

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

LIVING ENVIRONMENT

Friday, June 15, 2001 — 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 with a total of 73 questions. 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 35 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.

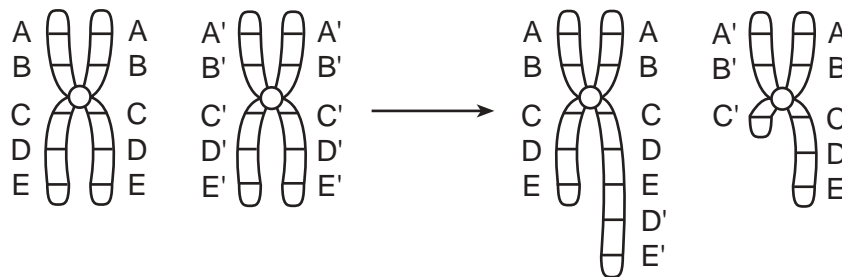
- 1 Diagrams, tables, and graphs are used by scientists mainly to
 - (1) design a research plan for an experiment
 - (2) test a hypothesis
 - (3) organize data
 - (4) predict the independent variable
- 2 A scientist tested a hypothesis that white-tailed deer would prefer apples over corn as a primary food source. The findings of the test, in which the scientist claimed that the deer preferred apples, were published. Which research technique, if used by the scientist, might result in this claim being questioned?
 - (1) The scientist observed four deer in different locations at various times of the day.
 - (2) The scientist observed a total of 500 deer in 20 different locations at various times of the day.
 - (3) The scientist observed 200 deer in various natural settings, but none in captivity.
 - (4) The scientist observed 300 deer in various locations in captivity, but none in natural settings.
- 3 What happens to certain nutrient molecules after they pass into muscle cells?
 - (1) They are replicated in the nucleus.
 - (2) They are acted on by enzymes and release the energy they contain.
 - (3) They are changed into tissues and organs in the cytoplasm.
 - (4) They enter chloroplasts, where they can absorb light energy.
- 4 A medical test indicates that a patient has a defective protein. This condition is most likely due to a change in the directions coded in the
 - (1) number of hydrogen atoms in starch molecules
 - (2) sequence of inorganic molecules
 - (3) number of carbon atoms in sugar molecules
 - (4) sequence of subunits in DNA
- 5 If a human system fails to function properly, what is the most likely result?
 - (1) a stable rate of metabolism
 - (2) a disturbance in homeostasis
 - (3) a change in the method of cellular respiration
 - (4) a change in the function of DNA
- 6 Which statement regarding the functioning of the cell membrane of all organisms is *not* correct?
 - (1) The cell membrane forms a boundary that separates the cellular contents from the outside environment.
 - (2) The cell membrane is capable of receiving and recognizing chemical signals.
 - (3) The cell membrane forms a barrier that keeps all substances that might harm the cell from entering the cell.
 - (4) The cell membrane controls the movement of molecules into and out of the cell.
- 7 In multicellular organisms, cells must be able to communicate with each other. Structures that enable most cells to communicate with each other are known as
 - (1) pathogenic agents
 - (2) chloroplasts
 - (3) antibiotics
 - (4) receptor molecules
- 8 Every single-celled organism is able to survive because it carries out
 - (1) metabolic activities
 - (2) autotrophic nutrition
 - (3) heterotrophic nutrition
 - (4) sexual reproduction
- 9 The shape of a protein molecule is influenced by
 - (1) whether it is organic or inorganic
 - (2) the sequence of amino acids in it
 - (3) the number of genes found in the nucleus
 - (4) the number of chromosomes in the cell

- 10 The data table below summarizes the results of an investigation in which seeds from the same plant were grown under different conditions of temperature and relative humidity.

Temperature: 20°C Relative Humidity: 20%		Temperature: 31°C Relative Humidity: 95%	
Genes Present in Cells of Organism	Appearance of Organism	Genes Present in Cells of Organism	Appearance of Organism
AA	red	AA	white
Aa	red	Aa	white
aa	white	aa	white

Which conclusion can be drawn from the information in the data table?

- (1) Color in this species is determined by genes, only.
 - (2) Many characteristics are not inherited.
 - (3) Mutations occur only when plants are grown at low temperatures.
 - (4) There is an interaction between environment and heredity.
- 11 The diagram below represents a change that occurred in a pair of chromosomes during the formation of an egg cell. The letters represent genes on the pair of chromosomes.



The alteration that occurred will most likely

- (1) be passed on to every cell that develops from the egg cell
 - (2) change the chromosome number of the body cells that develop from the egg cell
 - (3) convert sex cells into body cells
 - (4) trigger the production of pathogens
-
- 12 A small amount of DNA was taken from a fossil of a mammoth found frozen in glacial ice. Genetic technology can be used to produce a large quantity of identical DNA from this mammoth's DNA. In this technology, the original DNA sample is used to
- (1) stimulate differentiation in other mammoth cells
 - (2) provide fragments to replace certain human body chemicals
 - (3) act as a template for repeated replication
 - (4) trigger mitosis to obtain new base sequences
- 13 Many diabetics are now using insulin that was made by certain bacteria. The ability of these bacteria to produce insulin was most likely the result of
- (1) deleting many DNA segments from bacterial DNA
 - (2) genetic mapping of bacterial DNA to activate the gene for insulin production
 - (3) inserting a portion of human DNA into the ring-shaped DNA of bacteria
 - (4) using radiation to trigger mutations

14 Which situation would most directly affect future generations naturally produced by a maple tree?

- (1) Ultraviolet radiation changes the DNA sequence within some leaves of the tree.
- (2) Ultraviolet radiation changes the DNA sequence within the gametes of some flowers of the tree.
- (3) An increase in temperature reduces the number of cell divisions in the roots.
- (4) Rapidly growing cells just under the bark are exposed to radiation, causing changes in genetic material.

15 Which statement is best supported by fossil records?

- (1) Many organisms that lived in the past are now extinct.
- (2) Species occupying the same habitat have identical environmental needs.
- (3) The struggle for existence between organisms results in changes in populations.
- (4) Structures such as leg bones and wing bones can originate from the same type of tissue found in embryos.

16 The first life-forms to appear on Earth were most likely

- (1) complex single-celled organisms
- (2) complex multicellular organisms
- (3) simple single-celled organisms
- (4) simple multicellular organisms

17 One explanation for the variety of organisms present on Earth today is that over time

- (1) new species have adapted to fill available niches in the environment
- (2) evolution has caused the appearance of organisms that are similar to each other
- (3) each niche has changed to support a certain variety of organism
- (4) the environment has remained unchanged, causing rapid evolution

18 Within which structure in the human body does specialization of parts of the developing baby take place?

- | | |
|------------|--------------|
| (1) ovary | (3) testis |
| (2) uterus | (4) pancreas |

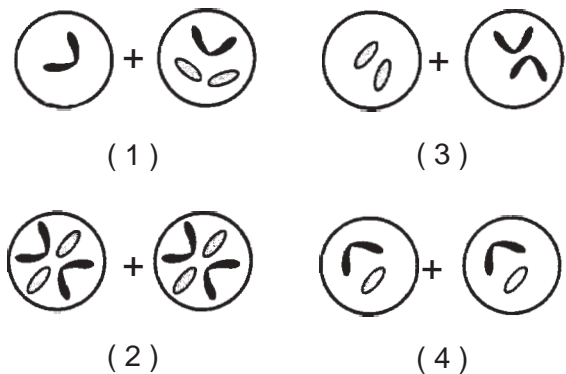
19 Which statement best explains the significance of meiosis in the process of evolution within a species?

- (1) The gametes produced by meiosis ensure the continuation of any particular species by asexual reproduction.
- (2) Equal numbers of eggs and sperm are produced by meiosis.
- (3) Meiosis produces eggs and sperm that are alike.
- (4) Meiosis provides for variation in the gametes produced by an organism.

20 The diagram below represents chromosomes in a zygote.



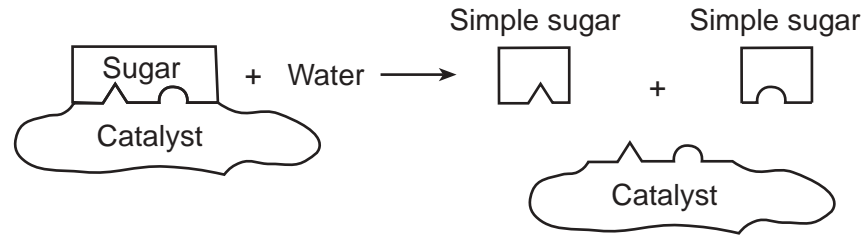
Which diagrams best illustrate the daughter cells that result from normal mitotic cell division of this zygote?



21 During the last months of pregnancy, the brain of a human embryo undergoes an essential "growth spurt." Which action by the mother would most likely pose the greatest threat to the normal development of the nervous system of the embryo at this time?

- (1) spraying pesticides in the garden
- (2) taking prescribed vitamins on a daily basis
- (3) maintaining a diet high in fiber and low in fat
- (4) not exercising

22 The diagram below illustrates a biochemical process that occurs in organisms.



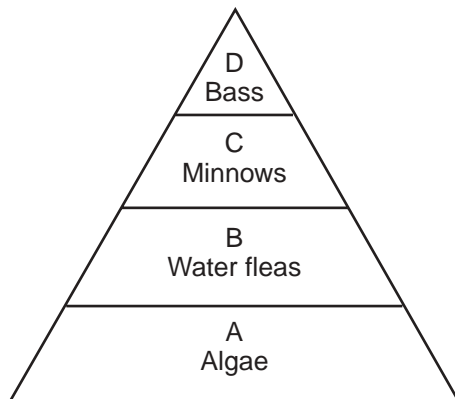
The substance labeled “catalyst” is also known as

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

23 Which phrase best describes cellular respiration, a process that occurs continuously in the cells of organisms?

- (1) removal of oxygen from the cells of an organism
- (2) conversion of light energy into the chemical bond energy of organic molecules
- (3) transport of materials within cells and throughout the bodies of multicellular organisms
- (4) changing of stored chemical energy in food molecules to a form usable by organisms

24 A food pyramid representing relationships in a pond community is shown below.



The energy of the Sun is made available to the pond community through the activities of the organisms at level

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

25 Eating a sweet potato provides energy for human metabolic processes. The original source of this energy is the energy

- (1) in protein molecules stored within the potato
- (2) from starch molecules absorbed by the potato plant
- (3) made available by photosynthesis
- (4) in vitamins and minerals found in the soil

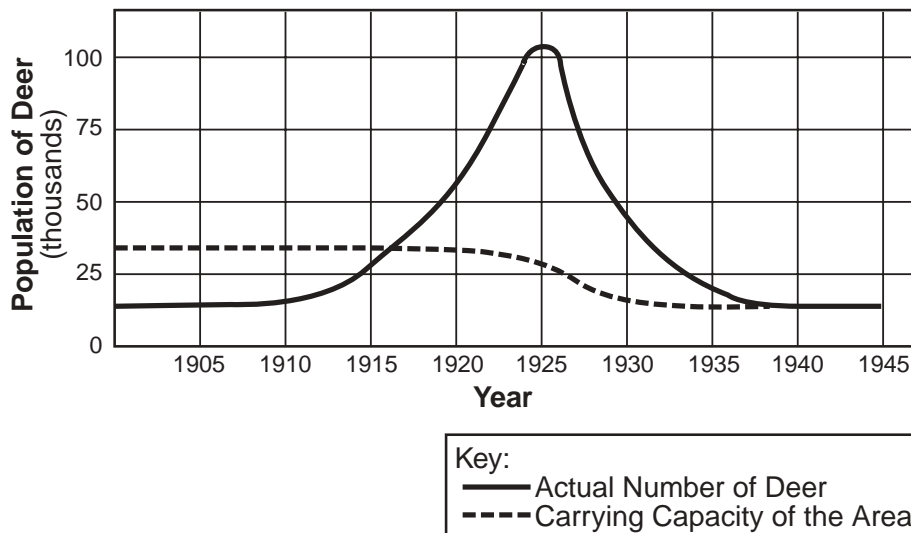
26 Which statement does *not* identify a characteristic of antibodies?

- (1) They are produced by the body in response to the presence of foreign substances.
- (2) They may be produced in response to an antigen.
- (3) They are nonspecific, acting against any foreign substance in the body.
- (4) They may be produced by white blood cells.

27 The blood of newborn babies is tested to determine whether a certain substance is present. This substance indicates the presence of the disorder known as PKU, which may result in mental retardation. Babies with this disorder are put on a special diet to prevent mental retardation. In this situation, which action is usually taken first?

- (1) treating the expression of the disorder
- (2) preventing the expression of the disorder
- (3) controlling the disorder
- (4) diagnosing the disorder

28 The graph below provides information about the population of deer in a given area between 1900 and 1945.



Which statement identifies the most likely reason that the carrying capacity of the area to support deer decreased between 1925 and 1930?

- (1) The deer population decreased in 1926.
- (2) The number of predators increased between 1915 and 1925.
- (3) The deer population became too large.
- (4) An unusually cold winter occurred in 1918.

29 An increase in the level of insulin in the blood would most directly result in

- (1) a decrease in the amount of glucose in the blood
- (2) a decrease in the amount of protein in the blood
- (3) an increase in the amount of fat in cells
- (4) an increase in the amount of carbon dioxide in cells

30 Compared to a natural forest, the wheat field of a farmer *lacks*

- (1) heterotrophs
- (2) significant biodiversity
- (3) autotrophs
- (4) stored energy

31 Human impact on the environment is often more dramatic than the impact of most other living things because humans have a greater

- (1) need for water
- (2) need for food
- (3) ability to adapt to change
- (4) ability to alter the environment

32 Which factor is *not* considered by ecologists when they evaluate the impact of human activities on an ecosystem?

- (1) amount of energy released from the Sun
- (2) quality of the atmosphere
- (3) degree of biodiversity
- (4) location of power plants

33 What will most likely result after a fire or other natural disaster damages an ecosystem in a certain area?

- (1) The area will remain uninhabited for an indefinite number of centuries.
- (2) A stable ecosystem will be reestablished after one year.
- (3) An ecosystem similar to the original one will eventually be reestablished if the climate is stable.
- (4) The stable ecosystem that becomes reestablished in the area will be different from the original.

34 The chart below shows the environmental functions that some organisms perform in a stable ecosystem.

Environmental Functions	Performed By
Pollination	bees, bats
Biodegradation	microorganisms
Soil aeration	earthworms
Recycling of atoms	soil bacteria
CO ₂ – O ₂ exchange	plants
Water storage	plants

How would a decrease in the number of organisms that perform these functions most likely affect the ecosystem?

- (1) The interactions between other organisms would stop immediately.
- (2) The functions carried out by these organisms would no longer be necessary.
- (3) The ecosystem would remain stable.
- (4) The ecosystem would become less stable.

35 A new type of fuel gives off excessive amounts of smoke. Before this type of fuel is widely used, an ecologist would most likely want to know

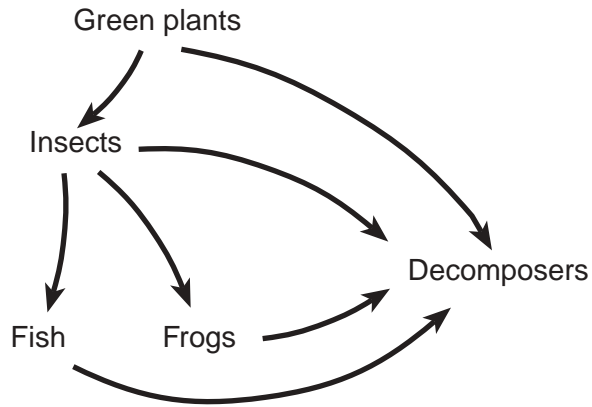
- (1) what effect the smoke will have on the environment
- (2) how much it will cost to produce the fuel
- (3) how long it will take to produce the fuel
- (4) if the fuel will be widely accepted by consumers

Part B

Answer all questions in this part

Directions (36–64): 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. [30]

36 A food web is shown below.



State what would happen to the plant population if the number of decomposers decreased and explain why this would happen. [1]

**For Teacher
Use Only**

36

Directions (37–39): For each description in questions 37 through 39, select the interaction, *chosen from the list below*, that is most closely associated with that description. Then record its *number* in the space below the description. An answer may be used more than once or not at all.

**For Teacher
Use Only**

Interactions

- (1) Organism A \longrightarrow Organism B
Organism B \longrightarrow Organism A
- (2) Organism A \dashrightarrow Organism B
Organism B \longrightarrow Organism A
- (3) Organism A $\cdots\cdots\cdots\rightarrow$ Organism B
Organism B \longrightarrow Organism A
- (4) Organism A \dashrightarrow Organism B
Organism B \dashrightarrow Organism A

Key	
\longrightarrow	= Positive effect
\dashrightarrow	= Negative effect
$\cdots\cdots\cdots\rightarrow$	= No effect

37 The rhinoceros bird (organism A) feeds on parasites that live on the body of a rhinoceros (organism B). The rhinoceros allows the birds to feed on the parasites.

37

38 Ants (organism A) defend acacia trees (organism B) from attacks by insects that are herbivores. The ants live in the hollow thorns of the trees.

38

39 Wasp larvae (organism A) obtain nutrition from tomato hornworms (organism B). The tomato hornworms do *not* survive.

39

Base your answers to questions 40 through 44 on the information and data table below and on your knowledge of biology.

**For Teacher
Use Only**

The rate of respiration of a freshwater sunfish was determined at different temperatures. The rate of respiration was determined by counting the number of times the gill covers of the fish opened and closed during 1-minute intervals at the various temperatures. The following data were collected.

Data Table

Temperature (°C)	Gill Cover Opening and Closing Per Minute
10	15
15	25
18	30
20	38
23	60
25	57
27	25

Directions (40–42): Using the information in the data table, construct a line graph on the grid provided on the next page, following the directions below.

40 Label the *x*-axis and indicate the units. [1]

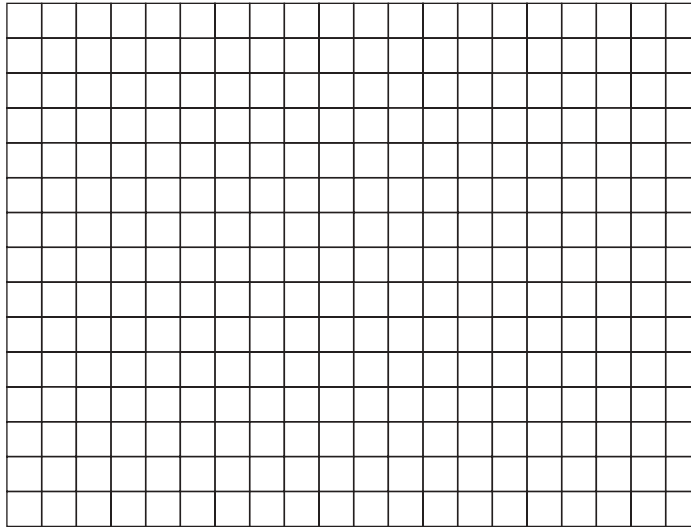
41 Mark an appropriate scale on each axis. [1]

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



40-42

Number of Times Gill Covers
Opened and Closed per Minute



40

41

42

43 According to the data, as the temperature increases, the rate of respiration of the sunfish

- (1) increases steadily
- (2) decreases steadily
- (3) increases, then decreases
- (4) decreases, then increases

43

44 Which title is appropriate for this graph?

- (1) The Effect of Temperature on Rate of Respiration in Sunfish
 - (2) The Effect of Gill Movement on Rate of Respiration in Sunfish
 - (3) The Relationship Between Temperature and Dissolved Oxygen
 - (4) The Relationship Between Sunfish Population and Temperature Change in Freshwater Habitats
-

44

Base your answers to questions 45 through 48 on the passage below and on your knowledge of biology.

**For Teacher
Use Only**

To Tan or Not To Tan

Around 1870, scientists discovered that sunshine could kill bacteria. In 1903, Niels Finsen, an Icelandic researcher, won the Nobel Prize for the use of sunlight therapy against infectious diseases. Sunbathing then came into wide use as a treatment for tuberculosis, Hodgkin's disease (a form of cancer), and common wounds. The discovery of vitamin D, the "sunshine vitamin," reinforced the healthful image of the Sun. People learned that it was better to live in a sun-filled home than in a dark dwelling. At that time, the relationship between skin cancer and exposure to the Sun was not known.

In the early twentieth century, many people believed that a deep tan was a sign of good health. However, in the 1940s, the rate of skin cancer began to increase and reached significant proportions by the 1970s. At this time, scientists began to realize how damaging those deep tans could really be.

Tanning occurs when ultraviolet radiation is absorbed by the skin, causing an increase in the activity of melanocytes, cells that produce the pigment melanin. As the melanin is produced, it is absorbed by cells in the upper region of the skin, resulting in the formation of a tan. In reality, the skin is building up protection against damage caused by the ultraviolet radiation. Exposure to more sunlight means more damage to the cells of the skin. Research has shown that, although people usually do not get skin cancer as children, each time a child is exposed to the Sun without protection, the chance of that child getting skin cancer as an adult increases.

Knowledge connecting the Sun to skin cancer has greatly increased since the late 1800s. Currently, it is estimated that ultraviolet radiation is responsible for more than 90% of skin cancers. Yet, even with this knowledge, about two million Americans use tanning parlors. A recent survey showed that at least 10% of these people would continue to do so even if they knew for certain that it would give them skin cancer.

Many of the deaths due to this type of cancer can be prevented. The cure rate for skin cancer is almost 100% when treated early. Reducing exposure to harmful ultraviolet radiation helps to prevent it. During the past 15 years, scientists have tried to undo the tanning myth. If the word "healthy" is separated from the word "tan," maybe the occurrence of skin cancer will be reduced.

45 State *one* known benefit of daily exposure to the Sun. [1]

45

46 Explain what is meant by the phrase "the tanning myth." [1]

46

47 Which statement concerning tanning is correct?

- (1) Tanning causes a decrease in the ability of the skin to regulate body temperature.
- (2) Radiation from the Sun is the only radiation that causes tanning.
- (3) The production of melanin, which causes tanning, increases when skin cells are exposed to the Sun.
- (4) Melanocytes decrease their activity as exposure to the Sun increases, causing a protective coloration on the skin.

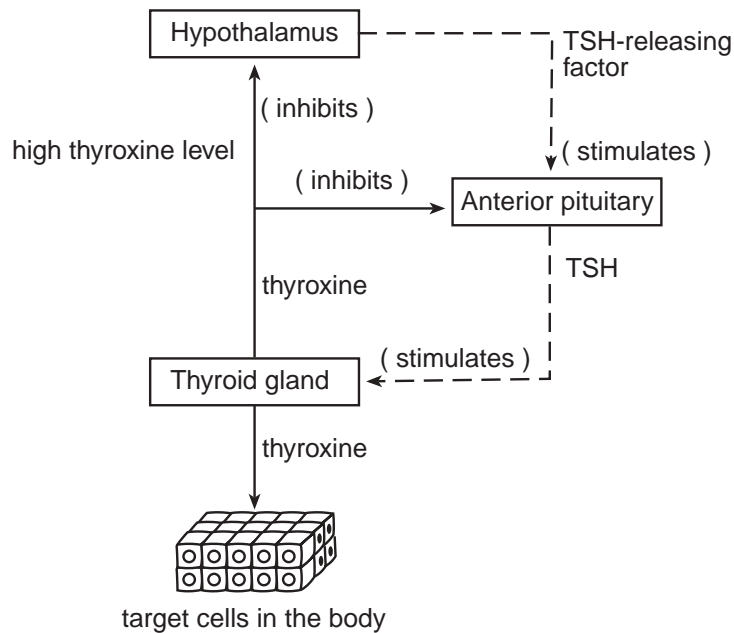
47

48 Which statement concerning ultraviolet radiation is *not* correct?

- (1) It may damage the skin.
- (2) It stimulates the skin to produce antibodies.
- (3) It is absorbed by the skin.
- (4) It may stimulate the skin to produce excess pigment.

48

49 The diagram below represents a function of the thyroid gland.



State *one* effect of an increasing level of TSH-releasing factor. [1]

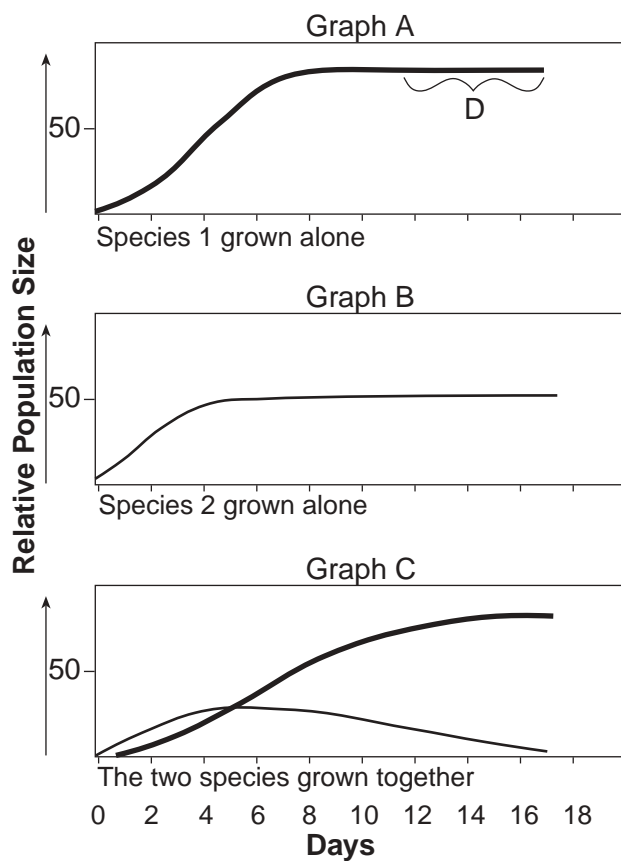
49

50 Although human muscle cells and nerve cells have the same genetic information, they perform different functions. Explain how this is possible. [1]

**For Teacher
Use Only**

50

Base your answers to questions 51 through 54 on the graphs below and on your knowledge of biology. The graphs show the relative population size of two closely related species of microorganisms grown under identical conditions in culture dishes.



51 Give *one* possible reason for the difference in final population size indicated in graph A and graph B. [1]

51

52 In graph A, what causes the population to level off at letter D? [1]

52

53 Give *one* possible explanation for the results shown in graph C. [1]

53

54 What will most likely happen if the culture containing the two species together (graph C) is maintained for an additional week? [1]

54

55 Explain why people with AIDS often develop many other infectious diseases. [1]

55

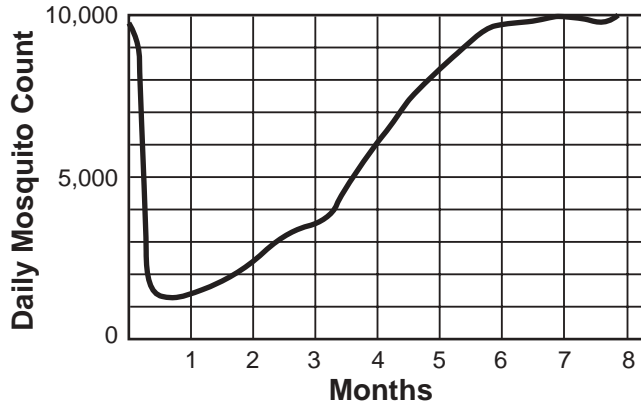
56 An unknown microorganism was observed with a compound light microscope. Identify the structure that, if observed in the organism, would indicate that it is an autotroph. [1]

56

Base your answers to questions 57 and 58 on the information and graph below and on your knowledge of biology.

**For Teacher
Use Only**

A small community that is heavily infested with mosquitoes was sprayed weekly with the insecticide DDT for several months. Daily counts providing information on mosquito population size are represented in the graph below.



57 Which statement best explains why some mosquitoes survived the first spraying?

- (1) The weather in early summer was probably cool.
- (2) Most of the mosquitoes were of reproductive age.
- (3) Environmental factors varied slightly as the summer progressed.
- (4) Natural variation existed within the population.

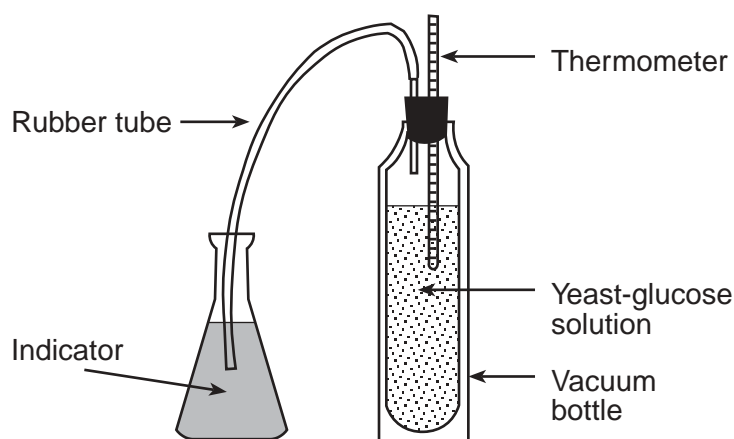
57

58 What is the most probable reason for the decreased effectiveness of the DDT?

- (1) DDT caused mutations in the mosquitoes, which resulted in immunity.
- (2) DDT was only sprayed once.
- (3) Mosquitoes resistant to DDT lived and produced offspring.
- (4) DDT chemically reacted with the DNA of the mosquitoes.

58

59 A student placed a solution of glucose and yeast in a vacuum bottle and sealed it with a two-hole stopper as shown in the diagram below. The temperature of the yeast-glucose solution increased gradually with time, and the color of the indicator was observed and recorded throughout a 2-day period.



The purpose of the investigation was most likely to

- (1) study the relationship between temperature and pressure
- (2) demonstrate the release of energy by a chemical process
- (3) show that proteins are produced by yeast
- (4) study autotrophic nutrition in yeast

59



60 The diagram below shows two setups that were used to study bacterial growth. Each setup initially contained an equal number of the bacterium *E. coli* in different carbohydrate solutions. After one hour, a 1-milliliter sample was drawn from each tube and analyzed. The number of bacteria found in the sample from test tube 1 was higher than the number in test tube 2.



Which conclusion regarding this investigation is *not* valid?

- (1) All bacteria grow best in a solution of glucose.
- (2) *E. coli* grows better in a 10% solution of glucose than in a 10% solution of sucrose.
- (3) The type of sugar solution will make a difference in the rate of growth of *E. coli*.
- (4) The rate of growth of *E. coli* depends on the type of carbohydrate present.

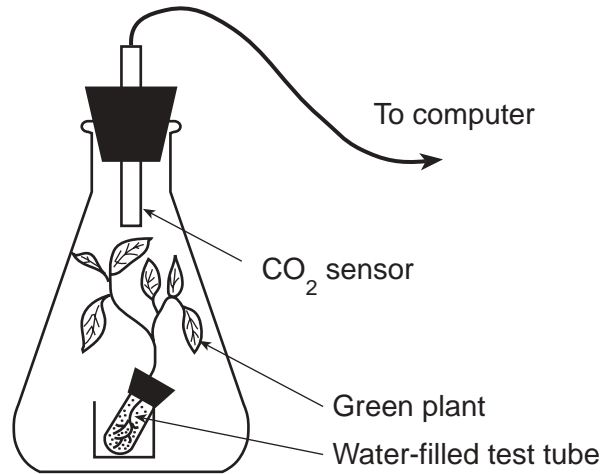
60



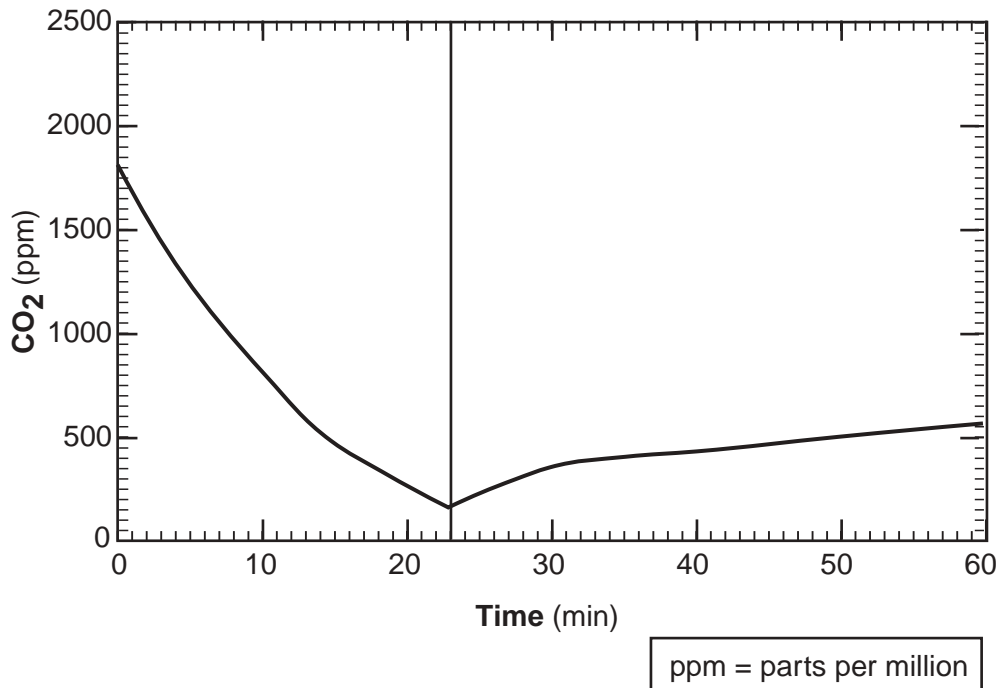
Base your answers to questions 61 and 62 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

A small green plant was placed in a flask as shown below. A sensor that measures the CO_2 content of the air in the flask was inserted, and then the flask was sealed with a rubber stopper. The other end of the sensor was connected to a computer to monitor and record CO_2 levels in the flask over a period of time.



For part of the time the flask was placed in bright light and for part of the time it was placed in total darkness. The graph below shows data that were recorded by the sensor over a period of time.



61 Which condition most likely produced the effect on CO₂ level over the first 23 minutes?

- (1) The light was on for the entire 23 minutes.
- (2) The light was off for the entire 23 minutes.
- (3) The light was off at the start and turned on after 10 minutes.
- (4) The light could have been either on or off because it would have had no effect on the CO₂ level.

61

62 Which process most likely caused the change in CO₂ level in the flask over the last 37 minutes?

- (1) photosynthesis
- (2) respiration
- (3) active transport
- (4) circulation

62

63 The data table below contains information on the growth of eight white pine trees, planted in eight different locations, after a period of time.

Data Table

Tree Number	Trunk Diameter 1.2 Meters Above Soil Surface (m)	Soil pH	Elevation Above Sea Level (ft)
1	0.54	4.0	1,200
2	0.79	6.5	1,650
3	0.64	4.5	1,400
4	1.04	5.0	1,350
5	0.96	5.0	1,350
6	0.82	4.5	1,250
7	0.80	5.5	1,400
8	0.52	5.0	1,600

Which statement is best supported by the data in the table?

- (1) White pines grow best at higher elevations.
- (2) White pines are not found at elevations below 1,000 feet.
- (3) White pines have a long life span.
- (4) White pines can grow in acidic soil.

63

64 In the table below, identify *two* body activities that would change in response to an increase in muscle activity *and* describe how each would change. [2]

**For Teacher
Use Only**

Activity	Change in Response to Muscle Activity
1. _____ _____	1. _____ _____
2. _____ _____	2. _____ _____

64

**Total Score
for Part B**

Part C

Answer all questions in Part C

**For Teacher
Use Only**

Directions (65–73): Record your answers in the spaces provided in this examination booklet.

Base your answer to question 65 on the information below and on your knowledge of biology.

You are the head of the research division of the Leafy Lettuce Company. Your company is experimenting with growing lettuce using hydroponic technology. Hydroponic technology involves growing plants in containers of growth solution in a greenhouse. No soil is used. The growth solution that the company uses contains water, nitrogen, and phosphorus. The company wants to know if adding iron to this formula will improve lettuce growth.

65 Briefly describe how to test the effect of the formula with iron added. In your description, be sure to:

- state a hypothesis to be tested in the new experiment [1]
- state how the control group will be treated differently from the experimental group [1]
- identify *two* factors that must be kept the same in both the experimental and control groups [2]
- state what type of data should be collected to support or refute the hypothesis [1]

65

Base your answers to questions 66 through 68 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

The planning board of a community held a public hearing in response to complaints by residents concerning a waste-recycling plant. These residents claim that the waste-hauling trucks were polluting air, land, and water and that the garbage has brought an increase in rats, mice, and pathogenic bacteria to the area. The residents were insistent that the waste-recycling plant be closed permanently.

Other residents recognized the health risks but felt that the benefits of waste recycling outweighed the health issues.

66 Identify *two* specific health problems that could result from living near the waste-recycling plant. [2]

66

67 State *one* cause of a health problem that can be associated with the presence of the waste-recycling plant. [1]

67

68 State *one* ecological benefit of recycling wastes. [1]

68

Base your answers to questions 69 through 71 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

Children must be vaccinated against certain diseases before they can enter school. Some parents feel that vaccinations are dangerous.

69 Explain to these parents what a vaccine is and what it does in the body. [2]

69

70 State *one* way a child could develop an immunity to a certain disease without being vaccinated. [1]

70

71 Identify *one* part of a research plan that must be followed when developing a new vaccine. [1]

71

72 Ladybugs were introduced as predators into an agricultural area of the United States to reduce the number of aphids (pests that feed on grain crops). Describe the positive and negative effects of this method of pest control. Your response must include at least:

- *two* advantages of this method of pest control [2]
- *two* possible dangers of using this method of pest control [2]

72

73 Some people claim that certain carnivores should be destroyed because they kill beneficial animals. Explain why these carnivores should be protected. Your answer must include information concerning:

- prey population growth [1]
- extinction [1]
- importance of carnivores in an ecosystem [1]

73

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Friday, June 15, 2001 — 9:15 a.m. to 12:15 p.m., only

ANSWER SHEET

Student Sex: Female
 Male

Teacher

School Grade

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

Record your answers to Part A on this answer sheet.

Part A

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

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

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

Signature

Tear Here

Tear Here

Tear Here

FOR TEACHERS ONLY

Le

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Friday, June 15, 2001 – 9:15 a.m. to 12:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

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

Part A (35 credits)

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

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

Directions to the Teachers

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 Living Environment and Physical Setting/Earth Science*.

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.

[OVER]

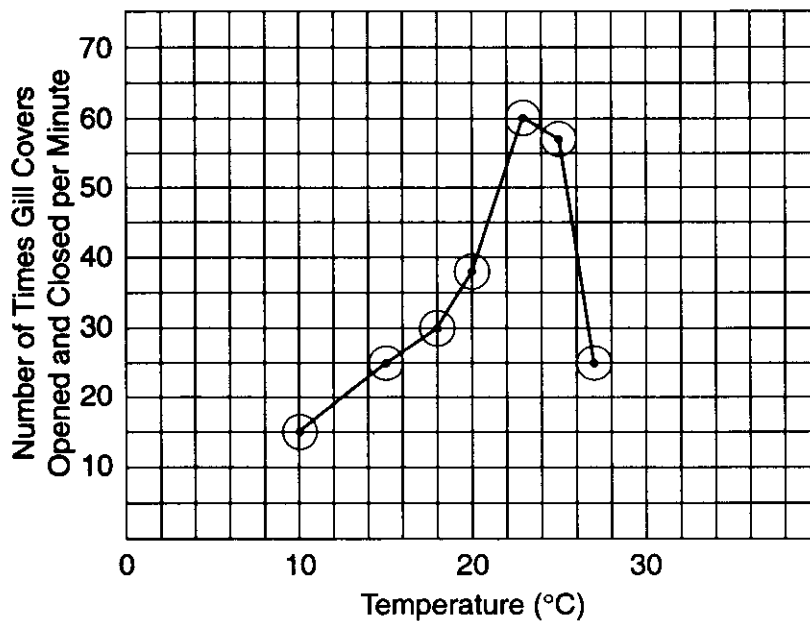
Part B

- (36) Allow 1 credit for a correct statement of how the plant population would be affected if decomposers decreased *and* a correct explanation of why. Appropriate responses include, but are not limited to:
- The number of plants would decrease *because* minerals/nutrients would not be recycled.
 - The plant population would decrease *because* material cycles would slow down.
- (37) 1
- (38) 1
- (39) 2

Rating Instructions for Questions 40–42:

- (40) Allow 1 credit for labeling the x-axis correctly and indicating the units (e.g., **Temperature (°C)**).
- (41) Allow 1 credit for marking an appropriate scale on both axes.
- (42) Allow 1 credit for plotting the data correctly, surrounding each point with a small circle, and connecting the points.

Example of an appropriate graph:



- (43) 3
- (44) 1
- (45) Allow 1 credit for stating one known benefit of daily exposure to the sun. Appropriate responses include, but are not limited to:
- kills bacteria
 - produces vitamin D
 - treats diseases and/or wounds
- (46) Allow 1 credit for explaining that the “tanning myth” refers to the idea that tans are good for people or a sign of good health.
- (47) 3
- (48) 2
- (49) Allow 1 credit for stating one effect of an increasing level of TSH-releasing factor. Appropriate responses include, but are not limited to:
- The anterior pituitary is stimulated.
 - TSH is released.
 - The level of thyroxine increases.
- (50) Allow 1 credit for a correct explanation of how muscle cells and nerve cells perform different functions. Appropriate responses include, but are not limited to:
- Different genes are “turned on” or “turned off” in different cells.
 - Cells are specialized for specific functions.
 - Different parts of DNA are used in different types of cells.
- (51) Allow 1 credit for a correct reason for the difference in final population size indicated by graphs *A* and *B*. Appropriate responses include, but are not limited to:
- Species 1 may be better adapted to this environment than species 2.
 - Species 2 requires more food than species 1.
 - The environment in the culture dish is better suited to the requirements of species 1.
- (52) Allow 1 credit for a correct explanation of what causes species 1 to level off at letter *D* on graph *A*. Appropriate responses include, but are not limited to:
- The carrying capacity has been reached.
 - There is not enough food to support a larger population.
 - The population is limited by the amount of available space.
- [OVER]

- (53) Allow 1 credit for a scientifically correct explanation for the results shown in graph C. Appropriate responses include, but are not limited to:
- There is competition between species 1 and species 2.
 - Species 1 eats species 2.
 - There is not enough space to support two species.
- (54) Allow 1 credit for a scientifically correct prediction of what will happen if the culture shown in graph C is maintained for an additional week. Appropriate responses include, but are not limited to:
- Species 2 will all die.
 - Species 1 will level off.
 - Species 1 may decrease in number.
- (55) Allow 1 credit for an explanation of why people with AIDS often develop many other diseases. Appropriate responses include, but are not limited to:
- The virus that causes AIDS interferes with the functioning of the immune system.
 - The virus that causes AIDS interferes with a cell's ability to produce antibodies.
 - The immune system in people with AIDS is impaired.
- (56) Allow 1 credit for identifying chloroplast as the structure that would indicate that the organism was an autotroph.
- (57) 4
- (58) 3
- (59) 2
- (60) 1
- (61) 1
- (62) 2
- (63) 4
- (64) Allow a total of 2 credits, 1 for each correctly identified body activity that would change in response to an increase in muscle activity and an accurate description of how it would change. Appropriate responses include, but are not limited to:
- heartbeat – It would speed up.
 - breathing – It would speed up.
 - sweating – It would increase.

Part C

- (65) Allow a total of 5 credits for a description of the effect of adding iron to the hydroponic solution. The response must include:
- a hypothesis to be tested in the new experiment [Note: A hypothesis is a statement with a prediction. (E.g., Adding iron to the hydroponic solution will improve the growth of lettuce.)] [1 credit]
 - how the control group will be treated differently from the experimental group (e.g., The control group should be grown in the solution that the company uses, which contains water, nitrogen, and phosphorus, while the growth solution for the experimental group should contain water, nitrogen, phosphorus, and iron.) [1 credit]
 - two factors that must be kept the same in both the experimental and control groups (e.g., the intensity of light or the number of plants in the experimental and control groups or any other scientifically correct answer) [2 credits]
 - the type of data that should be collected to support or refute the hypothesis (e.g., the height of the plants or the mass of the plants or the total leaf area of the plants) [Note: Growth can only be accepted if attached to a measurable quantity.] [1 credit]
- (66) Allow a total of 2 credits, 1 for each of *two* specific health problems that could result from living near the waste recycling plant. Appropriate responses include, but are not limited to:
- asthma
 - respiratory infections
 - allergic reactions
 - cancer
 - bacterial infections
 - viral infections
 - disease linked to a pathogen
- (67) Allow 1 credit for *one* cause of *one* health problem that can be associated with the presence of the waste recycling plant. (The health problem addressed in the question does not have to be one of those identified in question 66.) Appropriate responses include, but are not limited to:
- particles in the air
 - presence of viruses or bacteria or trucks
 - pollution particles or chemicals in air or water
 - carcinogens

[OVER]

- (68) Allow 1 credit for *one* ecological benefit of recycling wastes. Appropriate responses include, but are not limited to:
- conservation of natural resources
 - protection of finite resources
 - energy conservation
 - reduction in pollution
- (69) Allow a total of 2 credits for a correct explanation of what a vaccine is and what it does in the body. The explanation should include an identification of the contents of the vaccine (1 credit) and the reaction that occurs (1 credit). Appropriate responses include, but are not limited to:
- A vaccine contains weakened microbes or parts of microbes that stimulate the immune system to produce antibodies.
 - Vaccines contain the source of the disease in a dead or weakened form. When introduced into the body, the vaccine triggers the body's immune system to produce antibodies that are specific to the source of the disease.
- (70) Allow 1 credit for stating *one* way a child could develop immunity to a certain disease without being vaccinated. Appropriate responses include, but are not limited to:
- Exposure to the microbes stimulates immunity.
 - Receiving antibodies can provide immunity.
 - inborn immunities
 - receiving antibodies from mother's milk
- (71) Allow 1 credit for identifying *one* part of a research plan that must be followed when developing a new vaccine. The answer can relate to creating, isolating, testing, or funding. Appropriate responses include, but are not limited to:
- use a large sample
 - check for possible side effects
 - determine the method to be used to administer the vaccine
 - identify the organism causing the disease

- (72) Allow a total of 4 credits for describing positive and negative effects of the introduction of predators to reduce the number of aphids that feed on grain crops in an agricultural area of the United States. Allow 2 credits for descriptions of *two* advantages of this method of pest control and 2 credits for descriptions of *two* dangers.

Possible advantages include, but are not limited to:

- Chemicals are not added to the environment.
- Biological controls are more specific than chemical controls.
- Ladybugs are less likely to kill beneficial organisms.

Possible dangers include, but are not limited to:

- The control insects may eat the food of other organisms.
- The population of natural predators of the aphids may be eliminated or greatly reduced.
- The control organism may become overpopulated.

- (73) Allow a total of 3 credits for explaining why carnivores should be protected. The explanation must include information concerning:

- prey population growth (e.g., If predators are destroyed, the prey population will increase.) [1 credit]
- extinction (e.g., If too many carnivores of a particular species are killed, the species may become extinct.) [1 credit]
- importance of carnivores in an ecosystem (e.g., By feeding on herbivores, carnivores help keep certain species of plants from being eliminated in a given area.) [1 credit]

Example of a 3-credit response:

Carnivores are important in an ecosystem because by reducing the number of prey organisms, the food organisms of the prey are kept from being eliminated from the environment. If the predators were destroyed, the prey population would increase, perhaps to the point of consuming so many of the organisms that the prey feed upon, that these organisms would become extinct.

Map to Core Curriculum

Standards	Question Numbers		
	Part A 1-35	Part B 36-64	Part C 65-73
Standard 1—Analysis, Inquiry, and Design			
Key Idea 1		45,46,47,48	
Key Idea 2		59	65, 71
Key Idea 3	1,2,10	40,41,42,43,44,49,60,61,62	65
Appendix A (Laboratory Checklist)	1	40,41,42,43,44,59,60	65
Standard 4			
Key Idea 1	3,5,6,7,8	36,56,64	
Key Idea 2	4,9,10,11,12,13	50	
Key Idea 3	11,14,15,16,17,19	57,58	
Key Idea 4	18,19,20,21		
Key Idea 5	3,22,23,25,26,27,29	49,55,56,61,62,63,64	67,69,70
Key Idea 6	24,25,28,30,33,34	37,38,39,51,52,53,54,62,63	73
Key Idea 7	30,31,32,35		66,67,68,72,73

Regents Examination in Living Environment

June 2001

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

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
85	100	56	75	27	54
84	99	55	75	26	53
83	97	54	74	25	51
82	96	53	74	24	50
81	95	52	73	23	49
80	94	51	73	22	47
79	93	50	72	21	46
78	91	49	71	20	44
77	90	48	71	19	43
76	89	47	70	18	41
75	88	46	70	17	40
74	88	45	69	16	38
73	87	44	68	15	36
72	86	43	68	14	34
71	85	42	67	13	32
70	84	41	66	12	30
69	83	40	66	11	28
68	83	39	65	10	26
67	82	38	64	9	24
66	81	37	63	8	21
65	81	36	63	7	19
64	80	35	62	6	17
63	79	34	61	5	14
62	79	33	60	4	11
61	78	32	59	3	9
60	78	31	58	2	6
59	77	30	57	1	3
58	76	29	56	0	0
57	76	28	55		

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

All student answer papers that receive a scaled score of 62 through 68 **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 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.