The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Friday, January 26, 2007 — 9:15 a.m. to 12:15 p.m., only

Student Name _____

School Name _____

Print your name and the name of your school on the lines above. Then turn to the last page of this booklet, which is the answer sheet for Part A 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.

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 When brown tree snakes were accidentally introduced onto the island of Guam, they had no natural predators. These snakes sought out and ate many of the eggs of insect-eating birds. What probably occurred following the introduction of the brown tree snakes?

(1) The bird population increased.
(2) The insect population increased.
(3) The bird population began to seek a new food source.
(4) The insect population began to seek a new food source.

2 What will most likely happen to wastes containing nitrogen produced as a result of the breakdown of amino acids within liver cells of a mammal?

(1) They will be digested by enzymes in the stomach.
(2) They will be removed by the excretory system.
(3) They will be destroyed by specialized blood cells.
(4) They will be absorbed by mitochondria in nearby cells.

3 Which sequence represents the correct order of organization in complex organisms?

(1) tissues → organs → systems → cells
(2) organs → tissues → systems → cells
(3) systems → organs → cells → tissues
(4) cells → tissues → organs → systems

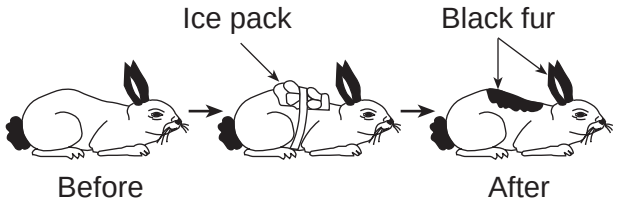
4 Which organelle is correctly paired with its specific function?

(1) cell membrane—storage of hereditary information
(2) chloroplast—transport of materials
(3) ribosome—synthesis of proteins
(4) vacuole—production of ATP

5 Homeostasis in unicellular organisms depends on the proper functioning of

(1) organelles
(2) insulin
(3) guard cells
(4) antibodies

6 Which statement best explains the change shown in the diagram below?



(1) Gene expression in an organism can be modified by interactions with the environment.
(2) Certain rabbits produce mutations that affect genes in specific areas of the body.
(3) Sorting and recombination of genes can be influenced by very cold temperatures.
(4) Molecular arrangement in existing proteins can be altered by environmental factors.

7 After a rabbit population reaches the carrying capacity of its habitat, the population of rabbits will most likely

(1) decrease, only
(2) increase, only
(3) alternately increase and decrease
(4) remain unchanged

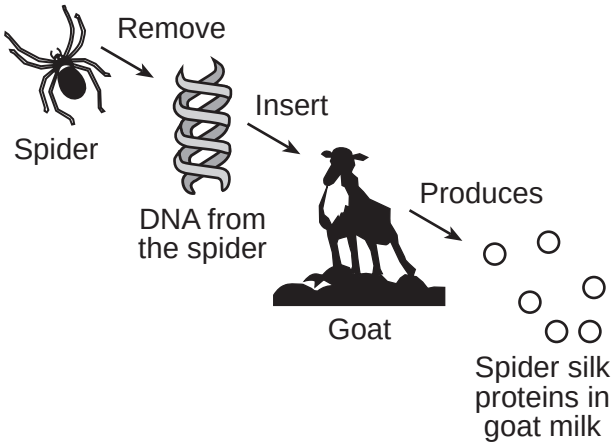
8 Variation in the offspring of sexually reproducing organisms is the direct result of

(1) sorting and recombining of genes
(2) replication and cloning
(3) the need to adapt and maintain homeostasis
(4) overproduction of offspring and competition

9 An error in genetic information present in a body cell of a mammal would most likely produce

(1) rapid evolution of the organism in which the cell is found
(2) a mutation that will affect the synthesis of a certain protein in the cell
(3) an adaptation that will be passed on to other types of cells
(4) increased variation in the type of organelles present in the cell

10 Which process is illustrated in the diagram below?



(1) chromatography
(2) direct harvesting
(3) meiosis
(4) genetic engineering

11 Which statement is most closely related to the modern theory of evolution?

(1) Characteristics that are acquired during life are passed to offspring by sexual reproduction.
(2) Evolution is the result of mutations and recombination, only.
(3) Organisms best adapted to a changed environment are more likely to reproduce and pass their genes to offspring.
(4) Asexual reproduction increases the survival of species.

12 In 1993, there were only 30 panthers in Florida. They were all closely related and many had reproductive problems. To avoid extinction and restore health to the population, biologists introduced 8 female panthers from Texas. Today, there are more than 80 panthers in Florida and most individuals have healthy reproductive systems. The success of this program was most likely due to the fact that the introduced females

(1) produced more reproductive cells than the male panthers in Texas
(2) solved the reproductive problems of the species by asexual methods
(3) increased the genetic variability of the panther population in Florida
(4) mated only with panthers from Texas

13 The *least* genetic variation will probably be found in the offspring of organisms that reproduce using

(1) mitosis to produce a larger population
(2) meiosis to produce gametes
(3) fusion of eggs and sperm to produce zygotes
(4) internal fertilization to produce an embryo

14 Woolly mammoths became extinct thousands of years ago, while other species of mammals that existed at that time still exist today. These other species of mammals most likely exist today because, unlike the mammoths, they

(1) produced offspring that all had identical inheritable characteristics
(2) did not face a struggle for survival
(3) learned to migrate to new environments
(4) had certain inheritable traits that enabled them to survive

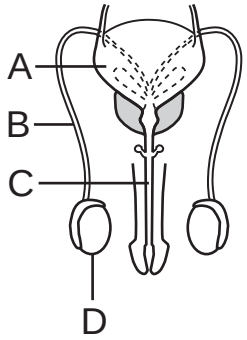
15 Marine sponges contain a biological catalyst that blocks a certain step in the separation of chromosomes. Which cellular process would be directly affected by this catalyst?

(1) mitosis
(2) diffusion
(3) respiration
(4) photosynthesis

16 A tree produces only seedless oranges. A small branch cut from this tree produces roots after it is planted in soil. When mature, this new tree will most likely produce

(1) oranges with seeds, only
(2) oranges without seeds, only
(3) a majority of oranges with seeds and only a few oranges without seeds
(4) oranges and other kinds of fruit

17 The diagram below represents a human reproductive system.



Meiosis occurs within structure

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

18 Which statement about embryonic organ development in humans is accurate?

(1) It is affected primarily by the eating habits and general health of the father.
(2) It may be affected by the diet and general health of the mother.
(3) It will not be affected by any medication taken by the mother in the second month of pregnancy.
(4) It is not affected by conditions outside the embryo.

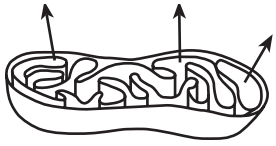
19 Experiments revealed the following information about a certain molecule:

— It can be broken down into amino acids.
— It can break down proteins into amino acids.
— It is found in high concentrations in the small intestine of humans.

This molecule is most likely

(1) an enzyme
(2) an inorganic compound
(3) a hormone
(4) an antigen

20 The diagram below represents a structure involved in cellular respiration.



Mitochondrion

The release of which substance is represented by the arrows?

(1) glucose
(2) oxygen
(3) carbon dioxide
(4) DNA

21 Scientists have genetically altered a common virus so that it can destroy the most lethal type of brain tumor without harming the healthy tissue nearby. This technology is used for all of the following *except*

(1) treating the disease
(2) curing the disease
(3) controlling the disease
(4) diagnosing the disease

22 Many species of plants interact with harmless underground fungi. The fungi enable the plants to absorb certain essential minerals and the plants provide the fungi with carbohydrates and other nutrients. This describes an interaction between a

(1) parasite and its host
(2) predator and its prey
(3) scavenger and a decomposer
(4) producer and a consumer

23 In an ocean, the growth and survival of seaweed, small fish, and sharks depends on abiotic factors such as

(1) sunlight, temperature, and minerals
(2) sunlight, pH, and type of seaweed
(3) number of decomposers, carbon dioxide, and nitrogen
(4) number of herbivores, carbon, and food

24 A basketball player develops speed and power as a result of practice. This athletic ability will *not* be passed on to her offspring because

(1) muscle cells do not carry genetic information
(2) mutations that occur in body cells are not inherited
(3) gametes do not carry complete sets of genetic information
(4) base sequences in DNA are not affected by this activity

25 Carbon dioxide containing carbon-14 is introduced into a balanced aquarium ecosystem. After several weeks, carbon-14 will most likely be present in

(1) the plants, only
(2) the animals, only
(3) both the plants and animals
(4) neither the plants nor animals

26 Which situation is a result of human activities?

(1) decay of leaves in a forest adds to soil fertility
(2) acid rain in an area kills fish in a lake
(3) ecological succession following volcanic activity reestablishes an ecosystem
(4) natural selection on an island changes gene frequencies

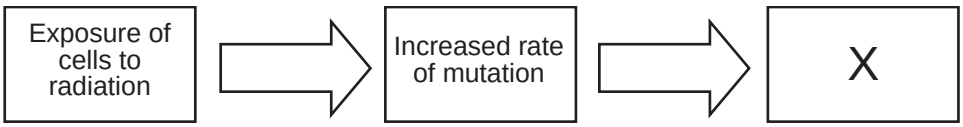
27 Which human activity will most likely have a *negative* effect on global stability?

(1) decreasing water pollution levels
(2) increasing recycling programs
(3) decreasing habitat destruction
(4) increasing world population growth

28 Which process helps reduce global warming?

(1) decay
(2) industrialization
(3) photosynthesis
(4) burning

29 Which phrase belongs in box *X* of the flowchart below?



(1) Increased chance of cancer
(2) Increase in the production of functional gametes
(3) Decrease in genetic variability of offspring
(4) Decreased number of altered genes

30 The data in the table below indicate the presence of specific reproductive hormones in blood samples taken from three individuals. An *X* in the hormone column indicates a positive lab test for the appropriate levels necessary for normal reproductive functioning in that individual.

Data Table

Individuals	Hormones Present		
	Testosterone	Progesterone	Estrogen
1		X	X
2			X
3	X		

Which processes could occur in individual 3?

(1) production of sperm, only
(2) production of sperm and production of eggs
(3) production of eggs and embryonic development
(4) production of eggs, only

Part B–1

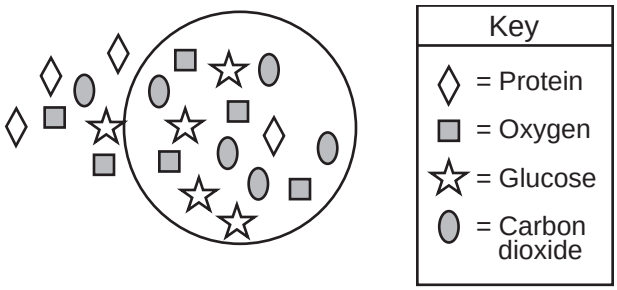
Answer all questions in this part. [10]

Directions (31–40): 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 While viewing a specimen under high power of a compound light microscope, a student noticed that the specimen was out of focus. Which part of the microscope should the student turn to obtain a clearer image under high power?

(1) eyepiece
(2) coarse adjustment
(3) fine adjustment
(4) nosepiece

32 The diagram below shows the relative concentration of molecules inside and outside of a cell.



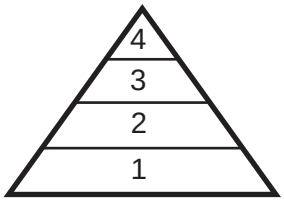
Which statement best describes the general direction of diffusion across the membrane of this cell?

(1) Glucose would diffuse into the cell.
(2) Protein would diffuse out of the cell.
(3) Carbon dioxide would diffuse out of the cell.
(4) Oxygen would diffuse into the cell.

33 Which statement most accurately describes scientific inquiry?

(1) It ignores information from other sources.
(2) It does not allow scientists to judge the reliability of their sources.
(3) It should never involve ethical decisions about the application of scientific knowledge.
(4) It may lead to explanations that combine data with what people already know about their surroundings.

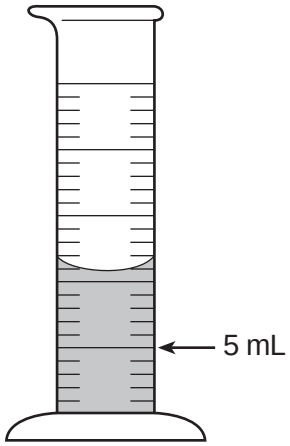
34 The diagram below represents a pyramid of energy that includes both producers and consumers.



The greatest amount of available energy is found at level

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

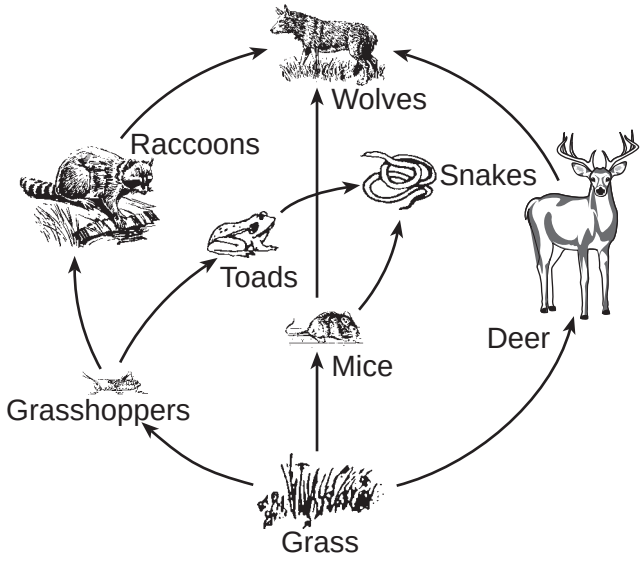
35 How much water should be removed from the graduated cylinder shown below to leave 5 milliliters of water in the cylinder?



(1) 6 mL
(2) 7 mL
(3) 11 mL
(4) 12 mL

36 The diagram below represents a food web.

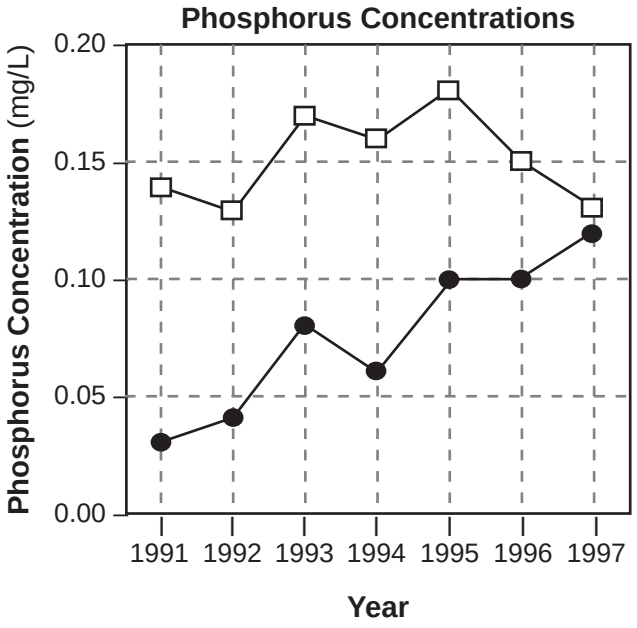
A Meadow Environment



Two of the herbivores represented in this food web are

(1) toads and snakes
(2) deer and mice
(3) wolves and raccoons
(4) grasshoppers and toads

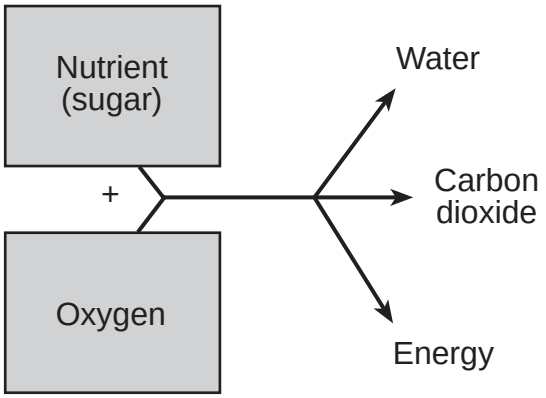
37 Compounds containing phosphorus that are dumped into the environment can upset ecosystems because phosphorus acts as a fertilizer. The graph below shows measurements of phosphorus concentrations taken during the month of June at two sites from 1991 to 1997.



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

(1) There was no decrease in the amount of compounds containing phosphorus dumped at site 2 during the period from 1991 to 1997.
(2) Pollution controls may have been put into operation at site 1 in 1995.
(3) There was most likely no vegetation present near site 2 from 1993 to 1994.
(4) There was a greater variation in phosphorous concentration at site 1 than there was at site 2.

Base your answers to questions 38 and 39 on the diagram below and on your knowledge of biology. The diagram illustrates a process by which energy is released in organisms.



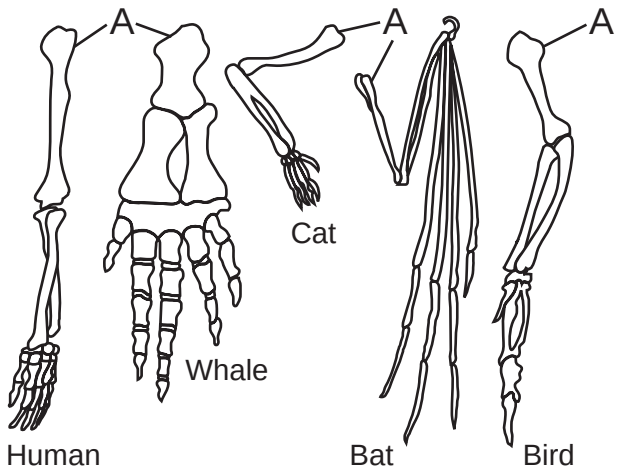
38 Cells usually transfer the energy that is released directly to

(1) glucose
(2) ATP
(3) oxygen
(4) enzymes

39 The energy released in this process was originally present in

(1) sunlight and then transferred to sugar
(2) sunlight and then transferred to oxygen
(3) the oxygen and then transferred to sugar
(4) the sugar and then transferred to oxygen

Base your answer to question 40 on the diagram below and on your knowledge of biology.



40 The similarities of the bones labeled *A* provide evidence that

(1) the organisms may have evolved from a common ancestor
(2) all species have one kind of bone structure
(3) the cells of the bones contain the same type of mutations
(4) all structural characteristics are the same in animals

Part B–2

Answer all questions in this part. [15]

Directions (41–55): For those questions that are followed by four choices, circle the *number* of the choice that best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question.

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

> A biology student was given three unlabeled jars of pond water from the same source, each containing a different type of mobile unicellular organism: euglena, ameba, and paramecium. The only information the student has is that the ameba and paramecium are both heterotrophs and the euglena can be either heterotrophic or autotrophic, depending on its environment.

41 State *one* way the euglena's two methods of nutrition provide a survival advantage the other unicellular organisms do *not* have. [1]

_____

_____

_____

41 ☐

42 Which procedure and resulting observation would help identify the jar that contains the euglena?

(1) Expose only one side of each jar to light. After 24 hours, only in the jar containing euglena will most of organisms be seen on the darker side of the jar.

(2) Expose all sides of each jar to light. After 48 hours, the jar with the highest dissolved carbon dioxide content will contain the euglena.

(3) Over a period of one week, determine the method of reproduction used by each type of organism. If mitotic cell division is observed, the jar will contain euglena.

(4) Prepare a wet-mount slide of specimens from each jar and observe each slide with a compound light microscope. Only the euglena will have chloroplasts.

42 ☐

Base your answers to questions 43 through 46 on the passage below and on your knowledge of biology.

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Decline of the Salmon Population

Salmon are fish that hatch in a river and swim to the ocean where their body mass increases. When mature, they return to the river where they were hatched and swim up stream to reproduce and die. When there are large populations of salmon, the return of nutrients to the river ecosystem can be huge. It is estimated that during salmon runs in the Pacific Northwest in the 1800s, 500 million pounds of salmon returned to reproduce and die each year. Research estimates that in the Columbia River alone, salmon contributed hundreds of thousands of pounds of nitrogen and phosphorus compounds to the local ecosystem each year. Over the past 100 years, commercial ocean fishing has removed up to two-thirds of the salmon before they reach the river each year.

43 Identify the process that releases the nutrients from the bodies of the dead salmon, making the nutrients available for other organisms in the ecosystem. [1]

_____

43 ☐

44 Identify *one* organism, other than the salmon, that would be present in or near the river that would most likely be part of a food web in the river ecosystem. [1]

_____

44 ☐

45 Identify *two* nutrients that are returned to the ecosystem when the salmon die. [1]

_____

_____

45 ☐

46 State *one* impact, other than reducing the salmon population, that commercial ocean fishing has on the river ecosystem. [1]

_____

_____

46 ☐

Base your answers to questions 47 through 51 on the information and data table below and on your knowledge of biology.

Biologists investigated the effect of the presence of aluminum ions on root tips of a variety of wheat. They removed 2-mm sections of the tips of roots. Half of the root tips were placed in a nutrient solution with aluminum ions, while the other half were placed in an identical nutrient solution without aluminum ions. The length of the root tips, in millimeters, was measured every hour for seven hours. The results are shown in the data table below.

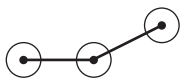
Data Table

Time (hr)	**Length of Root Tips in Solution With Aluminum Ions** (mm)	**Length of Root Tips in Solution Without Aluminum Ions** (mm)
0	2.0	2.0
1	2.1	2.2
2	2.2	2.4
3	2.4	2.8
4	2.6	2.9
5	2.7	3.2
6	2.8	3.7
7	2.8	3.9

Directions (47–49): Using the information in the data table, construct a line graph on the grid *on the next page*, following the directions below.

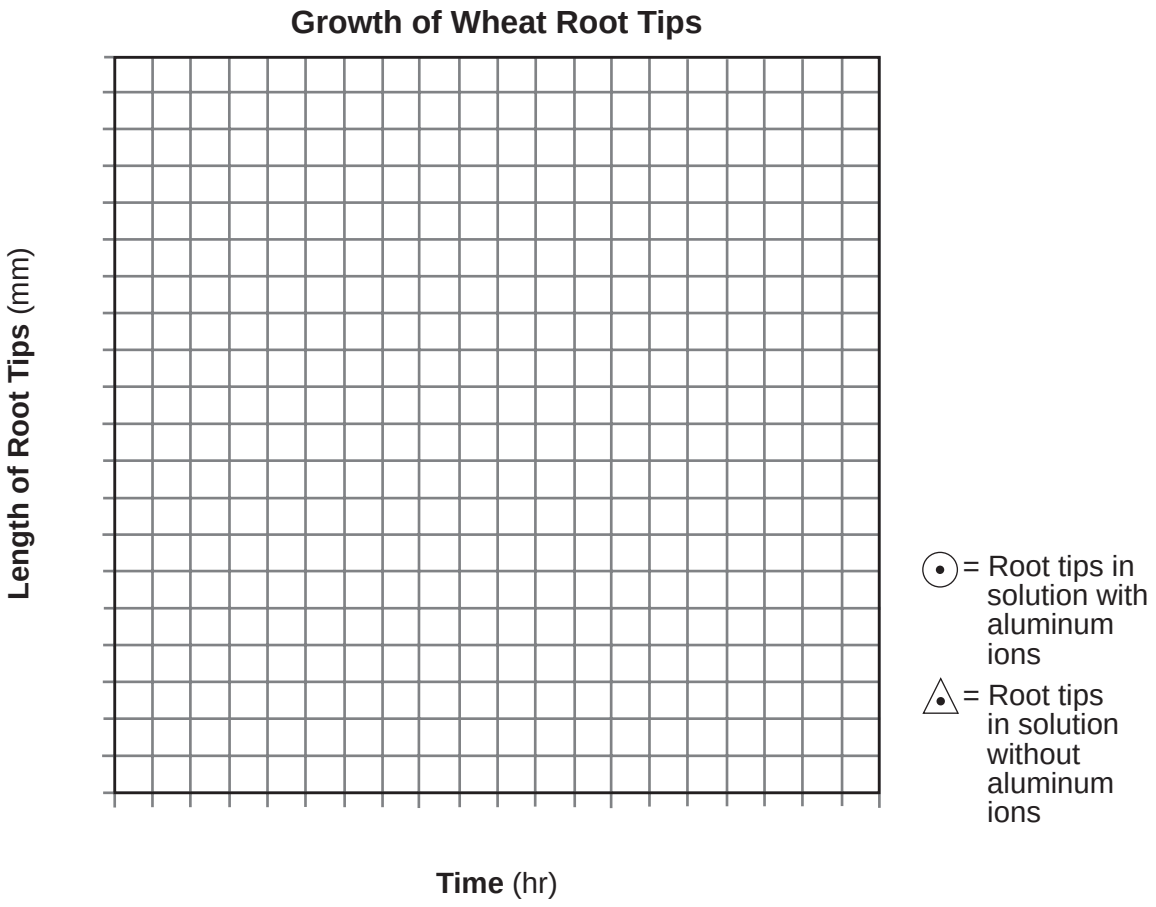
47 Mark an appropriate scale on each labeled axis. [1]

48 Plot the data for root tips in the solution with aluminum ions on the grid. Surround each point with a small circle and connect the points. [1]

Example: 

49 Plot the data for root tips in the solution without aluminum ions on the grid. Surround each point with a small triangle and connect the points. [1]

Example: 



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47 ☐

48 ☐

49 ☐

50 The aluminum ions most likely affected

(1) photosynthetic rate

(2) the union of gametes

(3) mitotic cell division

(4) starch absorption from the soil

50 ☐

51 Describe the effect of aluminum ions on the growth of the root tips of wheat. [1]

_____

_____

51 ☐

Base your answers to questions 52 and 53 on the information below and on your knowledge of biology.

A pond in the Adirondack Mountains of New York State was once a fishing spot visited by many people. It was several acres in size, and fishermen in boats were a common sight. Over time, the pond has become smaller in area and depth. Places where there was once open water are now covered by grasses and shrubs. Around the edges of the pond there are cattails and other wetland plants.

52 Identify the ecological process responsible for the changes to this pond. [1]

_____

53 Predict what will most likely happen to this pond area over the next hundred years if this process continues. [1]

_____

_____

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

The use of nuclear fuel can have positive and negative effects on an ecosystem.

54 State *one* positive effect on an ecosystem of using nuclear fuel to generate electricity. [1]

_____

_____

55 State *one* negative effect on an ecosystem of using nuclear fuel to generate electricity. [1]

_____

_____

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52 ☐

53 ☐

54 ☐

55 ☐

Part C

Answer all questions in this part. [17]

Directions (56–65): Record your answers in the spaces provided in this examination booklet.

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

Selective breeding has been used to improve the racing ability of horses.

56 Define selective breeding and state how it would be used to improve the racing ability of horses. [2]

_____

_____

_____

_____ 56 ☐

57 State *one disadvantage* of selective breeding. [1]

_____

_____ 57 ☐

58 State *one* specific way the removal of trees from an area has had a *negative* impact on the environment. [1]

_____

_____ 58 ☐

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Base your answers to questions 59 through 61 on the information below and on your knowledge of biology.

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It has been discovered that plants utilize chemical signals for communication. Some of these chemicals are released from leaves, fruits, and flowers and play various roles in plant development, survival, and gene expression. For example, bean plant leaves infested with spider mites release chemicals that result in an increase in the resistance to spider mites in uninfested leaves on the same plant and the expression of self-defense genes in uninfested bean plants nearby.

Plants can also communicate with insects. For example, corn, cotton, and tobacco under attack by caterpillars release chemical signals that simultaneously attract parasitic wasps to destroy the caterpillars and discourage moths from laying their eggs on the plants.

59 Identify the specialized structures in the cell membrane that are involved in communication. [1]

_____ 59 ☐

60 Explain why chemicals released from one plant species may not cause a response in a different plant species. [1]

_____

_____

_____ 60 ☐

61 State *two* advantages of relying on chemicals released by plants rather than using man-made chemicals for insect control. [2]

_____

_____

_____

_____

_____ 61 ☐

Base your answers to questions 62 through 64 on the information below and on your knowledge of biology.

For Teacher Use Only

Cells of the immune system and the endocrine system of the human body contribute to the maintenance of homeostasis. The methods and materials these two systems use as they carry out this critical function are different.

62 State *two* ways cells of the immune system fight disease. [2]

_____

_____

62 ☐

63 Identify the substance produced by the cells of all the endocrine glands that helps maintain homeostasis. [1]

_____

63 ☐

64 Identify *one* specific product of one of the endocrine glands and state how it aids in the maintenance of homeostasis. [1]

_____

_____

_____

64 ☐

65 A certain plant has white flower petals and it usually grows in soil that is slightly basic. Sometimes the plant produces flowers with red petals. A company that sells the plant wants to know if soil pH affects the color of the petals in this plant. Design a controlled experiment to determine if soil pH affects petal color. In your experimental design be sure to:

- state the hypothesis to be tested in the experiment [1]
- state *one* way the control group will be treated differently from the experimental group [1]
- identify *two* factors that must be kept the same in both the control group and the experimental group [1]
- identify the dependent variable in the experiment [1]
- state *one* result of the experiment that would support the hypothesis [1]

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65

Part D

Answer all questions in this part. [13]

Directions (66–76): For those questions that are followed by four choices, circle the *number* of the choice that best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question.

Base your answers to questions 66 and 67 on the information and data table below and on your knowledge of biology

Two students collected data on their pulse rates while performing different activities. Their average results are shown in the data table below.

Data Table

Activity	Average Pulse Rate (beats/min)
sitting quietly	70
walking	98
running	120

66 State the relationship between activity and pulse rate. [1]

_____

_____ 66 ☐

67 State *one* way that this investigation could be improved. [1]

_____

_____ 67 ☐

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Base your answers to questions 68 through 71 on the information below and on your knowledge of biology.

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To demonstrate techniques used in DNA analysis, a student was given two paper strip samples of DNA. The two DNA samples are shown below.

Sample 1: ATTCCGGTAATCCCGTAATGCCGGATAATACTCCGGTAATATC

Sample 2: ATTCCGGTAATCCCGTAATGCCGGATAATACTCCGGTAATATC

The student cut between the C and G in each of the shaded CCGG sequences in sample 1 and between the As in each of the shaded TAAT sequences in sample 2. Both sets of fragments were then arranged on a paper model of a gel.

68 The action of what kind of molecules was being demonstrated when the DNA samples were cut? [1]

_____

68 ☐

69 Identify the technique that was being demonstrated when the fragments were arranged on the gel model. [1]

_____

69 ☐

70 The results of this type of DNA analysis are often used to help determine

(1) the number of DNA molecules in an organism

(2) if two species are closely related

(3) the number of mRNA molecules in DNA

(4) if two organisms contain carbohydrate molecules

70 ☐

71 State *one* way that the arrangement of the two samples on the gel model would differ. [1]

_____

_____

71 ☐

Base your answers to questions 72 and 73 on the information below and on your knowledge of biology.

For Teacher Use Only

In birds, the ability to crush and eat seeds is related to the size, shape, and thickness of the beak. Birds with larger, thicker beaks are better adapted to crush and open seeds that are larger.

One species of bird found in the Galapagos Islands is the medium ground finch. It is easier for most of the medium ground finches to pick up and crack open smaller seeds rather than larger seeds. When food is scarce, some of the birds have been observed eating larger seeds.

72 Describe *one* change in beak characteristics that would most likely occur in the medium ground finch population after many generations when an environmental change results in a permanent shortage of small seeds. [1]

_____

_____

72 ☐

73 Explain this long-term change in beak characteristics using the concepts of:

- competition [1]
- survival of the fittest [1]
- inheritance [1]

_____

_____

_____

_____

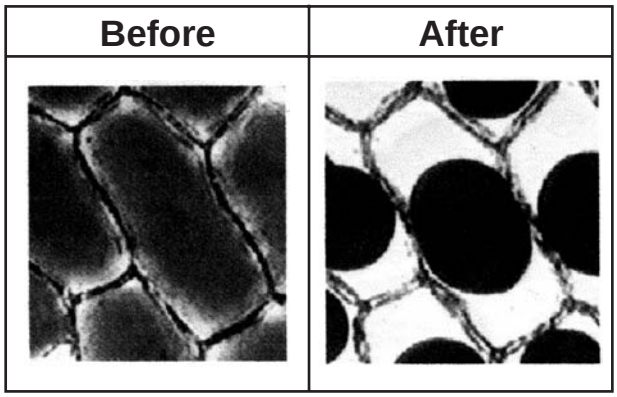
_____

_____

73 ☐

Base your answers to questions 74 and 75 on the information and diagram below and on your knowledge of biology. The diagram represents some cells on a microscope slide before and after a substance was added to the slide.

For Teacher Use Only



74 Identify a substance that was most likely added to the slide to cause the change observed. [1]

_____

74 ☐

75 Describe a procedure that could be used to add this substance to the cells on the slide without removing the coverslip. [1]

_____

_____

_____

75 ☐

76 In the *Diffusion Through a Membrane* lab, the model cell membranes allowed certain substances to pass through based on which characteristic of the diffusing substance?

(1) size

(2) shape

(3) color

(4) temperature

76 ☐

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Friday, January 26, 2007 — 9:15 a.m. to 12:15 p.m., only

ANSWER SHEET

Student ..... Sex: ☐ Female ☐ Male

Teacher .....

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

Part	Maximum Score	Student's Score
A	30	
B–1	10	
B–2	15	
C	17	
D	13	
Total Raw Score (maximum Raw Score: 85)		
Final Score (from conversion chart)		

Raters' Initials

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	36 .....
32	37 .....
33	38 .....
34	39 .....
35	40 .....

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

Friday, January 26, 2007 — 9:15 a.m. to 12:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

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

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

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

Part B–1

31	**3**	36	**2**
32	**3**	37	**2**
33	**4**	38	**2**
34	**1**	39	**1**
35	**1**	40	**1**

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 5 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 Friday, January 26, 2007. 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

41 Allow 1 credit for stating *one* way the euglena's two methods of nutrition provide a survival advantage the other unicellular organisms do *not* have. Acceptable responses include, but are not limited to:

— If food is not available, the euglena can make its own food.

42 4

43 Allow 1 credit for identifying the process that releases the nutrients from the bodies of the dead salmon, making the nutrients available for other organisms in the ecosystem. Acceptable responses include, but are not limited to:

— decomposition
— decay
— recycling

44 Allow 1 credit for identifying *one* organism, other than the salmon, that would be present in or near the river that would most likely be part of a food web in the river ecosystem. Acceptable responses include, but are not limited to:

— decomposer/bacteria
— small fish
— seagulls
— green plant

45 Allow 1 credit for identifying *two* nutrients that are returned to the ecosystem when the salmon die. Acceptable responses include, but are not limited to:

— nitrogen compounds
— phosphorus compounds
— carbon compounds

46 Allow 1 credit for stating *one* impact, other than reducing the salmon population, that commercial ocean fishing has on the river ecosystem. Acceptable responses include, but are not limited to:

— Fishing deprives upstream ecosystems of nutrients.
— Consumers in the ecosystem would be deprived of food.
— Decomposer populations would decrease.
— disrupts food webs

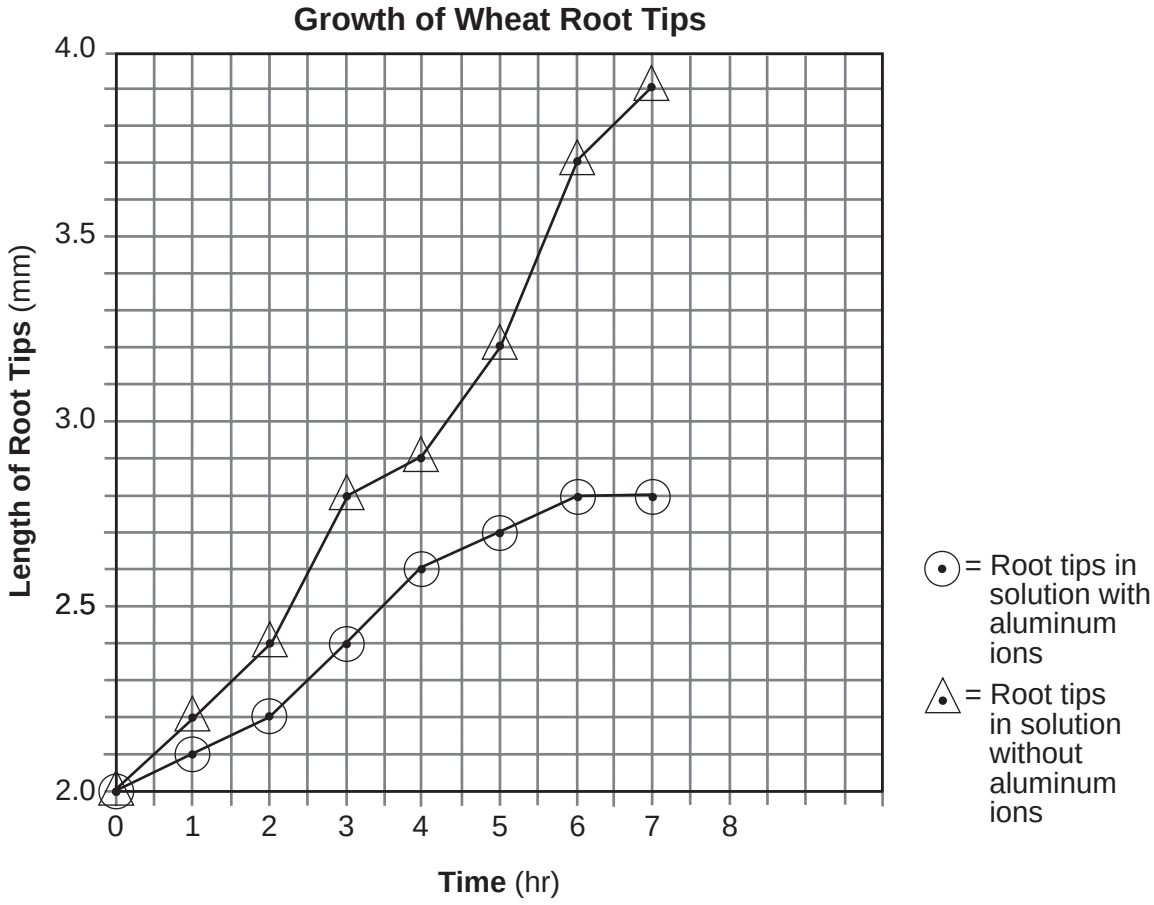
47 Allow 1 credit for marking an appropriate scale on each labeled axis.

Note: Make no assumptions about the origin unless it is labeled.

48 Allow 1 credit for plotting the data for root tips in the solution with aluminum ions, surrounding each point with a small circle, and connecting the points.

49 Allow 1 credit for plotting the data for root tips in the solution without aluminum ions, surrounding each point with a small triangle, and connecting the points.

Example of a 3-credit graph for questions 47 through 49:



50 3

51 Allow 1 credit for describing the effect of aluminum ions on the growth of the root tips of wheat. Acceptable responses include, but are not limited to:

— Root tips grow less when exposed to aluminum ions.
— The growth of the root tips was stunted.
— Without aluminum ions, the root tips grow more.

52 Allow 1 credit for identifying the ecological process responsible for the changes to the pond as ecological succession or succession.

53 Allow 1 credit for predicting what will most likely happen to this pond area over the next hundred years if this process continues. Acceptable responses include, but are not limited to:

— The pond will probably be totally filled in.
— It may become a swampy area.
— It may become a forest.

54 Allow 1 credit for stating *one* positive effect on an ecosystem of using nuclear fuel to generate electricity. Acceptable responses include, but are not limited to:

— There is little air pollution from nuclear fuels.
— It doesn't contribute to acid rain.
— It doesn't use fossil fuels.
— It doesn't contribute to global warming by releasing CO_2.

55 Allow 1 credit for stating *one negative* effect on an ecosystem of using nuclear fuel to generate electricity. Acceptable responses include, but are not limited to:

— results in nuclear waste
— dangers from radiation
— thermal pollution

Part C

56 Allow a maximum of 2 credits, 1 credit for defining selective breeding and 1 credit for stating how it would be used to improve the racing ability of horses.

Example of a 2-credit response:

Choose parents with the desired trait to breed. A fast male horse is bred to a fast female horse and the offspring may inherit the fast-running traits of both parents.

57 Allow 1 credit for stating *one disadvantage* of selective breeding. Acceptable responses include, but are not limited to:

— Undesirable traits of parents may be expressed in the offspring.
— unexpected combinations of genes
— unpredictable results
— decreased variation in race horses

58 Allow 1 credit for stating *one* specific way the removal of trees from an area has had a *negative* impact on the environment. Acceptable responses include, but are not limited to:

— Less oxygen is produced.
— Less carbon dioxide is removed from the atmosphere.
— Habitats are destroyed.
— Biodiversity is diminished.
— Plant species valued for medicines are lost.
— affects global temperatures
— increased erosion

59 Allow 1 credit for identifying the specialized structures in the cell membrane that are involved in communication. Acceptable responses include, but are not limited to:

— receptors
— receptor molecules

60 Allow 1 credit for explaining why chemicals released from one plant species may not cause a response in a different plant species. Acceptable responses include, but are not limited to:

— Receptors are specialized.
— The chemicals released by one plant species may not be recognized by the receptors of another plant species.
— Genetic differences between the two plant species may limit responses to specific chemicals.

61 Allow a maximum of 2 credits, 1 for each of *two* advantages of relying on chemicals released by plants rather than using man-made chemicals for insect control. Acceptable responses include, but are not limited to:

— less harmful to the environment
— cheaper
— do not cause pollution

62 Allow a maximum of 2 credits, 1 credit for each of *two* ways cells of the immune system fight disease. Acceptable responses include, but are not limited to:

— engulf foreign substances
— produce antibodies
— recognize pathogens/antigens

63 Allow 1 credit for identifying hormones as the substance produced by the cells of all the endocrine glands that helps maintain homeostasis.

64 Allow 1 credit for identifying *one* specific product of one of the endocrine glands and stating how it aids in the maintenance of homeostasis. Acceptable responses include, but are not limited to:

— Insulin regulates blood sugar levels.
— Estrogen *or* testosterone regulates the reproductive system.

65 Allow a maximum of 5 credits for designing a controlled experiment to determine if soil pH affects petal color, allocated as follows:

- Allow 1 credit for stating the hypothesis to be tested. Acceptable responses include, but are not limited to:

  — Soil pH affects flower (petal) color.

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

- Allow 1 credit for stating *one* way the control group will be treated differently from the experimental group. Acceptable responses include, but are not limited to:

  — The control group will be planted in soil that is slightly basic. The experimental groups will be planted in soil that has a pH that is not slightly basic.
  — The experimental group will be grown in acidic soil. The control group will be grown in nonacidic soil.

- Allow 1 credit for identifying *two* factors that must be kept the same in both the control group and the experimental group. Acceptable responses include, but are not limited to:

  — amount of soil
  — amount of water
  — amount of light
  — temperature

- Allow 1 credit for identifying the dependent variable as petal color *or* flower color.

- Allow 1 credit for stating *one* result of the experiment that would support the hypothesis. Acceptable responses include, but are not limited to:

  — Red flowers appear on the plants that grow in soil that is not slightly basic.
  — Plants grown in acidic soil have red flowers.

Part D

66 Allow 1 credit for stating the relationship between activity and pulse rate. Acceptable responses include, but are not limited to:

— As activity increases, so does the pulse rate.
— The pulse rate increases as the activity increases.

67 Allow 1 credit for stating *one* way that this investigation could be improved. Acceptable responses include, but are not limited to:

— larger sample size
— repeat the investigation

68 Allow 1 credit for identifying the kind of molecules whose action was being demonstrated when the DNA samples were cut. Acceptable responses include, but are not limited to:

— enzymes
— restriction enzymes
— proteins
— biological catalysts

69 Allow 1 credit for electrophoresis or gel electrophoresis.

70 2

71 Allow 1 credit for stating *one* way that the arrangement of the two samples on the gel model would differ. Acceptable responses include, but are not limited to:

— The number of bands would differ.
— The bands would be in different positions.
— The banding patterns would be different.

72 Allow 1 credit for describing *one* change in beak characteristics that would most likely occur in the medium ground finch population after many generations when an environmental change results in a permanent shortage of small seeds. Acceptable responses include, but are not limited to:

— Beaks would be thicker.
— Birds with larger, thicker beaks would become more common in the population than those with the original beak characteristics.

73 Allow a maximum of 3 credits for explaining the long-term change in beak characteristics, allocated as follows:

• Allow 1 credit for including the concept of competition.
• Allow 1 credit for including the concept of survival of the fittest.
• Allow 1 credit for including the concept of inheritance.

Example of a 3-credit response:

Competition for food would increase as small seeds became scarce. Birds with larger, thicker beaks would have a better chance of surviving when the seeds were larger and tougher to crack. Birds with normal thickness beaks would be less likely to survive. Reproduction of the surviving birds, many with the larger, thicker beaks, would produce more offspring inheriting the better adapted beak type. Over time, this would lead to a large proportion of the population having the thicker beaks.

74 Allow 1 credit for identifying a substance that was most likely added to the slide to cause the change observed. Acceptable responses include, but are not limited to:

— salt solution
— salt water
— salt

75 Allow 1 credit for describing a procedure that could be used to add this substance to the cells on the slide without removing the coverslip. Acceptable responses include, but are not limited to:

— Put a piece of paper towel on one edge of the coverslip and add the substance to the opposite edge of the coverslip one drop at a time. Add more drops as the paper towel soaks up the liquid from under the slide.

76 1

The *Chart for Determining the Final Examination Score for the January 2007 Regents Examination in Living Environment* will be posted on the Department's web site http://www.emsc.nysed.gov/osa/ on Friday, January 26, 2007. 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.

Submitting 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/.
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

January 2007 Living Environment

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

Part D 66–76	
Lab 1	68,69,70,71
Lab 2	66,67
Lab 3	72,73
Lab 5	74,75,76

University of the State of New York
State Education Department

Regents Examination in Living Environment
January 2007

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

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
85	100	56	79	27	49
84	99	55	78	26	47
83	98	54	78	25	46
82	97	53	77	24	44
81	97	52	76	23	43
80	96	51	75	22	41
79	95	50	74	21	40
78	95	49	74	20	38
77	94	48	73	19	36
76	93	47	72	18	35
75	92	46	71	17	33
74	92	45	70	16	31
73	91	44	69	15	30
72	90	43	68	14	28
71	90	42	67	13	26
70	89	41	66	12	24
69	88	40	65	11	22
68	88	39	64	10	21
67	87	38	63	9	19
66	86	37	62	8	17
65	86	36	61	7	15
64	85	35	59	6	13
63	84	34	58	5	11
62	83	33	57	4	9
61	83	32	56	3	7
60	82	31	54	2	4
59	81	30	53	1	2
58	80	29	52	0	0
57	80	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 scaled score that corresponds to that raw score. The scaled score is the student's final examination score. Enter this score in the space labeled "Final Score" on the student's answer sheet.

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

Because scaled scores corresponding to raw scores in the conversion chart 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.