The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Thursday, January 29, 2004 — 9:15 a.m. to 12:15 p.m., only

Student Name _____

School Name _____

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

This examination has three parts. You must answer all questions in this examination. Write your answers to the Part A multiple-choice questions on the separate answer sheet. Write your answers for the questions in Parts B and C directly in this examination booklet. All answers should be written in pen, except for graphs and drawings which should be done in pencil. You may use scrap paper to work out the answers to the questions, but be sure to record all your answers on the answer sheet and in this examination booklet.

When you have completed the examination, you must sign the statement printed on the Part A answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet cannot be accepted if you fail to sign this declaration.

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

Part A

Answer all questions in this part. [35]

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

1 The analysis of data gathered during a particular experiment is necessary in order to

(1) formulate a hypothesis for that experiment
(2) develop a research plan for that experiment
(3) design a control for that experiment
(4) draw a valid conclusion for that experiment

2 A student could best demonstrate knowledge of how energy flows throughout an ecosystem by

(1) drawing a food web using specific organisms living in a pond
(2) conducting an experiment that demonstrates the process of photosynthesis
(3) labeling a diagram that illustrates ecological succession
(4) making a chart to show the role of bacteria in the environment

3 In most habitats, the removal of predators will have the most immediate impact on a population of

(1) producers
(2) decomposers
(3) herbivores
(4) microbes

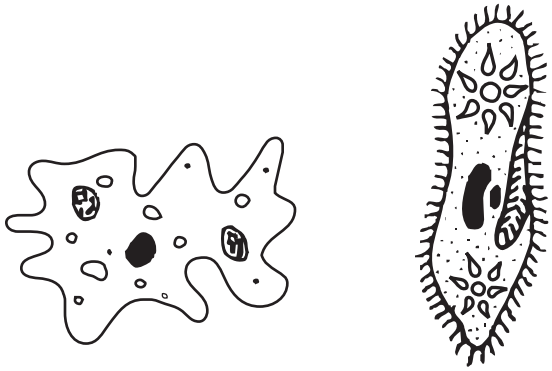
4 Hormones and secretions of the nervous system are chemical messengers that

(1) store genetic information
(2) carry out the circulation of materials
(3) extract energy from nutrients
(4) coordinate system interactions

5 Which statement concerning simple sugars and amino acids is correct?

(1) They are both wastes resulting from protein synthesis.
(2) They are both building blocks of starch.
(3) They are both needed for the synthesis of larger molecules.
(4) They are both stored as fat molecules in the liver.

6 The diagram below represents two single-celled organisms.



These organisms carry out the activities needed to maintain homeostasis by using specialized internal

(1) tissues
(2) organelles
(3) systems
(4) organs

7 The sequence of subunits in a protein is most directly dependent on the

(1) region in the cell where enzymes are produced
(2) DNA in the chromosomes in a cell
(3) type of cell in which starch is found
(4) kinds of materials in the cell membrane

8 Fruit flies with the curly-wing trait will develop straight wings if kept at a temperature of 16°C during development and curly wings if kept at 25°C. The best explanation for this change in the shape of wings is that the

(1) genes for curly wings and genes for straight wings are found on different chromosomes
(2) type of genes present in the fruit fly is dependent on environmental temperature
(3) environment affects the expression of the genes for this trait
(4) higher temperature produces a gene mutation

9 The genetic code of a DNA molecule is determined by a specific sequence of

(1) ATP molecules
(2) sugar molecules
(3) chemical bonds
(4) molecular bases

10 To produce large tomatoes that are resistant to cracking and splitting, some seed companies use the pollen from one variety of tomato plant to fertilize a different variety of tomato plant. This process is an example of

(1) selective breeding
(2) DNA sequencing
(3) direct harvesting
(4) cloning

11 The cells that make up the skin of an individual have some functions different from the cells that make up the liver because

(1) all cells have a common ancestor
(2) different cells have different genetic material
(3) environment and past history have no influence on cell function
(4) different parts of genetic instructions are used in different types of cells

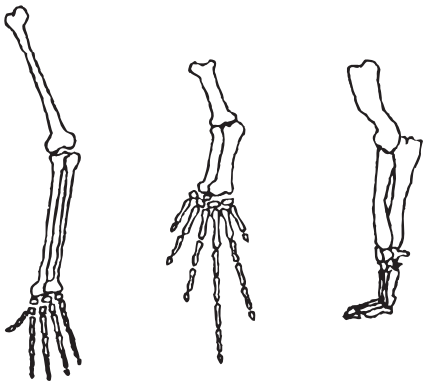
12 The production of certain human hormones by genetically engineered bacteria results from

(1) inserting a specific group of amino acids into the bacteria
(2) combining a portion of human DNA with bacterial DNA and inserting this into bacteria
(3) crossing two different species of bacteria
(4) deleting a specific amino acid from human DNA and inserting it into bacterial DNA

13 Which statement best describes a current understanding of natural selection?

(1) Natural selection influences the frequency of an adaptation in a population.
(2) Natural selection has been discarded as an important concept in evolution.
(3) Changes in gene frequencies due to natural selection have little effect on the evolution of species.
(4) New mutations of genetic material are due to natural selection.

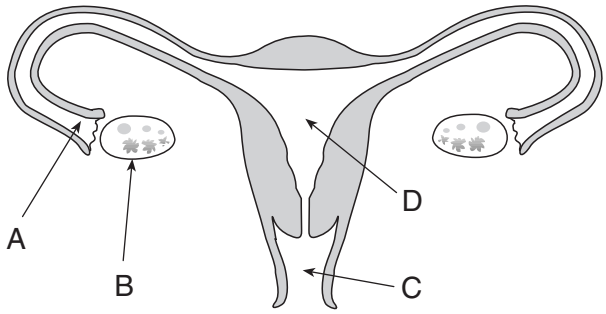
14 The bones in the forelimbs of three mammals are shown below.



For these mammals, the number, position, and shape of the bones most likely indicates that they may have

(1) developed in a common environment
(2) developed from the same earlier species
(3) identical genetic makeup
(4) identical methods of obtaining food

Base your answers to questions 15 and 16 on the diagram below, which represents the human female reproductive system.



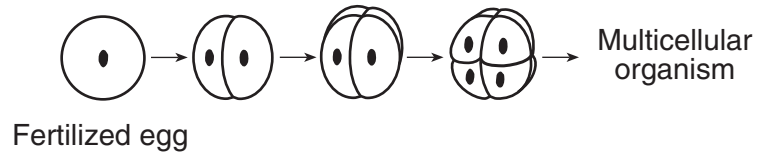
15 New inherited characteristics may appear in offspring as a result of new combinations of existing genes or may result from mutations in genes contained in cells produced by structure

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

16 In which part of this system does a fetus usually develop?

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

17 Which phrase best describes a process represented in the diagram below?



(1) a zygote dividing by mitosis
(2) a zygote dividing by meiosis
(3) a gamete dividing by mitosis
(4) a gamete dividing by meiosis

18 Which species is most likely to survive changing environmental conditions?

(1) a species that has few variations
(2) a species that reproduces sexually
(3) a species that competes with similar species
(4) a species that has a limited life span

19 Organisms that have the ability to use an atmospheric gas to produce an organic nutrient are known as

(1) herbivores
(2) decomposers
(3) carnivores
(4) autotrophs

20 Which phrase does *not* describe cells cloned from a carrot?

(1) they are genetically identical
(2) they are produced sexually
(3) they have the same DNA codes
(4) they have identical chromosomes

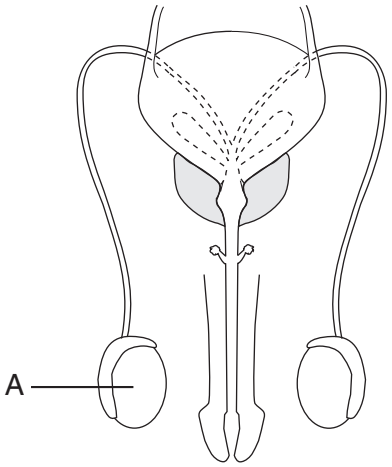
21 Human egg cells are most similar to human sperm cells in their

(1) degree of motility
(2) amount of stored food
(3) chromosome number
(4) shape and size

22 One arctic food chain consists of polar bears, fish, seaweed, and seals. Which sequence demonstrates the correct flow of energy between these organisms?

(1) seals → seaweed → fish → polar bears
(2) fish → seaweed → polar bears → seals
(3) seaweed → fish → seals → polar bears
(4) polar bears → fish → seals → seaweed

23 The diagram below represents the reproductive system of a mammal.



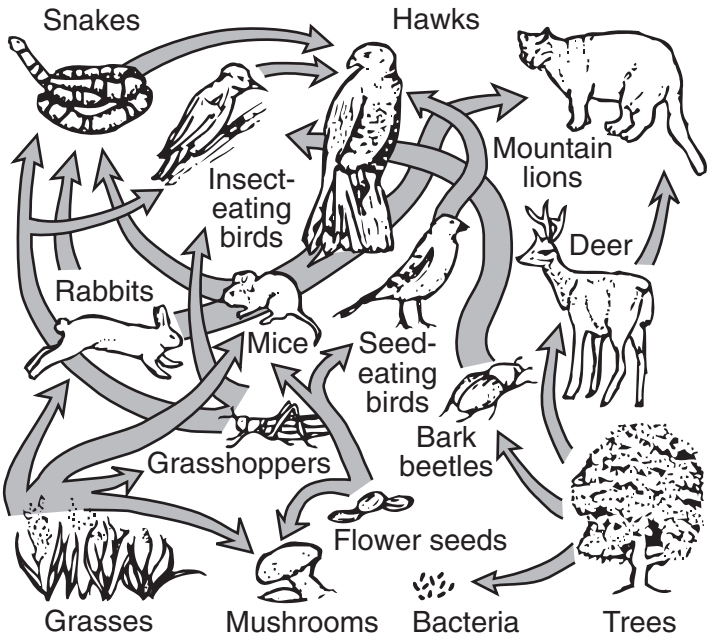
The hormone produced in structure *A* most directly brings about a change in

(1) blood sugar concentration
(2) physical characteristics
(3) the rate of digestion
(4) the ability to carry out respiration

24 Leaves of green plants contain openings known as stomates, which are opened and closed by specialized cells allowing for gas exchange between the leaf and the outside environment. Which phrase best represents the net flow of gases involved in photosynthesis into and out of the leaf through these openings on a sunny day?

(1) carbon dioxide moves in; oxygen moves out
(2) carbon dioxide and oxygen move in; ozone moves out
(3) oxygen moves in; nitrogen moves out
(4) water and ozone move in; carbon dioxide moves out

25 A food web is represented in the diagram below.



Which organisms are correctly paired with their roles in this food web?

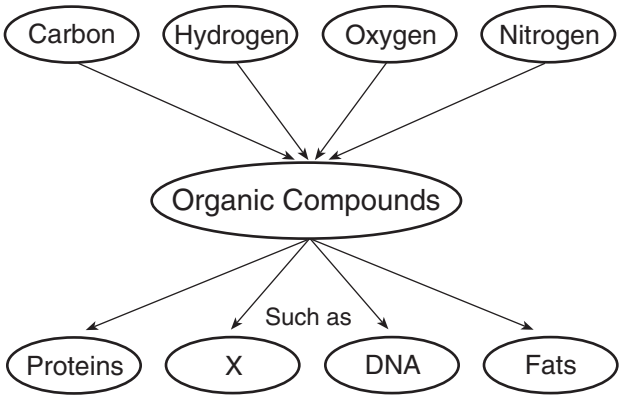
(1) mountain lions, bark beetles — producers
hawks, mice — heterotrophs

(2) snakes, grasshoppers — consumers
mushrooms, rabbits — autotrophs

(3) all birds, deer — consumers
grasses, trees — producers

(4) seeds, bacteria — decomposers
mice, grasses — heterotrophs

26 What substance could be represented by the letter *X* in the diagram below?



(1) carbohydrates
(2) ozone
(3) carbon dioxide
(4) water

27 Information concerning a metabolic activity is shown below.

$$X \xrightarrow{\text{enzyme}} \text{products + energy for metabolism}$$

Substance *X* is most likely

(1) DNA
(2) oxygen
(3) ATP
(4) chlorophyll

28 A part of the Hepatitis B virus is synthesized in the laboratory. This viral particle can be identified by the immune system as a foreign material but the viral particle is not capable of causing disease. Immediately after this viral particle is injected into a human it

(1) stimulates the production of enzymes that are able to digest the Hepatitis B virus
(2) triggers the formation of antibodies that protect against the Hepatitis B virus
(3) synthesizes specific hormones that provide immunity against the Hepatitis B virus
(4) breaks down key receptor molecules so that the Hepatitis B virus can enter body cells

29 Which phrase would be appropriate for area *A* in the chart below?

Technological Device	Positive Impact	Negative Impact
Nuclear power plant	Provides efficient, inexpensive energy	A

(1) produces radioactive waste
(2) results in greater biodiversity
(3) provides light from radioactive substances
(4) reduces dependence on fossil fuels

30 Which situation is *not* an example of the maintenance of a dynamic equilibrium in an organism?

(1) Guard cells contribute to the regulation of water content in a geranium plant.
(2) Water passes into an animal cell causing it to swell.
(3) The release of insulin lowers the blood sugar level in a human after eating a big meal.
(4) A runner perspires while running a race on a hot summer day.

31 Which statement best describes what happens to energy and molecules in a stable ecosystem?

(1) Both energy and molecules are recycled in an ecosystem.
(2) Neither energy nor molecules are recycled in an ecosystem.
(3) Energy is recycled and molecules are continuously added to the ecosystem.
(4) Energy is continuously added to the ecosystem and molecules are recycled.

32 Methods used to reduce sulfur dioxide emissions from smokestacks are an attempt by humans to

(1) lessen the amount of insecticides in the environment
(2) eliminate diversity in wildlife
(3) lessen the environmental impact of acid rain
(4) use nonchemical controls on pest species

33 Deforestation will most directly result in an immediate increase in

(1) atmospheric carbon dioxide
(2) atmospheric ozone
(3) wildlife populations
(4) renewable resources

34 Which statement concerning ecosystems is correct?

(1) Stable ecosystems that are changed by natural disaster will slowly recover and may again become stable if left alone for a long period of time.
(2) Competition does not influence the number of organisms that live in ecosystems.
(3) Climatic change is the principal cause of habitat destruction in ecosystems in the last fifty years.
(4) Stable ecosystems, once changed by natural disaster, will never recover and become stable again, even if left alone for a long period of time.

35 Which human activity would be *least* likely to disrupt the stability of an ecosystem?

(1) disposing of wastes in the ocean
(2) using fossil fuels
(3) increasing the human population
(4) recycling bottles and cans

Part B

Answer all questions in this part. [30]

Directions (36–62): For those questions that are followed by four choices, circle the number of the choice that best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question and record your answers in the spaces provided.

For Teacher Use Only

36 After switching from the high-power to the low-power objective lens of a compound light microscope, the area of the low-power field will appear

(1) larger and brighter

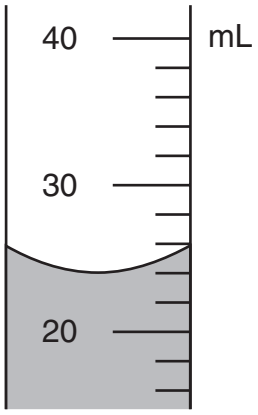
(2) smaller and brighter

(3) larger and darker

(4) smaller and darker

36 ☐

37 The diagram below shows a portion of a graduated cylinder.



What is the volume of the liquid in this cylinder?

(1) 22 mL

(2) 24 mL

(3) 25 mL

(4) 26 mL

37 ☐

38 A mutation occurs in a cell. Which sequence best represents the correct order of the events involved for this mutation to affect the traits expressed by this cell?

(1) a change in the sequence of DNA bases → joining amino acids in sequence → appearance of characteristic

(2) joining amino acids in sequence → a change in the sequence of DNA bases → appearance of characteristic

(3) appearance of characteristic → joining amino acids in sequence → a change in the sequence of DNA bases

(4) a change in the sequence of DNA bases → appearance of characteristic → joining amino acids in sequence

38 ☐

39 Recently, scientists noted that stained chromosomes from rapidly dividing cells, such as human cancer cells, contain numerous dark, dotlike structures. Chromosomes from older human cells that have stopped dividing have very few, if any, dotlike structures. The best generalization regarding these dotlike structures is that they

(1) will always be present in cells that are dividing

(2) may increase the rate of mitosis in human cells

(3) definitely affect the rate of division in all cells

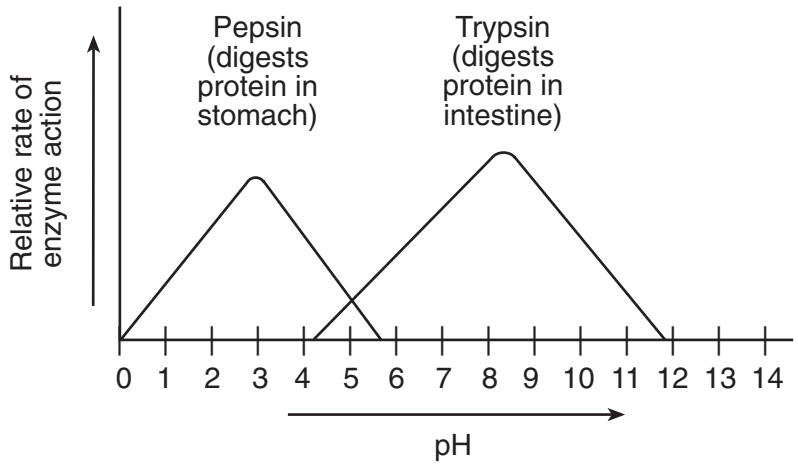
(4) can cure all genetic disorders

39 ☐

For Teacher Use Only

Base your answers to questions 40 and 41 on the graph below and on your knowledge of biology.

For Teacher Use Only



40 Pepsin works best in which type of environment?

(1) acidic, only

(2) basic, only

(3) neutral

(4) sometimes acidic, sometimes basic

40 ☐

41 Neither enzyme works at a pH of

(1) 1

(2) 5

(3) 3

(4) 13

41 ☐

Base your answers to questions 42 through 44 on the information below and on your knowledge of biology.

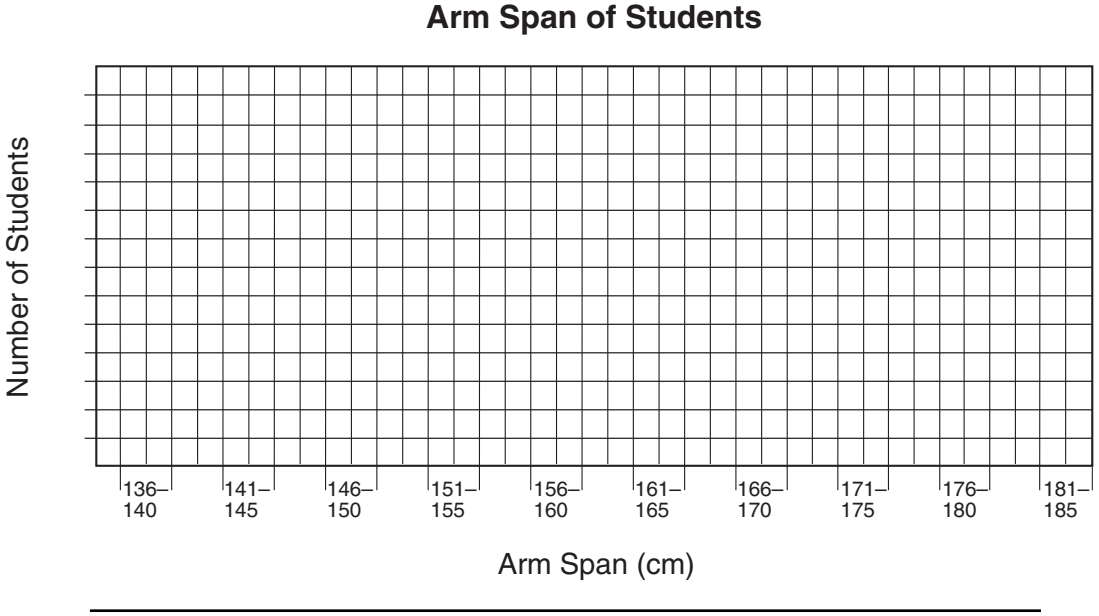
A science class was studying various human physical characteristics in an investigation for a report on human genetics. As part of the investigation, the students measured the arm span of the class members. The data table below summarizes the class results.

Arm Span of the Students	
Student Arm Span (cm)	**Number of Students**
136–140	1
141–145	2
146–150	0
151–155	4
156–160	5
161–165	8
166–170	5
171–175	5
176–180	3
181–185	1

Directions (42–43): Using the information in the data table, construct a bar graph on the grid provided, following the directions below.

42 Mark an appropriate scale on the axis labeled "Number of Students." [1]

43 Construct vertical bars to represent the data. Shade in each bar. [1]



For Teacher Use Only

42 ☐

43 ☐

44 What should be done to provide additional support for the generalization that human arm span is a characteristic that falls within a range of lengths, with most lengths falling in the middle ranges? [1]

_____

_____

_____

For Teacher Use Only

44 ☐

45 In an investigation to determine a factor that affects the growth of rats, a student exposed 100 rats of the same age and species to identical conditions, except for the amount of living space and the amount of food each rat received. Each day the student measured and recorded the weight of each rat. State *one* major error that the student made in performing this investigation. [1]

_____

_____

_____

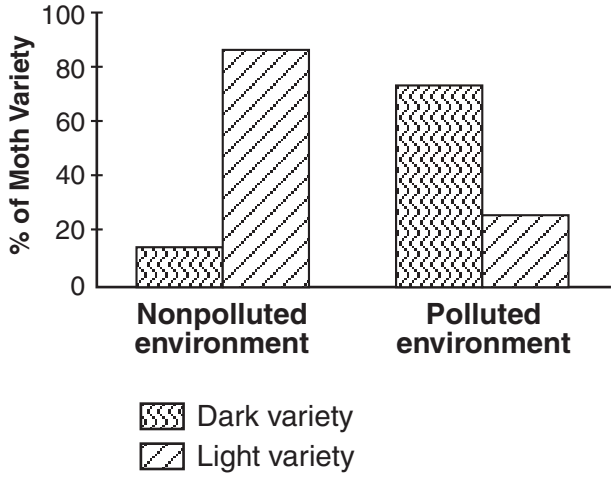
45 ☐

Base your answers to questions 46 through 50 on the information below and on your knowledge of biology.

For Teacher Use Only

Color in peppered moths is controlled by genes. A light-colored variety and a dark-colored variety of a peppered moth species exist in nature. The moths often rest on tree trunks, and several different species of birds are predators of this moth.

Before industrialization in England, the light-colored variety was much more abundant than the dark-colored variety and evidence indicates that many tree trunks at that time were covered with light-colored lichens. Later, industrialization developed and brought pollution which killed the lichens leaving the tree trunks covered with dark-colored soot. The results of a study made in England are shown below.



46 State *one* possible reason that a larger number of the dark-colored variety were present in the polluted environment. [1]

_____

_____

_____ 46

47 State *one* possible reason that the light-colored variety was not completely eliminated from the polluted environment. [1]

_____

_____

_____ 47

48 During the past few decades, air pollution control laws in many areas of England greatly limited the soot and other air pollutants coming from the burning of coal. State *one* way the decrease in soot and other air pollutants will most likely influence the survival of the light-colored variety of peppered moth. [1]

For Teacher Use Only

_____

_____

_____ 48

49 The percentage of light-colored moths in the polluted environment was closest to

(1) 16

(2) 24

(3) 42

(4) 76 49

50 Which conclusion can best be drawn from the information given?

(1) The trait for dark coloration better suits the peppered moth for survival in non-polluted environments.

(2) The trait for light coloration better suits the peppered moth for survival in polluted environments.

(3) The variation of color in the peppered moth has no influence on survival of the moth.

(4) A given trait may be a favorable adaptation in one environment, but not in another environment. 50

51 Humans require multiple systems for various life functions. Two vital systems are the circulatory system and the respiratory system. Select *one* of these systems, write its name in the chart below, then identify *two* structures that are part of that system, and state how each structure you identified functions as part of the system. [2]

System:	
Structure	Function
(1)	
(2)	

51

52 What is the role of bacteria and fungi in an ecosystem? [1]

For Teacher Use Only

_____

_____

_____

52 ☐

53 Arrange the following structures from largest to smallest. [1]

a chromosome
a nucleus
a gene

Largest _____

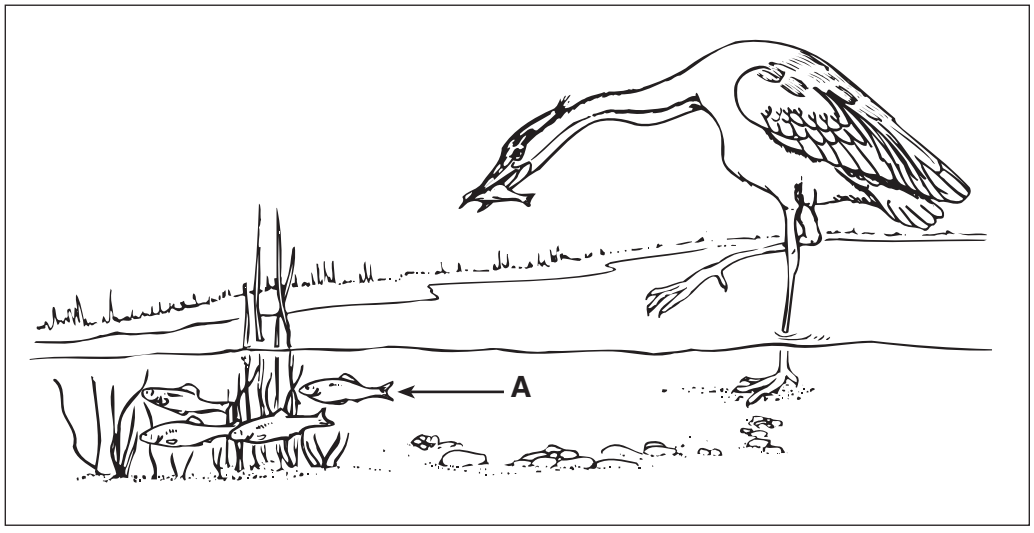
↓

_____

Smallest _____

53 ☐

54 Identify *one* abiotic factor that would directly affect the survival of organism *A* shown in the diagram below. [1]



_____

54 ☐

55 Explain why most ecologists would agree with the statement "A forest ecosystem is more stable than a cornfield." [1]

For Teacher Use Only

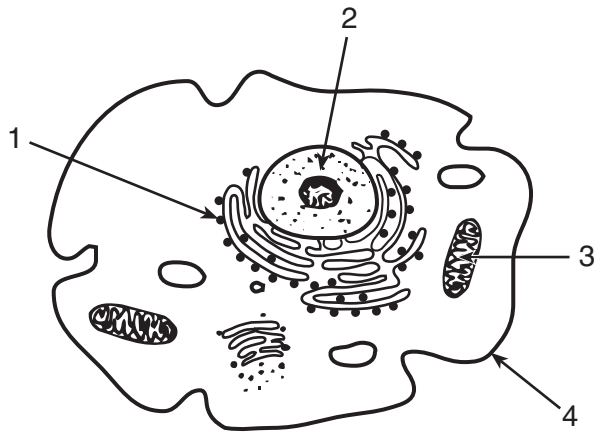
_____

_____

_____

55 ☐

Base your answers to questions 56 and 57 on the diagram of a cell below.



56 Describe how structures 1 and 2 interact in the process of protein synthesis. [1]

_____

_____

_____

56 ☐

57 Choose either structure 3 *or* structure 4, write the number of the structure on the line below, and describe how it aids the process of protein synthesis. [1]

Structure: _____

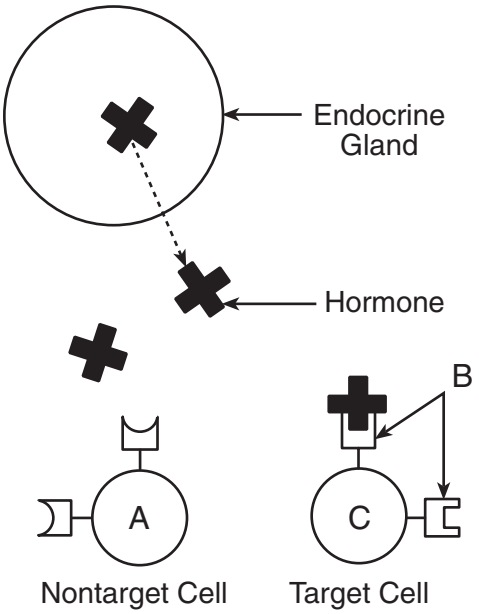
_____

_____

57 ☐

Base your answers to questions 58 and 59 on the diagram below which illustrates a role of hormones.

For Teacher Use Only



58 Letter *B* indicates

(1) ribosomes

(2) receptor molecules

(3) tissues

(4) inorganic substances

58 ☐

59 Explain why cell *A* is a nontarget cell for the hormone illustrated in the diagram. [1]

_____

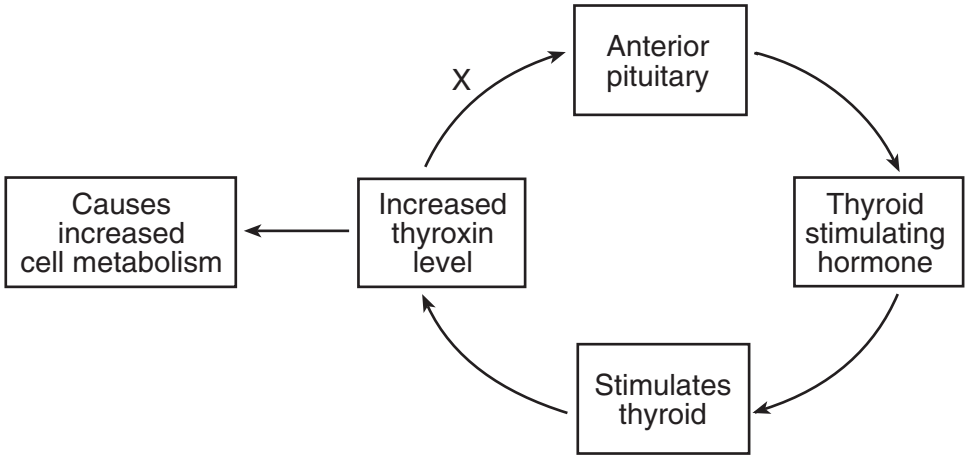
_____

_____

59 ☐

Base your answers to questions 60 through 62 on the diagram below of activities in the human body.

For Teacher Use Only



60 This diagram illustrates part of

(1) a feedback mechanism

(2) an enzyme pathway

(3) a digestive mechanism

(4) a pattern of learned behavior

60 ☐

61 Describe the action represented by the arrow labeled *X* in the diagram and state *one* reason that this action is important. [2]

_____

_____

_____

_____

_____

61 ☐

62 Identify *one* hormone involved in another biological relationship and an organ that is directly affected by the hormone you identified. [2]

_____

_____

_____

_____

62 ☐

Part C

Answer all questions in this part. [20]

Directions (63–66): Record your answers in the spaces provided in this examination booklet.

For Teacher Use Only

63 Plants respond to their environment in many different ways. Design a controlled experiment to test the effect of *one* environmental factor (such as light, acidity of precipitation, etc.) on some aspect of plant growth. In your experimental design be sure to:

- state the hypothesis [1]
- list the steps of the procedure [2]
- identify the control setup for the experiment [1]
- include an appropriate data table with column headings for the collection of data [1]
- identify the independent variable in the experiment [1]

63

64 Compare asexual reproduction to sexual reproduction. In your comparison, be sure to include:

- which type of reproduction results in offspring that are usually genetically identical to the previous generation and explain why this occurs [2]
- *one* other way these methods of reproduction differ [1]

For Teacher Use Only

64 ☐

Base your answer to question 65 on the information below.

Zebra mussels have caused several major changes in the ecosystem in the Hudson River. Native to Eurasia, zebra mussels were accidentally imported to the Great Lakes in ships during the late 1980s and first appeared in the Hudson in 1990.

In regions of the Hudson north of West Point, zebra mussels have depleted the levels of dissolved oxygen to the point where many native organisms either die or move to other waters. In addition, large amounts of phytoplankton (small photosynthetic organisms) are consumed by the zebra mussels.

Before the introduction of zebra mussels, one typical food chain in this part of the Hudson was:

phytoplankton → freshwater clams → other consumers

65 Describe some long-term changes in the Hudson River ecosystem that could be caused by zebra mussels. In your answer be sure to:

- state *one* likely change in the population of each of *two* different species (other than the zebra mussels) found in the Hudson [2]
- identify *one* gas in this ecosystem and state how a change in its concentration due to the effects of zebra mussels would affect organisms other than the zebra mussels [1]
- state how the death of many of the native organisms could affect the rate of decay and how this would affect the amount of material being recycled [2]
- explain why the size of the zebra mussel population would decrease after an initial increase [1]

For Teacher Use Only

65 ☐

66 A tropical rain forest in the country of Belize contains over 100 kinds of trees as well as thousands of species of mammals, birds, and insects. Dozens of species living there have not yet been classified and studied. The rain forest could be a commercial source of food as well as a source of medicinal and household products. However, most of this forested area is not accessible because of a lack of roads and therefore, little commercial use has been made of this region. The building of paved highways into and through this rain forest has been proposed.

Discuss some aspects of carrying out this proposal to build paved highways. In your answer be sure to:

- state *one* possible impact on biodiversity and *one* reason for this impact [2]
- state *one* possible reason for an increase in the number of some producers as a result of road building [1]
- identify *one* type of consumer whose population would most likely increase as a direct result of an increase in a producer population [1]
- state *one* possible action the road builders could take to minimize human impact on the ecology of this region [1]

For Teacher Use Only

66 ☐

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Thursday, January 29, 2004 — 9:15 a.m. to 12:15 p.m., only

ANSWER SHEET

Student ..... Sex: ☐ Female ☐ Male

Teacher .....

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

Part	Maximum Score	Student's Score
A	35	
B	30	
C	20	
Total Raw Score (maximum Raw Score: 85)		
Final Score (from conversion chart)		

Raters' Initials

Rater 1 ..... Rater 2 .....

Record your answers to Part A on this answer sheet.

Part A

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

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

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

Signature

Tear Here

Tear Here

Tear Here

FOR TEACHERS ONLY

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

LE

LIVING ENVIRONMENT

Thursday, January 29, 2004 — 9:15 a.m. to 12:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

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

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

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

Note: The **June 2004** Living Environment Regents Examination will include a Part D, which will assess content and skills contained in required laboratory activities 1, 2, 3, and 5. The number of credits on the examination will remain at 85.

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

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

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

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

At least two science teachers must participate in the scoring of the Part B and Part C open-ended questions on a student's paper. Each of these teachers should be responsible for scoring a selected number of the open-ended questions on each answer paper. No one teacher is to score all the open-ended questions on a student's answer paper.

Students' responses must be scored strictly according to the Scoring Key and Rating Guide. For open-ended questions, credit may be allowed for responses other than those given in the rating guide if the response is a scientifically accurate answer to the question and demonstrates adequate knowledge as indicated by the examples in the rating guide. In the student's examination booklet, record the number of credits earned for each answer in the box printed to the right of the answer lines or spaces for that question.

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

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

Part B

(36) 1

(37) 2

(38) 1

(39) 2

(40) 1

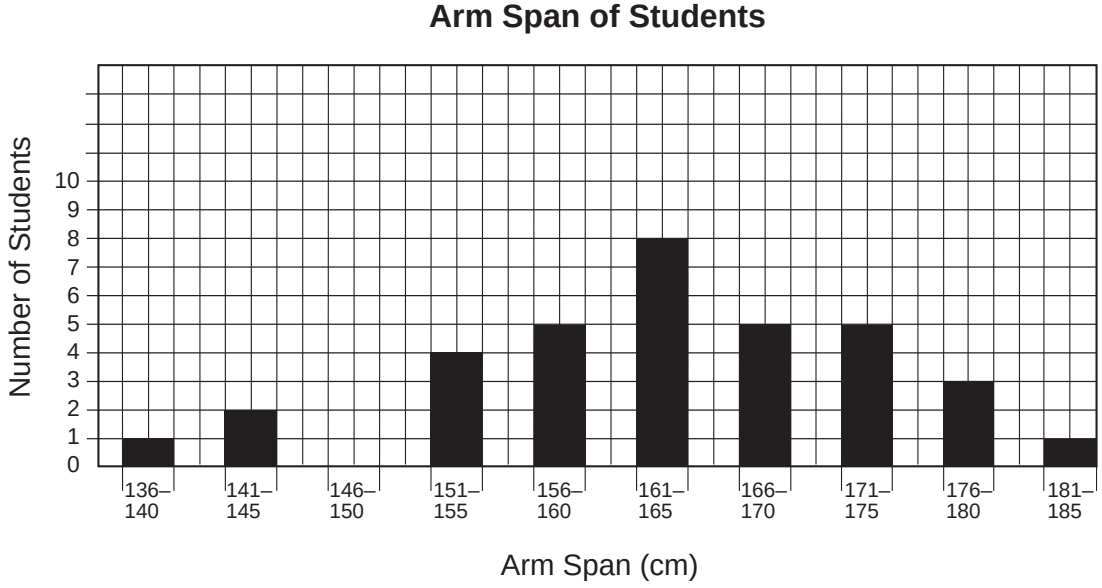
(41) 4

(42) Allow 1 credit for marking an appropriate scale on the axis labeled "Number of Students."

(43) Allow 1 credit for constructing vertical bars to represent the data.

Note: Do not deduct credit if the bars are not shaded.

Example of a 2-Credit Graph



(44) Allow 1 credit for stating what should be done to provide additional support. Acceptable responses include, but are not limited to:

— The investigation should be repeated a number of times.
— The investigation should be repeated using larger numbers of students.
— Repeat the investigation using people from different age groups.

(45) Allow 1 credit for stating one major error made in the investigation. Acceptable responses include, but are not limited to:

— used two variables
— changed the living space and food
— should have only changed the amount of living space or food
— There is no control.

(46) Allow 1 credit for stating one possible reason that a larger number of the dark-colored variety were present in the polluted environment. Acceptable responses include, but are not limited to:

— Dark-colored moths were better camouflaged from predators in the polluted environment.
— Dark-colored moths were better adapted for survival on the darker tree bark.

(47) Allow 1 credit for stating one possible reason that the light-colored variety was not completely eliminated from the polluted environment. Acceptable responses include, but are not limited to:

— Dark-colored moths may be carriers of a gene for light color.
— Some light-colored moths may have migrated in from other areas.
— Some light-colored moths may have other adaptations that are more important than color for survival.
— Some light-colored moths may have rested in areas other than the bark.

(48) Allow 1 credit for stating one way the decrease in soot and other air pollutants will most likely influence the survival of the light-colored variety of peppered moth. Acceptable responses include, but are not limited to:

— The lichens may return so more light-colored moths will be camouflaged and survive.
— More light-colored moths would survive.

(49) 2

(50) 4

(51) Allow a maximum of 2 credits, 1 credit each for identifying an appropriate structure and its function within either the circulatory *or* the respiratory system. Acceptable responses include, but are not limited to:

System: Circulatory	
Structure	Function
heart	pumps blood
artery	carries blood

System: Respiratory	
Structure	Function
trachea	transports oxygen
alveolus	exchanges gases

(52) Allow 1 credit for indicating that the role of bacteria and fungi in an ecosystem is to recycle materials *or* that they are decomposers.

(53) Allow 1 credit for indicating that the correct order is:

Largest ↓ Smallest

nucleus
chromosome
gene

(54) Allow 1 credit for identifying one abiotic factor that would directly affect the survival of organism *A*. Acceptable responses include, but are not limited to:

— oxygen
— water temperature

(55) Allow 1 credit for explaining why most ecologists would agree with the statement. Acceptable responses include, but are not limited to:

— A forest ecosystem has greater biodiversity. This leads to a more stable ecosystem since more interrelationships and interdependencies among the organisms exist in a forest than in a cornfield.
— A forest has much greater plant biodiversity than a cornfield that is dominated by a single plant species.
— A forest has more species involved with the cycling of matter and flow of energy.
— A forest ecosystem has greater biodiversity.

(56) Allow 1 credit for describing how structures 1 and 2 interact in the process of protein synthesis. An acceptable response includes, but is not limited to:

— Structure 2 provides the code for assembling a protein at structure 1.

(57) Allow 1 credit for describing how either structure 3 or structure 4 aids the process of protein synthesis. Acceptable responses include, but are not limited to:

— Structure 3 provides the energy needed for protein synthesis.
— Structure 4 allows the movement of substances into the cell for the process of protein synthesis.

(58) 2

(59) Allow 1 credit for indicating that the receptor molecules on Cell *A* are not the correct shape to combine with the hormone or are not the correct receptors for the hormone.

(60) 1

(61) Allow a maximum of 2 credits, 1 credit for describing the action represented by arrow *X* and 1 credit for stating one reason that this action is important. Acceptable responses include, but are not limited to:

Action: high level of thyroxin causes the pituitary to produce less TSH
Importance: — to slow down metabolism
— to regulate metabolism
or
Action: shows control of the anterior pituitary
Importance: the pituitary controls the thyroid

(62) Allow a maximum of 2 credits, 1 credit for identifying the hormone involved and 1 credit for identifying an organ directly affected by that hormone. Acceptable responses include, but are not limited to:

— Insulin–pancreas or *any* organ requiring glucose
— Glucagon–liver
— Estrogen–uterus

Part C

(63) Allow a maximum of 6 credits for designing an experiment to test the effect of one environmental factor on some aspect of plant growth, allocated as follows:

- Allow 1 credit for stating a hypothesis, e.g., presence of light affects the height of plants. [1]

- Allow 2 credits for providing enough information so that the experiment could be carried out, i.e., criteria for selection of uniform subjects, treatment of control and experimental groups leading to a comparison of observations and collection of data.

  Allow only 1 credit for providing limited information, but not enough to actually carry out the experiment.

  Example of a 2-Credit Response

  1 Obtain plants of the same species and height.

  2 Place equal numbers of plants in light and in the dark. Maintain all other growing conditions, i.e., water, temperature, soil, pot size, the same.

  3 Collect growth data by measuring the height of each plant in each group (light and dark) immediately before and after a period of two weeks. Determine average plant height for each group immediately before and after the two week period and record the data in a table.

- Allow 1 credit for identifying the control setup, e.g., the control setup is the group of plants grown in the dark. The control setup should be some standard that the experiment can be compared to.

- Allow 1 credit for an appropriate data table with column headings.

  Example of an Appropriate Data Table

Growth Condition	Average Height of Plants	
	Initial	Final
Light		
Dark		

- Allow 1 credit for identifying the independent variable.

  Note: The response should be evaluated as a whole. Portions of the response do not need to be addressed in order, e.g., measurement of growth in height may be found in the data table and not necessarily in the procedural steps.

(64) Allow a maximum of 3 credits for a comparison of asexual and sexual reproduction, allocated as follows:

- Allow 1 credit for indicating that asexual reproduction results in offspring that are usually genetically identical to the previous generation and 1 credit for indicating that this is because offspring receive all their genetic information from one parent.

- Allow 1 credit for indicating that sexual reproduction involves meiosis and asexual reproduction does not.

(65) Allow a maximum of 6 credits for describing some long-term changes in the Hudson River ecosystem that could be caused by zebra mussels, allocated as follows:

- Allow a maximum of 2 credits, 1 credit for stating one likely change in the population of each of two species in the Hudson. Acceptable responses include, but are not limited to:

  — phytoplankton population will likely decrease
  — freshwater clam population will likely decrease
  — Any organism that eats the phytoplankton population or clam population will likely decrease.

- Allow 1 credit for identifying one gas in the ecosystem and stating how a change in its concentration due to the zebra mussels would affect other organisms. Acceptable responses include, but are not limited to:

  — The oxygen concentration will likely decrease, resulting in a decrease in fish or clam populations.

- Allow 2 credits, 1 credit for stating how the death of many native organisms could affect the rate of decay and 1 credit for stating how this would affect the amount of material being recycled. Acceptable responses include, but are not limited to:

  — The rate of decay would increase. [1]
  — The amount of material being recycled would increase. [1]

- Allow 1 credit for explaining why the size of the zebra mussel population would decrease after an initial increase. Acceptable responses include, but are not limited to:

  — The zebra mussel population would increase for a time then decrease because of the lack of food (or the lack of oxygen).
  — limiting factors

(66) Allow a maximum of 5 credits for discussing different aspects of building paved highways in the rain forest, allocated as follows:

- Allow a maximum of 2 credits, 1 credit for stating one possible impact on biodiversity and 1 credit for providing one reason for this impact. Acceptable responses include, but are not limited to:

  — Biodiversity would decrease when plants are removed and habitats destroyed.
  — Biodiversity would increase when trees are removed and more light becomes available.

- Allow 1 credit for indicating that some producers could increase in number because more light becomes available along the side of the road.

- Allow 1 credit for indicating that herbivores would increase in number as a direct result of an increase in a producer population.

- Allow 1 credit for stating one possible action the road builders could take to minimize human impact on the ecology of this region. Acceptable responses include, but are not limited to:

  — provide pathways for animals to cross the road
  — take steps to reduce erosion
  — limit the size of the road

Regents Examination in Living Environment

January 2004

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

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
85	100	56	75	27	50
84	99	55	74	26	49
83	98	54	74	25	47
82	97	53	73	24	46
81	95	52	72	23	45
80	94	51	71	22	43
79	93	50	71	21	42
78	92	49	70	20	40
77	91	48	69	19	39
76	90	47	69	18	37
75	89	46	68	17	36
74	89	45	67	16	34
73	88	44	66	15	32
72	87	43	65	14	31
71	86	42	65	13	29
70	85	41	64	12	27
69	84	40	63	11	25
68	84	39	62	10	23
67	83	38	61	9	21
66	82	37	60	8	19
65	81	36	59	7	17
64	81	35	59	6	15
63	80	34	58	5	12
62	79	33	57	4	10
61	78	32	56	3	8
60	78	31	54	2	5
59	77	30	53	1	3
58	76	29	52	0	0
57	76	28	51		

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

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

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

Map to Core Curriculum

January 2004 Living Environment

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