The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Wednesday, August 12, 2015 — 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 made available for you to use while taking this examination.

DO NOT OPEN THIS EXAMINATION BOOKLET 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 statement describes a situation that would reduce the stability of a forest ecosystem?

(1) A fierce predator is removed from the ecosystem.
(2) The number of producers remains constant in the ecosystem.
(3) Organisms frequently interact within the ecosystem.
(4) The energy in the ecosystem flows from the Sun.

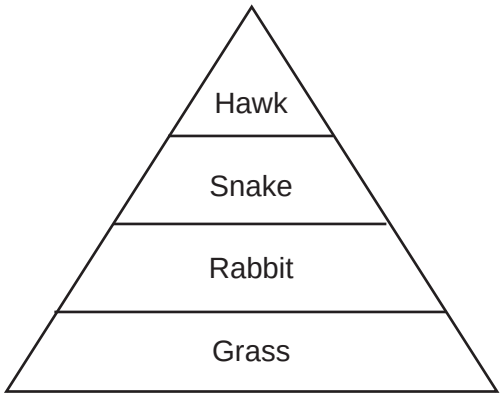
2 Although the digestive system is primarily responsible for the breakdown of food, this process can be disrupted if the circulatory system malfunctions. The best explanation for this disruption is that

(1) human body systems interact with each other to perform life functions
(2) the circulatory system is the control center of the body
(3) the digestive system and the circulatory system have many organs in common
(4) the circulatory system is responsible for the coordination of life functions, including the breakdown of food

3 When an organism reproduces asexually, it usually has

(1) only one parent, and half as much DNA as the parent
(2) only one parent, and the same chromosome number as the parent
(3) two parents, and twice as much DNA as either parent
(4) two parents, and the same chromosome number as each parent

4 The diagram below represents a food pyramid in an ecosystem.



The best explanation for the decrease in the amount of energy transferred to each succeeding level is that much of the energy is

(1) consumed by predators
(2) released as heat
(3) stored within inorganic materials
(4) used in photosynthesis

5 The corn we eat today is larger and has more kernels than the corn people first grew thousands of years ago. Which process is most likely responsible for the changes that have occurred?

(1) mitosis
(2) succession
(3) direct harvesting
(4) selective breeding

6 Which statement is correct concerning hereditary information?

(1) A chromosome is composed of many genes.
(2) A gene is composed of many chromosomes.
(3) Each chromosome carries the same information.
(4) Each gene carries the same information.

7 Which process is most closely associated with the regulation of water loss from the leaves of trees?

(1) digestion of water within the cytoplasm in the leaf cells of the trees
(2) synthesis of protein by the chloroplasts in the leaf cells of the trees
(3) movement of water through leaf openings controlled by the guard cells
(4) absorption of nitrogen through leaf openings controlled by the guard cells

8 A mutation occurring in a human can be passed from parent to offspring when it occurs in a

(1) lung cell, due to exposure to a toxic gas
(2) gamete formed in the ovary
(3) body cell undergoing mitosis
(4) heart cell with chromosome damage

9 If the concentration of sodium is greater outside a cell than inside the cell, which process could move sodium out of the cell?

(1) diffusion
(2) carbohydrate synthesis
(3) active transport
(4) digestion

10 The basic building blocks of a protein are

(1) glucose molecules
(2) amino acids
(3) hormones
(4) fats

11 Over time, data that support the successful evolution of a species would include observations that describe

(1) an increase in the genetic changes occurring in body cells
(2) a decrease in the genetic variety carried in sex cells
(3) an increase in the proportion of offspring that have favorable characteristics
(4) a decrease in the proportion of the population that has beneficial traits

12 Caffeine is a compound found in the seeds of many different plants, such as coffee beans, cola nuts, and cacao beans (the source of chocolate). The presence of this chemical in all three types of plants suggests that these plants

(1) inherited identical mutations
(2) share a common ancestry
(3) were exposed to the same type of radiation in the past
(4) were cloned from a caffeine plant

13 Male turkeys are birds that naturally strut and display their large tail feathers, which attracts female turkeys. This display is an example of

(1) a behavioral adaptation
(2) selective breeding
(3) asexual reproduction
(4) a learned behavior

14 A scientist at a large natural history museum has a collection of fossils that were found throughout the world. Only a few of the fossils represent species that are still alive on Earth today. One reason for this is that

(1) most of the species that have ever lived on Earth are alive today
(2) most of the species that have ever lived on Earth are extinct
(3) fossils of only extinct species have been found
(4) species alive today will not form any fossils for future discovery by scientists

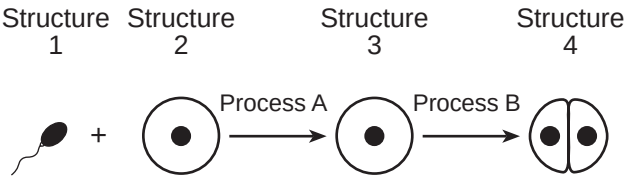
15 Which statement concerning sexual reproduction is correct?

(1) It is not necessary in order for the individual to survive.
(2) The offspring are identical to the parent.
(3) It is necessary in order for the individual to survive.
(4) The offspring are identical to each other.

16 When a paramecium, a single-celled organism, is living under stressful conditions, it sometimes switches from asexual to sexual reproduction. The main advantage when this switch occurs is that the paramecium is most likely to

(1) produce fewer offspring
(2) increase variation among its offspring
(3) avoid having to find a mate
(4) produce clones of itself

17 The diagram below represents some processes in the early development of a multicellular organism.



Which statement describing this diagram is correct?

(1) The cell represented by structure 3 has the same genetic content as structure 2.
(2) Process *A* represents the process of meiosis.
(3) Each cell in structure 4 has the same genetic content as that in structure 3.
(4) Processes *A* and *B* both occur in the placenta.

18 Which statement describes a function of the hormone estrogen?

(1) It regulates the secretion of digestive enzymes.
(2) It promotes sperm production in males.
(3) It influences the development of adult sex characteristics.
(4) It maintains blood sugar levels.

19 The primary function of the human male reproductive system is to

(1) provide a site for fertilization
(2) produce and transport gametes
(3) protect and nourish the embryo
(4) prevent urine from leaving the body

20 In an embryo, the formation of many types of tissues and organs occurs as a result of the process of

(1) fertilization
(2) genetic sorting
(3) differentiation
(4) gene recombination

21 Which activity would be an appropriate first step when designing an experiment?

(1) reporting a conclusion based on multiple experimental trials
(2) researching the problem, using information from a variety of sources
(3) creating a data table to organize experimental observations
(4) repeating the experiment with a different hypothesis

22 Every time a child visited a cousin who has two cats, the child's eyes turned red, itched, and began to water. Then, the child began to have trouble breathing. It is most likely that the child reacted this way because

(1) normally harmless cat antigens stimulated the immune system
(2) it is difficult for the respiratory system to filter cat antigens out of the inhaled air
(3) cat antigens are a health hazard, since they always cause disease
(4) cat antigens stop the immune system from making antibodies, so bacteria cause these responses

23 Shrimp that live in the cold waters off Alaska will die if introduced into warm water. One likely reason these shrimp do not survive is that enzymes in the shrimp

(1) start to replicate
(2) change shape
(3) are composed of fat molecules that melt
(4) break down into small starch molecules

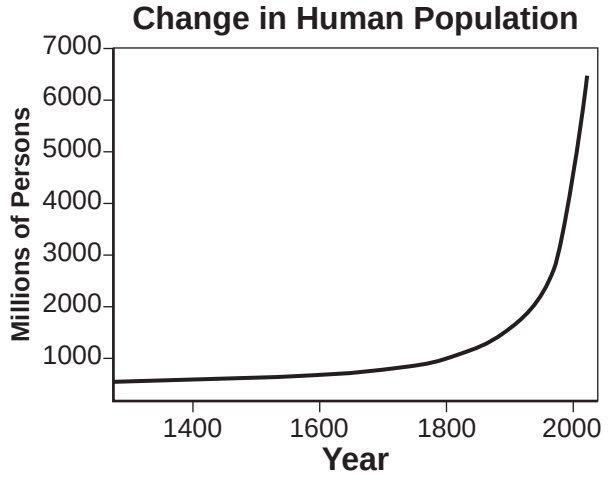
24 A DNA segment removed from neurospora (a pink mold) contained the base sequence G-T-C-C-A-T-G-C-A. A similar segment of DNA removed from neurospora that had been exposed to radiation for several hours had the base sequence G-T-C-C-A-T. This change in the base sequence is an example of

(1) a deletion
(2) an insertion
(3) a substitution
(4) a replication

25 Farmers in India have increased the harvest yield of food crops like eggplant by growing them from seeds that have been modified to produce a bacterial toxin that is harmful to pest insects. This is an example of

(1) selective breeding of the insects
(2) spraying an insecticide on plants
(3) selective breeding of the eggplant
(4) an application of biotechnology

26 The graph below shows changes in human population numbers over time.



A consequence of these changes is

(1) an increase in the numbers and kinds of organisms worldwide
(2) a decrease in the availability of natural resources
(3) a decrease in deforestation due to technological improvements
(4) an increase in biosphere stability

27 In the fall, some farmers plow the remains of corn plants into the ground. This activity contributes most directly to the

(1) increase in the biodiversity of their fields
(2) depletion of nonrenewable resources
(3) destruction of natural habitats
(4) recycling of organic matter

28 A person usually experiences small variations in body temperature over a 24-hour period. These variations in temperature are an example of

(1) an immune response
(2) genetic differences between individuals
(3) an adaptation to global warming
(4) dynamic equilibrium

29 Fossil fuels have been used for years as a source of energy. Even though there are many negative issues associated with the use of fossil fuels, they continue to be used to a great extent. This is most likely because

(1) they have been commercially available as an energy source
(2) there are alternatives to these types of fuels
(3) they have had a positive effect on global temperatures
(4) fossil fuels can be burned to produce large quantities of carbon dioxide

30 Sometimes, a person is born with one or more extra chromosomes in each cell. This usually results in abnormalities because the affected person has

(1) a reduced number of genes in cell nuclei
(2) fewer cell mutations than a person with a normal chromosome number
(3) more genes in each cell than a person with a normal chromosome number
(4) less DNA in cell nuclei, but more proteins in cell mitochondria

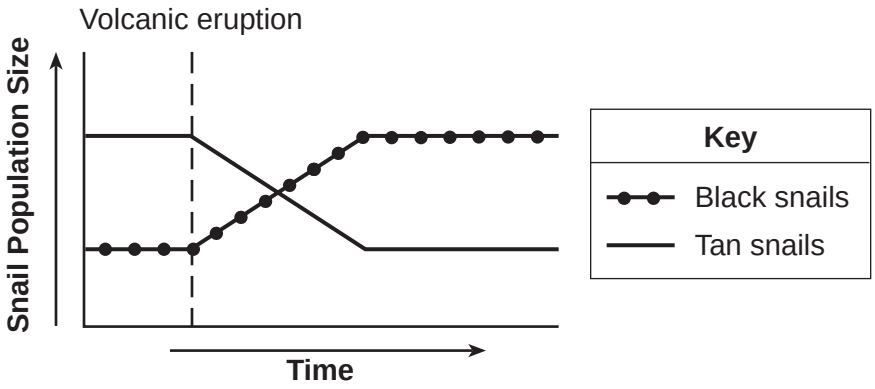
Part B–1

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 answers to questions 31 through 33 on the information and graph below and on your knowledge of biology.

A population composed of tan snails and black snails inhabits the same sandy beach. A nearby volcano erupted, and black lava particles washed down to the beach. The once tan beach was now black. The graph below shows the population of tan snails and black snails before and after the volcanic eruption.



31 Which statement concerning the snails is correct?

(1) The lava particles turned the tan snails black.
(2) The tan snails will become extinct.
(3) The black snails had an adaptive advantage.
(4) The tan snails preyed on the black snails.

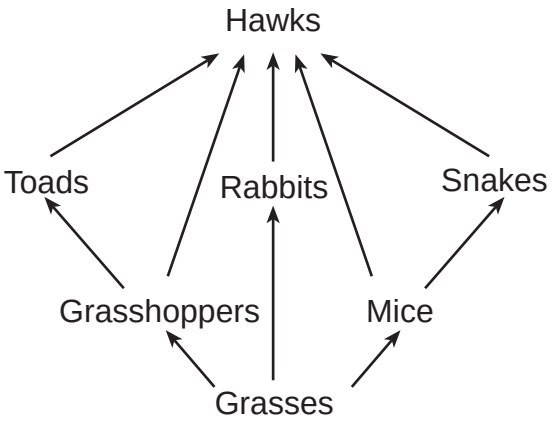
32 The increase in the number of black snails can best be explained by

(1) natural selection after an environmental change
(2) climatic change followed by ecological succession
(3) increased stability due to a decrease in variation
(4) an increase in mutation rate

33 Variation in snail color is an example of

(1) environmental stability
(2) a natural limitation
(3) equilibrium
(4) diversity

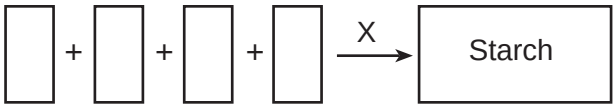
34 The diagram below represents relationships in a community. After a pathogen reduced the population of grasshoppers, the number of mice increased, while the numbers of toads and rabbits decreased.



These changes in the community demonstrate that

(1) ecosystems are shaped by nonliving factors
(2) autotrophs convert solar energy into food
(3) grasshoppers are producers that are essential for ecosystem stability
(4) populations are linked with many others in the ecosystem

Base your answers to questions 35 and 36 on the diagram below, which represents a metabolic process, and on your knowledge of biology.



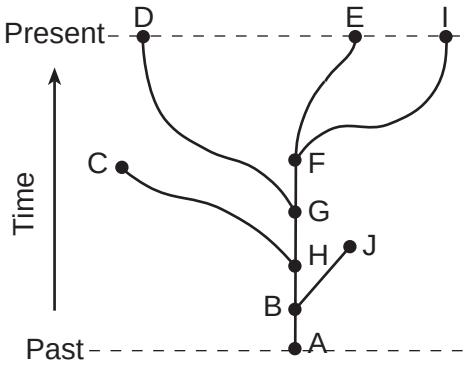
35 This process best represents

(1) the bonding of amino acids to form a starch molecule
(2) the digestion of amino acids to form a starch molecule
(3) the bonding of simple sugars to form a starch molecule
(4) the digestion of simple sugars to form a starch molecule

36 The letter *X* in the process represents

(1) an antibody
(2) a hormone
(3) a receptor
(4) an enzyme

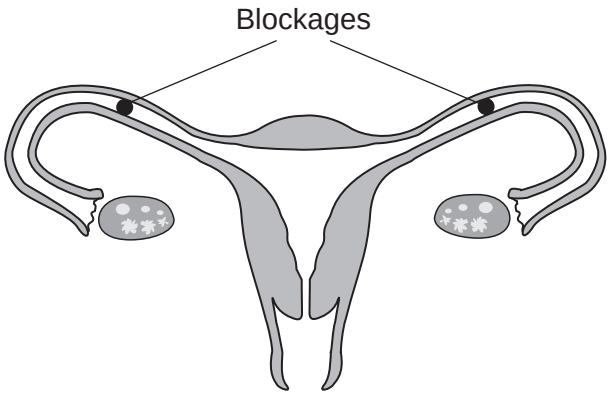
37 The evolutionary pathways of ten different species are represented in the diagram below.



Which statement would most likely be correct, based on the information in the diagram?

(1) Species *C* had many variations and lived in a stable, unchanging environment.
(2) Species *D*, *C*, and *J* are extinct.
(3) Species *F* evolved from species *D*.
(4) Species *J* had little variation and lived in a changing environment.

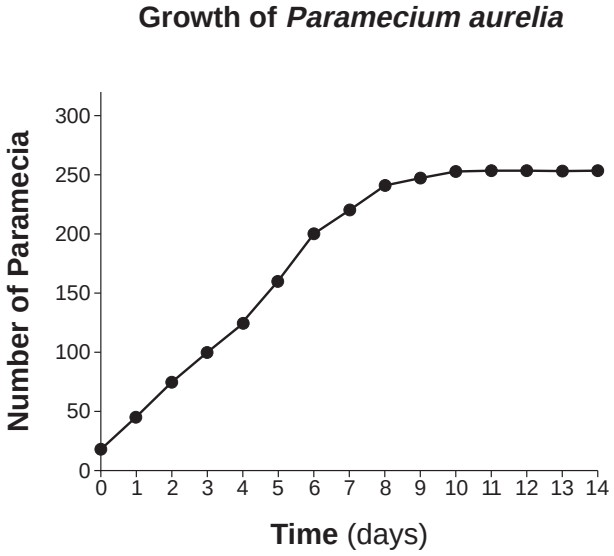
38 Blockages caused by a condition known as Pelvic Inflammatory Disease (PID) are represented in the diagram of the female reproductive system below.



If blockages of this type occur, the most likely result would be that

(1) the egg would remain in the uterus and not travel upward
(2) the female gamete would not be able to unite with the male gamete
(3) hormones could not be produced by the ovaries
(4) the process of asexual reproduction would be prevented or interrupted

Base your answers to questions 39 and 40 on the information below and on your knowledge of biology. The graph below shows the growth of *Paramecium aurelia* in the same culture dish for 14 days.



39 If no additional materials were added to the culture dish, after day 14, the paramecium population would most probably

(1) remain the same, since it has reached carrying capacity and has an unlimited food supply
(2) begin to increase as they continue to reproduce
(3) begin to increase, since they have not yet reached carrying capacity
(4) begin to decrease as finite resources are used up

40 In another experiment, a second species of paramecium was introduced into a culture dish with *Paramecium aurelia*. Which statement describes a possible result as the populations interact over the next 14 days?

(1) The population numbers of *Paramecium aurelia* would be lower than 250, since the new species is competing with it for resources.
(2) The population of *Paramecium aurelia* would increase above 250, since they would mate with the new species.
(3) The population of *Paramecium aurelia* would increase above 250, since the two species occupy the same niche.
(4) The population of *Paramecium aurelia* would remain at 250, since the species compete with each other for the same resources.

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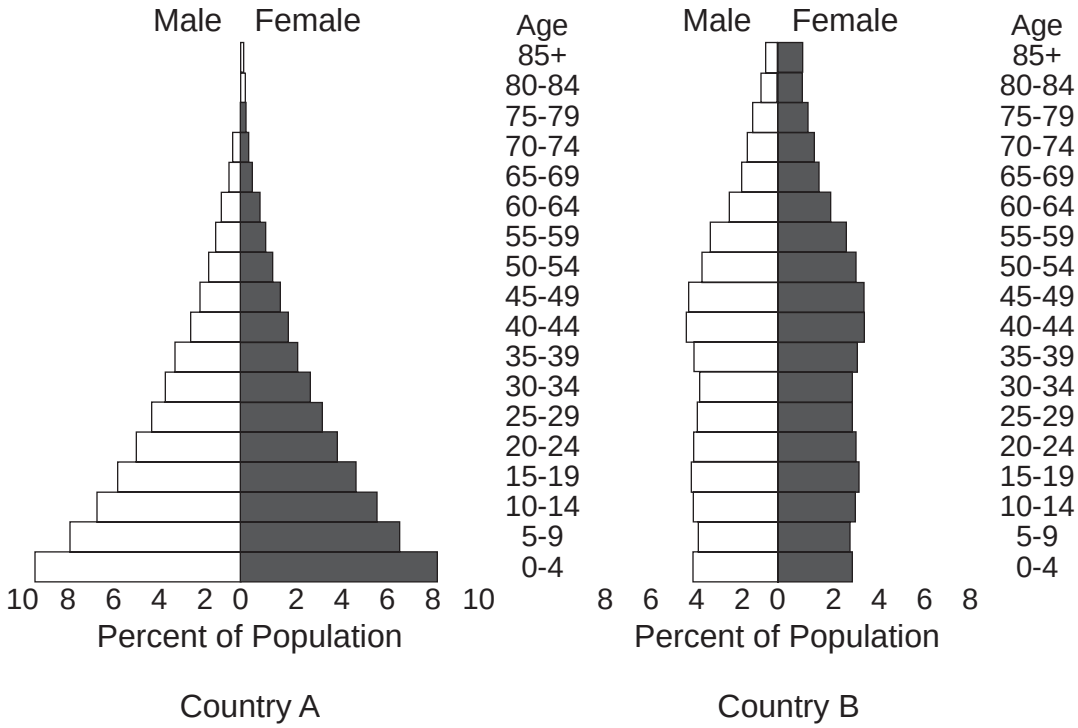
41 The chart below lists substances involved in the process of photosynthesis.

	Substance
A	glucose
B	oxygen
C	carbon dioxide
D	water

Which statement best describes how these substances interact in photosynthesis?

(1) *A* and *B* combine to produce *C* and *D*.
(2) *B* and *C* combine to produce *A* and *D*.
(3) *C* and *D* combine to produce *A* and *B*.
(4) *A* and *C* combine to produce *B* and *D*.

Base your answers to questions 42 and 43 on the diagram below and on your knowledge of biology. The diagram represents the current percentage of each population by age and gender (male/female) for two countries.



Adapted from: *Campbell Biology, 8th edition*

42 At the present time, both populations have the same number of individuals. In which of these countries will the population growth over the next 20 years place the greatest strain on the environment?

(1) Country *A*, since the larger percentage of young could result in rapid population growth
(2) Country *B*, since the smaller percentage of young could result in rapid population growth
(3) Country *A*, since the smaller percentage of people over 60 uses the most resources
(4) Country *B*, since the larger percentage of people over 60 uses the fewest resources

43 Approximately what percent of the population of Country *A* is less than 10 years old?

(1) 8%
(2) 16%
(3) 32%
(4) 64%

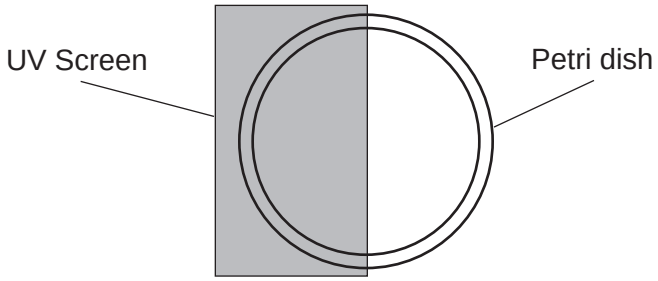
Part B–2

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 47 on the information below and on your knowledge of biology.

An experiment was carried out to determine the effect of exposure to UV light on the growth of bacteria. Equal quantities of bacteria were spread on 5 petri dishes containing nutrient agar. Half of each petri dish was exposed to UV light for various amounts of time, and the other half was protected from the UV light with a UV screen. After the UV treatment, the bacteria were grown in an incubator for 24 hours, and the number of colonies was counted. The diagram below represents the initial set up.



The table below contains the data collected by counting the number of bacterial colonies growing on both the screen-covered side and the unscreened side.

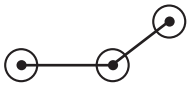
Growth of Bacterial Colonies

Petri Dish	Exposure Time to UV Light	Number of Bacterial Colonies on Screened Side	Number of Bacterial Colonies on Unscreened Side
1	No exposure (0.0 minutes)	17	18
2	1.0 minute	18	15
3	2.0 minutes	17	11
4	5.0 minutes	18	4
5	10.0 minutes	16	1

Directions (44–46): Using the information in the data table, construct a line graph on the grid below, following the directions below.

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

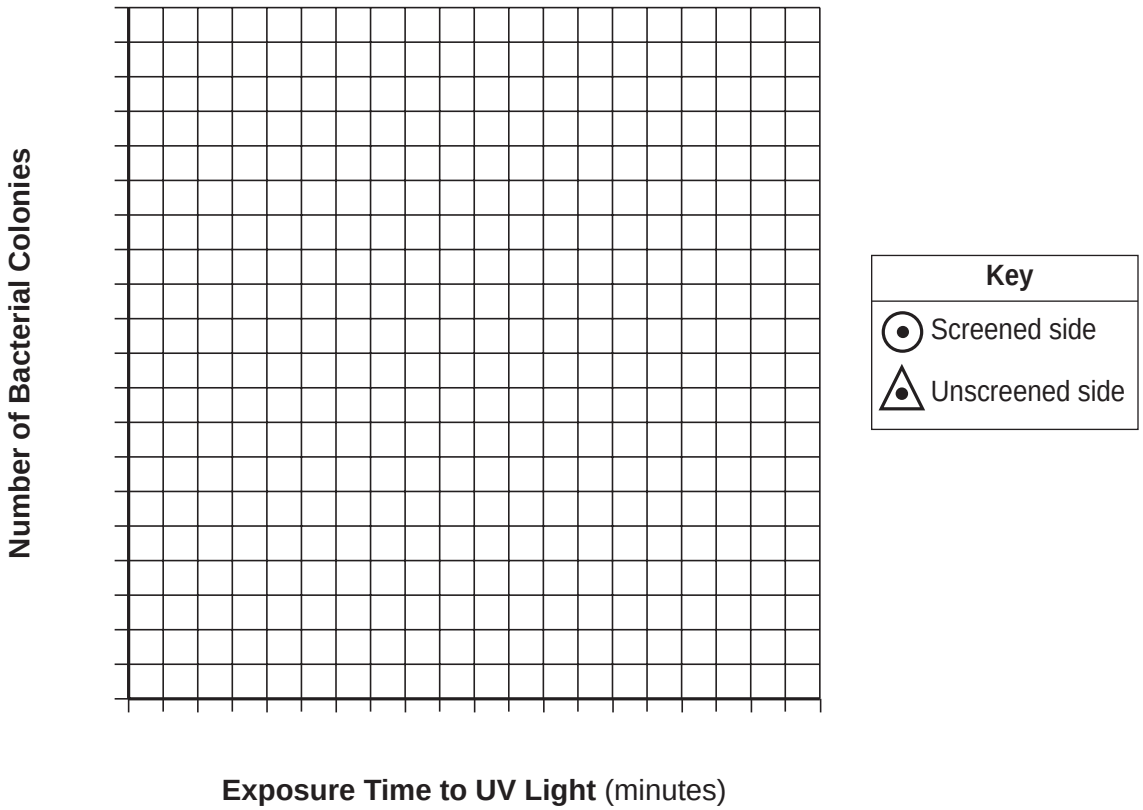
45 Plot the data for the number of bacterial colonies on the screened side. Connect the points and surround each point with a small circle. [1]

Example: 

46 Plot the data for the number of bacterial colonies on the unscreened side. Connect the points and surround each point with a small triangle. [1]

Example: 

Growth of Bacterial Colonies



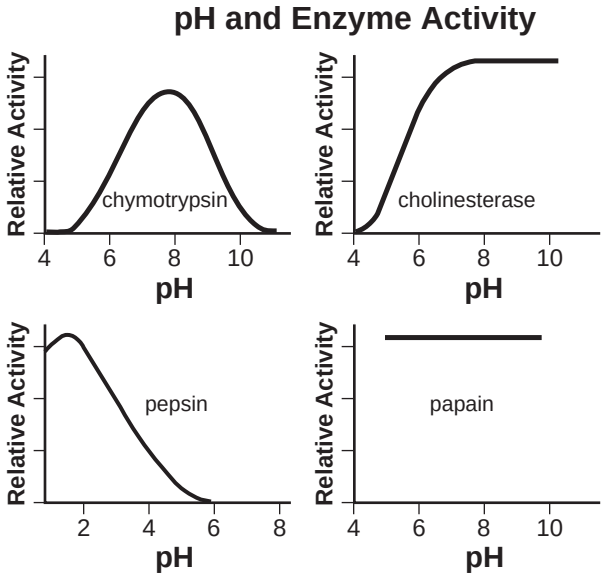
Note: The answer to question 47 should be recorded on your separate answer sheet.

47 The diagram below represents cellular growth that can occur in human skin after prolonged exposure to ultraviolet light.

Which statement provides a possible explanation for this growth pattern?

(1) Manipulation of genes caused the movement of embryonic skin cells.
(2) Exposure to light stimulated the development of cells containing ozone.
(3) Uncontrolled mitotic division occurred as a result of gene mutations.
(4) An immune reaction triggered the formation of excess blood cells.

Base your answers to questions 48 and 49 on the information and graphs below and on your knowledge of biology. The graphs show the relative enzymatic activity of four different enzymes in acidic (below pH 7) and basic (above pH 7) environments.



Part of Digestive System	pH Range
mouth	6.5 – 7.5
stomach	1.5 – 4.0
small intestine	4.0 – 7.0
large intestine	4.0 – 7.0

48 Which enzyme would most likely function in the stomach? Support your answer. [1]

Enzyme: _____

Note: The answer to question 49 should be recorded on your separate answer sheet.

49 The activity of which enzyme decreases in both acidic and basic environments?

(1) chymotrypsin
(2) pepsin
(3) cholinesterase
(4) papain

Base your answers to questions 50 and 51 on the information below and on your knowledge of biology.

Head Start for Hellbenders

The hellbenders (a species of large salamander) at the Bronx Zoo are now approximately seven inches in length and will grow to full size in about five years. Once they are about two-and-a-half years old, they will be returned to the wild in western New York State. Hellbender populations are declining due to several factors including over-collection for the pet trade, disease, pollution, and habitat destruction. Juvenile hellbenders in the wild currently face great difficulties in reaching adulthood, so the "head start" provided by the reintroduction of the 41 animals will help boost local populations.

Source: Wildlife Conservation Society, *Members News*
May/June 2011

Note: The answer to question 50 should be recorded on your separate answer sheet.

50 Which statement best explains the hellbender population decline in western New York State?

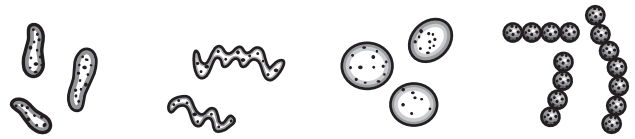
(1) Human activities had the unexpected consequence of decreasing the hellbender population to a dangerous level.
(2) Humans have purposefully removed the hellbender from its habitat due to its aggressive behavior.
(3) The decline of the hellbender population is due mainly to natural causes that humans cannot control.
(4) The hellbender population decreased because salamanders are very resistant to climate change.

51 Describe *one* potential ecological effect, other than the loss of the hellbender from western New York State, of the hellbender population continuing to decline. [1]

52–54 Animals eat and digest food to obtain the energy available for life activities. Discuss energy use in animals. In your discussion, be sure to:

- identify the type of protein molecules used to digest food [1]
- identify the organelle where energy from nutrients is released [1]
- state *one* inference that can be made concerning a cell that has many of these organelles [1]

Base your answer to question 55 on the diagram below and on your knowledge of biology. The diagram represents four types of bacteria.



55 A dichotomous key to these bacterial types is shown below. Complete the missing information for sections 3a. and 3b. so that the key is complete for all four types. [1]

1a. Is rod shaped	bacillus
1b. Is not rod shaped	go to 2
2a. Is spiral shaped	spirillum
2b. Is not spiral shaped	go to 3
3a. _____	type C
3b. _____	type D

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.

The fight-or-flight response in humans prepares the body to fight off or run away from a potential threat. This response results from a series of nerve and chemical signals that direct how cells function. This, in turn, determines the actions of organs in these situations. Some of the changes experienced by the individuals as part of this response include:

increased pulse rate
increased blood glucose levels
increased breathing rate

56 Select *one* of the listed changes experienced by the individual and write it on the line below. Explain how the change you chose allows the individual to effectively respond to a threat. [1]

Change: _____

_____

_____

57 Once the threat has passed, another series of changes returns the body to its original state. Why must this occur? [1]

_____

_____

Base your answers to questions 58 and 59 on the article below and on your knowledge of biology.

Bats Devastated by Deadly Fungus

The most common bat species in North America, the little brown bat, could be facing extinction because of a fungus. The fungus, called white-nose syndrome, grows on the exposed skin of bats as they hibernate in cool caves or mines. Infected bats develop lesions (sores) on their wings, which play important roles in water balance, circulation and heat regulation. These lesions on a bat's wings or on its nose cause the bat to wake up during hibernation. Waking up early forces the bat to use up the energy it has stored as fat for its long sleep, exhausting the animal and eventually killing it.

In some infected caves, 90 percent to 100 percent of bats die. On average, the disease takes out 73 percent of the bat population at a given hibernation site. If infection continues at current rates, the researchers predict that the little brown bat population will drop below 0.01 percent of its current numbers by 2026.

The loss of the little brown bat would be harmful for humans because bats eat their body weight in insects each night. Many of these bugs are agricultural pests or carriers of human disease.

One way to decrease the spread of the disease would be for the researchers who visit infected caves to decontaminate their clothes and gear with antiseptics. It has also been suggested that a small number of these bats could be placed in an artificial hibernating area and medicated to protect them.

58 Describe *one* way that an infection with the white-nose fungus can cause death in little brown bats. [1]

59 Describe *one* way that the little brown bats can be helped. [1]

60 Describe how a student could use a microscope to compare the size of frog skin cells to the size of human skin cells. [1]

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

Chickenpox vaccine is the best way to prevent chickenpox. Vaccination not only protects vaccinated persons, it also reduces the risk for exposure in the community for persons unable to be vaccinated because of illness or other conditions, including those who may be at greater risk for severe disease. While no vaccine is 100% effective in preventing disease, the chickenpox vaccine is very effective: about 8 to 9 of every 10 people who are vaccinated are completely protected from chickenpox. In addition, the vaccine almost always prevents against severe disease. If a vaccinated person does get chickenpox, it is usually a very mild case lasting only a few days and involving fewer skin lesions (usually less than 50), mild or no fever, and few other symptoms.

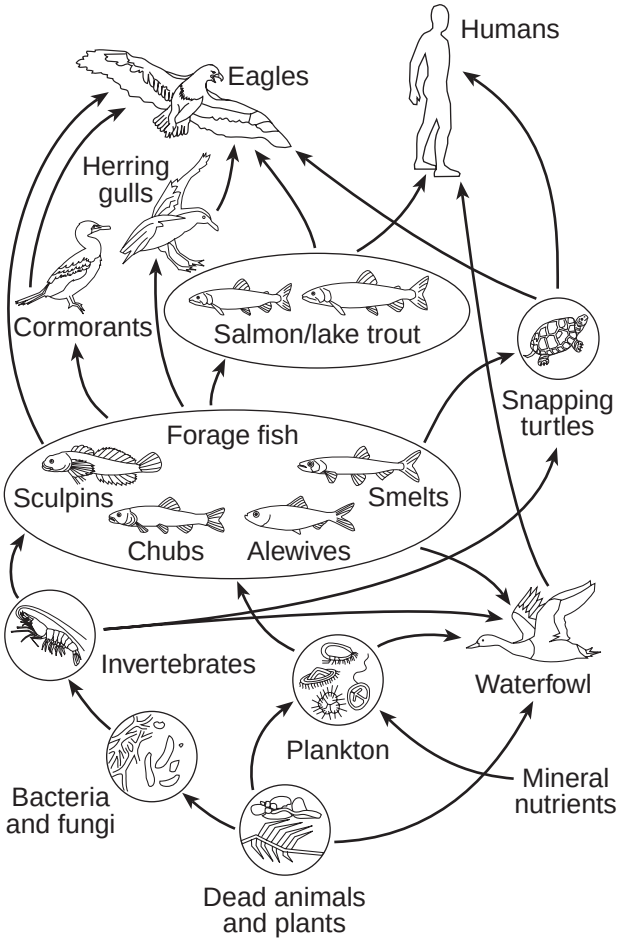
Source: www.cdc.gov

61 Identify the component of a vaccine that makes it effective. [1]

62 Describe how a vaccination prevents disease in the individual who receives a vaccination. [1]

63 Describe how vaccinations help to prevent the spread of disease, even in people who have not received the vaccination. [1]

Base your answer to question 64–66 on the diagram below and on your knowledge of biology. The diagram represents a food web typical of the Great Lakes area of New York State.



Adapted from: http://www.uwsp.edu/geo/ faculty/ritter/ geog101/textbook/title_page.html

64–66 Some people have argued for the removal of cormorants from the eastern shores of Lake Ontario because of their negative effects on the fishing industry. Describe the consequences of this action. In your answer, be sure to:

- state *one* reason why removing the cormorants from the food web could have a positive impact on the fishing industry [1]
- state *one* possible effect of removing the cormorants on a species other than fish and support your answer [1]
- describe *one* action, other than removing a population of organisms from the environment, that humans could take to preserve the fishing industry in Lake Ontario [1]

Base your answers to questions 67 through 69 on the passage below and on your knowledge of biology.

A field in New York State is mowed all summer long for a number of years. The field is sold, and the new owner decides to stop mowing. Over a number of years, the ecosystem begins to undergo ecological succession. After a series of different plant communities are present, the area eventually becomes a stable forest ecosystem.

67 Explain why *not* mowing the field allowed the ecosystem to undergo ecological succession. [1]

68 Identify *one* specific human activity, other than mowing, that could alter this succession and explain how this activity affects biodiversity. [1]

Human activity: _____

Effect on biodiversity: _____

69 Describe how this forest ecosystem would respond to a natural disaster, such as a flood, that resulted in the destruction of the plant community. [1]

70 In a laboratory, spinach leaves exposed to continuous fluorescent light increased in vitamin content by 50 to 100 percent. Spinach leaves kept in darkness for a similar period of time either lost vitamin content or produced no gain. Describe how these findings could influence the way in which spinach is displayed for sale in supermarkets. [1]

Base your answers to questions 71 and 72 on the passage below and on your knowledge of biology.

On April 20, 2010, an explosion occurred at an oil well in the Gulf of Mexico, causing millions of gallons of oil to escape into the water over the next few months. Large areas of the Gulf were covered by oil. As the oil washed ashore, many areas along the coastline that were breeding grounds for various bird species were contaminated. By November 2010, researchers along the coast and in the Gulf had collected 6104 dead birds, 609 dead turtles, and 100 dead mammals. Although the oil well had provided oil for energy for a large number of people, the oil spill had a great effect on the ecosystems in and around the Gulf of Mexico.

71 Explain how the original decision to drill for oil in the Gulf of Mexico could be considered a trade-off. [1]

72 State *one* possible reason why it will most likely take the bird populations more time to recover from this oil spill than it will mammal populations. [1]

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 the statement or answers the question. For all other questions in this part, follow the directions given and record your answers in the spaces provided in this examination booklet.

73 A plant was discovered that contained a compound that was found to have potential medicinal value. However, the plant is rare, so it is important to see if a related plant might also produce the same compound. The chart shows some characteristics of the plant and four possible relatives.

Plant	Flower	Leaves	Amino Acid Sequence
Medicinal Plant	Red, 6 petals	simple, parallel veins	Ile–Ile–Try–Gly–Glu–Asp–Pro
A	Red, 9 petals	simple, parallel veins	Ile–Arg–Try–Gly-Glu-Asp–Ser
B	Yellow, 8 petals	compound, branched veins	Ile–Arg–Ala–Gly-Glu-Asp–Pro
C	Pink, 6 petals	simple, parallel veins	Ile–Ile–Try–Gly–Glu–Asp–Ser
D	Yellow, 6 petals	compound, parallel veins	Ile–Arg–Try–Gly–Glu–Asp–Pro

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

Which plant in the chart would be selected as most similar to the medicinal plant?

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

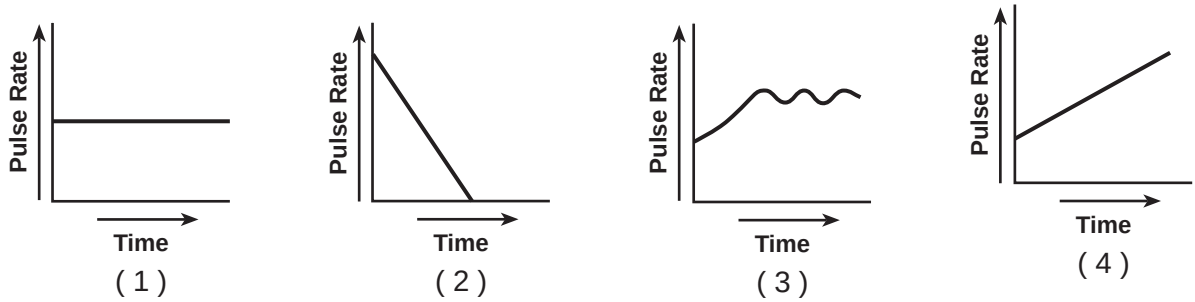
Note: The answer to question 74 should be recorded on your separate answer sheet.

74 A drug company has discovered an endangered plant that produces a chemical that might be used to cure cancer. A first step in developing this cancer cure could be to

(1) preserve the habitat where the species is found
(2) introduce a new plant species that will share the habitat of the plant
(3) eliminate every species that eats this plant
(4) harvest all of the plants of this species and use them to treat cancer patients

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

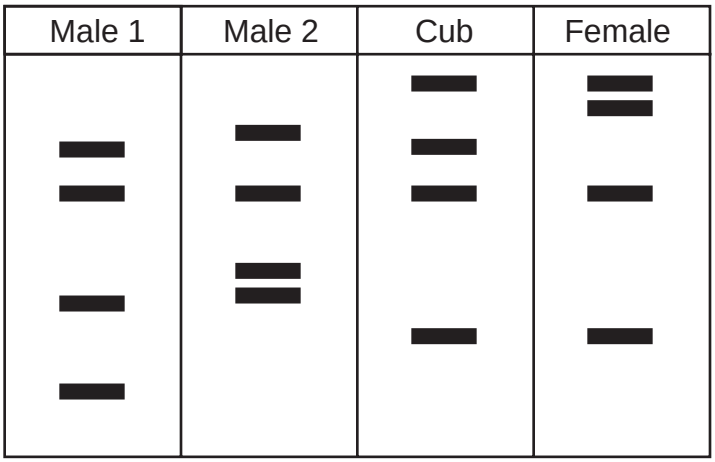
75 Students in a science class took their pulse rates before and after they ran in place for one minute. The class data showed that pulse rates increased with exercise. A graph of the data would look most like



(1) (2) (3) (4)

Base your answers to questions 76 and 77 on the information below and on your knowledge of biology.

Caretakers at a zoo are trying to determine which of two male tigers fathered the newest cub. They obtained DNA from the tiger cub, the mother tiger, and the two male tigers. The DNA was analyzed. The results of the analysis are shown below.



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

76 The technique used to separate the DNA for analysis is

(1) genetic engineering
(2) electrophoresis
(3) chromatography
(4) protein synthesis

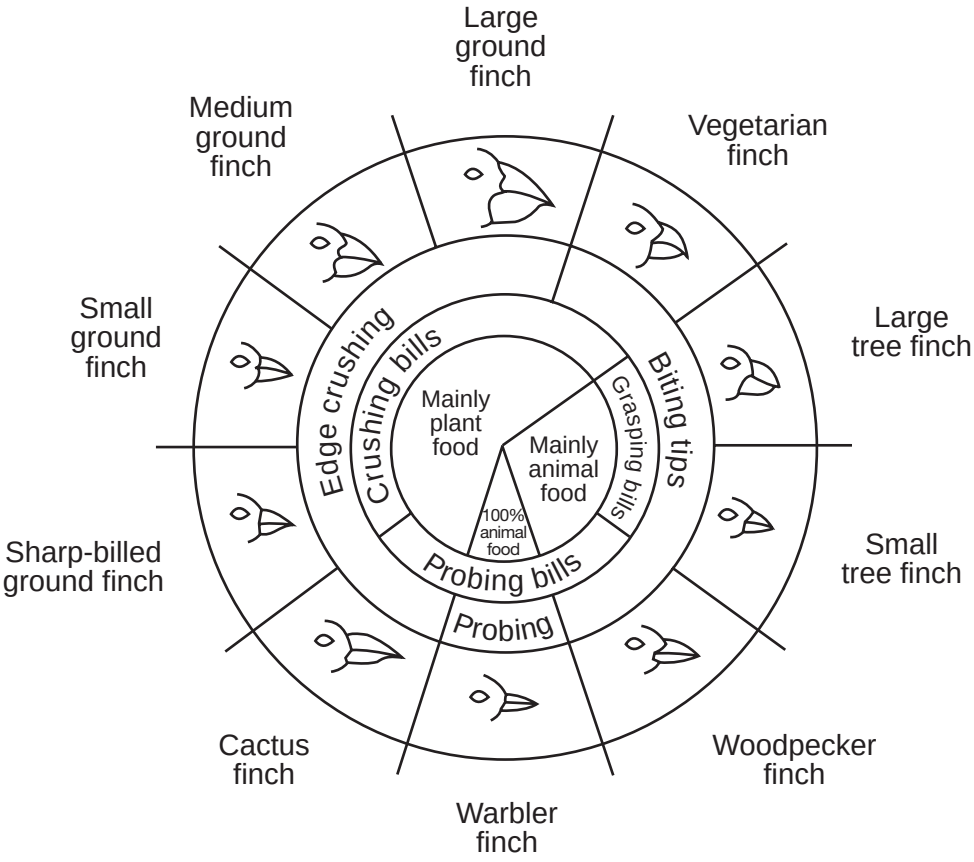
77 Which male tiger is the father of the newborn cub? Support your answer. [1]

Male tiger: _____

78 Some roads are salted heavily in winter. Describe *one* way plants growing near these roads could be harmed by the salt. [1]

Base your answer to question 79 on the diagram below and on your knowledge of biology.

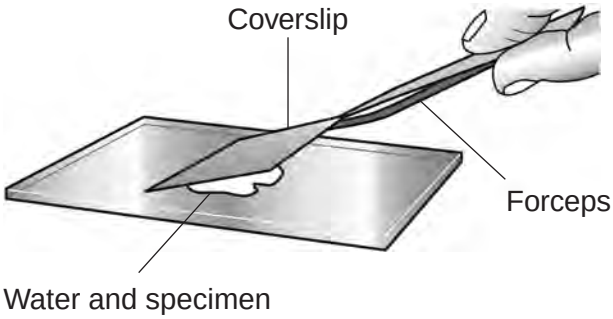
Variations in Beaks of Galapagos Islands Finches



from: *Galapagos: A Natural History Guide*

79 Several populations of finches migrated to an island that had mostly large seeds with tough outer coverings. Identify a finch population that would most likely survive on the island. Support your answer. [1]

80 The diagram below shows how a coverslip should be placed on a drop of pond water during the preparation of a wet mount.



State *one* reason why this is the recommended procedure for placing a coverslip. [1]

Base your answers to questions 81 through 83 on the information below and on your knowledge of biology.

There are two different species of finch that live on the same small island, species *A* and species *B*. Both species successfully feed and reproduce on the island. Species *A* nests in pine trees and eats large seeds. Species *B* nests in hollowed-out dead logs and eats small insects.

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

81 Both bird species *A* and species *B* can most likely survive on the same small island because they

(1) use different resources and, therefore, they do not compete
(2) mate with each other, keeping both populations constant
(3) compete for food, but do not compete for shelter
(4) eat the same food, but feed at different times of the day

Note: The answer to question 82 should be recorded on your separate answer sheet.

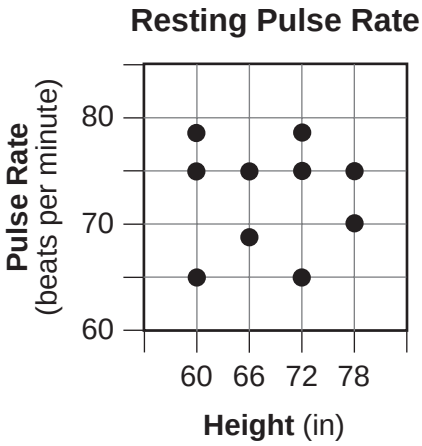
82 The factor most often acting as a selecting agent for the survival of a species in a particular location is the

(1) strength of the organism
(2) new mutations within the individual
(3) speed of the organism
(4) environment they inhabit

83 A third species of finch, species *C*, migrates to the island. It nests in pine trees and eats small insects. Predict what most likely will happen to the populations of both species *A* and species *B* if species *C* successfully survives on the island. Support your answer. [1]

Base your answers to question 84 on the information below and on your knowledge of biology.

Biology students conducted a preliminary survey to study the relationship between body height and resting pulse rate. The students collected data from 10 classmates and the results are shown in the graph below.



84 Is there a relationship between height and resting pulse rate? Support your answer. [1]

85 The table below shows the number of individual molecules obtained when a DNA molecule from a bacterial species is broken down.

Molecules from Bacterial DNA

Molecule	Number
sugar	4.6 million
phosphate	4.6 million
adenine (A)	1.75 million
cytosine (C)	0.55 million
guanine (G)	0.55 million
thymine (T)	1.75 million

What data in the data table indicate that adenine pairs with thymine in a DNA molecule? [1]

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LIVING ENVIRONMENT

FOR TEACHERS ONLY

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Wednesday, August 12, 2015 — 12:30 to 3:30 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

Refer to the directions on page 2 before rating student papers.

Updated information regarding the rating of this examination may be posted on the New York State Education Department's web site during the rating period. Check this web site at: http://www.p12.nysed.gov/assessment/ and select the link "Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents Examination period.

Multiple Choice for Parts A, B–1, B–2, and D
Allow 1 credit for each correct response.

Part A

1 ..... **1**	9 ..... **3**	17 ..... **3**	25 ..... **4** .....
2 ..... **1**	10 ..... **2**	18 ..... **3**	26 ..... **2** .....
3 ..... **2**	11 ..... **3**	19 ..... **2**	27 ..... **4** .....
4 ..... **2**	12 ..... **2**	20 ..... **3**	28 ..... **4** .....
5 ..... **4**	13 ..... **1**	21 ..... **2**	29 ..... **1** .....
6 ..... **1**	14 ..... **2**	22 ..... **1**	30 ..... **3** .....
7 ..... **3**	15 ..... **1**	23 ..... **2**	
8 ..... **2**	16 ..... **2**	24 ..... **1**	

Part B–1

31 ..... **3**	35 ..... **3**	39 ..... **4**	43 ..... **3** .....
32 ..... **1**	36 ..... **4**	40 ..... **1**	
33 ..... **4**	37 ..... **4**	41 ..... **3**	
34 ..... **4**	38 ..... **2**	42 ..... **1**	

Part B–2

47 ..... **3**	49 ..... **1**	50 ..... **1** .....

Part D

73 ..... **3**	75 ..... **4**	81 ..... **1**	
74 ..... **1**	76 ..... **2**	82 ..... **4**	

Directions to the Teacher

Follow the procedures below for scoring student answer papers for the Regents Examination in Living Environment. Additional information about scoring is provided in the publication *Information Booklet for Scoring Regents Examinations in the Sciences.*

Do not attempt to correct the student's work by making insertions or changes of any kind. If the student's responses for the multiple-choice questions are being hand scored prior to being scanned, the scorer must be careful not to make any marks on the answer sheet except to record the scores in the designated score boxes. Marks elsewhere on the answer sheet will interfere with the accuracy of the scanning.

Allow 1 credit for each correct response.

At least two science teachers must participate in the scoring of the Part B–2, Part C, and Part D open-ended questions on a student's paper. Each of these teachers should be responsible for scoring a selected number of the open-ended questions on each answer paper. No one teacher is to score more than approximately one-half of the open-ended questions on a student's answer paper. Teachers may not score their own student's answer papers.

Students' responses must be scored strictly according to the Scoring Key and Rating Guide. For open-ended questions, credit may be allowed for responses other than those given in the rating guide if the response is a scientifically accurate answer to the question and demonstrates adequate knowledge as indicated by the examples in the rating guide. On the student's separate answer sheet, for each question, record the number of credits earned and the teacher's assigned rater/scorer letter.

Fractional credit is *not* allowed. Only whole-number credit may be given for a response. If the student gives more than one answer to a question, only the first answer should be rated. Units need not be given when the wording of the questions allows such omissions.

For hand scoring, raters should enter the scores earned in the appropriate boxes printed on the separate answer sheet. Next, the rater should add these scores and enter the total in the box labeled "Total Raw Score." Then the student's raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: http://www.p12.nysed.gov/assessment/ on Wednesday, August 12, 2015. The student's scale score should be entered in the box labeled "Scale Score" on the student's answer sheet. The scale score is the student's final examination score.

Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.

Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that for each administration, the conversion chart provided for that administration be used to determine the student's final score.

Part B–2

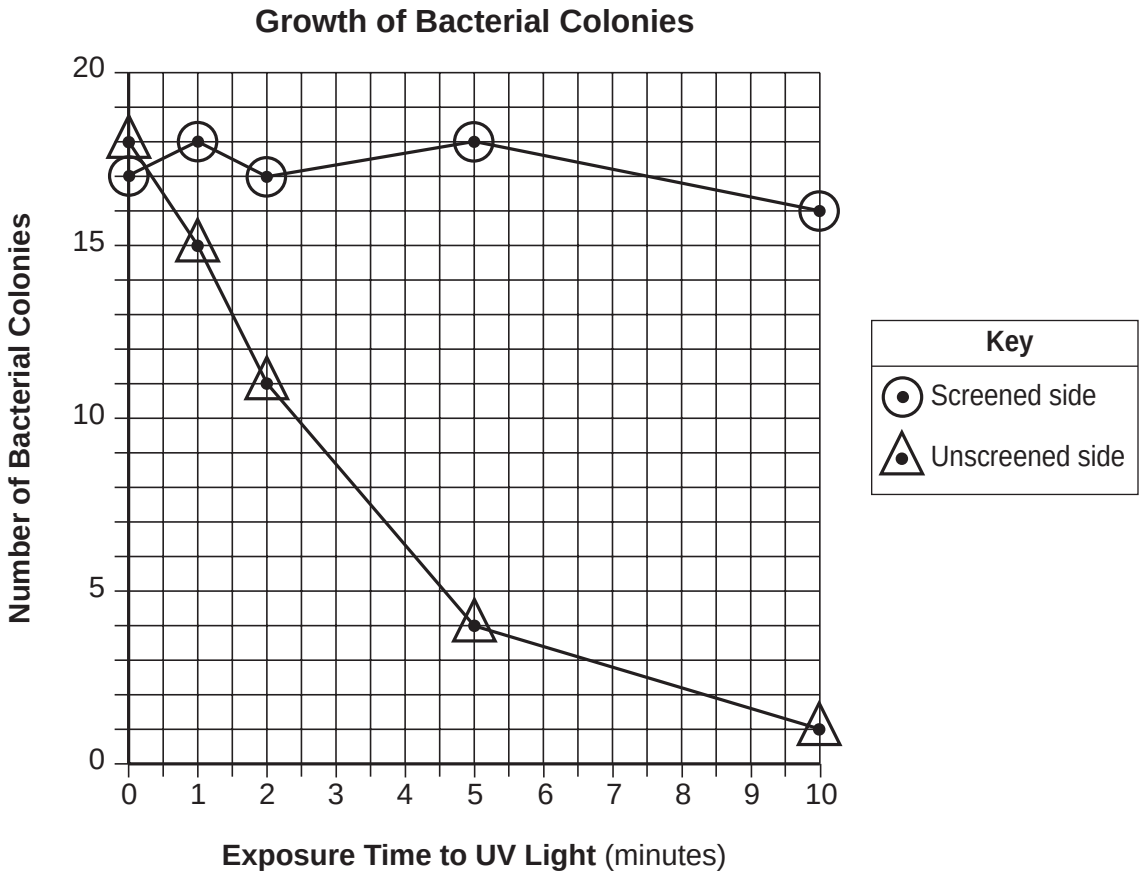
Note: The student's response to the bulleted items in question 44–46 need *not* appear in the following order.

44 [1] Allow 1 credit for marking an appropriate scale, without any breaks in the data, on each labeled axis.

45 [1] Allow 1 credit for plotting the data for the number of bacterial colonies on the screened side, connecting the points and surrounding each point with a small circle.

46 [1] Allow 1 credit for plotting the data for the number of bacterial colonies on the unscreened side, connecting the points and surrounding each point with a small triangle.

Example of a 3-credit response to questions 44–46:



Note: Allow credit only if circles and triangles are used.

Do *not* assume that the intersection of the *x*- and *y*-axes is the origin (0,0), unless it is labeled. An appropriate scale only needs to include the data range in the data table.

Do *not* allow credit if points are plotted that are not in the data table, e.g., (0,0); or for extending lines beyond the data points.

47 MC on scoring key

48 [1] Allow 1 credit for pepsin and supporting the answer. Acceptable responses include, but are not limited to:

— The pH of the stomach is acidic (1.5–4.0), and pepsin works best at very low pH values.

49 MC on scoring key

50 MC on scoring key

51 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The population size of organisms that feed on the hellbender will decline.

— The population size of organisms that the hellbender feeds upon will increase.

— The biodiversity of this western New York ecosystem will decrease, causing instability.

— disruption of the food chain/web

Note: The student's response to the bulleted items in question 52–54 need *not* appear in the following order.

52 [1] Allow 1 credit for identifying the type of protein molecules used to digest food. Acceptable responses include, but are not limited to:

— enzymes

— biological catalysts

53 [1] Allow 1 credit for mitochondrion/mitochondria.

54 [1] Allow 1 credit for stating *one* inference that can be made concerning a cell that has many of these organelles. Acceptable responses include, but are not limited to:

— The cell uses a great amount of energy.

— The cell is very active.

— The cell requires a lot of energy.

Note: Allow credit for an answer that is consistent with the student's response to question 53.

55 [1] Allow 1 credit for correctly completing the missing information for sections 3*a* and 3*b*.

Example of a 1-credit response:

1a. Is rod shaped	bacillus
1b. Is not rod shaped	go to 2
2a. Is spiral shaped	spirillum
2b. Is not spiral shaped	go to 3
3a. **Exists singly or Single cells**	type C
3b. **Exists in a group *or* colony *or* Clumps of cells *or* Chains of cells**	type D

Part C

56 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Change: Increased pulse rate:

— moves blood rich in glucose/oxygen to the cells faster

— allows the body to get rid of waste products/carbon dioxide faster

Note: Do *not* accept an answer that only states that the blood moves faster without explaining how this helps an individual effectively respond.

Change: Increased blood glucose levels:

— provide cells with a ready source of energy more rapidly

Change: Increased breathing rate:

— eliminates carbon dioxide faster

— allows the body to get oxygen into the blood faster

57 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The fight-or-flight response includes many changes in body activity, which could result in damage to the body if not returned to normal.

— The fight-or-flight response sped up activity, which must now be slowed to normal.

— Once the danger is over, the high activity levels of cells and organs are reduced to normal levels, preventing damage to the body.

— so that homeostasis can be restored

58 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Lesions interfere with water balance.

— makes them wake up during hibernation and use up energy

— Lesions interfere with heat regulation/circulation.

59 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Research to find a way to stop the spread of the disease.

— Decontaminate the clothing of researchers who are studying the caves.

— Make artificial hibernating areas.

— Decontaminate the caves in the fall before hibernation.

— Don't allow people to enter caves used as hibernation sites.

— Medicate the bats.

60 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The student could use a microscope with a known field diameter to measure the size of the two kinds of cells.

— Place both cell types on the same slide and compare them.

61 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— antigens

— weakened/dead pathogen

— inactive chickenpox virus

Note: Do *not* accept "a little bit of the disease" or "a small amount of the virus."

62 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The vaccination activates the immune system.

— stimulates the production of antibodies

— stimulates the formation of memory cells

63 [1] Allow 1 credit. Acceptable responses include, but are *not* limited to:

— Not as many people get sick, so the disease does not spread to as many other people.

— It is less likely that the disease will spread, since fewer people are going to have the disease.

— reduces the risk for exposure in the community

Note: The student's response to the bulleted items in question 64–66 need not appear in the following order.

64 [1] Allow 1 credit for stating *one* reason why removing the cormorants from the food web could have a positive impact on the fishing industry. Acceptable responses include, but are not limited to:

— There could be more lake trout/salmon available to be caught by fisherman.

— There could be more fish available for fishing.

— There would be more forage fish for the salmon/ lake trout to eat.

Note: Do *not* allow credit if the answer does not refer to the impact on fishing.

65 [1] Allow 1 credit for stating *one* possible effect of removing the cormorants on a species other than fish and supporting the answer. Acceptable responses include, but are not limited to:

— The number of eagles will decrease because of fewer cormorants to eat.

— The number of eagles will increase because there are more forage fish to eat.

— The number of plankton will decrease because there are more forage fish eating them.

— The number of invertebrates will decrease because there are more forage fish eating them.

66 [1] Allow 1 credit for describing *one* action, other than removing a population of organisms from the environment, that humans could take to preserve the fishing industry in Lake Ontario. Acceptable responses include, but are not limited to:

— Add more forage fish/food supply for the salmon/lake trout to eat.

— Increase breeding programs for fish/Stock lakes.

— Pass laws restricting fishing for forage fish.

— Limit pollution by regulating industries on the Great Lakes.

— Grow fish in fish farms.

67 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Not mowing allowed the natural progression of plant communities to occur.

— Mowing was preventing the plant populations from modifying the environment, making it more suitable for others.

— allowed other plants to grow

68 [1] Allow 1 credit for identifying *one* specific human activity, other than mowing, and describing how this activity affects biodiversity. Acceptable responses include, but are not limited to:

Human activity: cut down forest
Effect on biodiversity: Different plant and animal species will be present. Many species that live in the forest will be lost.

Human activity: plant trees
Effect on biodiversity: decrease biodiversity by shading out small plants or increase biodiversity by adding new species.

Human activity: building a mall
Effect on biodiversity: removes many plants and animals from the environment

Human activity: plant wild flowers
Effect on biodiversity: increase biodiversity because you are adding new plants

69 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The ecosystem would undergo succession again and eventually return to its stable state.

— The ecosystem would gradually change back to the climax community that was there before the flood.

— The ecosystem would slowly change back to what it was before the flood.

— Succession would begin from bare soil.

70 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Spinach should be displayed under fluorescent lights.

— Spinach should be displayed in transparent packaging, under lighted conditions.

— Spinach should not be sold in containers that block light.

71 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— People could get oil to be used for energy, but they might damage the environment while doing it.

— Oil companies provide many jobs for people, but there could be a negative effect on the environment.

72 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— More birds were killed.

— The breeding grounds were contaminated.

Part D

73 MC on scoring key

74 MC on scoring key

75 MC on scoring key

76 MC on scoring key

77 [1] Allow 1 credit for male 1 and supporting the answer. Acceptable responses include, but are not limited to:

— All of the cub's DNA fragments match fragments found in either the female or male 1.

— Half of the cub's DNA fragments matched DNA fragments from male 1.

— The cub's DNA has two matches with male 1 and only one match with male 2.

78 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Salt could cause water to diffuse out of the cells of the plants.

— The solution contains less water than was in the leaves, so water could diffuse out of the leaves.

— Water could leave the plant.

— They would dehydrate.

79 [1] Allow 1 credit for identifying the finch population that would most likely survive on the island and supporting the answer. Acceptable responses include, but are not limited to:

— large ground finch, because it has a large, crushing bill

— medium ground finch, because it has a crushing bill and eats mainly plant food

80 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— This procedure reduces the chance of trapping air bubbles.

81 MC on scoring key

82 MC on scoring key

83 [1] Allow 1 credit for predicting what most likely will happen to the populations of both species *A* and species *B* if species *C* successfully survives on the island and supporting the answer. Acceptable responses include, but are not limited to:

— Both species *A* and species *B* will decrease in number, since species *C* competes with each of them.

— Species *A* will compete with species *C* for nesting sites and species *B* will compete for food. Therefore, the populations of both *A* and *B* will decrease.

— Both will survive if there are adequate resources.

84 [1] Allow 1 credit for stating if there is a relationship between height and resting pulse rate and supporting the answer. Acceptable responses include, but are not limited to:

— No, the data are scattered.

— No, the data do not show a trend.

85 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Adenine and thymine are present in equal numbers.

— There is the same number of each molecule.

The *Chart for Determining the Final Examination Score for the August 2015 Regents Examination in Living Environment* will be posted on the Department's web site at: http://www.p12.nysed.gov/assessment/ on Wednesday, August 12, 2015. Conversion charts provided for previous administrations of the Regents Examination in Living Environment must NOT be used to determine students' final scores for this administration.

Online Submission of Teacher Evaluations of the Test to the Department

Suggestions and feedback from teachers provide an important contribution to the test development process. The Department provides an online evaluation form for State assessments. It contains spaces for teachers to respond to several specific questions and to make suggestions. Instructions for completing the evaluation form are as follows:

1. Go to http://www.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm.
2. Select the test title.
3. Complete the required demographic fields.
4. Complete each evaluation question and provide comments in the space provided.
5. Click the SUBMIT button at the bottom of the page to submit the completed form.

Map to Core Curriculum

August 2015 Living Environment

Standards	Question Numbers			
	Part A 1–30	Part B–1 31–43	Part B–2 44–55	Part C 56–72
Standard 1 — Analysis, Inquiry and Design				
Key Idea 1	21			70
Key Idea 2				
Key Idea 3			44, 45, 46	
Appendix A (Laboratory Checklist)			48, 49, 55	60
Standard 4				
Key Idea 1	1, 2, 30	34, 35, 36	52, 53, 54	56, 57
Key Idea 2	3, 5, 6, 8, 9, 10, 24, 25			
Key Idea 3	11, 12, 13, 14, 16	31, 32, 33, 37		
Key Idea 4	15, 17, 18, 19, 20	38		
Key Idea 5	7, 22, 23, 28	41	47	58, 59, 61, 62, 63
Key Idea 6	4	39, 40		64, 65, 66, 67, 68, 69
Key Idea 7	26, 27, 29	42, 43	50, 51	71, 72

Part D 73–85	
Lab 1	73, 74, 76, 77, 85
Lab 2	75, 84
Lab 3	79, 81, 82, 83
Lab 5	78, 80

The State Education Department / The University of the State of New York

Regents Examination in Living Environment – August 2015

Chart for Converting Total Test Raw Scores to Final Examination Scores (Scale Scores)

Raw Score	Scale Score
85	**100**
84	**98**
83	**97**
82	**96**
81	**95**
80	**95**
79	**94**
78	**93**
77	**92**
76	**91**
75	**91**
74	**90**
73	**89**
72	**88**
71	**88**
70	**87**
69	**86**
68	**86**
67	**85**
66	**84**
65	**84**
64	**83**
63	**82**
62	**81**
61	**81**
60	**80**
59	**79**
58	**79**
57	**78**

Raw Score	Scale Score
56	**77**
55	**77**
54	**76**
53	**75**
52	**75**
51	**74**
50	**73**
49	**72**
48	**71**
47	**71**
46	**70**
45	**69**
44	**68**
43	**67**
42	**66**
41	**65**
40	**64**
39	**63**
38	**62**
37	**61**
36	**60**
35	**59**
34	**58**
33	**57**
32	**56**
31	**55**
30	**53**
29	**52**
28	**51**

Raw Score	Scale Score
27	**49**
26	**48**
25	**47**
24	**45**
23	**44**
22	**42**
21	**41**
20	**39**
19	**38**
18	**36**
17	**34**
16	**33**
15	**31**
14	**29**
13	**28**
12	**26**
11	**24**
10	**22**
9	**20**
8	**18**
7	**16**
6	**14**
5	**12**
4	**10**
3	**7**
2	**5**
1	**2**
0	**0**

To determine the student's final examination score, find the student's total test raw score in the column labeled "Raw Score" and then locate the scale score that corresponds to that raw score. The scale score is the student's final examination score. Enter this score in the space labeled "Scale Score" on the student's answer sheet.

Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.

Because scale scores corresponding to raw scores in the conversion chart change from one administration to another, it is crucial that for each administration the conversion chart provided for that administration be used to determine the student's final score. The chart above is usable only for this administration of the Regents Examination in Living Environment.