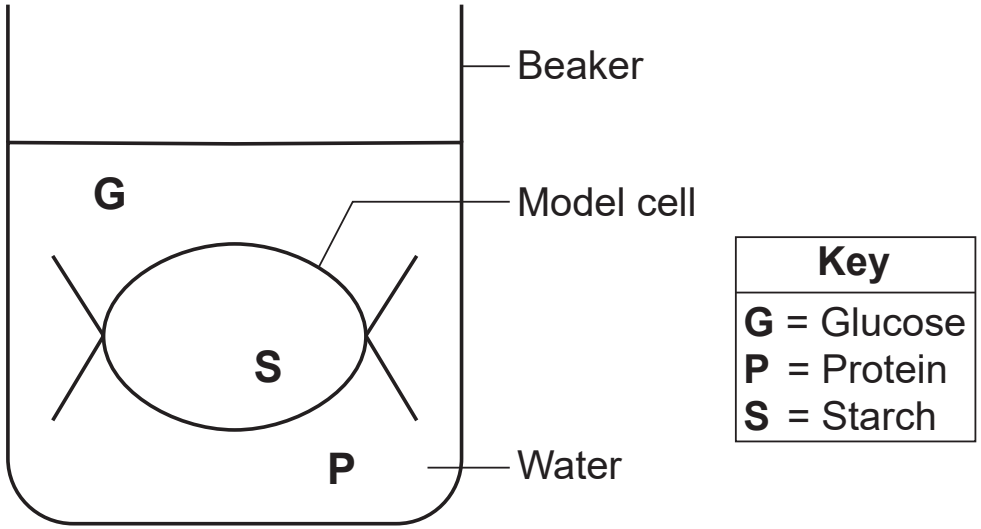
| Setup | Beaker | Dialysis Bag |
|---|---|---|
| (1) | glucose solution | starch solution |
| (2) | starch solution | glucose solution |
| (3) | starch solution | starch indicator solution |
| (4) | starch indicator solution | starch solution |

Base your answer to question 83 on the diagram below and on your knowledge of biology. The diagram shows the beaks of several different bird species.



83 Identify *one* bird species that might compete with species *g* if it were in the same environment. Support your answer with information from the diagram. [1]

Base your answer to question 84 on the diagram below and on your knowledge of biology. The diagram represents an experimental setup with a model cell. The letters *G*, *P*, and *S* represent molecules present in the setup.



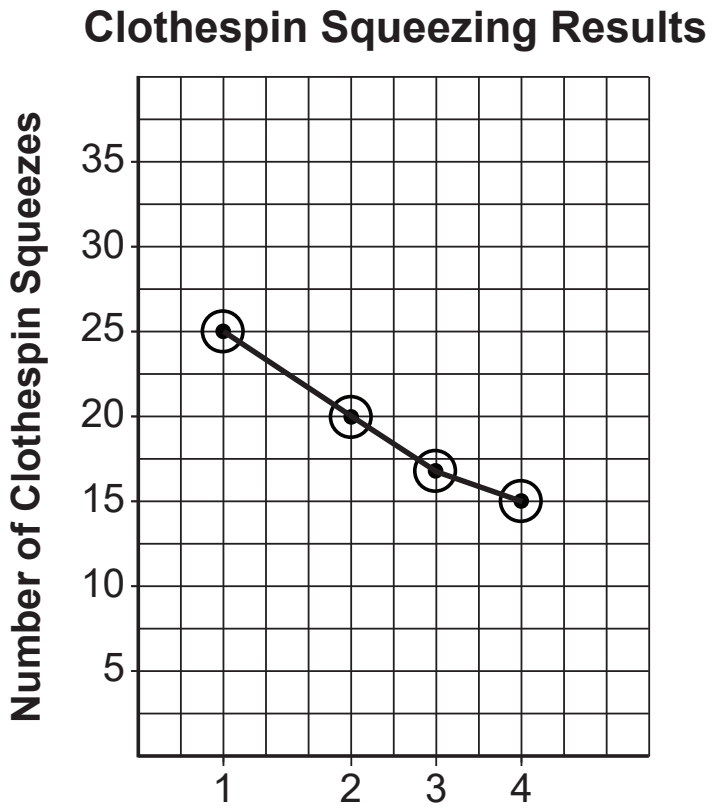

84 Identify the process that would be responsible for the movement of some of the molecules across the membrane. [1]

Base your answer to question 85 on the table and graph below and on your knowledge of biology.

When writing a lab report, a student organized his data in the data table below and used these data to plot the graph.

**Clothespin Squeezing Results**

| Trial Number | Number of Clothespin Squeezes |
|---|---|
| 1 | 25 |
| 2 | 20 |
| 3 | 18 |
| 4 | 15 |




85 Identify *two* mistakes the student made when graphing the information from the data table. [1]

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