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

LIVING ENVIRONMENT

Thursday, August 13, 2009 — 12:30 to 3:30 p.m., only

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 and Part B–1. 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.

You are to answer all questions in all parts of this examination. Write your answers to the Part A and Part B–1 multiple-choice questions on the separate answer sheet. Write your answers for the questions in Parts B–2, C, and D 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 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.

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

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, write on your separate answer sheet the number of the word or expression that, of those given, best completes the statement or answers the question.

1 Organisms that are able to manufacture organic nutrients from substances in the abiotic environment are classified as
   (1) heterotrophs  (3) predators
   (2) fungi          (4) autotrophs

2 Which factor would have the greatest effect on the flow of energy into an ecosystem?
   (1) a large decrease in the amount of sunlight available
   (2) a large increase in the number of carnivores
   (3) a small increase in the number of decomposers
   (4) a small decrease in the amount of minerals available

3 Which structures carry out life functions within cells?
   (1) tissues       (3) organelles
   (2) organ systems (4) organs

4 Which process is most directly responsible for maintaining internal stability in an organism when its environment is constantly changing?
   (1) digestion     (3) reproduction
   (2) feedback      (4) evolution

5 The function of a cell depends primarily on its
   (1) life span     (3) structure
   (2) color         (4) movement

6 In some cases, humans have chosen to mate certain individual farm animals within a species. For example, by allowing only the largest cattle to reproduce over many generations, strains of very large cattle have been produced. This process is known as
   (1) natural selection
   (2) direct harvesting
   (3) selective breeding
   (4) dynamic equilibrium

7 A boy inherits genes for tallness, but his growth is limited as a result of poor nutrition. This is an example of
   (1) an inherited disorder
   (2) environmental influence on gene expression
   (3) expression of a hidden trait
   (4) a characteristic controlled by more than one pair of genes

8 The sickle-cell trait is an inherited condition resulting from the presence of abnormal molecules of the protein hemoglobin in red blood cells. A person with the sickle-cell trait may have a child with the same condition because the child receives from the parent
   (1) abnormal red blood cells
   (2) abnormal hemoglobin molecules
   (3) a code for the production of abnormal hemoglobin
   (4) a code for the production of abnormal amino acids

9 The sorting and recombining of genes during meiosis and fertilization usually leads to the production of
   (1) gametes with many copies of the same chromosome
   (2) embryos with traits identical to those of all other members of the species
   (3) zygotes with the genetic information to produce only females
   (4) offspring with some traits that did not appear in their parents

10 Which situation would most likely produce a gene mutation in a squirrel?
    (1) The squirrel stops using its claws for digging.
    (2) The squirrel is exposed to radiation for several days.
    (3) Oak trees gradually become less common.
    (4) The weather becomes wetter for a short period of time.
11 Which row in the chart below best describes what happens when some DNA bases are deleted from a gene?

<table>
<thead>
<tr>
<th>Row</th>
<th>Gene</th>
<th>Trait Controlled By the Original DNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>is not changed</td>
<td>is never changed</td>
</tr>
<tr>
<td>(2)</td>
<td>is not changed</td>
<td>may be changed</td>
</tr>
<tr>
<td>(3)</td>
<td>is changed</td>
<td>is never changed</td>
</tr>
<tr>
<td>(4)</td>
<td>is changed</td>
<td>may be changed</td>
</tr>
</tbody>
</table>

12 The diagram below represents a technique currently used by scientists in the field of biotechnology.

![Diagram showing the process of genetic engineering involving a human cell, bacterial cell, human DNA, bacterial DNA, and a section of human DNA.]

Which statement describes a possible outcome of this technique?
(1) The bacterium is able to produce a human hormone.
(2) It allows the bacterium to grow in humans, since it contains a human gene.
(3) It allows humans to become immune to an infection from this type of bacteria.
(4) The bacterium can now produce human cells identical to cells of the DNA donor.
13 When antibiotics were first developed, most infectious diseases could be controlled by them. Today, certain bacteria are resistant to many antibiotics. One possible explanation for this change is that
(1) the antibiotics killed most of the bacteria that did not have a genetic variation for resistance
(2) the bacteria needed to change in order to produce more antibiotics
(3) some of the bacteria learned how to resist the antibiotics
(4) antibiotics have become weaker over the years

14 Thousands of genetically identical trees have been discovered growing in a remote, undisturbed mountain area in Colorado. These trees are most likely the result of
(1) genetic engineering
(2) asexual reproduction
(3) meiotic cell division
(4) biotechnology

15 The ability of the human body to keep blood-sugar levels within a fairly narrow range, despite the intake of meals high in carbohydrates, is an example of
(1) active transport
(2) genetic recombination
(3) homeostasis
(4) digestion

16 A large number of sperm cells are produced by males every day. This large number of sperm cells increases the chance that
(1) at least one sperm cell will be reached when the eggs swim toward the sperm cells in the ovary
(2) several sperm cells will unite with an egg so the fertilized egg will develop properly
(3) some of the sperm cells will survive to reach the egg
(4) enough sperm cells will be present to transport the egg from where it is produced to where it develops into a fetus

17 Which statement best describes the relationship between the blood of a human fetus and the blood of the mother?
(1) Their blood systems are separate only at certain times in development and connected at other times.
(2) The blood flows directly from the mother into the fetus.
(3) Their blood systems are separate and no materials are exchanged.
(4) Their blood systems are separate, but certain materials pass from one to the other.

18 To replace burned skin, doctors can successfully transplant replacement skin taken from another part of the body of the burn victim. Which statement best explains why the transplanted skin is not rejected?
(1) The transplanted skin is damaged, making the immune system nonfunctional.
(2) The antigens of the replacement skin are the same as those of the damaged skin.
(3) Burn victims lose so much blood that white blood cells cannot cause an immune response.
(4) There is no blood supply to the skin, so mixing of antigens does not occur.

19 The soil on a farm can very quickly become depleted of the minerals essential to plants because harvesting of crops can interfere with the
(1) reproductive cycles of animals
(2) recycling of inorganic compounds
(3) flow of energy
(4) transport of groundwater

20 A vaccine used against an infectious disease may contain
(1) specialized blood cells
(2) toxic enzymes
(3) a variety of antibiotics
(4) weakened pathogens
21. What will most likely occur if two different plant species compete for the same requirements in an ecosystem?
   (1) They will usually develop different requirements.
   (2) One species may adapt to a different environment.
   (3) One species may be eliminated from that ecosystem.
   (4) They will alter the environment so that they can both survive in that ecosystem.

22. Some of the energy taken in by an organism is not available to other organisms in a food web. Energy that is not available to other organisms in a food web is energy that is
   (1) stored in the remains of a dead animal
   (2) lost to the environment as heat
   (3) stored in eggs produced during sexual reproduction
   (4) produced in muscle tissue during the growth of an organism

23. The relationship that exists when athlete’s foot fungus grows on a human is an example of
   (1) predator/prey
   (2) producer/consumer
   (3) parasite/host
   (4) decomposer/autotroph

24. If an ecosystem is changed through a natural disaster, organisms will have the best chance of survival if
   (1) their environment has few abiotic factors
   (2) the organisms are large
   (3) the population size is small
   (4) their species exhibits genetic variation

25. In state forests and parks containing varieties of flowering trees and shrubs, there are signs that say “Take nothing but pictures, leave nothing but footprints.” These signs are necessary because
   (1) humans can destroy habitats by removing flowering trees and shrubs
   (2) all animals feed directly on flowering shrubs that may be removed by people
   (3) removal of flowering trees and shrubs will increase biodiversity
   (4) flowering shrubs grow best in state forests and parks

26. Which human activity creates the least threat to global stability?
   (1) overuse of resources
   (2) pollution of water with heavy metals
   (3) pollution of air with sulfur gases
   (4) reuse of plastic bags

27. Which change is a cause of the other three?
   (1) increased fossil fuel consumption
   (2) destruction of the ozone shield
   (3) increased industrialization
   (4) destruction of natural habitats

28. In an attempt to improve environmental quality, local officials in a county in New York State want to build a garbage-to-steam plant. At the plant, garbage would be burned to produce energy, but air pollution would also be produced. In order to decide whether or not to build this plant, the community must consider
   (1) the trade-offs involved
   (2) new genetic technology
   (3) the natural process of succession
   (4) energy flow between organisms
29 An evolutionary pathway is represented below.

Which statement about evolutionary pathways is most accurate?
(1) All evolutionary pathways show that life began with autotrophic organisms that soon evolved into heterotrophic organisms.
(2) Two organisms on the same branch of an evolutionary pathway are more closely related to each other than to those on distant branches.
(3) All the organisms shown at the ends of evolutionary pathway branch tips are alive today.
(4) Evolutionary pathways show that evolution is a short-term process.

30 Which graph represents a population that grew and is maintained at the carrying capacity of its ecosystem?
Part B–1

Answer all questions in this part. [13]

Directions (31–43): 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.

31 A laboratory procedure calls for heating 50 milliliters of a sugar solution to 60°C. Which piece of laboratory equipment will not be needed?
(1) protective eyewear
(2) ruler
(3) thermometer
(4) graduated cylinder

32 Which statement best describes a hypothesis?
(1) A hypothesis is the process of making careful observations.
(2) The conclusion drawn from the results of an experiment is part of a hypothesis.
(3) A hypothesis serves as a basis for determining what data to collect when designing an experiment.
(4) The facts collected from an experiment are written in the form of a hypothesis.

33 The diagram below represents a species of bee that helps one type of orchid plant reproduce by carrying pollen on structure X from one orchid flower to another. Pollination by this species of bee is the only way the orchid can reproduce.

34 Which model best represents the relationship between a cell, a nucleus, a gene, and a chromosome?

35 A researcher recently discovered a new species of bacteria in the body of a tubeworm living near a hydrothermal vent. He compared the DNA of this new bacterial species to the DNA of four other species of bacteria. The DNA sequences came from the same part of the bacterial chromosome of all four species.

<table>
<thead>
<tr>
<th>Species</th>
<th>DNA Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>unknown species</td>
<td>ACT GCA CCC</td>
</tr>
<tr>
<td>species I</td>
<td>ACA GCA CCG</td>
</tr>
<tr>
<td>species II</td>
<td>ACT GCT GGA</td>
</tr>
<tr>
<td>species III</td>
<td>ACA GCA GGG</td>
</tr>
<tr>
<td>species IV</td>
<td>ACT GCA CCG</td>
</tr>
</tbody>
</table>

According to these data, the unknown bacterial species is most closely related to
(1) species I
(2) species II
(3) species III
(4) species IV
Base your answers to questions 36 and 37 on the passage below and on your knowledge of biology.

Alaska: Anchorage — Birders noted a sharp increase in European starlings in the 2005 Anchorage Christmas Bird Count. The sometimes aggressive species is relatively new to Alaska. Only three starlings were spotted during the 1995 Christmas bird count. Last year, there were 35. This year, birders counted 156.

Source: USA Today, 12/28/05

36 Which graph best represents the change in the number of starlings seen in the Anchorage area?

37 The change in the starling population in Anchorage from 1995 to 2005 could have been due to the presence of

(1) a large population of competing species
(2) a wide variety of predators
(3) an abundant food supply
(4) very few flowering plants
38 The diagram below represents the bones of the forelimbs of two animals alive today that most likely evolved from a common ancestor. Members of the original ancestral population were isolated into two groups by natural events.

If these two animals did have a common ancestor, which statement would best explain why there are differences in the bones?

(1) Changes occurred to help the animals return to their original environment.
(2) Changes contributed to the survival of the organisms in their new environment.
(3) Changes helped reduce competition within each group.
(4) Changes indicate the species are evolving to be more like the ancestral species.

39 Within which structure shown in the diagram below are energy-rich organic compounds used to produce ATP?

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

40 The graph below shows the relative concentrations of certain hormones in the blood during the human female reproductive cycle.

Which hormone has the lowest concentration on which day?

(1) hormone A on day 4
(2) hormone B on day 2
(3) hormone C on day 12
(4) hormone D on day 20

41 Which statement best describes the starch content of two leaves taken from the same plant shown in the chart below?

Leaf A taken from plant in the dark for 48 hours
Leaf B taken from plant in bright light for 48 hours

(1) Neither leaf contains starch.
(2) Both leaves contain the same amount of starch.
(3) Leaf A contains more starch than leaf B.
(4) Leaf B contains more starch than leaf A.
Base your answers to questions 42 and 43 on the diagram below, which represents a chemical reaction that occurs in the human body, and on your knowledge of biology.

```
Part of a starch molecule + Water → X + Y
```

42 Substances X and Y are examples of which kind of molecule?

(1) simple sugar  (3) fat
(2) amino acid     (4) hormone

43 Which statement describes a characteristic of molecule Z?

(1) Molecule Z will function at any temperature above 20°C.
(2) Molecule Z is composed of a string of molecular bases represented by A, T, G, and C.
(3) Molecule Z will function best at a specific pH.
(4) Molecule Z is not specific, so this reaction can be controlled by any other chemical in the body.
To most people, using maggots (fly larvae) for a medical treatment is not a great idea. However, to many doctors, fly larvae do have a place in medicine, and that place is inside open wounds.

In maggot debridement therapy, live fly larvae are mixed into a dressing for a wound and the area is covered with gauze. Maggots, which will only eat dead tissue, feed on damaged flesh and leave the healthy tissue behind. In the process, the maggots excrete an antimicrobial chemical that helps cleanse the wound of pathogens. When the dressing is cut away two or three days later, the maggots, now up to 10 times their original size, are easily removed.

People with diabetes often have impaired wound healing. This could lead to infection. Maggot therapy has been used to clean these types of wounds.

44 What is the meaning of the term *debridement*?

(1) excretions of pathogens  
(2) impaired wound healing  
(3) removal of dead tissue  
(4) destruction of antimicrobial chemicals

45 Which group of terms best describes a maggot?

(1) decomposer, prey, host  
(2) scavenger, heterotroph, consumer  
(3) producer, predator, parasite  
(4) pathogen, carnivore, autotroph

46 State one possible reason why slow healing of wounds can lead to infection. [1]
Hydrogen peroxide is a toxic substance produced in an organism as a result of certain metabolic processes. Catalase, a biological catalyst produced by cells, speeds the breakdown of hydrogen peroxide into less harmful substances.

In an investigation, 2-gram pieces of liver (which contains catalase) were added to separate dishes. Each dish contained the same amount of a 3% solution of hydrogen peroxide, but at different temperatures. The relative activity of the catalase was determined. The results were recorded and are shown in the data table below.

**The Effect of Temperature on Catalase Activity**

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Relative Catalase Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>25</td>
<td>22</td>
</tr>
<tr>
<td>30</td>
<td>33</td>
</tr>
<tr>
<td>35</td>
<td>43</td>
</tr>
<tr>
<td>40</td>
<td>37</td>
</tr>
<tr>
<td>45</td>
<td>24</td>
</tr>
<tr>
<td>50</td>
<td>12</td>
</tr>
</tbody>
</table>

*Directions (47–48):* Using the information in the data table, construct a line graph on the grid on the next page, following the directions below.

47 Mark an appropriate scale on each axis. [1]

48 Plot the data, surround each point with a small circle, and connect the points. [1]
49 At which temperature does catalase work most effectively? Support your answer. [1]

______________________________________________________________

______________________________________________________________

50 What type of organic substance is catalase? [1]

______________________________________________________________
Base your answers to questions 51 through 53 on the diagram of nerve cells below and on your knowledge of biology.

51 In the space below, sketch a chemical molecule that might be released from nerve cell A and be recognized and bind to area I of nerve cell B. [1]

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[14]
52 Describe what would happen if a drug molecule shaped like □ were introduced into this nerve pathway. [1]

_______________________________________________________________________
_______________________________________________________________________

53 Identify one substance, other than the secretions from nerve cells, used in cell communication. [1]

_______________________________________________________________________

Base your answers to questions 54 and 55 on the information below and on your knowledge of biology.

If farm fields in the Piedmont region of North Carolina are abandoned, there is a regular sequence of plant species that will inhabit the field. The data table below shows a typical sequence of dominant plant species.

<table>
<thead>
<tr>
<th>Years After Last Cultivation</th>
<th>Dominant Plant Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>crabgrass</td>
</tr>
<tr>
<td>1</td>
<td>horseweed</td>
</tr>
<tr>
<td>2</td>
<td>aster</td>
</tr>
<tr>
<td>3</td>
<td>broomsedge</td>
</tr>
<tr>
<td>5–15</td>
<td>shortleaf pine</td>
</tr>
<tr>
<td>50–150</td>
<td>oak trees</td>
</tr>
</tbody>
</table>

54 This regular sequence of plant species over the 150-year period is known as

(1) degrading of the ecosystem
(2) loss of biodiversity
(3) ecological succession
(4) biological evolution

55 If the oak forest is destroyed by fire and no other disturbances occur, which dominant plant species would most likely be found in the region 70 years after the fire? [1]
A park with a small lake is home to a population of ducks. The building of a housing complex eliminates a nearby pond. Soon other ducks and waterbirds like geese and egrets come to live at this small lake.

56 State one specific way the new populations of birds may affect the original population of ducks. [1]

_______________________________________________________________________
_______________________________________________________________________

57 State one specific way the new populations of birds may change the abiotic factors of the environment in and around the lake. [1]

_______________________________________________________________________
_______________________________________________________________________

58 Predict one way the new populations of birds may affect the populations of plants that live in and around the lake. [1]

_______________________________________________________________________
_______________________________________________________________________

Directions (56–65): Record your answers in the spaces provided in this examination booklet.
59 Two life functions performed by all living organisms are nutrition and respiration. Identify two other life functions that are essential for the survival of all living organisms. Explain how each of the two life functions you identified maintains homeostasis. [2]

Life Function: ____________________________

Explanation: ____________________________________________________________
_______________________________________________________________________

Life Function: ____________________________

Explanation: ____________________________________________________________
_______________________________________________________________________

60 A population of bats feeds on flying insects. Some of these bats have a gene that results in much stronger flight muscles than those of the other bats in the area. Explain how this variation could lead to evolutionary change within this species of bat. In your answer, be sure to include an explanation of:

- competition within the bat population [1]
- survival of various individuals within the bat population [1]
- how the frequency of the trait for stronger flight muscles would be expected to change within the bat population over time [1]
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

61 Identify one activity of a mother that can disrupt fetal development and explain how this activity might affect the development of her fetus. [1]

_______________________________________________________________________
_______________________________________________________________________
Base your answer to question 62 on the list below and on your knowledge of biology. The list includes two processes involved in the development of a human fetus.

**Processes**
- mitosis
- differentiation

62 Select one process from the list and describe its role in the development of a human fetus. In your answer be sure to:
  - identify the process you selected
  - state the role of this process in fetal development [1]
  - identify the organ in the mother where this process occurs [1]

Process: ________________________________

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

63 Describe the cycling of carbon in an ecosystem. In your answer be sure to:
  - identify the inorganic carbon compound that is obtained by plants from the environment [1]
  - identify the process plants use to form more complex organic molecules from this carbon compound [1]
  - describe how herbivores use these complex organic molecules [1]
  - identify the process herbivores use to return carbon to the environment [1]
Base your answers to questions 64 and 65 on the information below and on your knowledge of biology.

Windmill farms are being developed as alternative energy sources in some areas of the United States. Windmill farms convert energy from the wind into electricity.

64 State one reason why some residents might be concerned if windmill farms were planned for their part of the country. [1]

_______________________________________________________________________
_______________________________________________________________________

65 State one environmental reason why using windmills for energy might be preferred over using coal for energy. [1]

_______________________________________________________________________
_______________________________________________________________________
The diagram below represents a laboratory apparatus.

This apparatus is used to

(1) identify the molecular bases in DNA
(2) detect chemical toxins in the air
(3) stain specimens before observing them with a microscope
(4) separate a mixture of plant pigments
Base your answers to questions 67 and 68 on the information and diagram below and on your knowledge of biology.

Starch turns blue black in the presence of a starch indicator. Dialysis tubing tied at both ends and containing starch solution is placed in a beaker of water. Yellowish brown starch indicator is then added to the water.

67 What will the solutions in the beaker and the tubing look like after 20 minutes?

(1) The indicator solution in the beaker will be blue black and the starch solution in the tubing will not change color.

(2) The starch solution in the tubing will be blue black and the indicator solution in the beaker will not change color.

(3) Neither the indicator solution nor the starch solution will be blue black.

(4) Both the indicator solution and the starch solution will be blue black.

68 This laboratory setup would most likely be used to demonstrate the process of

(1) diffusion

(2) active transport

(3) replication

(4) cellular respiration
Base your answers to questions 69 through 71 on the chart below showing mRNA base sequences and the amino acids for which they code.

69 Which three codons would code for a different amino acid sequence from that coded for by the mRNA base sequence AGU-UCA-CCA?

(1) AGC-UCU-CCU
(2) AGU-UCC-C CG
(3) AGC-UCA-CUU
(4) AGU-UCG-CCC
70  Fill in an mRNA codon that would code for each amino acid shown.  [1]

<table>
<thead>
<tr>
<th>Amino acid</th>
<th>mRNA codon</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASP</td>
<td>____</td>
</tr>
<tr>
<td>TRP</td>
<td>____</td>
</tr>
<tr>
<td>CYS</td>
<td>____</td>
</tr>
</tbody>
</table>

71  Identify one of the mRNA codons that would stop the coding process.  [1]

____________________________________

Base your answers to questions 72 through 74 on the information below and on your knowledge of biology.

A scientist conducted an experiment to test the hypothesis that maple seeds exposed to acid rain will take longer to germinate than seeds exposed to normal rain, which has a pH of 5.6. The scientist set up four groups, each containing 200 maple seeds. The water used for each group had a different pH value: 5.6, 4.0, 3.0, and 2.0. All other conditions were kept the same. After ten days, the number of seeds that had germinated in each group was counted.

72  Identify the control group in this experiment.  [1]

_______________________________________________________________________

73  Identify the dependent variable in this experiment.  [1]

_______________________________________________________________________

74  State one example of experimental results that would indicate that acid rain, which has a pH between 4.5 and 4.0, could be responsible for a decrease in the number of young maple trees in some forest regions.  [1]

_______________________________________________________________________

_______________________________________________________________________
A student squeezes a clothespin as rapidly as possible for one minute. Without stopping to rest, the student continues to squeeze the clothespin for a second minute. At the end of the second minute, the student’s fingers and hand feel very cramped and tired. The physical tiredness and cramping in the muscles in the student’s hand were most likely due to the increased production of

(1) ATP
(2) waste products
(3) oxygen
(4) glucose

A technique that can be used to compare the DNA of two or more plants is

(1) cloning
(2) chromatography
(3) staining
(4) gel electrophoresis

Three different species of finch inhabit one particular Galapagos Island. All three species of finch prefer plant food and have edge-crushing bills. Explain how all three species of finch can live successfully on the same island. [1]

_______________________________________________________________________
_______________________________________________________________________

Describe what will happen to red onion cells in a wet-mount slide when a saltwater solution is added to them. [1]

_______________________________________________________________________
_______________________________________________________________________

_______________________________________________________________________
The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Thursday, August 13, 2009 — 12:30 to 3:30 p.m., only

ANSWER SHEET

Student ............................................ Sex: □ Male □ Female
Teacher .............................................. Grade ........
School ..............................................

Record your answers to Part A and Part B–1 on this answer sheet.

Part A

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

Part A Score

Part B–1

31 ........... 38 ...........
32 ........... 39 ...........
33 ........... 40 ...........
34 ........... 41 ...........
35 ........... 42 ...........
36 ........... 43 ...........
37 ........... Part B–1 Score

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
# LE LIVING ENVIRONMENT

**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 [http://www.emsc.nysed.gov/osa/](http://www.emsc.nysed.gov/osa/) and select the link “Examination 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.

**Part A and Part B–1**

Allow 1 credit for each correct response.

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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.

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.

On the detachable answer sheet for Part A and Part B–1, indicate by means of a check mark 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 each of these parts.

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 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 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.

Raters should enter the scores earned for Part A, Part B–1, Part B–2, Part C, and Part D on the appropriate lines in the box printed on the answer sheet and should add these five 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 that will be posted on the Department’s web site [http://www.emsc.nysed.gov/osa/](http://www.emsc.nysed.gov/osa/) on Thursday, August 13, 2009. The student’s scaled score should be entered in the box labeled “Final Score” on the student’s answer sheet. The scaled score is the student’s final examination score.

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 for that administration be used to determine the student’s final score.
44  3

45  2

46  [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— There would be more time for pathogens to cause infection.
— Slow healing increases exposure time to pathogens.
— An open wound will provide a suitable environment for pathogens.

47  [1] Allow 1 credit for marking an appropriate scale on each labeled axis.

48  [1] Allow 1 credit for correctly plotting the data and connecting the points.

Example of a 2-credit graph for questions 47 and 48:

![Graph](image)

**Note:** Allow credit if points are plotted correctly but *not* circled.
Make no assumption about the origin unless it is labeled.
Do *not* allow credit for plotting points that are not in the data table, e.g., (0,0).
49 [1] Allow 1 credit for 35°C and supporting the answer. Acceptable responses include, but are not limited to:

— The greatest amount of activity occurs there.
— It is the highest point on the graph.
— The rate is highest at this temperature.

Note: Allow credit for an answer consistent with the student’s graph for questions 47 and 48.

50 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— an enzyme
— a catalyst
— protein

51 [1] Allow 1 credit.

Examples of 1-credit responses:

Note: Accept any shape with a corresponding section that will fit into the receptor on nerve cell B.

52 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Nothing; the shape would not be accepted by receptors on B.
— It would not bind with the receptors in area I.

53 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— hormones
— antigens
— receptor molecules

54 3

55 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— oak trees
— oak
Part C

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

- New populations of waterbirds will compete with the original population of ducks for space/food.
- New individuals of the same species as the original duck population may compete for mates.
- May bring disease with them
- Original population may decline

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

- Bird waste will pollute the water and make it cloudy.
- Additional waste might change the pH of the lake.
- New birds will decrease the amount of space available to other birds.

Note: Do not accept just “pollution.” The student’s answer must address a specific abiotic factor.

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

- More birds will eat the plants, so the plant populations will decrease in number.
- Some birds will eat organisms that eat plants. Since there will be fewer primary consumers, the plant populations will increase in number.
- Bird wastes will make the soil more fertile so more plants will grow.
- The population of plants will decrease.

Note: Do not accept extinction of the plants.
LIVING ENVIRONMENT – continued

59  [2] Allow a maximum of 2 credits, allocated as follows:

- Allow 2 credits if two life functions are identified and the student correctly explains how each function maintains homeostasis.

- Allow 1 credit if one life function is identified and the student correctly explains how that function maintains homeostasis.

Example of a 2-credit response:

Circulation or transport moves essential materials through the cell or organism. Excretion gets rid of potentially harmful wastes.

Note: Do not accept digestion (part of nutrition) or reproduction (not necessary to maintain homeostasis).

60  [3] Allow a maximum of 3 credits, allocated as follows:

- Allow 1 credit for an explanation of competition within the bat population. Acceptable responses include, but are not limited to:
  
  — Bats with the variation for stronger flight muscles would most likely catch more flying insects than bats without the gene.

- Allow 1 credit for an explanation of survival of various individuals within the bat population. Acceptable responses include, but are not limited to:
  
  — More bats possessing the gene for stronger flight muscles would survive than those without.

- Allow 1 credit for an explanation of how the frequency of the trait for stronger flight muscles would be expected to change within the bat population over time. Acceptable responses include, but are not limited to:
  
  — Over time, more bats would possess the variation for stronger flight muscles.
61 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Having x rays can result in defects in the genes of the fetus.
— Smoking may cause low birth weight.

62 [2] Allow a maximum of 2 credits, allocated as follows:

• Allow 1 credit for stating the role of the student-selected process in fetal development. Acceptable responses include, but are not limited to:

— Mitosis produces more cells, causing the fetus to grow.
— Differentiation causes individual cells to have specialized functions, resulting in the formation of tissues and organs.

• Allow 1 credit for identifying the organ in the mother where the student-selected process occurs. Acceptable responses include, but are not limited to:

  Mitosis
  — uterus

  Differentiation
  — uterus

63 [4] Allow a maximum of 4 credits, allocated as follows:

• Allow 1 credit for identifying the inorganic carbon compound that is obtained by plants from the environment as carbon dioxide (CO₂).

• Allow 1 credit for identifying the process plants use to form more complex organic molecules from this carbon compound as photosynthesis.

• Allow 1 credit for describing how herbivores use these complex organic molecules. Acceptable responses include, but are not limited to:

— as a source of energy
— as a source of nutrients
— as a source of materials to synthesize other molecules

• Allow 1 credit for identifying the process herbivores use to return carbon to the environment. Acceptable responses include, but are not limited to:

— respiration
— breathing
— excretion
64 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— It might block their scenic view.
— interrupt bird flight paths
— They think they will be too noisy.
— decrease the amount of open space

65 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Windmill farms reduce air pollution.
— Wind power is a renewable energy source.
— Energy doesn’t need to be imported.
Allow 1 credit for:

<table>
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<th>Amino acid:</th>
<th>ASP</th>
<th>TRP</th>
<th>CYS</th>
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<tbody>
<tr>
<td>mRNA codon:</td>
<td>GAU or GAC</td>
<td>UGG</td>
<td>UGU or UGC</td>
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</table>

Allow 1 credit for UAA or UAG or UGA.

Allow 1 credit. Acceptable responses include, but are not limited to:
- group with normal rainwater
- group with water of pH 5.6

Allow 1 credit. Acceptable responses include, but are not limited to:
- number of seeds that germinated at different pHs
- how many seeds grew
- germination of seeds

Allow 1 credit. Acceptable responses include, but are not limited to:
- The control group had 190 seeds germinate, while the experimental group had only 150 seeds germinate.
- If fewer seeds germinate at a pH of 4.0, then this result would support the hypothesis that acid rain could be responsible for a decrease in the number of trees.
77 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

   — The finches may eat different-size seeds or plant parts.
   — They may not compete for the same food.
   — They may live on different parts of the island.
   — They may have different niches.

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

   — Water will move out of the cell (diffuse).
   — The cell contents will shrink.
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:

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.

The Chart for Determining the Final Examination Score for the August 2009 Regents Examination in Living Environment will be posted on the Department’s web site http://www.emsc.nysed.gov/osa/ on Thursday, August 13, 2009. 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.
# Map to Core Curriculum

## August 2009 Living Environment

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<th>Standards</th>
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## Part D

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

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</tr>
<tr>
<td>57</td>
<td>78</td>
<td>28</td>
<td>52</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 “Final Score” on the student’s answer sheet.

All student answer papers that receive a scale score of 60 through 64 **must** be scored a second time to ensure the accuracy of the score. 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 scale scores corresponding to raw scores in the conversion chart change from one examination 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 Living Environment Examination.