

# LIVING ENVIRONMENT

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

## LIVING ENVIRONMENT

Wednesday, August 13, 2008 — 12:30 to 3:30 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 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]

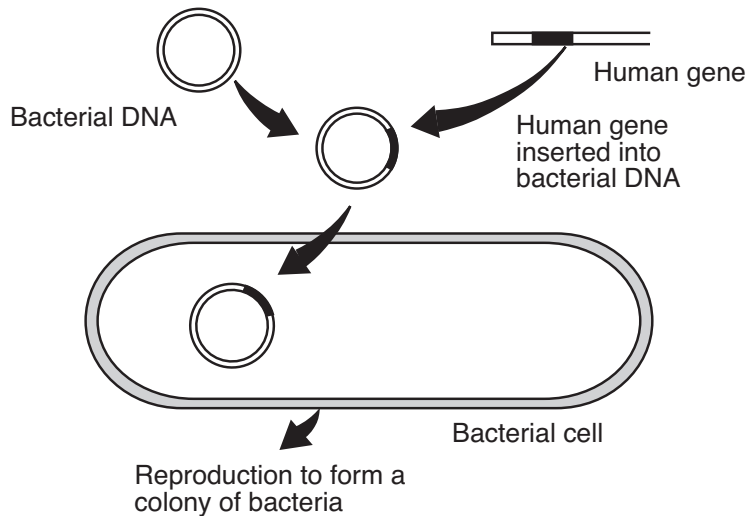
*Directions (1–30):* For *each* statement or question, write on your separate answer sheet the *number* of the word or expression that, of those given, best completes the statement or answers the question.

- 1 Scientists studying ocean organisms are discovering new and unusual species. Which observation could be used to determine that an ocean organism carries out autotrophic nutrition?
  - (1) Chloroplasts are visible inside the cells.
  - (2) Digestive organs are visible upon dissection.
  - (3) The organism lives close to the surface.
  - (4) The organism synthesizes enzymes to digest food.
- 2 Abiotic factors that characterize a forest ecosystem include
  - (1) light and biodiversity
  - (2) temperature and amount of available water
  - (3) types of producers and decomposers
  - (4) pH and number of heterotrophs
- 3 One season, there was a shortage of producers in a food web. As a result, the number of deer and wolves decreased. The reason that both the deer and wolf populations declined is that
  - (1) producers are not as important as consumers in a food web
  - (2) more consumers than producers are needed to support the food web
  - (3) organisms in this food web are interdependent
  - (4) populations tend to stay constant in a food web
- 4 Which statement best describes a population of organisms if cloning is the only method used to reproduce this population?
  - (1) The population would be more likely to adapt to a changing environment.
  - (2) There would be little chance for variation within the population.
  - (3) The population would evolve rapidly.
  - (4) The mutation rate in the population would be rapid.
- 5 An organelle that releases energy for metabolic activity in a nerve cell is the
  - (1) chloroplast
  - (2) ribosome
  - (3) mitochondrion
  - (4) vacuole
- 6 A student notices that fruit flies with the curly-wing trait develop straight wings if kept at a temperature of 16°C, but develop curly wings if kept at 25°C. The best explanation for this observation is that
  - (1) wing shape is controlled by behavior
  - (2) wing shape is influenced by light intensity
  - (3) gene expression can be modified by interactions with the environment
  - (4) gene mutations for wing shape can occur at high temperatures
- 7 In all organisms, the coded instructions for specifying the characteristics of the organism are directly determined by the arrangement of the
  - (1) twenty kinds of amino acids in each protein
  - (2) twenty-three pairs of genes on each chromosome
  - (3) strands of simple sugars in certain carbohydrate molecules
  - (4) four types of molecular bases in the genes
- 8 Which sequence shows a *decreasing* level of complexity?
  - (1) organs → organism → cells → tissues
  - (2) organism → cells → organs → tissues
  - (3) cells → tissues → organs → organism
  - (4) organism → organs → tissues → cells

9 Which row in the chart below contains an event that is paired with an appropriate response in the human body?

| Row | Event                                 | Response                           |
|-----|---------------------------------------|------------------------------------|
| (1) | a virus enters the bloodstream        | increased production of antibodies |
| (2) | fertilization of an egg               | increased levels of testosterone   |
| (3) | dehydration due to increased sweating | increased urine output             |
| (4) | a drop in the rate of digestion       | increased respiration rate         |

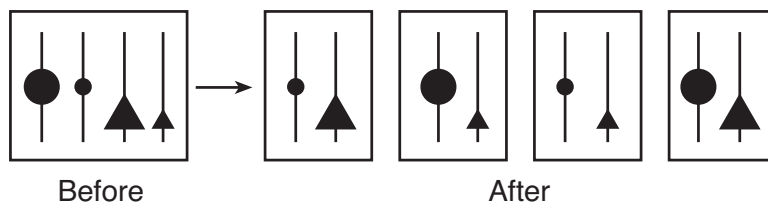
10 The diagram below represents a genetic procedure.



Which statement best describes the outcome of this procedure?

- (1) Bacterial cells will destroy defective human genetic material.
- (2) Bacterial cells may form a multicellular embryo.
- (3) The inserted human DNA will change harmful bacteria to harmless ones.
- (4) The inserted human DNA may direct the synthesis of human proteins.

11 The diagram below represents the genetic contents of cells before and after a specific reproductive process.



This process is considered a mechanism of evolution because it

- (1) decreases the chance for new combinations of inheritable traits in a species
- (2) decreases the probability that genes can be passed on to other body cells
- (3) increases the chance for variations in offspring
- (4) increases the number of offspring an organism can produce

- 12 One *disadvantage* of a genetic mutation in a human skin cell is that it
- (1) may result in the production of a defective protein
  - (2) may alter the sequence of simple sugars in insulin molecules
  - (3) can lead to a lower mutation rate in the offspring of the human
  - (4) can alter the rate of all the metabolic processes in the human

- 13 The DNA of a human cell can be cut and rearranged by using
- (1) a scalpel
  - (2) electrophoresis
  - (3) hormones
  - (4) enzymes

- 14 Much of the carbon dioxide produced by green plants is *not* excreted as a metabolic waste because it
- (1) can be used for photosynthesis
  - (2) is too large to pass through cell membranes
  - (3) is needed for cellular respiration
  - (4) can be used for the synthesis of proteins

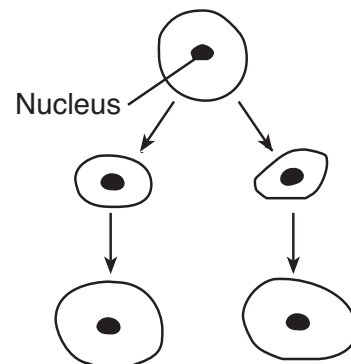
- 15 In several species of birds, the males show off their bright colors and long feathers. The dull-colored females usually pick the brightest colored males for mates. Male offspring inherit their father's bright colors and long feathers. Compared to earlier generations, future generations of these birds will be expected to have a greater proportion of
- (1) bright-colored females
  - (2) dull-colored females
  - (3) dull-colored males
  - (4) bright-colored males

- 16 To determine evolutionary relationships between organisms, a comparison would most likely be made between all of the characteristics below *except*
- (1) methods of reproduction
  - (2) number of their ATP molecules
  - (3) sequences in their DNA molecules
  - (4) structure of protein molecules present

- 17 The females of certain species of turtles will sneak into a nest of alligator eggs to lay their own eggs and then leave, never to return. When the baby turtles hatch, they automatically hide from the mother alligator guarding the nest and go to the nearest body of water when it is safe to do so. Which statement best explains the behavior of these baby turtles?

- (1) More of the turtles' ancestors who acted in this way survived to reproduce, passing this behavioral trait to their offspring.
- (2) The baby turtles are genetically identical, so they behave the same way.
- (3) Turtles are not capable of evolving, so they repeat the same behaviors generation after generation.
- (4) The baby turtles' ancestors who learned to behave this way taught the behaviors to their offspring

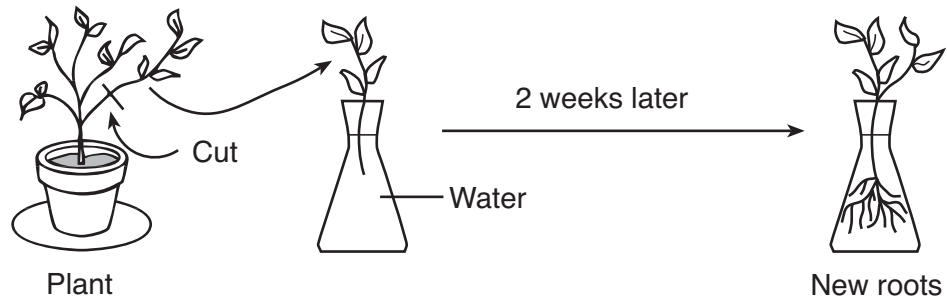
- 18 A pattern of reproduction and growth in a one-celled organism is shown below.



Which statement best describes this pattern of reproduction?

- (1) All genetic material comes from one parent.
- (2) Only some of the genetic material comes from one parent.
- (3) The size of the parent determines the amount of genetic material.
- (4) The size of the parent determines the source of the genetic material.

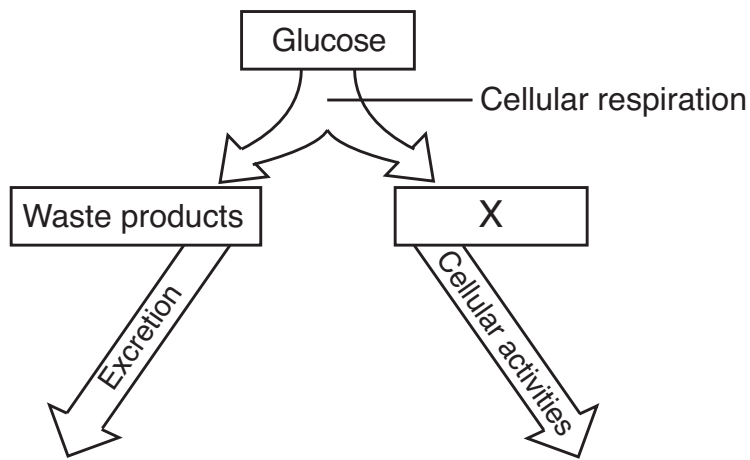
19 A technique used to reproduce plants is shown in the diagram below.



This technique is a form of

- (1) sexual reproduction
- (2) asexual reproduction
- (3) gamete production
- (4) gene manipulation

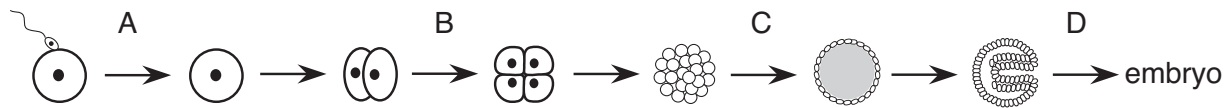
20 The diagram below represents a biochemical process.



Which molecule is represented by X?

- (1) DNA
- (2) starch
- (3) protein
- (4) ATP

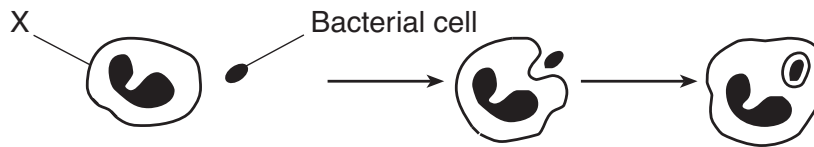
21 The diagram below represents early stages of embryo development.



The greatest amount of differentiation for organ formation most likely occurs at arrow

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

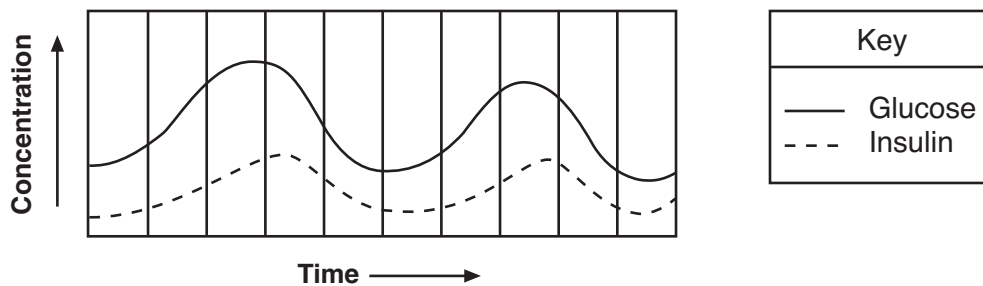
22 The diagram below shows a cell in the human body engulfing a bacterial cell.



The cell labeled X is most likely a

- (1) red blood cell
- (2) white blood cell
- (3) liver cell
- (4) nerve cell

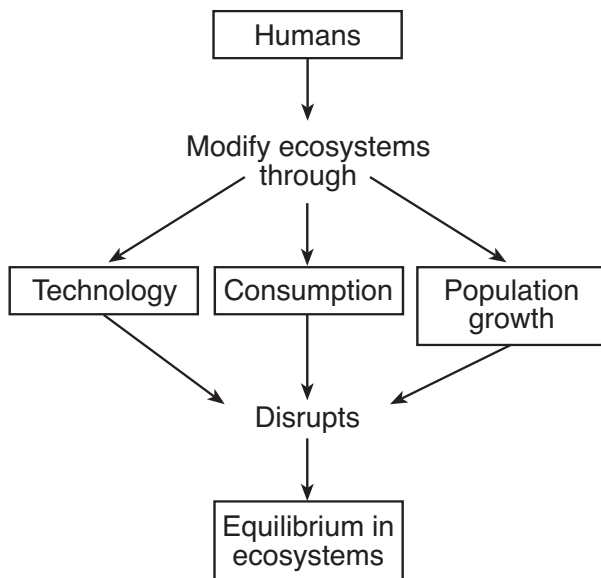
23 The graph below shows the levels of glucose and insulin in the blood of a human over a period of time.



This graph represents

- (1) an allergic reaction
- (2) an antigen-antibody reaction
- (3) maintenance of homeostasis
- (4) autotrophic nutrition

24 Which concept is best represented in the diagram shown below?



- (1) Human actions are a threat to equilibrium in ecosystems.
- (2) Equilibrium in ecosystems requires that humans modify ecosystems.
- (3) Equilibrium in ecosystems directly affects how humans modify ecosystems.
- (4) Human population growth is the primary reason for equilibrium in ecosystems.

25 One possible reason for the rise in the average air temperature at Earth's surface is that

- (1) decomposers are being destroyed
- (2) deforestation has increased the levels of oxygen in the atmosphere
- (3) industrialization has increased the amount of carbon dioxide in the air
- (4) growing crops is depleting the ozone shield

26 The size of a frog population in a pond remains fairly constant over a period of several years because of

- (1) decreasing competition
- (2) environmental carrying capacity
- (3) excessive dissolved oxygen
- (4) the depth of water

27 Plants such as the Venus flytrap produce chemical compounds that break down insects into substances that are usable by the plant. The chemical compounds that break down the insects are most likely

- (1) fats
- (2) minerals
- (3) biological catalysts
- (4) complex carbohydrates

28 In December 2004, a tsunami (giant wave) destroyed many of the marine organisms along the coast of the Indian Ocean. What can be expected to happen to the ecosystem that was most severely hit by the tsunami?

- (1) The ecosystem will change until a new stable community is established.
- (2) Succession will continue in the ecosystem until one species of marine organism is established.
- (3) Ecological succession will no longer occur in this marine ecosystem.
- (4) The organisms in the ecosystem will become extinct.

29 Many homeowners who used to collect, bag, and discard grass clippings are now using mulching lawnmowers, which cut up the clippings into very fine pieces and deposit them on the soil. The use of mulching lawnmowers contributes most directly to

- (1) increasing the diversity of life
- (2) recycling of nutrients
- (3) the control of pathogens
- (4) the production of new species

30 Deforestation of areas considered to be rich sources of genetic material could limit future agricultural and medical advances due to

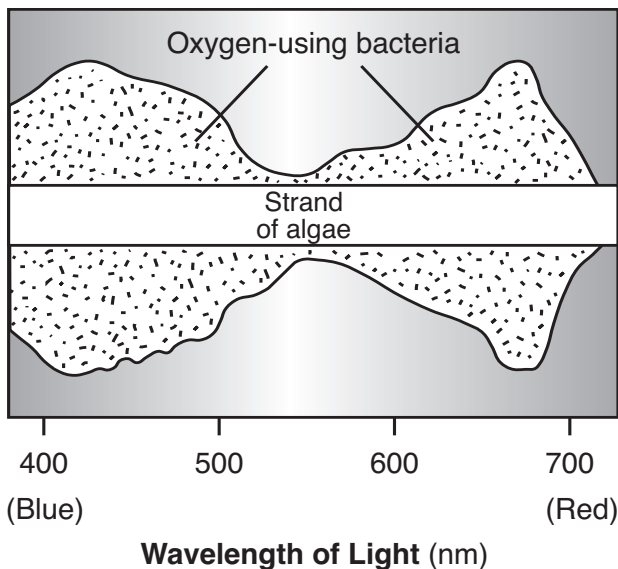
- (1) the improved quality of the atmosphere
- (2) the maintenance of dynamic equilibrium
- (3) an increase in the rate of evolutionary change
- (4) the loss of biodiversity

**Part B-1**

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

*Directions (31–42):* 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.

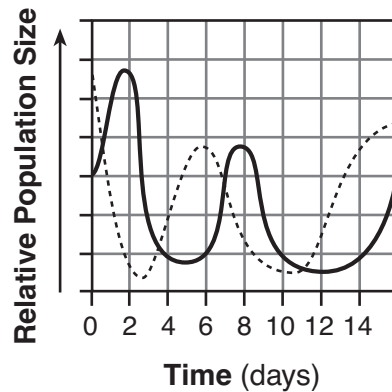
31 In 1883, Thomas Engelmann, a German botanist, exposed a strand of algae to different wavelengths of light. Engelmann used bacteria that concentrate near an oxygen source to determine which sections of the algae were releasing the most O<sub>2</sub>. The results are shown below.



Which statement is a valid inference based on this information?

- (1) Oxygen production decreases as the wavelength of light increases from 550 to 650 nm.
- (2) Respiration rate in the bacteria is greatest at 550 nm.
- (3) Photosynthetic rate in the algae is greatest in blue light.
- (4) The algae absorb the greatest amount of oxygen in red light.

32 The graph below represents a predator-prey relationship.



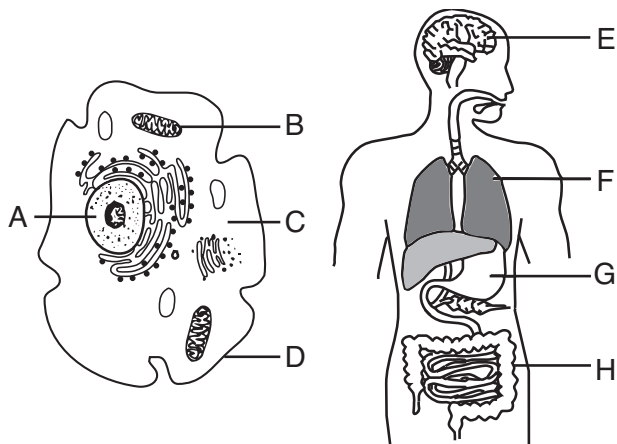
| Key     |                       |
|---------|-----------------------|
| —       | Paramecium (predator) |
| - - - - | Yeast (prey)          |

What is the most probable reason for the increasing predator population from day 5 to day 7?

- (1) an increasing food supply from day 5 to day 6
- (2) a predator population equal in size to the prey population from day 5 to day 6
- (3) the decreasing prey population from day 1 to day 2
- (4) the extinction of the yeast on day 3



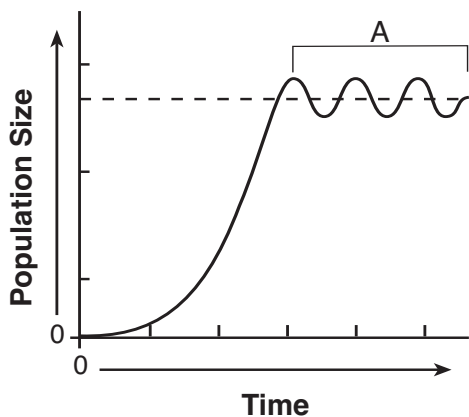
33 A single cell and a multicellular organism are represented below.



Which structures are correctly paired with their primary function?

- (1) A and G—transmission of nerve impulses
- (2) B and E—photosynthesis
- (3) C and H—digestion of food
- (4) D and F—gas exchange

34 The graph below indicates the size of a fish population over a period of time.



The section of the graph labeled A represents

- (1) biodiversity within the species
- (2) nutritional relationships of the species
- (3) a population becoming extinct
- (4) a population at equilibrium

35 The data table below shows the presence or absence of DNA in four different cell organelles.

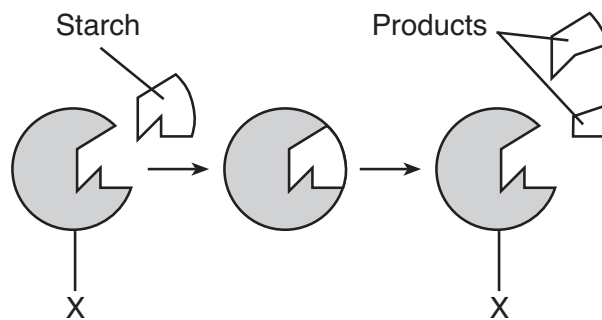
**Data Table**

| Organelle     | DNA     |
|---------------|---------|
| cell membrane | absent  |
| cell wall     | absent  |
| mitochondrion | present |
| nucleus       | present |

Information in the table suggests that DNA functions

- (1) within cytoplasm and outside of the cell membrane
- (2) both inside and outside of the nucleus
- (3) only within energy-releasing structures
- (4) within cell vacuoles

Base your answers to questions 36 and 37 on the diagram below, which represents stages in the digestion of a starch, and on your knowledge of biology.



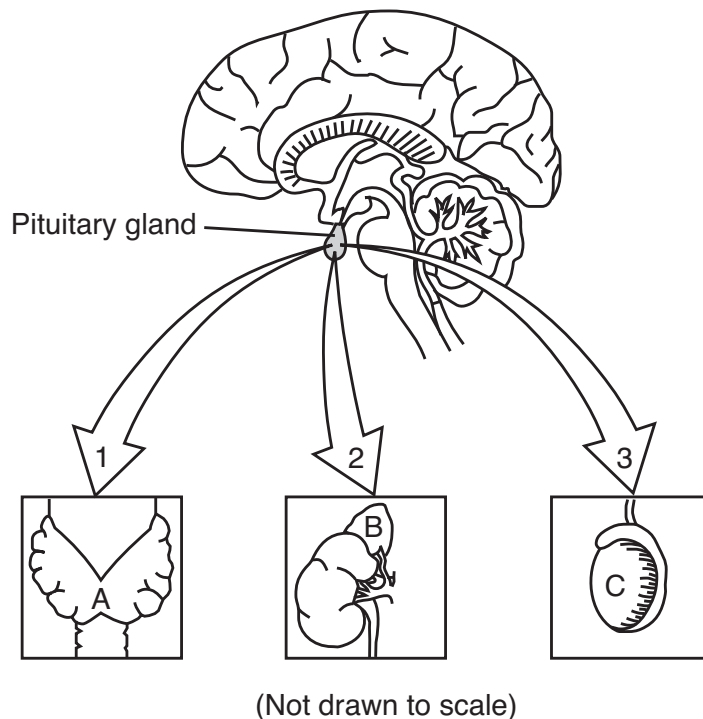
36 The products would most likely contain

- (1) simple sugars
- (2) fats
- (3) amino acids
- (4) minerals

37 The structure labeled X most likely represents

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

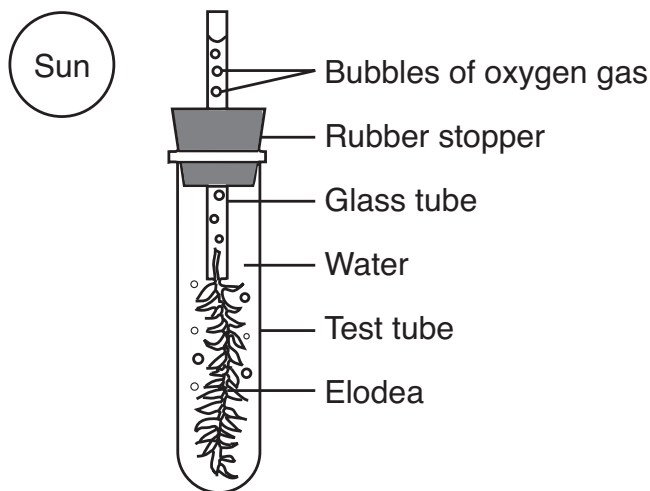
Base your answers to questions 38 through 40 on the diagram below and on your knowledge of biology. Each arrow in the diagram represents a different hormone released by the pituitary gland that stimulates the gland indicated in the diagram. All structures are present in the same organism.



- 38 The pituitary gland may release hormone 2 when blood pressure drops. Hormone 2 causes gland B to release a different hormone that raises blood pressure which, in turn, stops the secretion of hormone 2. The interaction of these hormones is an example of
- |  |                                  |
|--|----------------------------------|
| (1) DNA base substitution                | (3) a feedback mechanism         |
| (2) manipulation of genetic instructions | (4) an antigen-antibody reaction |
- 39 What would most likely occur if the interaction is blocked between the pituitary and gland C, the site of meiosis in males?
- (1) The level of progesterone would start to increase.
  - (2) The pituitary would produce another hormone to replace hormone 3.
  - (3) Gland A would begin to interact with hormone 3 to maintain homeostasis.
  - (4) The level of testosterone may start to decrease.
- 40 Why does hormone 1 influence the action of gland A but *not* gland B or C?
- (1) Every activity in gland A is different from the activities in glands B and C.
  - (2) The cells of glands B and C contain different receptors than the cells of gland A.
  - (3) Each gland contains cells that have different base sequences in their DNA.
  - (4) The distance a chemical can travel is influenced by both pH and temperature.

Base your answers to questions 41 and 42 on the information and diagram below and on your knowledge of biology.

A small water plant (elodea) was placed in bright sunlight for five hours as indicated below. Bubbles of oxygen gas were observed being released from the plant.



- 41 Since oxygen gas is being released, it can be inferred that the plant is
- |                       |                                  |
|-----------------------|----------------------------------|
| (1) producing glucose | (3) releasing energy from water  |
| (2) making protein    | (4) carrying on active transport |
- 42 What substance did the plant most likely absorb from the water for the process that produces the oxygen gas?
- |                        |               |
|------------------------|---------------|
| (1) dissolved nitrogen | (3) an enzyme |
| (2) carbon dioxide     | (4) a hormone |
-

**Part B-2**

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

*Directions (43–55):* For those questions that are followed by four choices, circle the *number* preceding the choice that, of those given, best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question and record your answers in the spaces provided.

Base your answers to questions 43 through 45 on the information below and on your knowledge of biology.

**For Teacher  
Use Only**

Human reproduction is influenced by many different factors.

43 Identify *one* reproductive hormone and state the role it plays in reproduction. [1]

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43

44 Identify the structure in the uterus where the exchange of material between the mother and the developing fetus takes place. [1]

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44

45 Identify *one* harmful substance that can pass through this structure and describe the *negative* effect it can have on the fetus. [1]

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45

46 The flow of materials through ecosystems involves the interactions of many processes and organisms. State how decomposers aid in the flow of materials in an ecosystem. [1]

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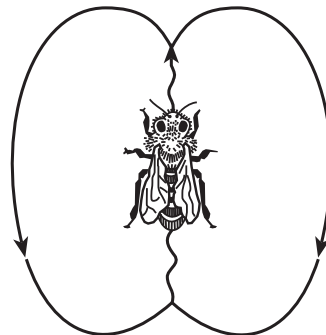
46

Base your answers to questions 47 through 49 on the information below and on your knowledge of biology.

**For Teacher  
Use Only**

Honeybees have a very cooperative way of living. Scout bees find food, return to the hive, and do the “waggle dance” to communicate the location of the food source to other bees in the hive. The waggle, represented by the wavy line in the diagram below, indicates the direction of the food source, while the speed of the dance indicates the distance to the food. Different species of honeybees use the same basic dance pattern in slightly different ways as shown in the table below.

| Number of Waggle Runs in 15 Seconds |                 | Distance to Food (feet) |
|-------------------------------------|-----------------|-------------------------|
| Giant Honeybee                      | Indian Honeybee |                         |
| 10.6                                | 10.5            | 50                      |
| 9.6                                 | 8.3             | 200                     |
| 6.7                                 | 4.4             | 1000                    |
| 4.8                                 | 2.8             | 2000                    |



47 State the relationship between the distance to the food source and the number of waggle runs in 15 seconds. [1]

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47

48 Explain how waggle-dance behavior increases the reproductive success of the bees. [1]

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48

49 The number of waggle runs in 15 seconds for each of these species is most likely due to

- (1) behavioral adaptation as a result of natural selection
- (2) replacement of one species by another as a result of succession
- (3) alterations in gene structure as a result of diet
- (4) learned behaviors inherited as a result of asexual reproduction

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49

Base your answers to questions 50 through 54 on the information and data table below and on your knowledge of biology.

**For Teacher  
Use Only**

The table shows data collected on the pH level of an Adirondack lake from 1980 to 1996.

**Lake pH Level**

| Year | pH Level |
|------|----------|
| 1980 | 6.7      |
| 1984 | 6.3      |
| 1986 | 6.4      |
| 1988 | 6.2      |
| 1990 | 5.9      |
| 1992 | 5.6      |
| 1994 | 5.4      |
| 1996 | 5.1      |

*Directions (50–54):* Using the information in the data table, construct a line graph on the grid *on the next page*, following the directions below.

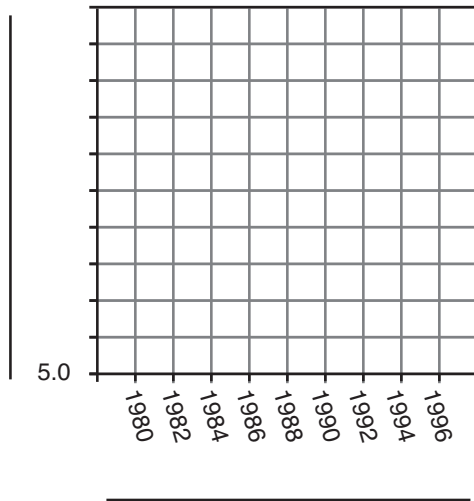
50 Label the axes. [1]

51 Mark an appropriate scale on the *y*-axis. The scale has been started for you. [1]

52 Plot the data from the data table. Surround each point with a small circle and connect the points. [1]



Lake pH Level from 1980 to 1996



For Teacher  
Use Only

50

51

52

53 Describe the trend in pH level in the lake over this 16-year period. [1]

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53

54 Identify *one* factor that should have been kept constant each time water samples were collected from the lake. [1]

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54

55 Two cultures, each containing a different species of bacteria, were exposed to the same antibiotic. Explain how, after exposure to this antibiotic, the population of one species of bacteria could increase while the population of the other species of bacteria decreased or was eliminated. [1]

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55

**Part C**

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

*Directions* (56–71): Record your answers in the spaces provided in this examination booklet.

Base your answers to questions 56 through 58 on the information below and on your knowledge of biology.

Throughout the world, in nearly every ecosystem, there are animal and plant species present that were introduced into the ecosystem by humans or transported to the ecosystem as a result of human activities. Some examples are listed in the chart below.

**Examples of Introduced Species**

| Organism                   | New Location               |
|----------------------------|----------------------------|
| purple loosestrife (plant) | wetlands in New York State |
| zebra mussel               | Great Lakes                |
| brown tree snake           | Guam                       |

56 State *one* reason why an introduced species might be very successful in a new environment. [1]

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56

57 Identify *one* action the government could take to prevent the introduction of additional new species. [1]

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57

58 Identify *one* introduced organism and write its name in the space below. Describe *one* way in which this organism has altered an ecosystem in the new location. [1]

Organism: \_\_\_\_\_

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58

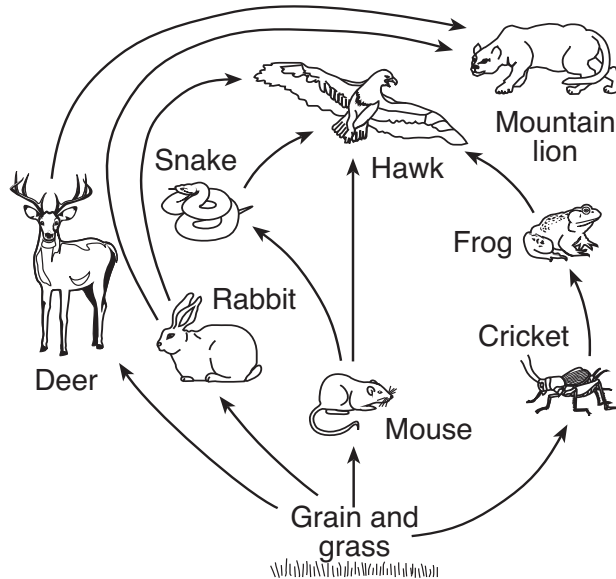
**For Teacher  
Use Only**



Base your answers to questions 59 and 60 on the information and food web below and on your knowledge of biology.

**For Teacher  
Use Only**

The organisms in the food web below live near large cattle ranches. Over many years, mountain lions occasionally killed a few cattle. One year, a few ranchers hunted and killed many mountain lions to prevent future loss of their cattle. Later, ranchers noticed that animals from this food web were eating large amounts of grain from their fields.



59 Identify *two* specific populations that most likely increased in number after the mountain lion population *decreased*. Support your answer. [2]

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59

60 Explain how killing many mountain lions affected other ranchers in the community. [1]

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60

Base your answers to questions 61 through 64 on the passage below and on your knowledge of biology. The letters indicate paragraphs.

**For Teacher  
Use Only**

### Yellow Fever

Paragraph A

A team of doctors was sent to Havana, Cuba, to study a yellow fever epidemic. The doctors wanted to find out how the pathogenic microbe that causes yellow fever is transferred from those who are sick to those who are well. Some people thought that the disease was spread by having contact with a person who had the disease or even through contact with clothing or bedding that they had used.

Paragraph B

It was known that yellow fever occurred more frequently in swampy environments than in environments that were dry. Consequently, some people thought that the disease was due to contact with the atmosphere of the swamps. A respected doctor in Havana was convinced that a particular species of mosquito, *Aedes calopus*, spread the disease.

Paragraph C

The team of doctors carried out several experiments and collected data. They built poorly ventilated houses in which American soldiers volunteered to sleep on bedding used by individuals who had recently died of yellow fever in local hospitals. The soldiers also wore the night-shirts of those who had died. The houses were fumigated to kill all mosquitoes and the doors and windows of the houses were screened. None of the soldiers living in these houses contracted the disease, though the experiment was tried repeatedly.

Paragraph D

In another experiment, the team built houses that were tightly sealed. The doors and windows were screened. The insides of the houses were divided into two parts by mosquito netting. One part of the house contained a species of mosquito, *Aedes calopus*, that had been allowed to bite yellow fever patients in the hospital. There were no mosquitoes in the other part of the house. A group of volunteers lived in each part of the house. A number of those who lived in the part of the house with the mosquitoes became infected; none of those in the other part of the house did.

Paragraph E

Putting these facts together with other evidence, the team concluded that *Aedes calopus* spread the disease. The validity of this conclusion then had to be tested. All newly reported cases of yellow fever were promptly taken to well-screened hospitals and their houses were fumigated to kill any mosquitoes. The breeding places of the mosquitoes in and around Havana were drained or covered with a film of oil to kill mosquito larvae. Native fish species known to feed on mosquito larvae were introduced into streams and ponds. The number of yellow fever cases steadily declined until Havana was essentially free of the epidemic.

61 State the problem the team of doctors was trying to solve. [1]

---

---

**For Teacher  
Use Only**

61

62 State *one* hypothesis from paragraph A that was tested by one of the experiments. [1]

---

---

62

63 Describe the control that should have been set up for the experiment described in paragraph C. [1]

---

---

63

64 Explain why the use of native fish (described in paragraph E), rather than the use of pesticides, is less likely to have a *negative* impact on the environment. [1]

---

---

---

64

Base your answers to questions 65 through 67 on the information below and on your knowledge of biology.

**For Teacher  
Use Only**

Vaccines play an important role in the ability of the body to resist certain diseases.

65 Describe the contents of a vaccine. [1]

---

---

65

66 Identify the system in the body that is most directly affected by a vaccination. [1]

---

66

67 Explain how a vaccination results in the long-term ability of the body to resist disease. [1]

---

---

---

---

67

Base your answers to questions 68 and 69 on the information below and on your knowledge of biology.

A factory in Florida had dumped toxic waste into the soil for 40 years. Since the company is no longer in business, government officials removed the toxic soil and piled it up into large mounds until they can finish evaluating how to treat the waste.

68 State *one* way these toxins could move from the soil into local ecosystems, such as nearby lakes and ponds. [1]

---

---

68

69 State *one* way these toxins might affect local ecosystems. [1]

---

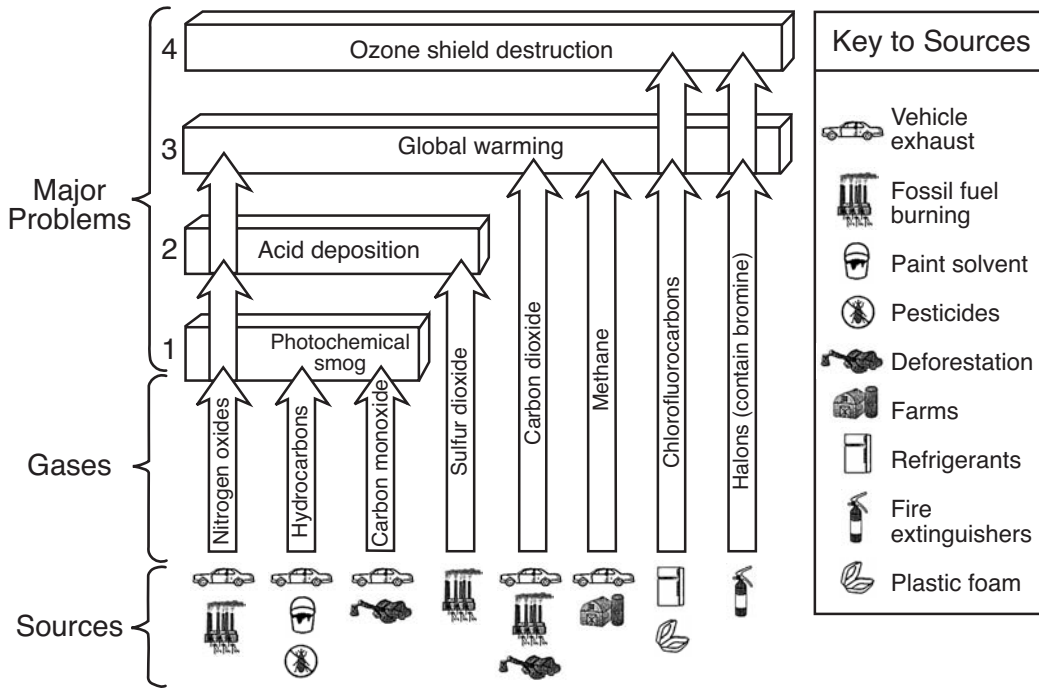
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69

Base your answers to questions 70 and 71 on the diagram below and on your knowledge of biology. The diagram shows some of the gases that, along with their sources, contribute to four major problems associated with air pollution.

**For Teacher Use Only**



70 Select *one* of the four major problems from the diagram and record the number of the problem on the line below. Identify a gas that contributes to the problem you selected and state *one* way in which the amount of this gas can be reduced. [1]

Problem number: \_\_\_\_\_

Gas: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

70

71 Explain why damage to the ozone shield is considered a threat to many organisms. [1]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

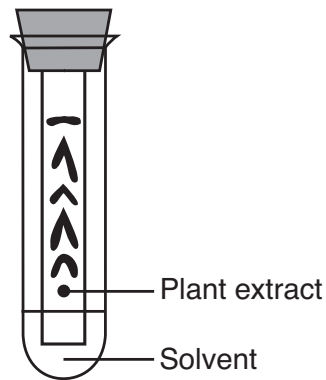
71

**Part D**

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

*Directions (72–84):* For those questions that are followed by four choices, circle the *number* of the choice, that, of those given, best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question and record your answers in the spaces provided.

72 A laboratory technique is illustrated in the diagram below.



This technique is used to

- (1) determine volume
- (2) separate molecules in a mixture
- (3) measure length
- (4) analyze data from an experiment

**For Teacher  
Use Only**

72

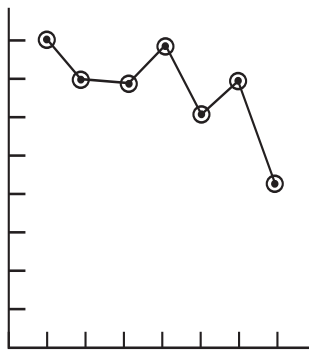
73 As part of an experiment, the heart rate of a person at rest was measured every hour for 7 hours. The data are shown in the table below.

**For Teacher  
Use Only**

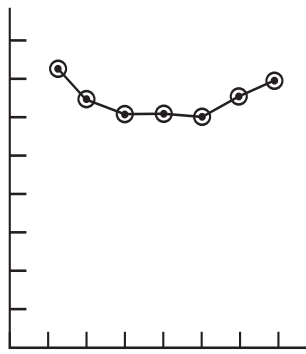
**Data Table**

| Hour | Heart Rate<br>(beats/min) |
|------|---------------------------|
| 1    | 72                        |
| 2    | 63                        |
| 3    | 61                        |
| 4    | 61                        |
| 5    | 60                        |
| 6    | 63                        |
| 7    | 68                        |

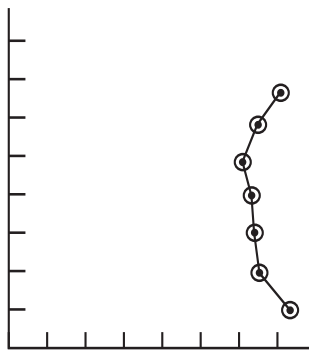
Which graphed line best represents this data?



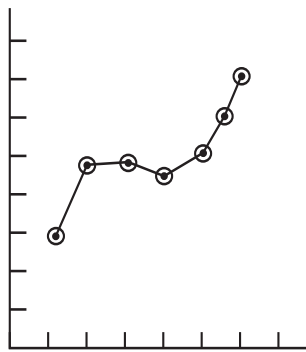
(1)



(3)



(2)



(4)

73



Base your answers to questions 74 through 77 on the Universal Genetic Code Chart below and on your knowledge of biology. Some DNA, RNA, and amino acid information from the analysis of a gene present in five different species is shown in the chart on the next page.

**For Teacher  
Use Only**

**Universal Genetic Code Chart**  
**Messenger RNA Codons and Amino Acids for Which They Code**

|   |   | Second base                      |                            |                                  |     |                                  |                 |                                  |                        |                  |
|---|---|----------------------------------|----------------------------|----------------------------------|-----|----------------------------------|-----------------|----------------------------------|------------------------|------------------|
|   |   | U                                | C                          | A                                | G   |                                  |                 |                                  |                        |                  |
| F<br>i<br>r<br>s<br>t<br><br>b<br>a<br>s<br>e | U | UUU }<br>UUC }<br>UUA }<br>UUG } | PHE<br><br>LEU             | UCU }<br>UCC }<br>UCA }<br>UCG } | SER | UAU }<br>UAC }<br>UAA }<br>UAG } | TYR<br><br>STOP | UGU }<br>UGC }<br>UGA }<br>UGG } | CYS<br><br>STOP<br>TRP | U<br>C<br>A<br>G |
|   | C | CUU }<br>CUC }<br>CUA }<br>CUG } | LEU                        | CCU }<br>CCC }<br>CCA }<br>CCG } | PRO | CAU }<br>CAC }<br>CAA }<br>CAG } | HIS<br><br>GLN  | CGU }<br>CGC }<br>CGA }<br>CGG } | ARG                    | U<br>C<br>A<br>G |
|   | A | AUU }<br>AUC }<br>AUA }<br>AUG } | ILE<br><br>MET or<br>START | ACU }<br>ACC }<br>ACA }<br>ACG } | THR | AAU }<br>AAC }<br>AAA }<br>AAG } | ASN<br><br>LYS  | AGU }<br>AGC }<br>AGA }<br>AGG } | SER<br><br>ARG         | U<br>C<br>A<br>G |
|   | G | GUU }<br>GUC }<br>GUA }<br>GUG } | VAL                        | GCU }<br>GCC }<br>GCA }<br>GCG } | ALA | GAU }<br>GAC }<br>GAA }<br>GAG } | ASP<br><br>GLU  | GGU }<br>GGC }<br>GGA }<br>GGG } | GLY                    | U<br>C<br>A<br>G |

- 74 Using the Universal Genetic Code Chart, fill in the missing amino acids in the amino acid sequence for species A in the chart *on the next page*. [1]
- 75 Using the information given, fill in the missing mRNA bases in the mRNA strand for species B in the chart *on the next page*. [1]
- 76 Using the information given, fill in the missing DNA bases in the DNA strand for species C in the chart *on the next page*. [1]



**For Teacher  
Use Only**

|           |   |
|-----------|---|
| Species A | DNA strand: TAC CGA CCT TCA<br>mRNA strand: AUG GCU GGA AGU<br>Amino acid sequence: _____           |
| Species B | DNA strand: TAC TTT GCA GGA<br>mRNA strand: _____<br>Amino acid sequence: MET LYS ARG PRO           |
| Species C | DNA strand: _____<br>mRNA strand: AUG UUU UGU CCC<br>Amino acid sequence: MET PHE CYS PRO           |
| Species D | DNA strand: TAC GTA GTT GCA<br>mRNA strand: AUG CAU CAA CGU<br>Amino acid sequence: MET HIS GLN ARG |
| Species E | DNA strand: TAC TTC GCG GGT<br>mRNA strand: AUG AAG CGC CCA<br>Amino acid sequence: MET LYS ARG PRO |

74

75

76

77 According to the information, which *two* species are most closely related? Support your answer. [1]

Species: \_\_\_\_\_ and \_\_\_\_\_

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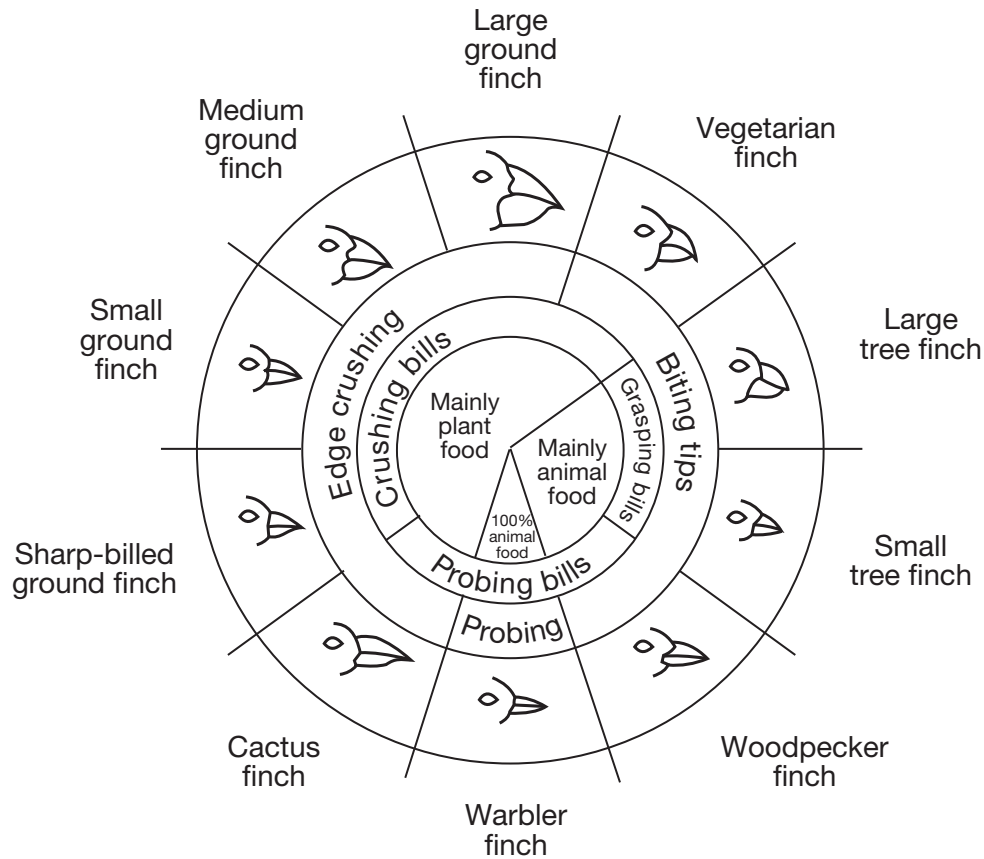
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77

Base your answers to questions 78 and 79 on the information below and on your knowledge of biology. The diagram below represents the relationship between beak structure and food in several species of finches in the Galapagos Islands.

**For Teacher  
Use Only**



From: *Galapagos: A Natural History Guide*

**Variations in Beaks of Galapagos Islands Finches**

78 Which factor most directly influenced the evolution of the diverse types of beaks of these finches?

- (1) predation by humans
- (2) available food sources
- (3) oceanic storms
- (4) lack of available niches

78

79 State *one* reason why the large tree finch and the large ground finch are able to coexist on the same island. [1]

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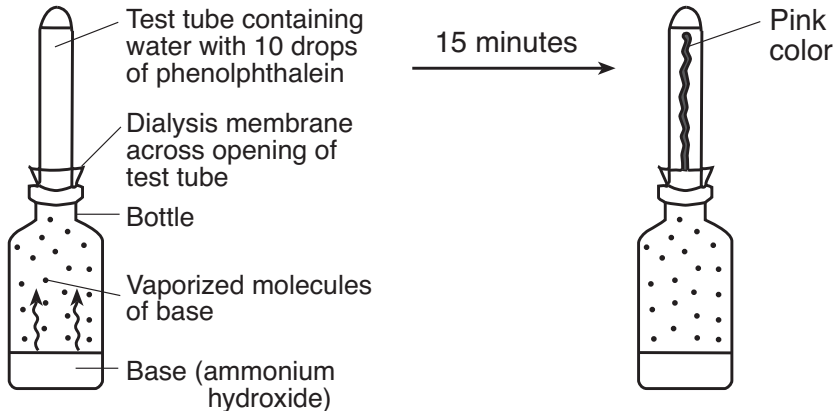
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**For Teacher  
Use Only**

79

80 Phenolphthalein is a chemical that turns pink in the presence of a base. A student set up the demonstration shown in the diagram below.



The appearance of the pink color was due to the movement of

- (1) phenolphthalein molecules from low concentration to high concentration
- (2) base molecules from high concentration through the membrane to low concentration
- (3) water molecules through the membrane from high concentration to low concentration
- (4) phenolphthalein molecules in the water from high concentration to low concentration

80

Base your answers to questions 81 and 82 on the information and data table below and on your knowledge of biology.

**For Teacher  
Use Only**

A student cut three identical slices from a potato. She determined the mass of each slice. She then placed them in labeled beakers and added a different solution to each beaker. After 30 minutes, she removed each potato slice from its solution, removed the excess liquid with a paper towel, and determined the mass of each slice. The change in mass was calculated and the results are shown in the data table below.

**Change in Mass of Potato in Different Solutions**

| Beaker | Solution          | Change in Mass   |
|--------|-------------------|------------------|
| 1      | distilled water   | gained 4.0 grams |
| 2      | 6% salt solution  | lost 0.4 gram    |
| 3      | 16% salt solution | lost 4.7 grams   |

81 Identify the process that is responsible for the change in mass of each of the three slices. [1]

---

81

82 Explain why the potato slice in beaker 1 increased in mass. [1]

---

---

82

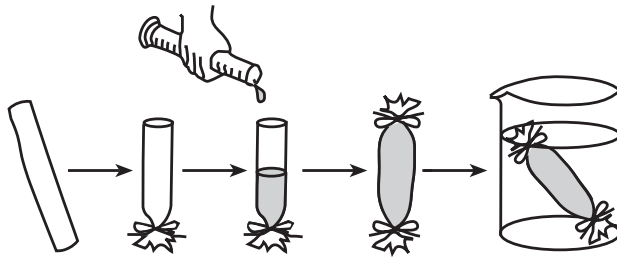
83 Which activity might lead to damage of a microscope and specimen?

- (1) cleaning the ocular and objectives with lens paper
- (2) focusing with low power first before moving the high power into position
- (3) using the coarse adjustment to focus the specimen under high power
- (4) adjusting the diaphragm to obtain more light under high power

83

84 A solution containing both starch and glucose was placed inside the model cell represented below. The model cell was then placed in a beaker containing distilled water.

**For Teacher  
Use Only**



Identify *one* specific substance that should have been added to the distilled water so that observations regarding movement of starch could be made. [1]

---

---

84



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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

# LIVING ENVIRONMENT

Wednesday, August 13, 2008 — 12:30 to 3:30 p.m., only

## ANSWER SHEET

Female

Student ..... Sex:  Male

Teacher .....

School ..... Grade .....

| Part  | Maximum Score | Student's Score      |
|---|---------------|----------------------|
| A   | 30            |                      |
| B-1   | 12            |                      |
| B-2   | 13            |                      |
| C   | 17            |                      |
| D   | 13            |                      |
| <b>Total Raw Score</b><br>(maximum Raw Score: 85) |               | <input type="text"/> |
| <b>Final Score</b><br>(from conversion chart)     |               | <input type="text"/> |
| <b>Raters' Initials</b>                           |               |                      |
| Rater 1 ..... Rater 2 .....                       |               |                      |

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 ..... | 37 ..... |
| 32 ..... | 38 ..... |
| 33 ..... | 39 ..... |
| 34 ..... | 40 ..... |
| 35 ..... | 41 ..... |
| 36 ..... | 42 ..... |

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

Tear Here

# FOR TEACHERS ONLY

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

# LE

## LIVING ENVIRONMENT

Wednesday, August 13, 2008 — 12:30 to 3:30 p.m., only

### SCORING KEY AND RATING GUIDE

**Directions to the Teacher:**

Refer to the directions on page 3 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/> 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.

| Part A                          |                                 |                                 | Part B-1                        |                                 |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| 1 . . . . . <b>1</b> . . . . .  | 11 . . . . . <b>3</b> . . . . . | 21 . . . . . <b>4</b> . . . . . | 31 . . . . . <b>3</b> . . . . . | 37 . . . . . <b>3</b> . . . . . |
| 2 . . . . . <b>2</b> . . . . .  | 12 . . . . . <b>1</b> . . . . . | 22 . . . . . <b>2</b> . . . . . | 32 . . . . . <b>1</b> . . . . . | 38 . . . . . <b>3</b> . . . . . |
| 3 . . . . . <b>3</b> . . . . .  | 13 . . . . . <b>4</b> . . . . . | 23 . . . . . <b>3</b> . . . . . | 33 . . . . . <b>4</b> . . . . . | 39 . . . . . <b>4</b> . . . . . |
| 4 . . . . . <b>2</b> . . . . .  | 14 . . . . . <b>1</b> . . . . . | 24 . . . . . <b>1</b> . . . . . | 34 . . . . . <b>4</b> . . . . . | 40 . . . . . <b>2</b> . . . . . |
| 5 . . . . . <b>3</b> . . . . .  | 15 . . . . . <b>4</b> . . . . . | 25 . . . . . <b>3</b> . . . . . | 35 . . . . . <b>2</b> . . . . . | 41 . . . . . <b>1</b> . . . . . |
| 6 . . . . . <b>3</b> . . . . .  | 16 . . . . . <b>2</b> . . . . . | 26 . . . . . <b>2</b> . . . . . | 36 . . . . . <b>1</b> . . . . . | 42 . . . . . <b>2</b> . . . . . |
| 7 . . . . . <b>4</b> . . . . .  | 17 . . . . . <b>1</b> . . . . . | 27 . . . . . <b>3</b> . . . . . |                                 |                                 |
| 8 . . . . . <b>4</b> . . . . .  | 18 . . . . . <b>1</b> . . . . . | 28 . . . . . <b>1</b> . . . . . |                                 |                                 |
| 9 . . . . . <b>1</b> . . . . .  | 19 . . . . . <b>2</b> . . . . . | 29 . . . . . <b>2</b> . . . . . |                                 |                                 |
| 10 . . . . . <b>4</b> . . . . . | 20 . . . . . <b>4</b> . . . . . | 30 . . . . . <b>4</b> . . . . . |                                 |                                 |

## 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 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 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 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/> on Wednesday, August 13, 2008. 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.



**Part B–2**

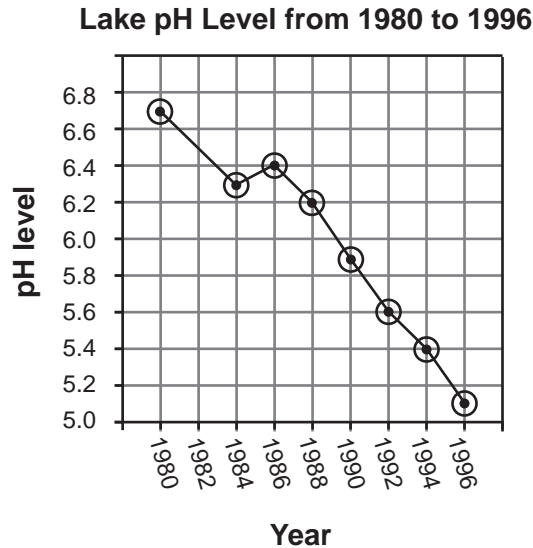
- 43** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Testosterone influences the formation of sperm cells.
  - Testosterone influences the formation of gametes.
  - estrogen – regulates female reproductive cycles
  - Estrogen builds up the uterine lining for implantation and development of the embryo.
  - progesterone – maintains uterine lining during pregnancy
- 44** [1] Allow 1 credit for placenta.
- 45** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- drugs – fetal addiction
  - alcohol – low birth weight *or* premature birth *or* brain damage *or* fetal alcohol syndrome
  - nicotine – brain damage *or* low birth weight
  - Viruses, such as HIV, can cross the placenta putting the fetus at risk of disease or defects.
- 46** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- recycle nutrients
- 47** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The closer the food source, the more waggle runs in 15 seconds.
  - Fewer waggles means that food is farther away.
  - As one variable increases, the other decreases.
- 48** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- If bees have better access to food, they can produce more offspring.
  - Finding food is easier, thus more bees can exist.

**49** 1

LIVING ENVIRONMENT – *continued*

- 50 [1] Allow 1 credit for correctly labeling the axes.
- 51 [1] Allow 1 credit for marking an appropriate scale on the  $y$ -axis.
- 52 [1] Allow 1 credit for correctly plotting the data and connecting the points.

**Example of a 3-credit response for questions 50 through 52:**



**Note:** Allow credit if the points are correctly plotted but *not* circled.  
Make no assumptions about the origin unless it is labeled.  
Do *not* allow credit for plotting points that are not in the data table or for extending lines beyond the data points.

- 53 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The pH level decreased over this time period.
  - The acid level increased over this time period.
- 54 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- water depth
  - time of year
  - The sample should be taken under similar weather conditions.
  - The sample should be taken from the same site.

LIVING ENVIRONMENT – *continued*

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

- Organisms with antibiotic resistance would survive and reproduce. Others without resistance would decrease in number.
- Antibiotics target specific bacteria.

**Note:** Do *not* accept “the bacteria were immune.”

**Part C**

- 56** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- no competition
  - no predators
  - large food supply
  - bigger/stronger than other species
- 57** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- pass laws
  - inspections
  - increase public knowledge about the problem
- 58** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The purple loosestrife crowded out other plants.
  - Zebra mussels outcompete native species.
  - The brown tree snake ate birds’ eggs and reduced bird populations.
  - Gypsy moths eat oak leaves and can kill oak trees.
- 59** [2] Allow 1 credit for rabbit and deer, and 1 credit for supporting the responses. Acceptable responses include, but are not limited to:
- rabbit and deer – They have fewer predators.
- 60** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Their grain crops decreased.
  - Fewer cattle were killed.

LIVING ENVIRONMENT – *continued*

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

- The problem was to determine how the yellow fever microbe was being transferred from person to person.
- How is yellow fever spread?

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

- Yellow fever is spread by contact with the clothing of people who had yellow fever.

**Note:** Do *not* allow credit for a hypothesis written in the form of a question.

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

- The control should have been a group of people sleeping in nightshirts *or* bedding that had not been used by yellow fever patients.

**64** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Pesticides can harm other parts of the environment (other species) but native fish will not.
- Native species will target the larvae with less disruption of food chains.
- Pesticides may disrupt the food chains in the area but native fish will not.
- Pesticides may cause human illness.

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

- A vaccine contains dead *or* weakened pathogens *or* their products.

**66** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- immune system

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

- White blood cells produce antibodies for a particular pathogen.
- White blood cells are prepared to recognize a particular pathogen in the future.
- causes the immune system to produce antibodies
- stimulates an immune response

LIVING ENVIRONMENT – *continued*

68 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Rain may wash the toxins into lakes.
- They may seep into groundwater.

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

- may move through the food web
- may change the pH of pond water
- may kill organisms

70 [1] Allow 1 credit.

**Examples of 1-credit responses:**

| 1   | 2                                | 3                                      | 4  |
|---|----------------------------------|--|--|
| hydrocarbons                                | sulfur dioxide                   | carbon dioxide                         | chlorofluorocarbons                        |
| reduce pesticide use<br>reduce auto exhaust | reduce burning of<br>fossil fuel | reduce car use<br>reduce deforestation | use alternatives to<br>chlorofluorocarbons |

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

- exposes organisms to UV rays
- increases chance of mutations in cells

**Part D**

**72** 2

**73** 3

**74** [1] Allow 1 credit for Amino acid sequence: MET *or* START ALA GLY SER

**75** [1] Allow 1 credit for mRNA strand: AUG AAA CGU CCU

**76** [1] Allow 1 credit for DNA strand: TAC AAA ACA GGG

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

— Their amino acid sequences are the same.

**Note:** Allow credit for a response that is consistent with the student’s responses to questions 74 through 76.

**78** 2

**79** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The large tree finch eats mainly animal food, while the large ground finch eats mainly plant food.

— They occupy different environmental niches.

— They eat different kinds of food.

**80** 2

LIVING ENVIRONMENT – *concluded*

81 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- diffusion
- osmosis
- passive transport

82 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Water diffused into the cells of the potato because there was a higher concentration of water outside than inside the slice.
- The potato slice increased in water content.

83 3

84 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- starch indicator
- iodine solution
- Lugol's solution

**Note:** Do *not* allow credit for just “indicator.”



**The *Chart for Determining the Final Examination Score for the August 2008 Regents Examination in Living Environment* will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Wednesday, August 13, 2008. Conversion charts provided for previous administrations of the Regents Examination in Living Environment must NOT be used to determine students' final scores for this administration.**

### **Online Submission of Teacher Evaluations of the Test to the Department**

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

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

# Map to Core Curriculum

## August 2008 Living Environment

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

| Part D<br>72–84 |                |
|-----------------|----------------|
| Lab 1           | 72,74,75,76,77 |
| Lab 2           | 73             |
| Lab 3           | 78,79          |
| Lab 5           | 80,81,82,83,84 |



# Regents Examination in Living Environment August 2008

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

| Raw Score | Scale Score | Raw Score | Scale Score | Raw Score | Scale Score |
|-----------|-------------|-----------|-------------|-----------|-------------|
| 85        | 100         | 56        | 77          | 27        | 48          |
| 84        | 98          | 55        | 76          | 26        | 47          |
| 83        | 97          | 54        | 76          | 25        | 46          |
| 82        | 96          | 53        | 75          | 24        | 44          |
| 81        | 95          | 52        | 74          | 23        | 43          |
| 80        | 95          | 51        | 73          | 22        | 41          |
| 79        | 94          | 50        | 73          | 21        | 40          |
| 78        | 93          | 49        | 72          | 20        | 38          |
| 77        | 92          | 48        | 71          | 19        | 37          |
| 76        | 91          | 47        | 70          | 18        | 35          |
| 75        | 91          | 46        | 69          | 17        | 34          |
| 74        | 90          | 45        | 68          | 16        | 32          |
| 73        | 89          | 44        | 67          | 15        | 30          |
| 72        | 88          | 43        | 66          | 14        | 29          |
| 71        | 88          | 42        | 66          | 13        | 27          |
| 70        | 87          | 41        | 65          | 12        | 25          |
| 69        | 86          | 40        | 64          | 11        | 23          |
| 68        | 86          | 39        | 63          | 10        | 21          |
| 67        | 85          | 38        | 62          | 9         | 19          |
| 66        | 84          | 37        | 60          | 8         | 18          |
| 65        | 83          | 36        | 59          | 7         | 15          |
| 64        | 83          | 35        | 58          | 6         | 13          |
| 63        | 82          | 34        | 57          | 5         | 11          |
| 62        | 81          | 33        | 56          | 4         | 9           |
| 61        | 81          | 32        | 55          | 3         | 7           |
| 60        | 80          | 31        | 54          | 2         | 5           |
| 59        | 79          | 30        | 52          | 1         | 2           |
| 58        | 79          | 29        | 51          | 0         | 0           |
| 57        | 78          | 28        | 50          |           |             |

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.