

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

LIVING ENVIRONMENT

Wednesday, June 19, 2002 — 9:15 a.m. to 12:15 p.m., only

Student Name _____

School Name _____

Print your name and the name of your school on the lines above. Then turn to the last page of this booklet, which is the answer sheet for Part A. Fold the last page along the perforations and, slowly and carefully, tear off the answer sheet. Then fill in the heading of your answer sheet.

This examination has three parts. You must answer all questions in this examination. Write your answers to the Part A multiple-choice questions on the separate answer sheet. Write your answers for the questions in Parts B and C directly in this examination booklet. All answers 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 and in this examination booklet.

When you have completed the examination, you must sign the statement printed on the Part A 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.

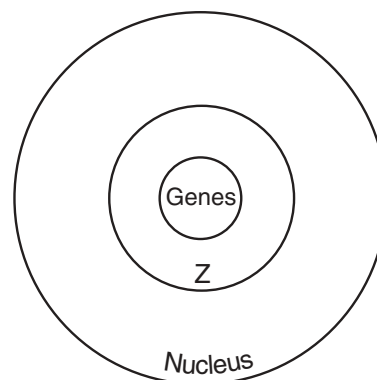
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Part A

Answer all questions in this part. [35]

Directions (1–35): For *each* statement or question, write on the separate answer sheet the number of the word or expression that, of those given, best completes the statement or answers the question.

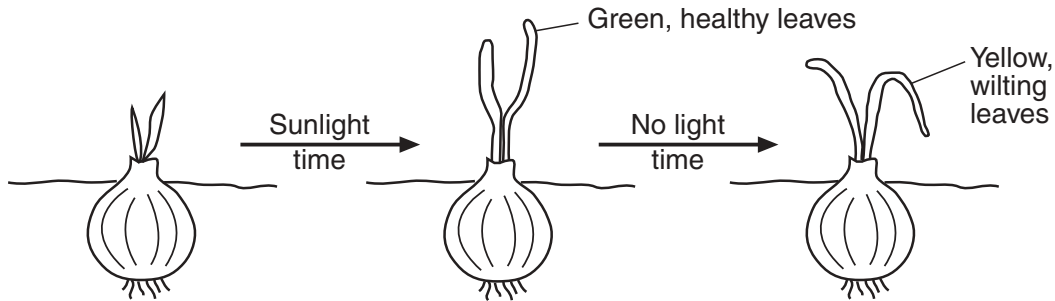
- 1 The current knowledge concerning cells is the result of the investigations and observations of many scientists. The work of these scientists forms a well-accepted body of knowledge about cells. This body of knowledge is an example of a
- (1) hypothesis
 - (2) controlled experiment
 - (3) theory
 - (4) research plan
- 2 An experimental design included references from prior experiments, materials and equipment, and step-by-step procedures. What else should be included before the experiment can be started?
- (1) a set of data
 - (2) a conclusion based on data
 - (3) safety precautions to be used
 - (4) an inference based on results
- 3 In his theory, Lamarck suggested that organisms will develop and pass on to offspring variations that they need in order to survive in a particular environment. In a later theory, Darwin proposed that changing environmental conditions favor certain variations that promote the survival of organisms. Which statement is best illustrated by this information?
- (1) Scientific theories that have been changed are the only ones supported by scientists.
 - (2) All scientific theories are subject to change and improvement.
 - (3) Most scientific theories are the outcome of a single hypothesis.
 - (4) Scientific theories are not subject to change.
- 4 The dense needles of Douglas fir trees can prevent most light from reaching the forest floor. This situation would have the most immediate effect on
- (1) producers
 - (2) carnivores
 - (3) herbivores
 - (4) decomposers
- 5 Which statement best describes a characteristic of an ecosystem?
- (1) It must have producers and consumers but not decomposers.
 - (2) It is stable because it has consumers to recycle energy.
 - (3) It always has two or more different autotrophs filling the same niche.
 - (4) It must have organisms that carry out autotrophic nutrition.
- 6 In a cell, all organelles work together to carry out
- (1) diffusion
 - (2) active transport
 - (3) information storage
 - (4) metabolic processes
- 7 The ability of certain hormones to attach to a cell is primarily determined by the
- (1) receptor molecules in the cell membrane
 - (2) proteins in the cytoplasm of the cell
 - (3) amount of DNA in the cell
 - (4) concentration of salts outside the cell
- 8 The diagram below represents the organization of genetic information within a cell nucleus.



The circle labeled Z most likely represents

- (1) amino acids
- (2) chromosomes
- (3) vacuoles
- (4) molecular bases

9 The diagram below represents the change in a sprouting onion bulb when sunlight is present and when sunlight is no longer available.



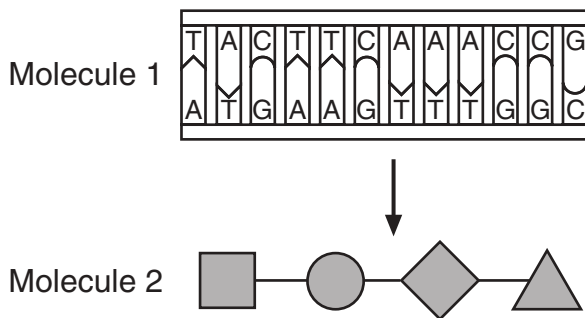
Which statement best explains this change?

- (1) Plants need oxygen to survive.
- (2) Environmental conditions do not alter characteristics.
- (3) Plants produce hormones.
- (4) The environment can influence the expression of certain genetic traits.

10 A human zygote is produced from gametes that are usually identical in

- (1) the expression of encoded information
- (2) the number of altered genes present
- (3) chromosome number
- (4) cell size

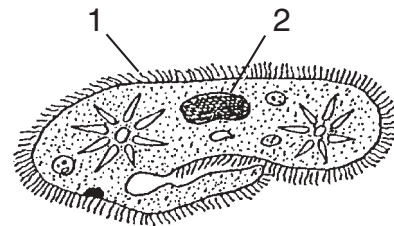
11 Molecule 1 represents a segment of hereditary information, and molecule 2 represents the portion of a molecule that is determined by information from molecule 1.



What will most likely happen if there is a change in the first three subunits on the upper strand of molecule 1?

- (1) The remaining subunits in molecule 1 will also change.
- (2) A portion of molecule 2 may be different.
- (3) Molecule 1 will split apart, triggering an immune response.
- (4) Molecule 2 may form two strands rather than one.

12 The diagram below shows two different structures, 1 and 2, that are present in many single-celled organisms. Structure 1 contains protein A, but not protein B, and structure 2 contains protein B, but not protein A.



Which statement is correct concerning protein A and protein B?

- (1) Proteins A and B have different functions and different amino acid chains.
- (2) Proteins A and B have different functions but the same amino acid chains.
- (3) Proteins A and B have the same function but a different sequence of bases (A, C, T, and G).
- (4) Proteins A and B have the same function and the same sequence of bases (A, C, T, and G).

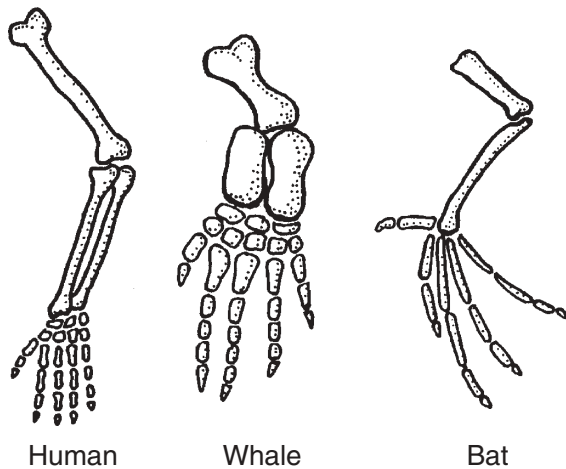
13 Which process is a common practice that has been used by farmers for hundreds of years to develop new plant and animal varieties?

- (1) cloning
- (2) genetic engineering
- (3) cutting DNA and removing segments
- (4) selective breeding for desirable traits

14 Which statement represents the major concept of the biological theory of evolution?

- (1) A new species moves into a habitat when another species becomes extinct.
- (2) Every period of time in Earth's history has its own group of organisms.
- (3) Present-day organisms on Earth developed from earlier, distinctly different organisms.
- (4) Every location on Earth's surface has its own unique group of organisms.

15 The diagrams below show the bones in the forelimbs of three different organisms.



Differences in the bone arrangements support the hypothesis that these organisms

- (1) are members of the same species
- (2) may have descended from the same ancestor
- (3) have adaptations to survive in different environments
- (4) all contain the same genetic information

16 Which situation would most likely result in the highest rate of natural selection?

- (1) reproduction of organisms by an asexual method in an unchanging environment
- (2) reproduction of a species having a very low mutation rate in a changing environment
- (3) reproduction of organisms in an unchanging environment with little competition and few predators
- (4) reproduction of organisms exhibiting genetic differences due to mutations and genetic recombinations in a changing environment

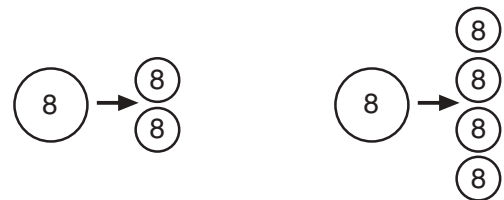
17 Some behaviors such as mating and caring for young are genetically determined in certain species of birds. The presence of these behaviors is most likely due to the fact that

- (1) birds do not have the ability to learn
- (2) individual birds need to learn to survive and reproduce
- (3) these behaviors helped birds to survive in the past
- (4) within their lifetimes, birds developed these behaviors

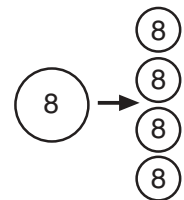
18 "Dolly" is a sheep developed from an egg cell of her mother that had its nucleus replaced by a nucleus from a body cell of her mother. As a result of this technique, Dolly is

- (1) no longer able to reproduce
- (2) genetically identical to her mother
- (3) able to have a longer lifespan
- (4) unable to mate

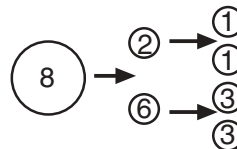
19 Which diagram best represents part of the process of sperm formation in an organism that has a normal chromosome number of eight?



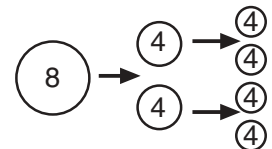
(1)



(3)



(2)

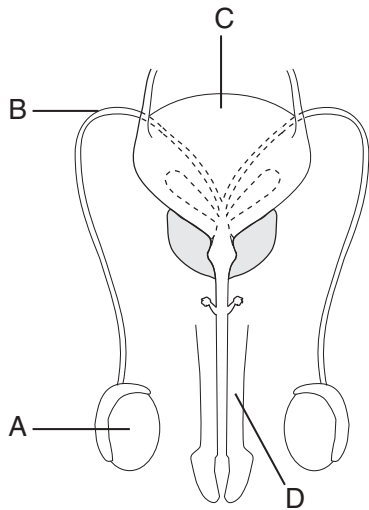


(4)

20 ATP is a compound that is synthesized when

- (1) chemical bonds between carbon atoms are formed during photosynthesis
- (2) energy stored in chemical bonds is released during cellular respiration
- (3) energy stored in nitrogen is released, forming amino acids
- (4) digestive enzymes break amino acids into smaller parts

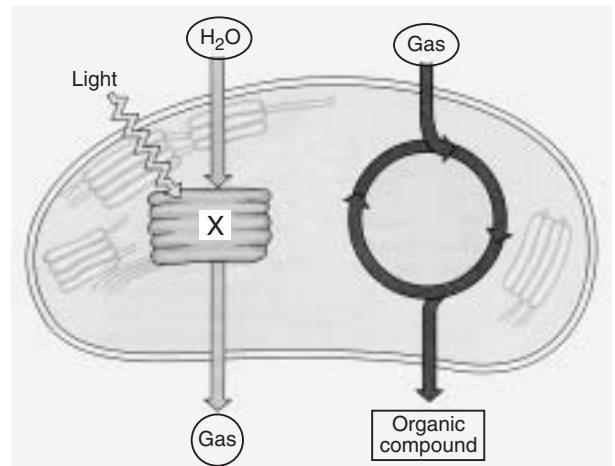
- 21 Allergic reactions are most closely associated with
- (1) the action of circulating hormones
 - (2) a low blood sugar level
 - (3) immune responses to usually harmless substances
 - (4) the shape of red blood cells
- 22 The diagram below represents the human male reproductive system.



Which pair of letters indicates a structure that produces gametes and a structure that makes possible the delivery of gametes for internal fertilization, respectively?

- | | |
|-------------|-------------|
| (1) A and D | (3) C and A |
| (2) B and D | (4) D and C |
- 23 Microbes that enter the body, causing disease, are known as
- | | |
|----------------|-------------|
| (1) pathogens | (3) enzymes |
| (2) antibodies | (4) hosts |
- 24 The blood of newborn babies is tested to determine the presence of a certain substance. This substance indicates the genetic disorder PKU, which may result in mental retardation. Babies born with this disorder are put on a special diet so that mental retardation will not develop. In this situation, modification of the baby's diet is an example of how biological research can be used to
- (1) change faulty genes
 - (2) cure a disorder
 - (3) stimulate immunity
 - (4) control a disorder

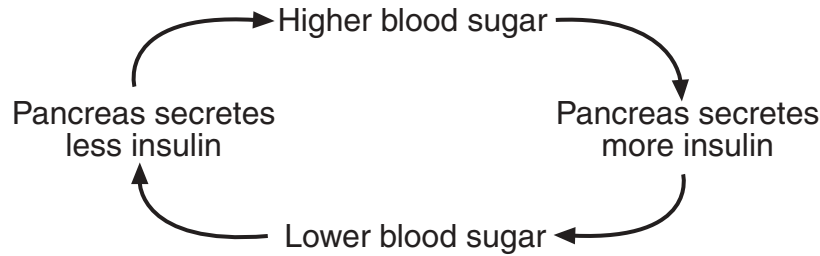
- 25 Which statement illustrates a biotic resource interacting with an abiotic resource?
- (1) A rock moves during an earthquake.
 - (2) A sea turtle transports a pilot fish to food.
 - (3) A plant absorbs sunlight, which is used for photosynthesis.
 - (4) A wind causes waves to form on a lake.
- 26 Which relationship best describes the interactions between lettuce and a rabbit?
- (1) predator — prey
 - (2) producer — consumer
 - (3) parasite — host
 - (4) decomposer — scavenger
- 27 The diagram below represents part of a life process in a leaf chloroplast.



If the process illustrated in the diagram is interrupted by a chemical at point X, there would be an immediate effect on the release of

- | | |
|-----------------|--------------------|
| (1) chlorophyll | (3) carbon dioxide |
| (2) nitrogen | (4) oxygen |
- 28 The widest variety of genetic material that can be used by humans for future agricultural or medical research would most likely be found in
- (1) a large field of a genetically engineered crop
 - (2) an ecosystem having significant biodiversity
 - (3) a forest that is planted and maintained by a forest service
 - (4) areas that contain only one or two species

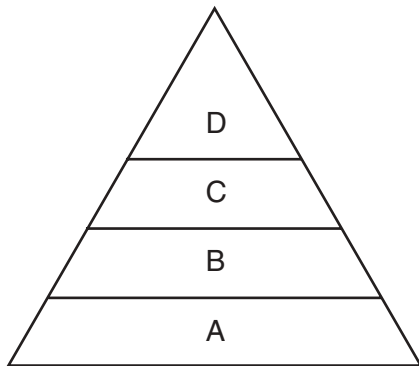
29 The diagram below shows the interaction between blood sugar levels and pancreatic activity.



This process is an example of

- (1) a feedback mechanism maintaining homeostasis
- (2) an immune system responding to prevent disease
- (3) the digestion of sugar by insulin
- (4) the hormonal regulation of gamete production

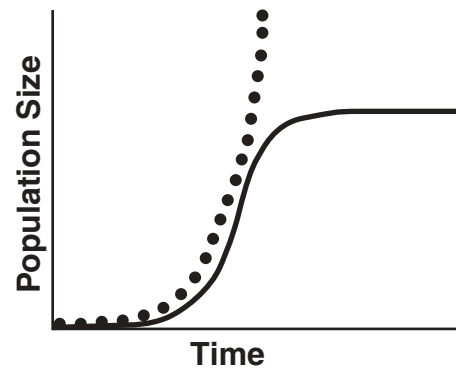
30 The diagram below represents an energy pyramid.



Which organisms would most likely be found at level A?

- (1) birds
 - (2) worms
 - (3) mammals
 - (4) algae
- 31 Which human activity would have the most direct impact on the oxygen-carbon dioxide cycle?
- (1) reducing the rate of ecological succession
 - (2) decreasing the use of water
 - (3) destroying large forest areas
 - (4) enforcing laws that prevent the use of leaded gasoline

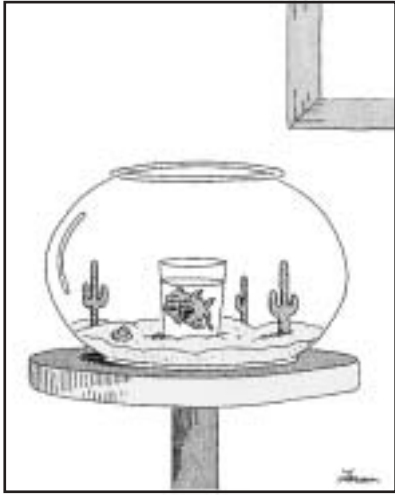
32 The dotted line on the graph below represents the potential size of a population based on its reproductive capacity. The solid line on this graph represents the actual size of the population.



Which statement best explains why the actual population growth is *less* than the potential population growth?

- (1) Resources in the environment are limited.
- (2) More organisms migrated into the population than out of the population.
- (3) The birthrate gradually became greater than the death rate.
- (4) The final population size is greater than the carrying capacity.

33 Which concept does the cartoon shown below illustrate?



"I love the desert."

- (1) Fish require certain environmental conditions for survival.
- (2) Fish can adapt to any environment.
- (3) Fish alter the ecosystems to improve their ability to survive.
- (4) Fish can survive abrupt climate changes.

34 Fertilizers used to improve lawns and gardens may interfere with the equilibrium of an ecosystem because they

- (1) cause mutations in all plants
- (2) cannot be absorbed by roots
- (3) can be carried into local water supplies
- (4) cause atmospheric pollution

35 The tall wetland plant, purple loosestrife, was brought from Europe to the United States in the early 1800s as a garden plant. The plant's growth is now so widespread across the United States that it is crowding out a number of native plants. This situation is an example of

- (1) the results of the use of pesticides
- (2) the recycling of nutrients
- (3) the flow of energy present in all ecosystems
- (4) an unintended effect of adding a species to an ecosystem

Part B

Answer all questions in this part. [30]

Directions (36–65): For those questions that are followed by four choices, circle the number of the choice that best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question and record your answers in the spaces provided.

36 The list below includes three ways of controlling viral diseases in humans.

- Administering a vaccine containing a dead or weakened virus that stimulates the body to form antibodies against the virus
- Using chemotherapy (chemical agents) to kill viruses similar to the way in which sulfa drugs or antibiotics act against bacteria
- Relying on the action of interferon, which is produced in cells and protects the body against pathogenic viruses

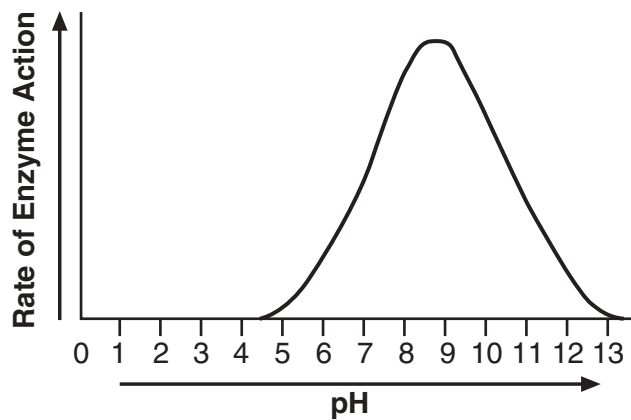
Based on this information, which activity would contribute to the greatest protection against viruses?

- (1) producing a vaccine that is effective against interferon
- (2) developing a method to stimulate the production of interferon in cells
- (3) using interferon to treat a number of diseases caused by bacteria
- (4) synthesizing a sulfa drug that prevents the destruction of bacteria by viruses

**For Teacher
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36

37 The effect of pH on a certain enzyme is shown in the graph below.



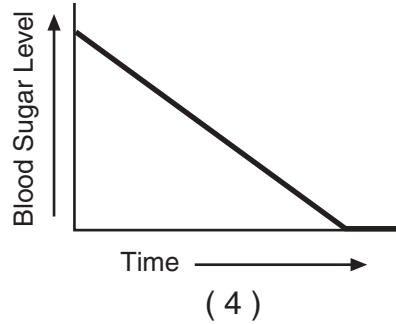
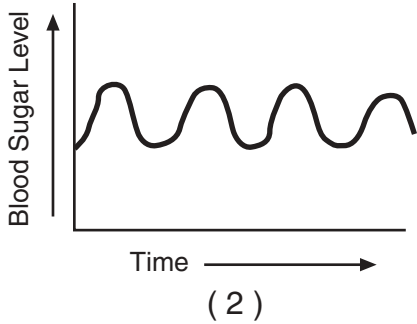
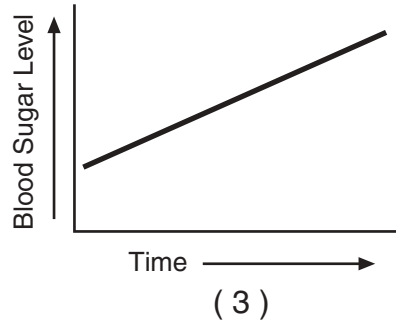
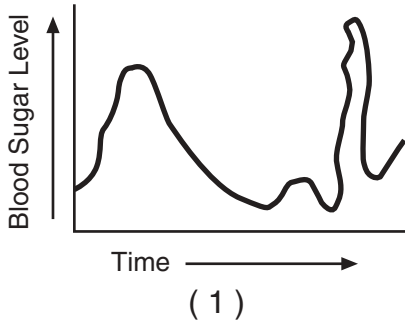
At what pH would the enzyme be most effective?

- (1) above 10
- (2) between 8 and 10
- (3) between 5 and 7
- (4) below 5

37

38 Which graph of blood sugar level over a 12-hour period best illustrates the concept of dynamic equilibrium in the body?

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38

39 A student hypothesized that lettuce seeds would not germinate (begin to grow) unless they were covered with soil. The student planted 10 lettuce seeds under a layer of soil and scattered 10 lettuce seeds on top of the soil. The data collected are shown in the table below.

Data Table

Seed Treatment	Number of Seeds Germinated
Planted under soil	9
Scattered on top of soil	8

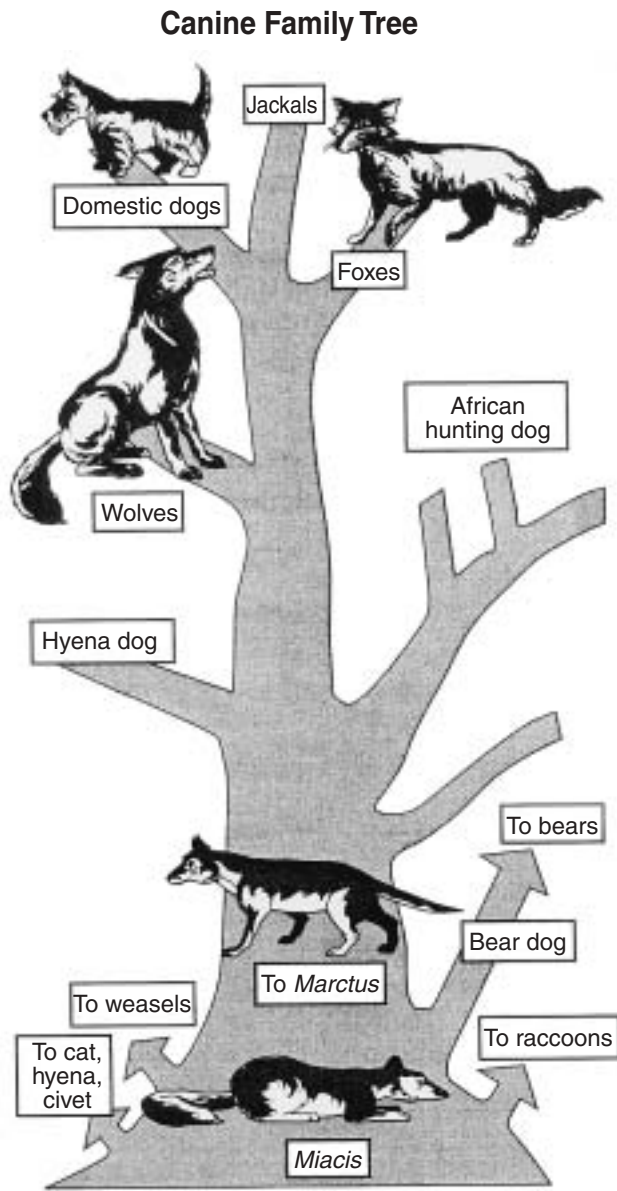
To improve the reliability of these results, the student should

- (1) conclude that darkness is necessary for lettuce seed germination
- (2) conclude that light is necessary for lettuce seed germination
- (3) revise the hypothesis
- (4) repeat the experiment using a larger sample size

39

Base your answers to questions 40 through 43 on the diagram below, which represents the relationships between animals in a possible canine family tree, and on your knowledge of biology.

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- 40 According to the diagram, which group of organisms has the most closely related members?
- (1) cats, weasels, and wolves
 - (2) bears, raccoons, and hyena dogs
 - (3) jackals, foxes, and domestic dogs
 - (4) African hunting dogs, hyena dogs, and domestic dogs

40



41 According to the canine family tree, weasels, foxes, and domestic dogs all most likely originated from the

- (1) wolf
- (2) bear dog
- (3) *Marctus*
- (4) *Miacis*

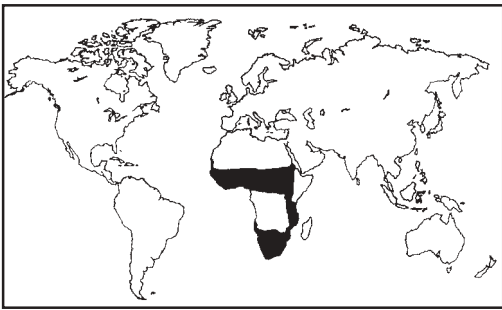
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41

42 State *one* valid inference regarding the relationship of bears to other animals in the canine family tree. [1]

42

43 The ranges of the African hunting dog and Arctic wolf are represented in the maps shown below.



■ Range of the African hunting dog

■ Range of the Arctic wolf

State a possible hypothesis that might explain why these two related animals successfully inhabit different areas of Earth. [1]

43

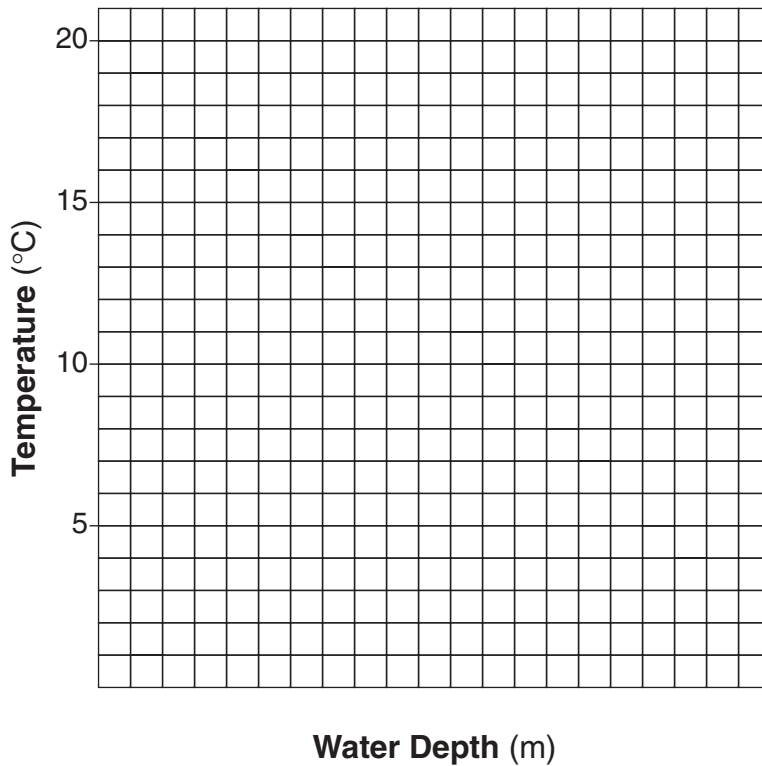
Base your answers to questions 44 through 47 on the data table and information below and on your knowledge of biology. The data table shows water temperatures at various depths in an ocean.

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**Water Temperatures
at Various Depths**

Water Depth (meters)	Temperature (°C)
50	18
75	15
100	12
150	5
200	4

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



44 Mark an appropriate scale on the axis labeled “Water Depth (m).” [1]

44

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

45



46 State the general relationship between temperature and water depth. [1]

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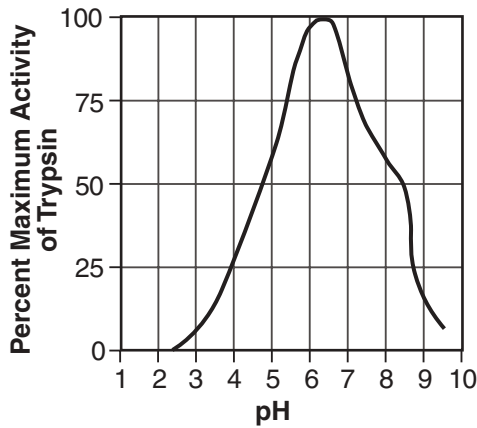
46

47 The approximate water temperature at a depth of 125 meters would be closest to

- (1) 15°C (3) 8°C
(2) 13°C (4) 3°C

47

48 What is the dependent variable in the experiment summarized in the graph below? [1]



48

49 Why are offspring of organisms that reproduce sexually *not* genetically identical to their parents? [1]

49

50 How can the introduction of a foreign species lead to the extinction of species that are native to an area? [1]

50

Base your answers to questions 51 through 54 on the information below and on your knowledge of biology.

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Stem Cells

If skin is cut, the wound closes within days. If a leg is broken, the fracture will usually mend if the bone is set correctly. Almost all human tissue can repair itself to some extent. Much of this repair is due to the activity of stem cells. These cells resemble those of a developing embryo in their ability to reproduce repeatedly, forming exact copies of themselves. They may also form many other different kinds of cells. Stem cells in bone marrow offer a dramatic example. They can give rise to all of the structures in the blood: red blood cells, platelets, and various types of white blood cells. Other stem cells may produce the various components of the skin, liver, or intestinal lining.

The brain of an adult human can sometimes compensate for damage by making new connections among surviving nerve cells (neurons). For many years, most biologists believed that the brain could not repair itself because it lacked stem cells that would produce new neurons.

A recent discovery, however, indicates that a mature human brain does produce neurons routinely at one site, the hippocampus, an area important to memory and learning. This discovery raises the prospect that stem cells that make new neurons in one part of the brain might be found in other areas. If investigators can learn how to cause existing stem cells to produce useful numbers of functional nerve cells, it might be possible to correct a number of disorders involving damage to neurons such as Alzheimer's disease, Parkinson's disease, stroke, and brain injuries.

51 What is the process by which stem cells produce exact copies of themselves?

- (1) cell division by mitosis
- (2) cell division by meiosis
- (3) sexual reproduction
- (4) glucose synthesis

51

52 Stem cells may be similar to the cells of a developing embryo because both cell types can

- (1) produce only one type of cell
- (2) help the brain to learn and remember things
- (3) divide and differentiate
- (4) cause Alzheimer's and Parkinson's diseases

52

53 Until recently, many biologists thought that the brain could *not* repair itself because they thought it

- (1) could not make new connections between neurons
- (2) had DNA different from DNA in reproductive cells
- (3) could form new cells only in certain areas of the brain
- (4) lacked stem cells needed to produce new neurons

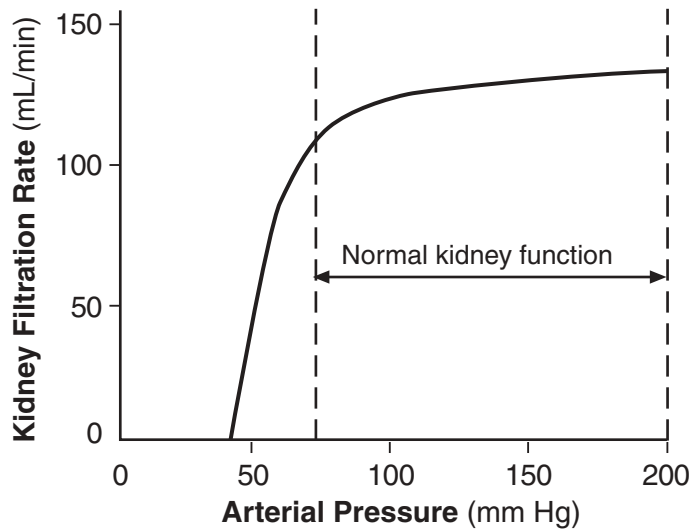
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53

54 Describe how this new discovery concerning stem cells might help to treat diseases such as Alzheimer's disease or Parkinson's disease. [1]

54

55 The graph below shows the relationship between kidney function and arterial pressure in humans.

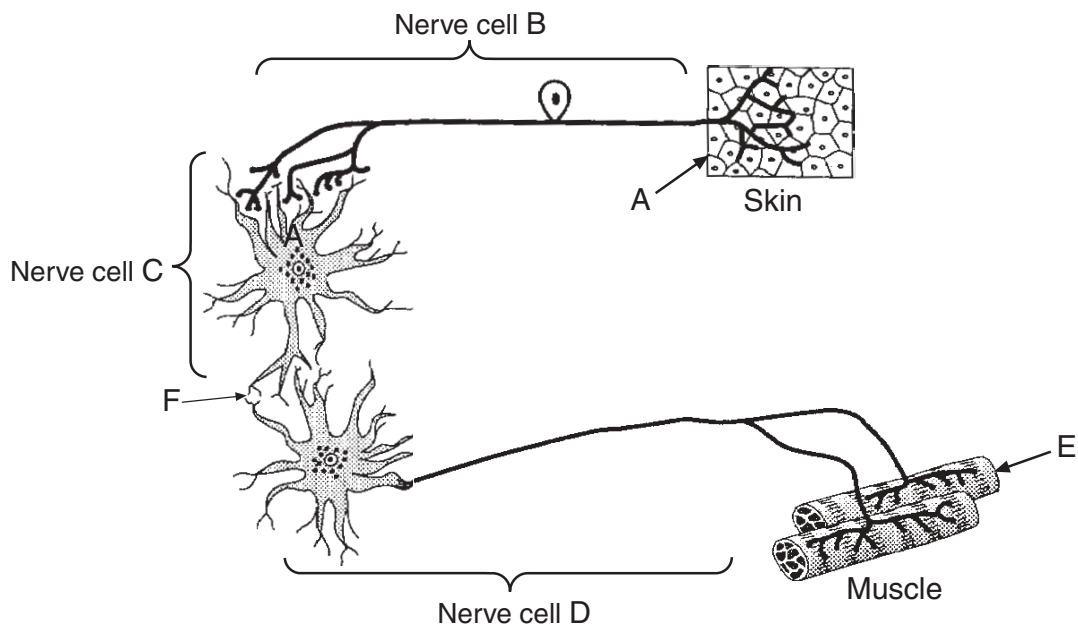


State how a steady decrease in arterial pressure will affect homeostasis in the human body. [1]

55

Base your answers to questions 56 through 58 on the diagram below illustrating one type of cellular communication and on your knowledge of biology.

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56 In region *F*, there is a space between nerve cells *C* and *D*. Cell *D* is usually stimulated to respond by

- (1) a chemical produced by cell *C* moving to cell *D*
- (2) the movement of a virus from cell *C* to cell *D*
- (3) the flow of blood out of cell *C* to cell *D*
- (4) the movement of material through a blood vessel that forms between cell *C* and cell *D*

56

57 If a stimulus is received by the cells at *A*, the cells at *E* will most likely use energy obtained from a reaction between

- (1) fats and enzymes
- (2) ATP and pathogens
- (3) glucose and oxygen
- (4) water and carbon dioxide

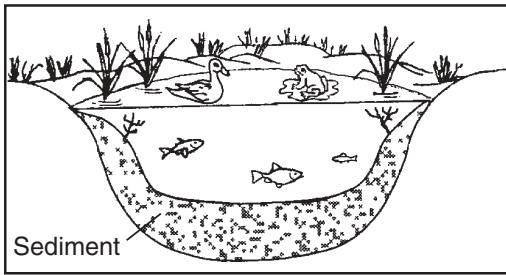
57

58 State *one* possible cause for the failure of muscle *E* to respond to a stimulus at *A*. [1]

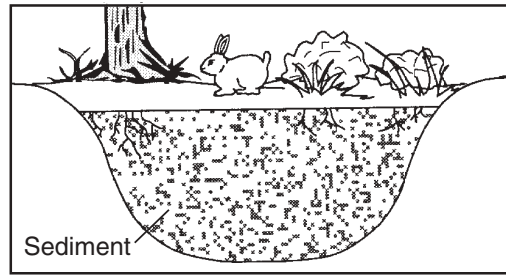
58

Base your answers to questions 59 through 62 on the diagrams of stages of succession below and on your knowledge of biology.

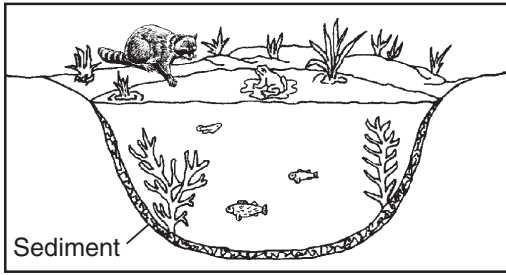
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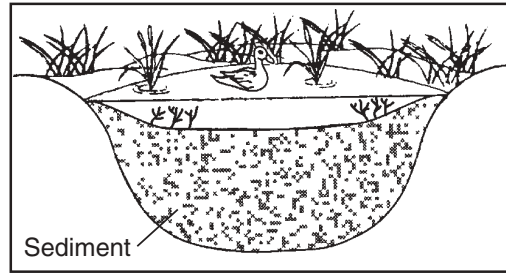
A



C



B



D

59 What is the correct sequence of these stages?

- (1) $B \rightarrow A \rightarrow D \rightarrow C$ (3) $C \rightarrow B \rightarrow A \rightarrow D$
 (2) $A \rightarrow D \rightarrow C \rightarrow B$ (4) $D \rightarrow A \rightarrow C \rightarrow B$

59

60 Which statement helps to explain this type of succession?

- (1) Species will replace species until an unstable ecosystem is established.
 (2) Species are replaced until a stable ecosystem is established.
 (3) Humans replace all species and fill all niches.
 (4) Changes in plant species are controlled only by the types of animals in an area.

60

61 Which organisms would most likely be harmed the most by the changes that occurred between these stages?

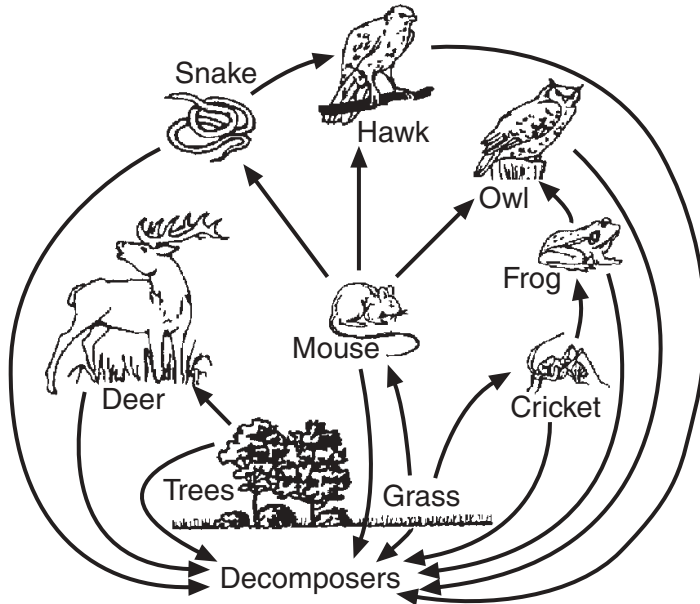
- (1) trees (3) fish
 (2) raccoons (4) rabbits

61

62 Identify *one* factor that could disrupt the final stage of this ecosystem. [1]

62

63 The diagram below represents a food web.



**For Teacher
Use Only**

Select and record the name of *one* species in the food web, and explain how its removal could affect *one* of the other species in the food web. [1]

63

64 Identify *one* process that a producer can accomplish that a carnivore can *not* accomplish. [1]

64

65 How do guard cells of a leaf help to maintain homeostasis in a plant? [1]

65

Part C

Answer all questions in this part. [20]

Directions (66–72): Record your answers in the spaces provided in this examination booklet.

66 Many people who are in favor of alternative medicine claim that large doses of vitamin C introduced into a vein speed up the healing of surgical wounds. Describe an experiment to test this hypothesis. Your answer must include at least:

- the difference between the experimental group of subjects and the control group [1]
- *two* conditions that must be kept constant in both groups [2]
- data that should be collected [1]
- an example of experimental results that would support the hypothesis [1]

**For Teacher
Use Only**

66

67 Choose *one* ecological problem from the list below.

Ecological Problems

- Global warming
- Destruction of the ozone shield
- Loss of biodiversity

Discuss the ecological problem you chose. In your answer be sure to state:

- the problem you selected and *one* human action that may have caused the problem [1]
- *one* way in which the problem may negatively affect humans [1]
- *one* positive action that could be taken to reduce the problem [1]

**For Teacher
Use Only**

67

68 There are a number of possible methods to control an invasion of gypsy moths in a city park. Several alternatives are listed below.

- A A band of material can be placed around each tree trunk, preventing the larvae from crawling up the trunk. The larvae can be picked off by hand each day and destroyed.
- B A chemical insecticide can be sprayed from an airplane. The chemical is effective and disappears rapidly, although some may run off into ponds and lakes.
- C The trees can be sprayed with a liquid containing naturally occurring bacteria that feed on gypsy moths. These bacteria are believed to be harmless, but the spray is very expensive.
- D No action is taken. This allows nature to take its course, which results in major changes in the area concerned. The damage can then be repaired.

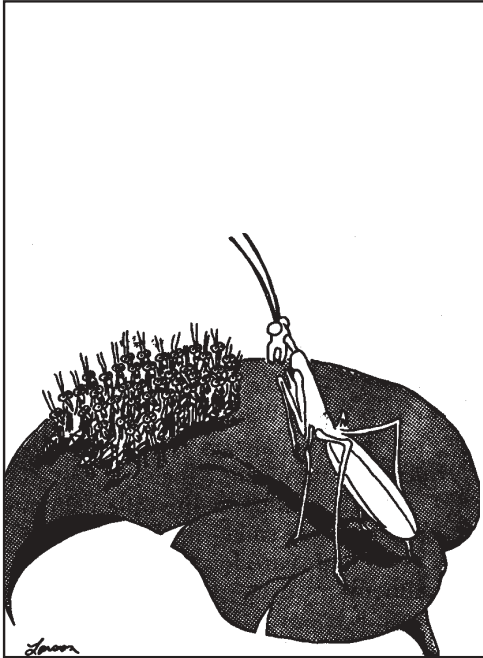
Write the letter of the method you would use and give an ecologically sound reason for your choice. [1]

68

Base your answer to question 69 on one of the cartoons below, which refer to certain concepts of natural selection, and on your knowledge of biology.

**For Teacher
Use Only**

Cartoon 1



"Of course, long before you mature, most of you will be eaten."

Cartoon 2



"Listen... I'm fed up with this 'weeding out the sick and the old' business... I want something in its prime."

69 Choose *one* cartoon and write its number in the space below. Identify *one* concept represented in that cartoon, and explain how this concept supports the theory of natural selection. Your answer must:

- identify *one* concept represented in the cartoon you choose [1]
- briefly explain the concept you identified [1]
- explain the relationship between this concept and the process of natural selection [1]

Cartoon Number: _____



Base your answers to questions 70 and 71 on the passage below and on your knowledge of biology.

**For Teacher
Use Only**

Plastics Produced by Plants

Plastics are generally thought of as materials made exclusively by human technology. However, some plants and bacteria naturally make small amounts of plastics. Furthermore, unlike synthetic plastics, plastics produced by plants and bacteria break down easily in the environment. Synthetic plastics, which are produced from petroleum, are the fastest growing type of waste in the United States. Researchers are learning how to greatly increase the amount of plastic made by plants. One day farmers may grow crops of plastic-producing plants in addition to wheat and corn crops.

A researcher at the Carnegie Institution of Washington was one of the first to attempt to use plants to make plastics. He knew that a common bacterium, known as *Alcaligenes eutrophus*, naturally produced a plastic called polyhydroxybutyrate (PHB), which resembles the type of plastic used to make garbage bags.

However, growing bacteria to produce plastic can be expensive. In order to determine if genetically engineered plants could make plastic, genes were isolated from *A. eutrophus* and inserted into plants. After a few tries, the researchers were able to produce healthy plastic-producing plants.

70 By what process were the plastic-producing plants developed? [1]

70

71 Explain why the use of the plastic produced by these plants is better for the environment than plastic produced by human technology, and explain why this plastic would be a benefit to future generations. [2]

71

72 Systems in the human body interact to maintain homeostasis. Four of these systems are listed below.

Body Systems

circulatory

digestive

respiratory

excretory

a Select *two* of the systems listed. Identify each system selected and state its function in helping to maintain homeostasis in the body. [2]

72a

b Explain how a malfunction of *one* of the four systems listed disrupts homeostasis and how that malfunction could be prevented or treated. In your answer be sure to:

- name the system and state *one* possible malfunction of that system [1]
- explain how the malfunction disrupts homeostasis [1]
- describe *one* way the malfunction could be prevented or treated [1]

72b

**For Teacher
Use Only**

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Wednesday, June 19, 2002 — 9:15 a.m. to 12:15 p.m., only

ANSWER SHEET

Student Sex: Female
 Male

Teacher

School Grade

Part	Maximum Score	Student's Score
A	35	_____
B	30	_____
C	20	_____
Total Raw Score (maximum Raw Score: 85)		<input type="text"/>
Final Score (from conversion chart)		<input type="text"/>
Raters' Initials		
Rater 1 Rater 2		

Record your answers to Part A on this answer sheet.

Part A

- | | | |
|----------|----------|----------|
| 1 | 13 | 25 |
| 2 | 14 | 26 |
| 3 | 15 | 27 |
| 4 | 16 | 28 |
| 5 | 17 | 29 |
| 6 | 18 | 30 |
| 7 | 19 | 31 |
| 8 | 20 | 32 |
| 9 | 21 | 33 |
| 10 | 22 | 34 |
| 11 | 23 | 35 |
| 12 | 24 | |

The declaration below must be signed when you have completed the examination.

I do hereby affirm, at the close of this examination, that I had no unlawful knowledge of the questions or answers prior to the examination and that I have neither given nor received assistance in answering any of the questions during the examination.

Signature

Tear Here

Tear Here

Tear Here

FOR TEACHERS ONLY

The University of the State of New York

Le

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Wednesday, June 19, 2002 — 9:15 a.m. to 12:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

Refer to the directions on page 3 before rating student papers.

Part A (35 credits)

Allow a total of 35 credits for Part A, one credit for each correct answer.

(1) 3	(13) 4	(25) 3
(2) 3	(14) 3	(26) 2
(3) 2	(15) 3	(27) 4
(4) 1	(16) 4	(28) 2
(5) 4	(17) 3	(29) 1
(6) 4	(18) 2	(30) 4
(7) 1	(19) 4	(31) 3
(8) 2	(20) 2	(32) 1
(9) 4	(21) 3	(33) 1
(10) 3	(22) 1	(34) 3
(11) 2	(23) 1	(35) 4
(12) 1	(24) 4	

LIVING ENVIRONMENT – *continued*

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 Administering and Scoring Regents Examinations in the Sciences*.

Use only *red* ink or *red* pencil in rating Regents papers. Do not attempt to *correct* the student's work by making insertions or changes of any kind.

Allow 1 credit for each correct response for multiple-choice questions in Part A and Part B.

On the detachable answer sheet for Part A, indicate by means of a checkmark each incorrect or omitted answer to multiple-choice questions. In the box provided in the upper right corner of the answer sheet, record the number of questions the student answered correctly for that part.

At least two science teachers must participate in the scoring of the Part B and Part C 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 all the open-ended questions on a student's answer paper.

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. In the student's examination booklet, record the number of credits earned for each answer in the box printed to the right of the answer lines or spaces for that question.

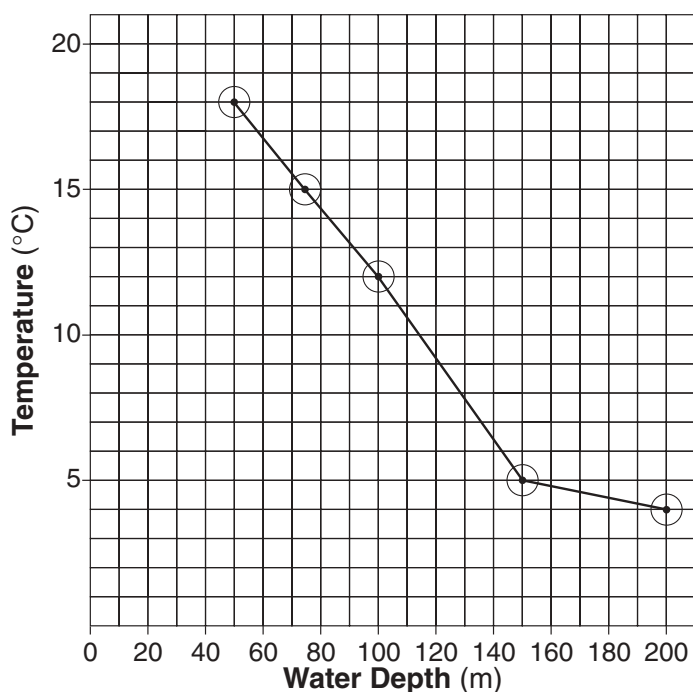
Fractional credit is *not* allowed. Only whole-number credit may be given to a response. If the student gives more than one answer to a question, only the first answer should be rated. Units need not be given when the wording of the questions allows such omissions.

Raters should enter the scores earned for Part A, Part B, and Part C on the appropriate lines in the box printed on the answer sheet and should add these 3 scores and enter the total in the box labeled "Total Raw Score." Then the student's raw score should be converted to a scaled score by using the conversion chart printed at the end of this Scoring Key and Rating Guide. The student's scaled score should be entered in the labeled box on the student's answer booklet. The scaled score is the student's final examination score.

Part B

- (36) 2
- (37) 2
- (38) 2
- (39) 4
- (40) 3
- (41) 4
- (42) Allow 1 credit for stating one valid inference regarding the relationship of bears to other animals in the canine family tree. Acceptable responses include, but are not limited to:
- *Miacis* is an ancestor of bears.
 - Bears are more closely related to raccoons than to the domestic dog.
 - Bears and canines share common ancestors.
- (43) Allow 1 credit for indicating that the two animals adapted to different environments.
- (44) Allow 1 credit for marking an appropriate scale on the axis labeled “Water Depth (m).”
- (45) Allow 1 credit for plotting the data correctly, surrounding each point with a small circle, and connecting the points.

Example of an Appropriate Graph



LIVING ENVIRONMENT – *continued*

- (46) Allow 1 credit for indicating that as the water depth increases, the temperature decreases.
- (47) 3
- (48) Allow 1 credit for indicating that the percent maximum activity of trypsin is the dependent variable.
Note: Allow no credit for the response “trypsin” or “amount of trypsin.”
- (49) Allow 1 credit for stating a scientifically accurate reason that the offspring of organisms that reproduce sexually are *not* genetically identical to their parents. Acceptable responses include, but are not limited to:
- Sexual reproduction allows for the recombination of genes.
 - Sexual reproduction allows for the exchange of genes/DNA during crossing-over in meiosis.
 - Sexual reproduction involves the combination of genes from two parents.
- (50) Allow 1 credit for a scientifically accurate explanation of how the introduction of a foreign species can lead to the extinction of species that are native to an area. Acceptable responses include, but are not limited to:
- Foreign species may be better adapted.
 - competition
 - no natural predators of the foreign species
 - Foreign species may carry disease or parasites.
- (51) 1
- (52) 3
- (53) 4
- (54) Allow 1 credit for an accurate description of how the new discovery concerning stem cells might help to treat diseases such as Alzheimer’s or Parkinson’s disease. Acceptable responses include, but are not limited to:
- Existing stem cells could be made to produce functional nerve cells in damaged brain areas.
 - Damaged neurons could be restored by the activity of stem cells.
- (55) Allow 1 credit for stating how a steady decrease in arterial pressure will affect homeostasis in the human body. Acceptable responses include, but are not limited to:
- reduce the normal kidney function
 - reduce the rate of filtration by the kidney
 - disrupt homeostasis
- (56) 1
- (57) 3

LIVING ENVIRONMENT – *continued*

- (58) Allow 1 credit for stating one possible cause for the failure of muscle *E* to respond to a stimulus at *A*. Acceptable responses include, but are not limited to:
- a cut in any of the nerve cells
 - failure of any neuron to release chemical transmitters
 - failure of any neuron or muscle to receive (or respond to) a chemical transmitter
 - inability of muscles to contract
 - lack of food (or oxygen) in any cells
 - very weak stimulus
 - death of nerve cell
- (59) 1
- (60) 2
- (61) 3
- (62) Allow 1 credit for identifying one factor that could disrupt the final stage of the ecosystem. Acceptable responses include, but are not limited to:
- natural disasters (fire, flood, etc.)
 - human activity
 - disease
 - introduction of a new species
 - climatic change
- (63) Allow 1 credit for naming one species shown in the food web and explaining how its removal could affect one of the other species in the food web. Acceptable responses include, but are not limited to:
- If the frogs were removed, the cricket population could increase.
 - If the hawks were removed, the mouse population could increase.
 - If the grass were removed, the cricket population could decrease.
 - If the crickets were removed, the grass population could increase.
- (64) Allow 1 credit for identifying one process a producer can accomplish that a carnivore can *not* accomplish. Acceptable responses include, but are not limited to:
- photosynthesis
 - oxygen release
 - food making
- (65) Allow 1 credit for a scientifically accurate explanation of how guard cells of a leaf help to maintain homeostasis in a plant. Acceptable responses include, but are not limited to:
- Guard cells can regulate the amount of water loss through the leaf.
 - Guard cells carry out photosynthesis.
 - allow CO₂ to enter the leaf
 - regulate gas exchange

Part C

- (66) Allow a maximum of 5 credits for describing an experiment to test the hypothesis, allocated as follows:
- Allow 1 credit for indicating that the experimental group received vitamin C and the control group did not.
 - Allow a maximum of 2 credits, 1 for each of two correctly identified conditions that should be kept constant. Acceptable responses include, but are not limited to:
 - age of people
 - type of wound
 - number in each group
 - dosage
 - food
 - water
- Note:** Allow no credit for the response “environment.”
- Allow 1 credit for identifying a measurable variable that could be used to collect data. Acceptable responses include, but are not limited to:
 - number of days to heal
 - rate of healing
 - Allow 1 credit for indicating that the experimental results would support the hypothesis if the experimental group healed more quickly (spent less time in the hospital, got better faster) than the control group.

LIVING ENVIRONMENT – *continued*

(67) Allow a maximum of 3 credits, 1 credit each for accurately stating:

- one human activity that may have caused the ecological problem selected from the list
- one way the problem may negatively affect humans
- one positive action that could be taken to reduce the problem

Note: No credit should be allowed for discussing an ecological problem not on the list.

Acceptable responses include, but are not limited to:

<u>Ecological Problem</u>	<u>Cause</u>	<u>Negative Effect</u>	<u>Positive Action</u>
Global warming	Air pollution Increased industry Burning rain forests Auto emissions	Changes in weather patterns Increase in temperature Increase in natural disasters (floods, storms) Loss of icecap	Alternative energy Carpooling Public transportation
Destruction of ozone shield	Use of chemicals that destroy ozone shield Use of CFCs in aerosols Air pollution	Increased exposure to UV rays	Reduce use of chemicals that destroy ozone shield Reduce use of CFCs in aerosols

Note: The response “air pollution” is acceptable for the ecological problem “destruction of ozone shield” because all halogens can cause destruction of ozone layer and many are produced by factories. “Pollution” or “pollution from cars” when standing alone is *not* acceptable.

Loss of biodiversity	Cutting down forests for farming Destruction of habitat	Loss of sources of medicine Loss of species	Set up protected areas Restrict logging Restore wetlands
----------------------	--	--	--

(68) Allow 1 credit for identifying an alternative to be used *and* giving an ecologically sound reason for choosing that alternative. Acceptable responses include but are not limited to:

- A Trunk banding does not damage the tree nor does it disrupt the environment.
- B The chemical insecticide is effective and disappears rapidly.
- C The liquid spray contains naturally occurring bacteria and will not disrupt the ecosystem.
- D No action because this has the least human impact on the environment.

LIVING ENVIRONMENT – *continued*

- (69) Allow a maximum of 3 credits, 1 for each of the three components of the explanation. Acceptable responses include, but are not limited to:

Cartoon 1

- The concept is overproduction. [1]
- More organisms are produced than can survive. [1]
- The organisms that are best adapted will survive. [1]

Cartoon 2

- The concept is struggle for survival (or survival of the fittest.) [1]
- Those organisms best adapted will survive. [1]
- Those that survive will pass these traits on to their offspring. [1]

- (70) Allow 1 credit for naming *or* describing the process by which plastic-producing plants were developed. Acceptable responses include, but are not limited to:

- genetic engineering
- recombinant DNA
- gene splicing
- gene manipulation
- biotechnology

- (71) Allow a maximum of 2 credits, 1 for each of two reasons that plastic produced by these plants is better for the environment than plastic produced by human technology and why this plastic would be a benefit to future generations. Acceptable responses include, but are not limited to:

- Plant plastics will decrease the need for recycling.
- Plant plastics will reduce pollution and trash.
- Plastic produced by plants breaks down easily in the environment.
- Plastics produced by humans break down very slowly.
- Plant plastics will not deplete oil reserves.
- Plant plastics will reduce the size of landfills.
- Growing plastic-producing plants will give farmers a new source of income.
- Plant plastics will provide a supply of plastic for the future.

LIVING ENVIRONMENT – *concluded*

(72) *a* Allow a maximum of 2 credits, 1 each for stating the function of the two systems chosen in helping to maintain homeostasis in the body. Acceptable responses include, but are not limited to:

- circulatory: carries nutrients to cells
- digestive: breaks down substances *or* makes nutrients available
- respiratory: exchange of gases
- excretory: eliminates metabolic wastes

b • Allow 1 credit for correctly stating a malfunction of the system chosen. Acceptable responses include, but are not limited to:

- circulatory: heart attack, hardening of arteries, disruption of blood flow
- digestive: constipation, diarrhea
- respiratory: asthma, bronchitis, emphysema
- excretory: kidney disease, gout

• Allow 1 credit for explaining how the malfunction disrupts homeostasis. Acceptable responses include, but are not limited to:

- hardening of arteries: raises blood pressure
- diarrhea: results in dehydration
- emphysema: reduced oxygen supply to cells
- kidney disease: interferes with excretion of some wastes

• Allow 1 credit for describing one way the malfunction could be prevented or treated. Acceptable responses include, but are not limited to:

- hardening of arteries: exercise
- emphysema: do not smoke

Regents Examination in Living Environment

June 2002

Chart for Converting Total Test Raw Scores to Final examination Scores (Scaled Scores)

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
85	100	56	75	27	54
84	99	55	74	26	53
83	97	54	74	25	52
82	96	53	73	24	50
81	95	52	73	23	49
80	93	51	72	22	48
79	92	50	72	21	46
78	91	49	71	20	45
77	90	48	70	19	43
76	89	47	70	18	42
75	88	46	69	17	40
74	87	45	69	16	38
73	86	44	68	15	36
72	85	43	68	14	35
71	84	42	67	13	33
70	84	41	66	12	31
69	83	40	66	11	28
68	82	39	65	10	26
67	81	38	64	9	24
66	81	37	63	8	22
65	80	36	63	7	19
64	79	35	62	6	17
63	79	34	61	5	14
62	78	33	60	4	12
61	77	32	59	3	9
60	77	31	58	2	6
59	76	30	57	1	3
58	76	29	56	0	0
57	75	28	55		

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 scaled score that corresponds to that raw score. The scaled score is the student's final examination score. Enter this score in the space labeled "Final Score" on the student's answer sheet.

All student answer papers that receive a scaled score of 60 through 64 **must** be scored a second time. For the second scoring, a different committee of teachers may score the student's paper or the original committee may score the paper, except that no teacher may score the same open-ended questions that he/she scored in the first rating of the paper. The school principal is responsible for assuring that the student's final examination score is based on a fair, accurate, and reliable scoring of the student's answer paper.

Because scaled scores corresponding to raw scores in the conversion chart may change from one examination to another, it is crucial that for each administration, the conversion chart provided in the scoring key for the administration be used to determine the student's final score. The chart above is usable only for this administration of the living environment examination.

Map to Core Curriculum

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