

LIVING ENVIRONMENT

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

LIVING ENVIRONMENT

Tuesday, January 27, 2009 — 9:15 a.m. to 12:15 p.m., only

Student Name _____

School Name _____

Print your name and the name of your school on the lines above. Then turn to the last page of this booklet, which is the answer sheet for Part A and Part B-1. Fold the last page along the perforations and, slowly and carefully, tear off the answer sheet. Then fill in the heading of your answer sheet.

You are to answer all questions in all parts of this examination. Write your answers to the Part A and Part B-1 multiple-choice questions on the separate answer sheet. Write your answers for the questions in Parts B-2, C, and D directly in this examination booklet. All answers should be written in pen, except for graphs and drawings which should be done in pencil. You may use scrap paper to work out the answers to the questions, but be sure to record all your answers on the answer sheet and in this examination booklet.

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

Notice...

A four-function or scientific calculator must be made available for you to use while taking this examination.

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

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

Part A

Answer all questions in this part. [30]

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

1 Scientists in the United States, Europe, and Africa have now suggested that the hippopotamus is a relative of the whale. Earlier studies placed the hippo as a close relative of wild pigs, but recent studies have discovered stronger evidence for the connection to whales. This information suggests that

- (1) genetic engineering was involved in the earlier theories
- (2) structural evidence is the best evolutionary factor to consider
- (3) natural selection does not occur in hippopotamuses
- (4) scientific explanations are tentative and subject to change

2 A stable ecosystem would *not* contain

- (1) materials being cycled
- (2) consumers without producers
- (3) decomposers
- (4) a constant source of energy

3 A human liver cell and a human skin cell in the same person have the same genetic sequences. However, these cells are different because the liver cell

- (1) has more dominant traits than the skin cell
- (2) can reproduce but the skin cell cannot
- (3) carries out respiration but the skin cell does not
- (4) uses different genes than the skin cell

4 Abiotic factors that could affect the stability of an ecosystem could include

- (1) hurricanes, packs of wolves, and temperature
- (2) blizzards, heat waves, and swarms of grasshoppers
- (3) droughts, floods, and heat waves
- (4) species of fish, number of decomposers, and supply of algae

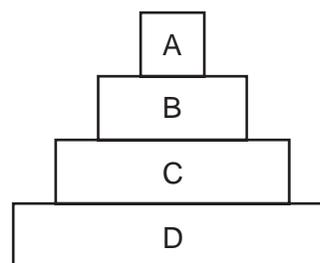
5 Many viruses infect only a certain type of cell because they bind to certain

- (1) other viruses on the surface of the cell
- (2) mitochondria in the cell
- (3) hormones in the cell
- (4) receptor sites on the surface of the cell

6 The respiratory system includes a layer of cells in the air passages that clean the air before it gets to the lungs. This layer of cells is best classified as

- (1) a tissue
- (2) an organ
- (3) an organelle
- (4) an organ system

7 The diagram below represents a typical energy pyramid.



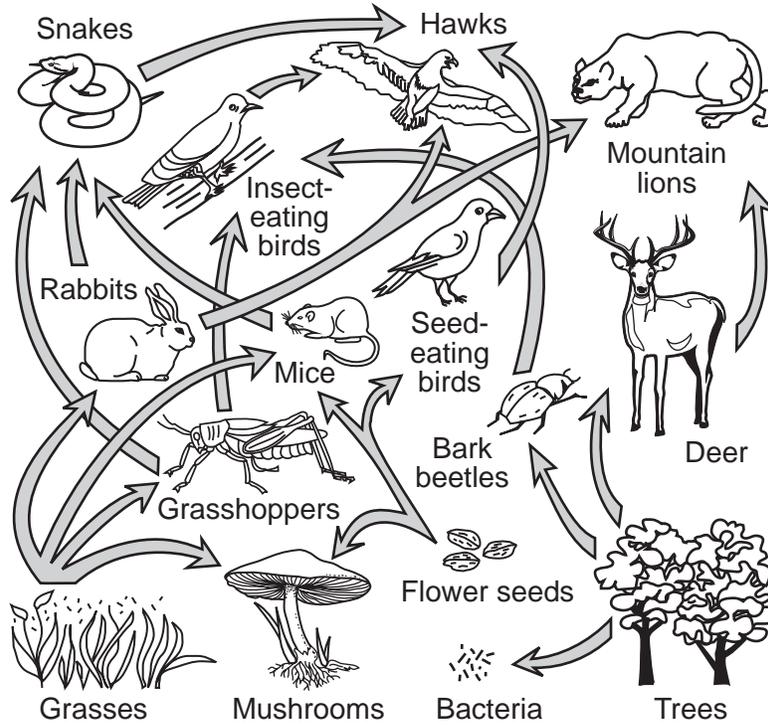
Which level in the pyramid includes autotrophs?

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

8 Mustard gas removes guanine (G) from DNA. For developing embryos, exposure to mustard gas can cause serious deformities because guanine

- (1) stores the building blocks of proteins
- (2) supports the structure of ribosomes
- (3) produces energy for genetic transfer
- (4) is part of the genetic code

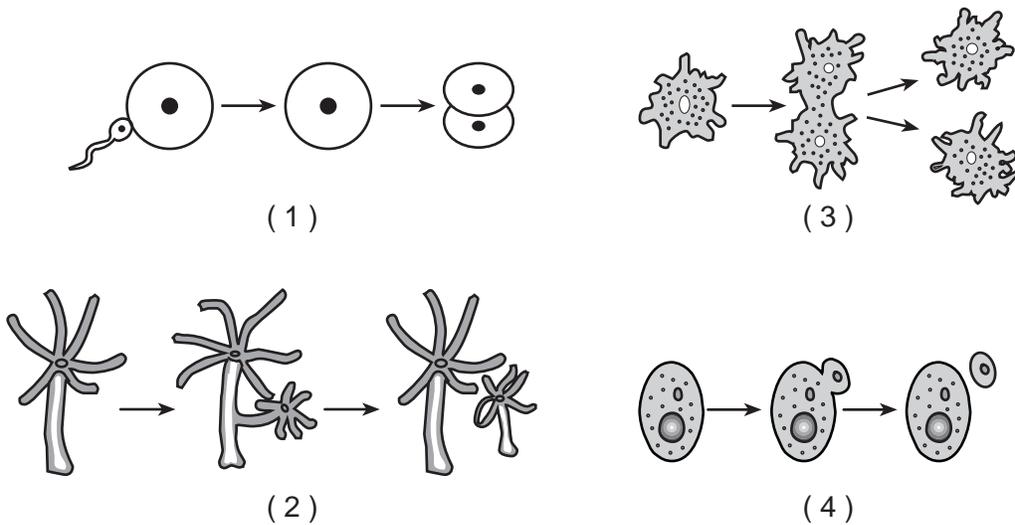
9 The diagram below represents a food web.



Which organisms are correctly paired with their nutritional roles?

- (1) hawk—decomposer; insect-eating bird—parasite
- (2) mouse—autotroph; flower seed—heterotroph
- (3) mountain lion—predator; bark beetle—herbivore
- (4) grasshopper—carnivore; grass—autotroph

10 Which process usually results in offspring that exhibit new genetic variations?



11 Which observation could best be used to indicate an evolutionary relationship between two species?

- (1) They have similar base sequences.
- (2) They have similar fur color.
- (3) They inhabit the same geographic regions.
- (4) They occupy the same niche.

12 A species in a changing environment would have the best chance of survival as a result of a mutation that has a

- (1) high adaptive value and occurs in its skin cells
- (2) low adaptive value and occurs in its skin cells
- (3) high adaptive value and occurs in its gametes
- (4) low adaptive value and occurs in its gametes

13 In an area of Indonesia where the ocean floor is littered with empty coconut shells, a species of octopus has been filmed “walking” on two of its eight tentacles. The remaining six tentacles are wrapped around its body. Scientists suspect that, with its tentacles arranged this way, the octopus resembles a rolling coconut. Local predators, including sharks, seem not to notice the octopus as often when it behaves in this manner. This unique method of locomotion has lasted over many generations due to

- (1) competition between octopuses and their predators
- (2) ecological succession in marine habitats
- (3) the process of natural selection
- (4) selective breeding of this octopus species

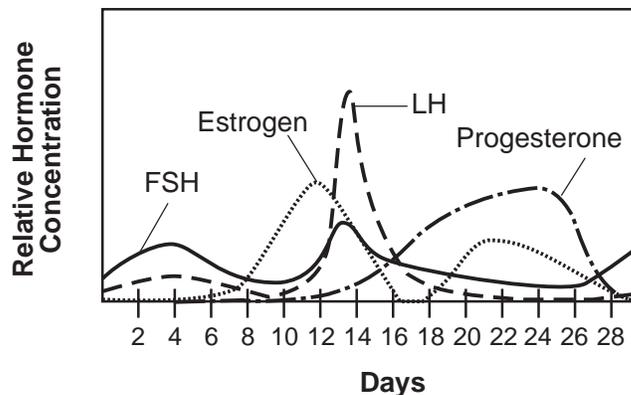
14 Which statement concerning production of offspring is correct?

- (1) Production of offspring is necessary for a species to survive, but it is not necessary for an individual to survive.
- (2) An organism can reproduce without performing any of the other life processes.
- (3) Production of offspring is necessary for an individual organism to survive, while the other life processes are important for a species to survive.
- (4) Reproduction is a process that requires gametes in all species.

15 Limited resources contribute to evolutionary change in animals by increasing

- (1) genetic variation within the population
- (2) competition between members of the species
- (3) the carrying capacity for the species
- (4) the rate of photosynthesis in the population

16 Some chemical interactions in a human are shown in the graph below.



This graph represents hormones and events in the

- (1) process of fetal growth and development
- (2) process of meiotic cell division during sperm development
- (3) reproductive cycle of males
- (4) reproductive cycle of females

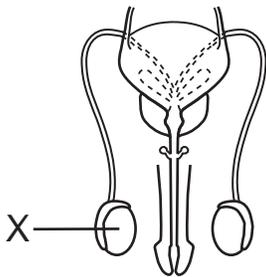
17 German measles is a disease that can harm an embryo if the mother is infected in the early stages of pregnancy because the virus that causes German measles is able to

- (1) be absorbed by the embryo from the mother's milk
- (2) be transported to the embryo in red blood cells
- (3) pass across the placenta
- (4) infect the eggs

18 In lakes in New York State that are exposed to acid rain, fish populations are declining. This is primarily due to changes in which lake condition?

- (1) size
- (2) temperature
- (3) pH
- (4) location

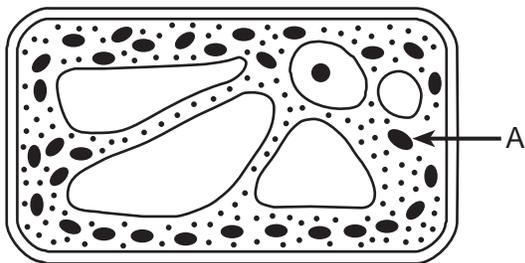
19 The diagram below represents a system in the human body.



The primary function of structure X is to

- (1) produce energy needed for sperm to move
- (2) provide food for the sperm to carry to the egg
- (3) produce and store urine
- (4) form gametes that may be involved in fertilization

20 The diagram below represents an autotrophic cell.



For the process of autotrophic nutrition, the arrow labeled A would most likely represent the direction of movement of

- (1) carbon dioxide, water, and solar energy
- (2) oxygen, glucose, and solar energy
- (3) carbon dioxide, oxygen, and heat energy
- (4) glucose, water, and heat energy

21 Which statement describes starches, fats, proteins, and DNA?

- (1) They are used to store genetic information.
- (2) They are complex molecules made from smaller molecules.
- (3) They are used to assemble larger inorganic materials.
- (4) They are simple molecules used as energy sources.

22 In 1995, during an Ebola virus outbreak, approximately 80% of the infected individuals died. Which statement is an inference that could be made based on this information?

- (1) The individuals who survived were able to produce antibodies against the Ebola virus.
- (2) The individuals who survived were not exposed to the Ebola antigens.
- (3) Eighty percent of the population had a natural immunity to the Ebola virus.
- (4) Eighty percent of the population was infected with a viral antigen.

23 In some people, substances such as peanuts, eggs, and milk cause an immune response. This response to usually harmless substances is most similar to the

- (1) action of the heart as the intensity of exercise increases
- (2) mechanism that regulates the activity of guard cells
- (3) action of white blood cells when certain bacteria enter the body
- (4) mechanism that maintains the proper level of antibiotics in the blood

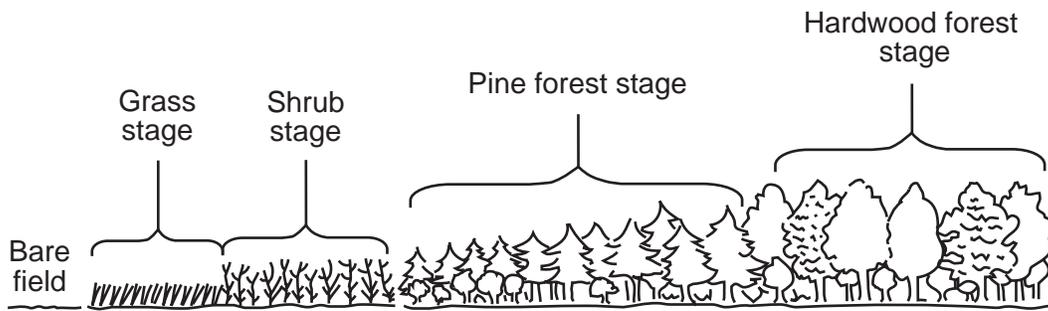
24 The ivory-billed woodpecker, long thought to be extinct, was recently reported to be living in a southern swamp area. The most ecologically appropriate way to ensure the natural survival of this population of birds is to

- (1) feed them daily with corn and other types of grain
- (2) destroy their natural enemies and predators
- (3) move the population of birds to a zoo
- (4) limit human activities in the habitat of the bird

25 Millions of acres of tropical rain forest are being destroyed each year. Which change would most likely occur over time if the burning and clearing of these forests were stopped?

- (1) an increase in the amount of atmospheric pollution produced
- (2) a decrease in the source of new medicines
- (3) an increase in the amount of oxygen released into the atmosphere
- (4) a decrease in the number of species

26 The diagram below represents a biological process taking place in an area of New York State unaffected by natural disasters.



Which statement correctly describes a stage in this process?

- (1) The grass stage is the most stable stage and exists for thousands of years.
- (2) The shrub stage modifies the ecosystem, making it more suitable for the pine forest.
- (3) The pine forest stage has no biodiversity and the least competition.
- (4) The hardwood forest stage will be replaced by a pine forest.

27 Which sequence of natural events is likely to lead to ecosystem stability?

- (1) sexual reproduction → genetic variation → biodiversity → ecosystem stability
- (2) asexual reproduction → genetic variation → cloning → ecosystem stability
- (3) genetic variation → asexual reproduction → biodiversity → ecosystem stability
- (4) genetic variation → sexual reproduction → cloning → ecosystem stability

28 The Susquehanna River, which runs through the states of New York, Pennsylvania, and Maryland, received the designation “America’s Most Endangered River” in 2005. One of the river’s problems results from the large number of sewage overflow sites that are found along the course of the river. These sewage overflow sites are a direct result of an increase in

- | | |
|----------------------|-------------------------|
| (1) global warming | (3) recycling programs |
| (2) human population | (4) atmospheric changes |

29 Many farmers plant corn, and then harvest the entire plant at the end of the growing season. One *negative* effect of this action is that

- (1) soil minerals used by corn plants are not recycled
- (2) corn plants remove acidic compounds from the air all season long
- (3) corn plants may replace renewable sources of energy
- (4) large quantities of water are produced by corn plants

30 Which human activity is correctly paired with its likely future consequence?

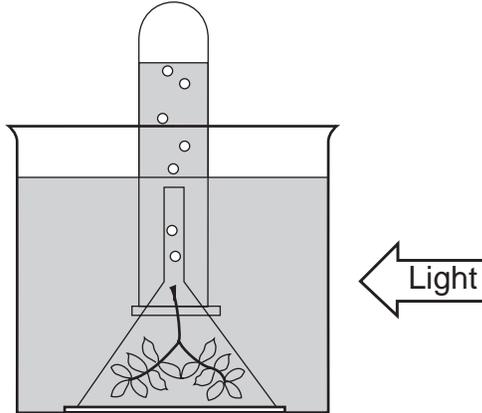
- (1) overfishing in the Atlantic — increase in supply of flounder and salmon as food for people
- (2) development of electric cars or hybrid vehicles — increased rate of global warming
- (3) use of fossil fuels — depletion of underground coal, oil, and natural gas supplies
- (4) genetically engineering animals — less food available to feed the world’s population

Part B-1

Answer all questions in this part. [12]

Directions (31–42): For *each* statement or question, write on the separate answer sheet the *number* of the word or expression that, of those given, best completes the statement or answers the question.

- 31 An experiment was set up to test the effect of light intensity on the rate of photosynthesis, as shown in the diagram below.



Data were collected by counting gas bubbles released in a 5-minute period when the light source was placed at various distances from the experimental setup. The data are shown in the table below.

Data Table

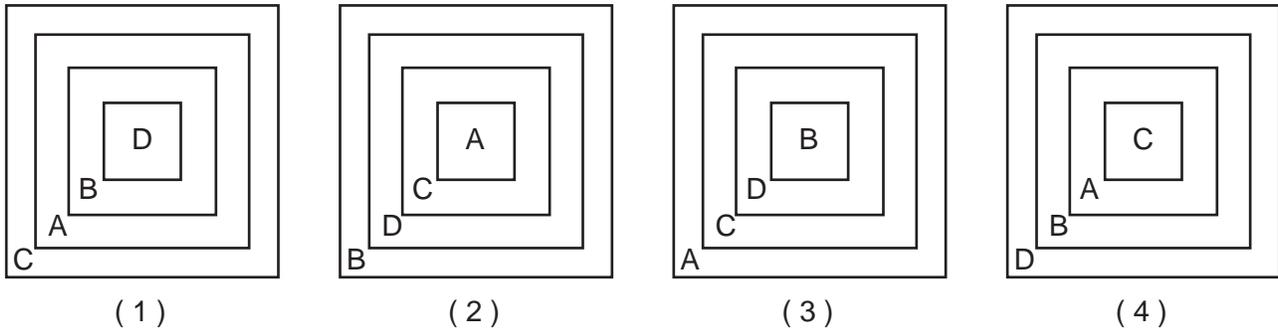
Distance From Light (cm)	Bubbles in 5-Minute Period
15	27
23	20
30	13
45	6

The number of bubbles released when the light source is at a distance of 38 centimeters would most likely be closest to

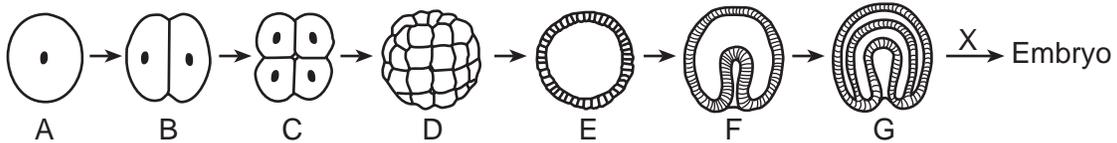
- (1) 6
(2) 10
(3) 13
(4) 22

32 Which diagram represents the relative sizes of the structures listed below?

Structures	
A	gene
B	cell
C	chromosome
D	nucleus



Base your answers to questions 33 through 35 on the diagram below, which represents some stages in the development of an embryo, and on your knowledge of biology.



33 This entire sequence (A through embryo) started with

- (1) the periodic shedding of a thickened uterine lining
- (2) mitotic cell division in a testis
- (3) meiotic cell division in the placenta
- (4) the process of fertilization

34 If cell A has 46 chromosomes, how many chromosomes will most likely be found in each cell of stage G?

- (1) 23
- (2) 46
- (3) 69
- (4) 92

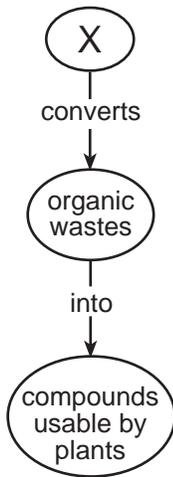
35 The arrow labeled X represents the process of

- (1) meiosis
- (2) recombination
- (3) differentiation
- (4) cloning

- 36 Which statement about the use of independent variables in controlled experiments is correct?
- (1) A different independent variable must be used each time an experiment is repeated.
 - (2) The independent variables must involve time.
 - (3) Only one independent variable is used for each experiment.
 - (4) The independent variables state the problem being tested.

- 37 A scientist was investigating why a particular tree species grows only in a specific environment. To determine physical conditions the tree species needs to survive, an appropriate study should include
- (1) the identification of organisms in the food web in that environment
 - (2) an analysis of the arrangement of the leaves on the trees
 - (3) the identification of all tree species in the area
 - (4) an analysis of the soil around the tree

- 38 The process illustrated in the sequence below occurs constantly in the biosphere.

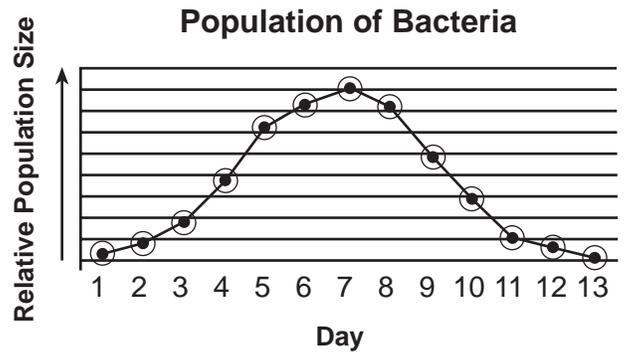


Which type of organism is most likely represented by X?

- (1) decomposer
- (2) producer
- (3) herbivore
- (4) carnivore

- 39 The direct source of ATP for the development of a fetus is
- (1) a series of chemical activities that take place in the mitochondria of fetal cells
 - (2) a series of chemical activities that take place in the mitochondria of the uterine cells
 - (3) the transport of nutrients by the cytoplasm of the stomach cells of the mother
 - (4) the transport of nutrients by the cytoplasm of the stomach cells of the fetus

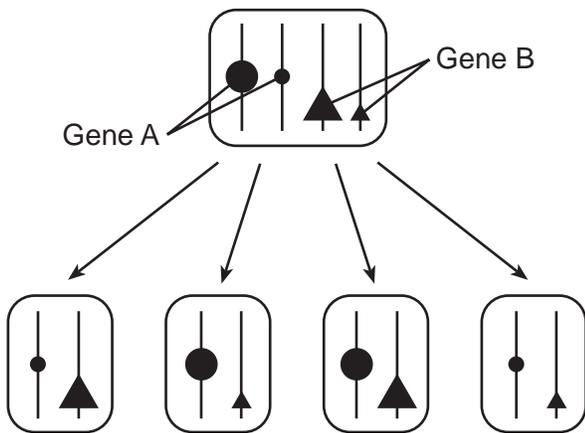
- 40 A sample of bacteria was added to a culture dish containing a food supply. The dish was kept in an incubator for two weeks, where temperature and other conditions that favored bacterial growth were kept constant. The graph below shows changes that occurred in the bacterial population over the two weeks.



Which statement provides the best explanation for some of the changes observed?

- (1) The bacteria were unable to reproduce until day 8.
- (2) The bacteria consumed all of the available food.
- (3) The culture dish contained an antibiotic for the first five days.
- (4) The temperature increased and the bacteria died.

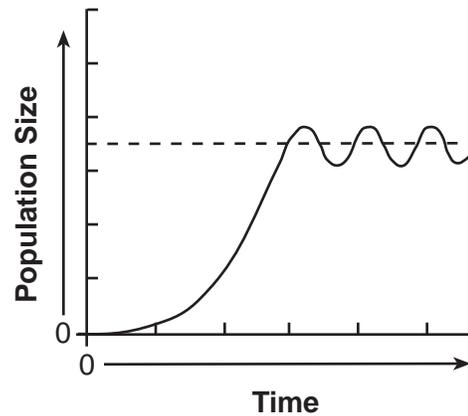
41 The diagram below represents a process involved in reproduction in some organisms.



This process is considered a mechanism of evolution because

- (1) mitosis produces new combinations of inheritable traits
- (2) it increases the chances of DNA alterations in the parent
- (3) it is a source of variation in the offspring produced
- (4) meiosis prevents recombination of lethal mutations

42 The graph below shows the changes in the size of a fish population over a period of time.



The dashed line on the graph represents the

- (1) carrying capacity of the environment
- (2) life span of the species
- (3) level at which extinction is reached
- (4) level of maximum biodiversity of the species

Part B-2

Answer all questions in this part. [13]

Directions (43–54): For those questions that are followed by four choices, circle the *number* preceding the choice that, of those given, best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question and record your answers in the spaces provided.

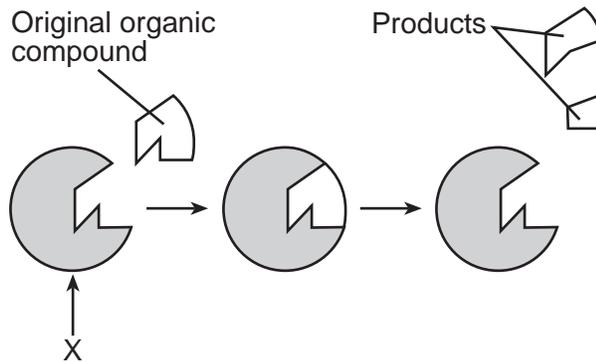
43 Complete the chart below by identifying *two* cell structures involved in protein synthesis and stating how *each* structure functions in protein synthesis. [2]

Cell Structure	Function in Protein Synthesis

For Teacher Use Only

43

44 The diagram below represents stages in the digestion of an organic compound.



Explain why substance *X* would *not* be likely to digest a different organic compound. [1]

44

Base your answers to questions 45 through 47 on the passage below and on your knowledge of biology.

**For Teacher
Use Only**

Overstaying Their Welcome: Cane Toads in Australia

Everyone in Australia is in agreement that the cane toads have got to go. The problem is getting rid of them. Cane toads, properly known as *Bufo marinus*, are the most notorious of what are called invasive species in Australia and beyond. But unlike other species of the same classification, cane toads were intentionally introduced into Australia. The country simply got much more and much worse than it bargained for.

Before 1935, Australia did not have any toad species of its own. What the country did have, however, was a major beetle problem. Two species of beetles in particular, French's Cane Beetle and the Greyback Cane Beetle, were in the process of decimating [destroying] the northeastern state of Queensland's sugar cane crops. The beetle's larvae were eating the roots of the sugar cane and stunting, if not killing, the plants. The anticipated solution to this quickly escalating problem came in the form of the cane toad. After first hearing about the amphibians in 1933 at a conference in the Caribbean, growers successfully lobbied to have the cane toads imported to battle and hopefully destroy the beetles and save the crops....

The plan backfired completely and absolutely. As it turns out, cane toads do not jump very high, only about two feet actually, so they did not eat the beetles that for the most part lived in the upper stalks of cane plants. Instead of going after the beetles, as the growers had planned, the cane toads began going after everything else in sight—insects, bird's eggs and even native frogs. And because the toads are poisonous, they began to kill would-be predators. The toll on native species has been immense....

Source: Tina Butler, mongabay.com, April 17, 2005

45 State *one* reason why the cane toads were imported to Australia. [1]

45

46 Identify *one* adaptation of cane toads that made them successful in their new environment. [1]

46

47 State *one* specific example of how the introduction of the cane toads threatened biodiversity in Australia. [1]

47

Base your answers to questions 48 and 49 on the information below and on your knowledge of biology.

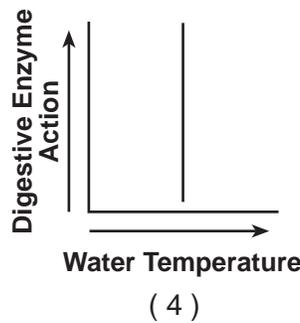
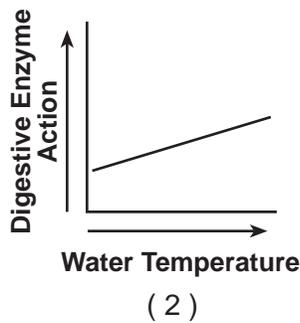
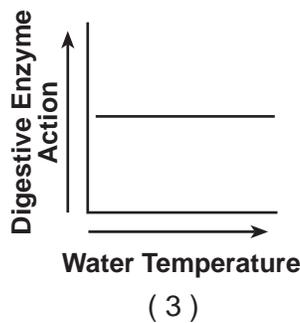
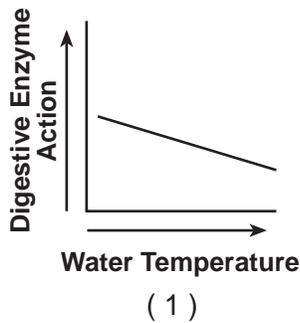
**For Teacher
Use Only**

Signs of a Changing Planet

While the changing climate endangers some species, a little global warming suits many shallow-water squid and octopuses just fine. Slightly higher ocean temperatures have been shown to boost the growth of these cephalopods, whose digestive enzymes speed up when warm. The tentacled creatures are also quick to colonize new territory as conditions become more favorable. Humboldt squid, which usually range from Southern California to South America, have been spotted as far north as Alaska. Deep-sea squid may not, however, adapt as readily.

Sierra Magazine, March/April 2005

48 Which graph most accurately shows the interaction between water temperature and digestive enzyme action in the shallow-water squid?



48

49 Although warming of the ocean may favor the migration of these squid into new territory, there may be biotic factors that make it difficult for these squid to live there. Identify *one* of these biotic factors, and explain why this factor would make it difficult for these squid to live in the new territory. [1]

49

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

**For Teacher
Use Only**

In a test for diabetes, blood samples were taken from an individual every 4 hours for 24 hours. The glucose concentrations were recorded and are shown in the data table below.

Blood Glucose Level Over Time

Time (h)	Blood Glucose Concentration (mg/dL)
0	100
4	110
8	128
12	82
16	92
20	130
24	104

50 State *one* likely cause of the change in blood glucose concentration between hour 16 and hour 20. [1]

50

Directions (51 and 52): Using the information given, construct a line graph on the grid on the next page, following the directions below.

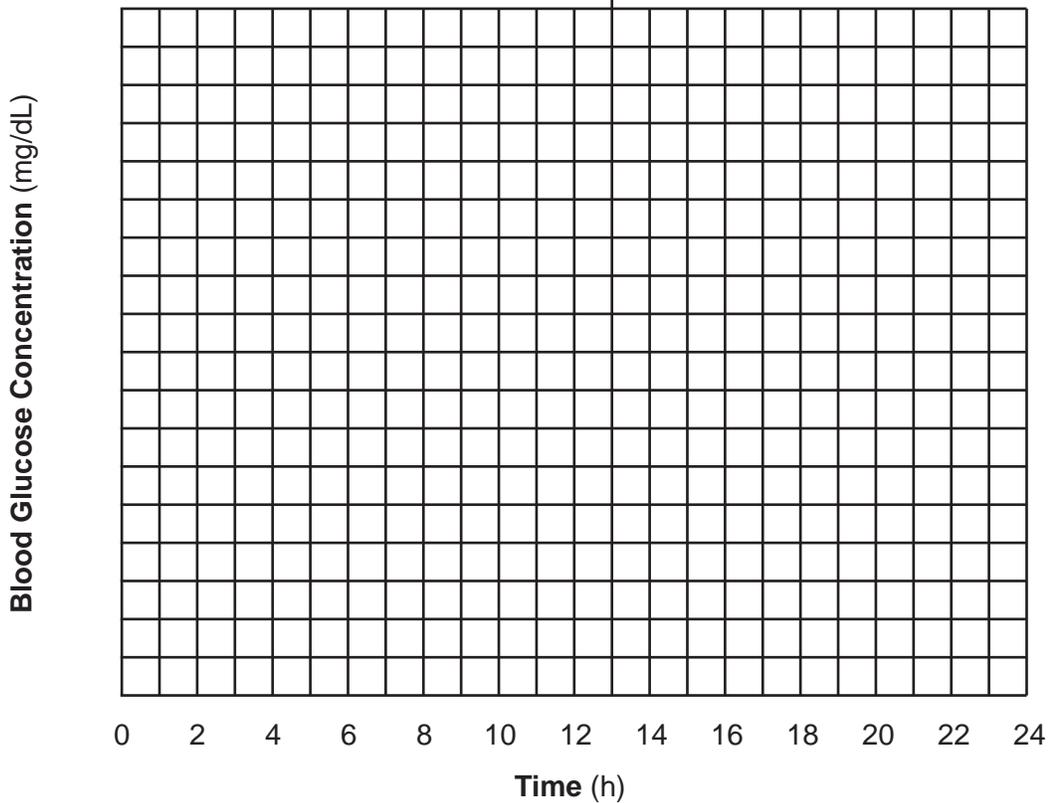
51 Mark an appropriate scale on the axis labeled "Blood Glucose Concentration (mg/dL)." [1]

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



**For Teacher
Use Only**

Blood Glucose Concentration Over Time



51

52

53 How might these results be different if this individual was *not* able to produce sufficient levels of insulin?

- (1) The level of blood glucose would be constant.
- (2) The average level of blood glucose would be lower.
- (3) The maximum level of blood glucose would be higher.
- (4) The minimum level of blood glucose would be lower.

53

54 The chemical that is responsible for the *decrease* in blood glucose concentration is released by

- (1) muscle cells
 - (2) guard cells
 - (3) the ovaries
 - (4) the pancreas
-

54

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

**For Teacher
Use Only**

A biologist at an agriculture laboratory is asked to develop a better quality blueberry plant. He is given plants that produce unusually large blueberries and plants that produce very sweet blueberries.

56 Describe *one* way the biologist could use these blueberry plants to develop a plant with blueberries that are both large and sweet. [1]

56

57 The biologist is successful in producing the new plant. State *one* method that can be used to produce many identical blueberry plants of this new type. [1]

57

Base your answers to questions 58 and 59 on the information below and on your knowledge of biology.

Two adaptations of the monarch butterfly that aid in its survival are the production of a certain chemical and a distinctive coloration that other animals can easily recognize. When a monarch butterfly is eaten, the presence of the chemical results in a bad taste to the predator.

Although the viceroy butterfly does not contain the chemical that tastes bad to a predator, it does resemble the monarch in size, shape, and coloration.

58 Explain how the combination of this chemical and the distinctive coloration aid in the survival of the monarch butterfly. [1]

58

59 How do the characteristics of the viceroy butterfly aid in its survival? [1]

59

Base your answers to questions 60 through 62 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

Food is often treated to lower the risk of disease and spoilage, as shown in the chart below.

Food Preservation Methods

Method	Description of Method	Example of Food Treated With This Method
canning	heating at 115°C for 30 minutes	green beans
freezing	storing between -10°C and -18°C for extended time	meat, fish, poultry
salting	soaking in a salt solution for several days or weeks	pickles, sauerkraut

60 Identify *one* type of organism that is controlled by these food preservation methods. [1]

60

61 State *one* way extremely high temperatures can affect biological catalysts found in these organisms. [1]

61

62 Explain why high salt concentrations can kill organisms. [1]

62

63 An industry releases small amounts of a chemical pollutant into a nearby river each day. The chemical is absorbed by the microscopic water plants in the river. It causes the plants no apparent harm. Explain how this small amount of the chemical in the microscopic plants could enter the food chain and endanger the lives of birds that live nearby and feed on the fish from the river each day. [1]

**For Teacher
Use Only**

63

Base your answers to questions 64 through 67 on the information below and on your knowledge of biology.

Carbon, like many other elements, is maintained in ecosystems through a natural cycle. Human activities have been disrupting the carbon cycle.

64 Identify *one* process involved in recycling carbon dioxide within ecosystems. [1]

64

65 State *one* reason why the amount of carbon dioxide in the atmosphere has increased in the last 100 years. [1]

65

66 Identify *one* effect this increase in carbon dioxide could have on the environment. [1]

66

67 Describe *one* way individuals can help slow down or reverse the increase in carbon dioxide. [1]

67

Part D

Answer all questions in this part. [13]

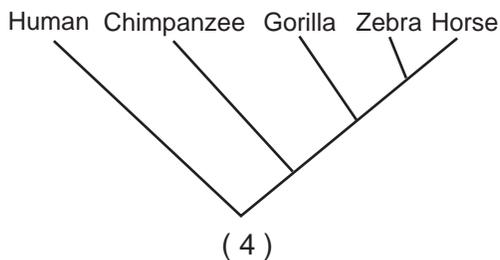
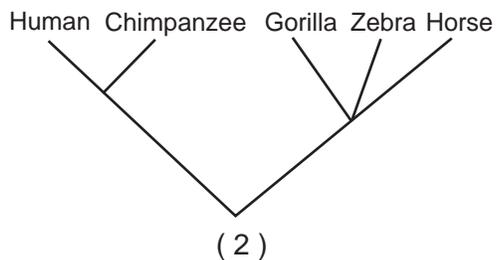
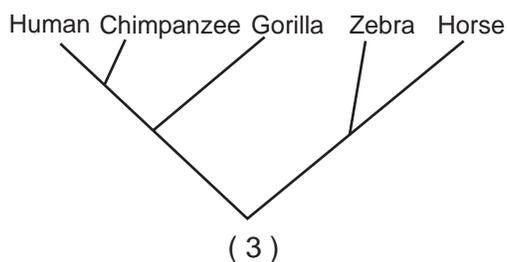
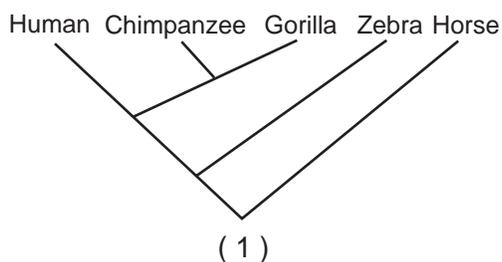
Directions (68–80): For those questions that are followed by four choices, circle the *number* of the choice, that, of those given, best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question and record your answers in the spaces provided.

Base your answer to question 68 on the chart below and on your knowledge of biology.

**For Teacher
Use Only**

Species	Sequence of Four Amino Acids Found in the Same Part of the Hemoglobin Molecule of Species
human	Lys–Glu–His–Phe
horse	Arg–Lys–His–Lys
gorilla	Lys–Glu–His–Lys
chimpanzee	Lys–Glu–His–Phe
zebra	Arg–Lys–His–Arg

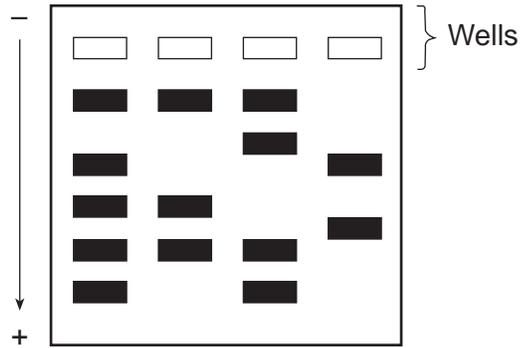
68 Which evolutionary tree best represents the information in the chart?



68

Base your answers to questions 69 and 70 on the diagram below that illustrates the results of a laboratory technique and on your knowledge of biology.

**For Teacher
Use Only**



69 State *one* way the information obtained by this technique can be used. [1]

69

70 The results of which laboratory technique are represented in the diagram?

- (1) chromatography
- (2) manipulation of genes
- (3) genetic engineering
- (4) gel electrophoresis

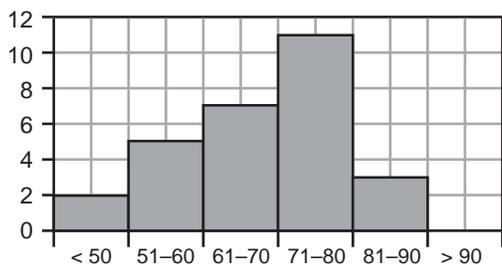
70

Base your answers to questions 71 through 73 on the histograms below and on your knowledge of biology.

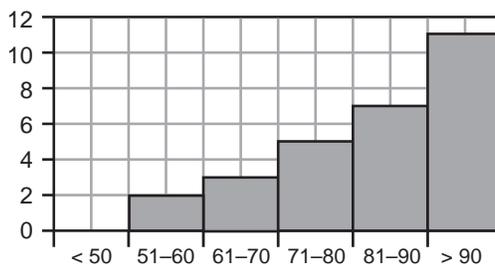
**For Teacher
Use Only**

Students in a class recorded their resting pulse rates and their pulse rates immediately after strenuous activity. The data obtained are shown in the histograms below.

Resting Pulse Rate



Pulse Rate After Activity



Average Pulse Rate Range (per min)

Average Pulse Rate Range (per min)

71 An appropriate label for the y-axis in each histogram would be

- (1) Number of Students
- (2) Average Number of Heartbeats
- (3) Time (min)
- (4) Amount of Exercise

71

72 According to the data, compared to the average resting pulse rate, the average pulse rate immediately after strenuous activity generally

- (1) decreased
- (2) increased
- (3) remained the same
- (4) decreased and leveled off

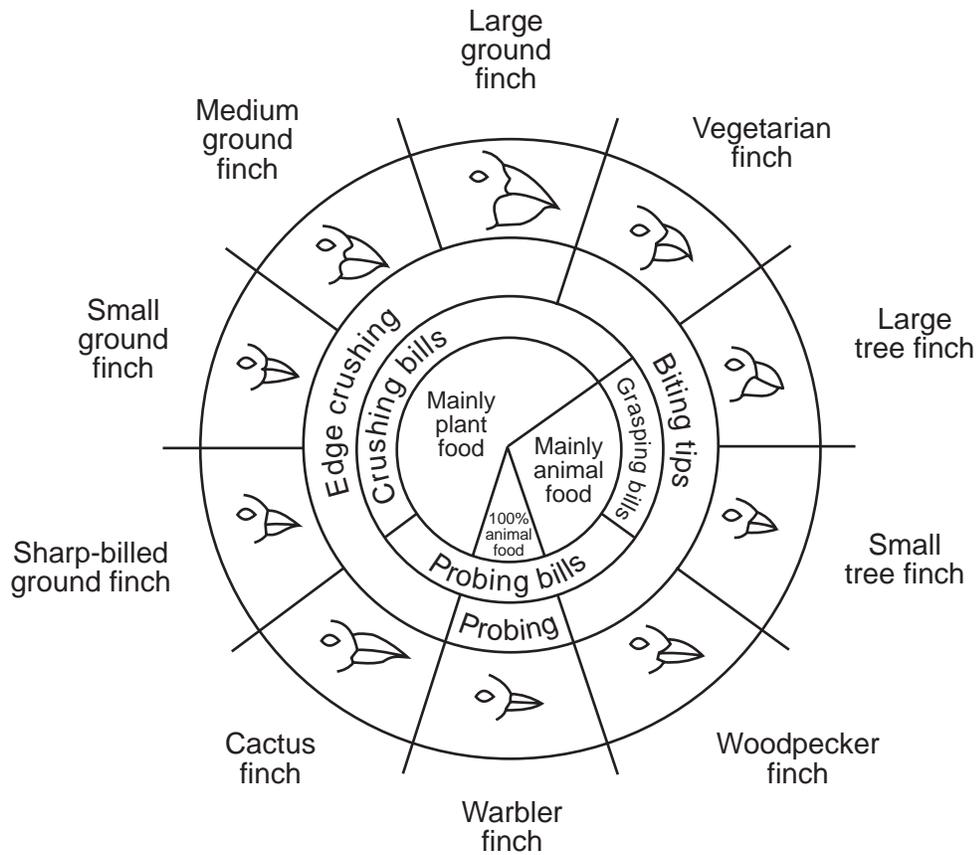
72

73 State *one* biological explanation for the fact that *not* all students had the same resting pulse rate. [1]

73

Base your answers to questions 74 and 75 on the diagram below and on your knowledge of biology.

For Teacher Use Only



Variations in Beaks of Galapagos Islands Finches

74 The only finch that is completely carnivorous has a beak adapted for

- (1) probing, only
- (2) probing and edge crushing
- (3) probing and biting
- (4) biting and edge crushing

74

75 Which two finches would compete the *least* for food?

- (1) small ground finch and large ground finch
- (2) large ground finch and sharp-billed ground finch
- (3) small tree finch and medium ground finch
- (4) vegetarian finch and small ground finch

75

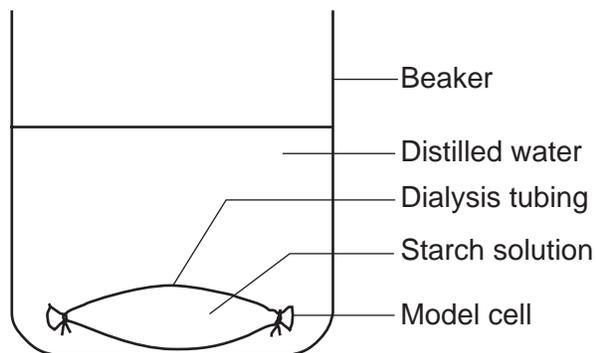
76 Glucose indicator was added to a beaker of an unknown liquid. Starch indicator was added to a different beaker containing the same unknown liquid. The color of the indicator solutions before they were added to the beakers and the color of the contents of the beakers after adding the indicator solution are recorded in the chart below.

Beaker	Solution	Color of Indicator Solution Before Adding to Beaker	Color of Contents of Beaker After Adding Indicator Solution
1	unknown liquid + glucose indicator	blue	blue (after heating)
2	unknown liquid + starch indicator	amber	blue black

Which carbohydrate is present in the unknown liquid? Support your answer. [1]

76

77 A laboratory setup of a model cell is shown in the diagram below.

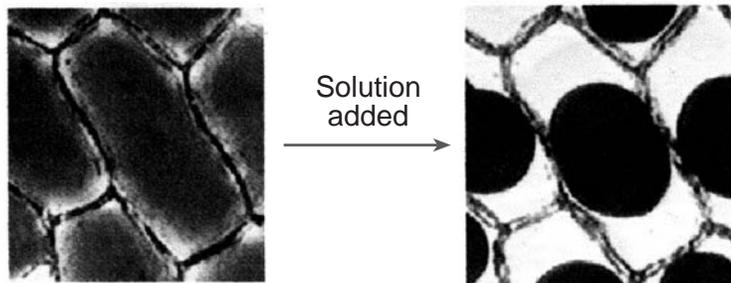


Which observation would most likely be made 24 hours later?

- (1) The contents of the model cell have changed color.
- (2) The diameter of the model cell has increased.
- (3) The model cell has become smaller.
- (4) The amount of distilled water in the beaker has increased.

77

Base your answers to questions 78 and 79 on the diagram below and on your knowledge of biology. The diagram illustrates what happens when a particular solution is added to a wet-mount slide containing red onion cells being observed using a compound light microscope.



78 Identify a process that caused the change in the cells. [1]

78

79 To observe the cells on this slide it is best to start out using the

- (1) high-power objective and focus using the coarse adjustment, only
 - (2) low-power objective and focus using the fine adjustment, only
 - (3) high-power objective and focus using the fine adjustment
 - (4) low-power objective and focus using the coarse adjustment
- _____

79

**For Teacher
Use Only**

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Tuesday, January 27, 2009 — 9:15 a.m. to 12:15 p.m., only

ANSWER SHEET

Female

Student Sex: Male

Teacher

School Grade

Part	Maximum Score	Student's Score
A	30	
B-1	12	
B-2	13	
C	17	
D	13	
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 and Part B-1 on this answer sheet.

Part A

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

Part A Score

Part B-1

- | | |
|----------|----------|
| 31 | 37 |
| 32 | 38 |
| 33 | 39 |
| 34 | 40 |
| 35 | 41 |
| 36 | 42 |

Part B-1 Score

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

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

Signature

Tear Here

LIVING ENVIRONMENT

Tear Here

Tear Here

LIVING ENVIRONMENT

FOR TEACHERS ONLY

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

LE

LIVING ENVIRONMENT

Tuesday, January 27, 2009 — 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 2 before rating student papers.

Updated information regarding the rating of this examination may be posted on the New York State Education Department's web site during the rating period. Check this web site <http://www.emsc.nysed.gov/osa/> and select the link "Examination Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents examination period.

Part A and Part B-1

Allow 1 credit for each correct response.

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

LIVING ENVIRONMENT – *continued*

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

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

Allow 1 credit for each correct response for multiple-choice questions.

On the detachable answer sheet for Part A and Part B–1, indicate by means of a check mark each incorrect or omitted answer to multiple-choice questions. In the box provided in the upper right corner of the answer sheet, record the number of questions the student answered correctly for each of these parts.

At least two science teachers must participate in the scoring of the Part B–2, Part C, and Part D open-ended questions on a student's paper. Each of these teachers should be responsible for scoring a selected number of the open-ended questions on each answer paper. No one teacher is to score all the open-ended questions on a student's answer paper.

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

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

Raters should enter the scores earned for Part A, Part B–1, Part B–2, Part C, and Part D on the appropriate lines in the box printed on the answer sheet and should add these five scores and enter the total in the box labeled "Total Raw Score." Then the student's raw score should be converted to a scaled score by using the conversion chart that will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Tuesday, January 27, 2009. The student's scaled score should be entered in the box labeled "Final Score" on the student's answer sheet. The scaled score is the student's final examination score.

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

Because scaled scores corresponding to raw scores in the conversion chart may change from one examination to another, it is crucial that for each administration, the conversion chart provided for that administration be used to determine the student's final score.

Part B-2

43 [2] Allow a maximum of 2 credits, 1 credit for identifying *one* cell structure involved in protein synthesis and stating how the structure functions in protein synthesis and 1 credit for identifying a second cell structure involved in protein synthesis and stating how the structure functions in protein synthesis. Acceptable responses include, but are not limited to:

- nucleus – contains template/blueprint/instructions for protein synthesis
- ribosome – assembles proteins; synthesizes proteins
- mitochondrion – provides energy

44 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- A different organic compound would have a different shape.
- A different organic compound would not fit with substance *X*.
- The active site of *X* does not fit a different substrate.
- Substance *X* is specific to only certain materials.

45 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- to destroy beetles
- to save crops

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

- poisonous to predators
- can eat a large variety of food

47 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- killed off other species
- outcompeted other species
- reduced number of birds by eating eggs
- poisoned other species

48 2

49 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Predators may eat squid, making it difficult for squid to survive.
- Food organisms may be scarce in the new environment so the squid do not have enough to eat.
- Lack of vegetation (seaweed) may make hiding from predators difficult.

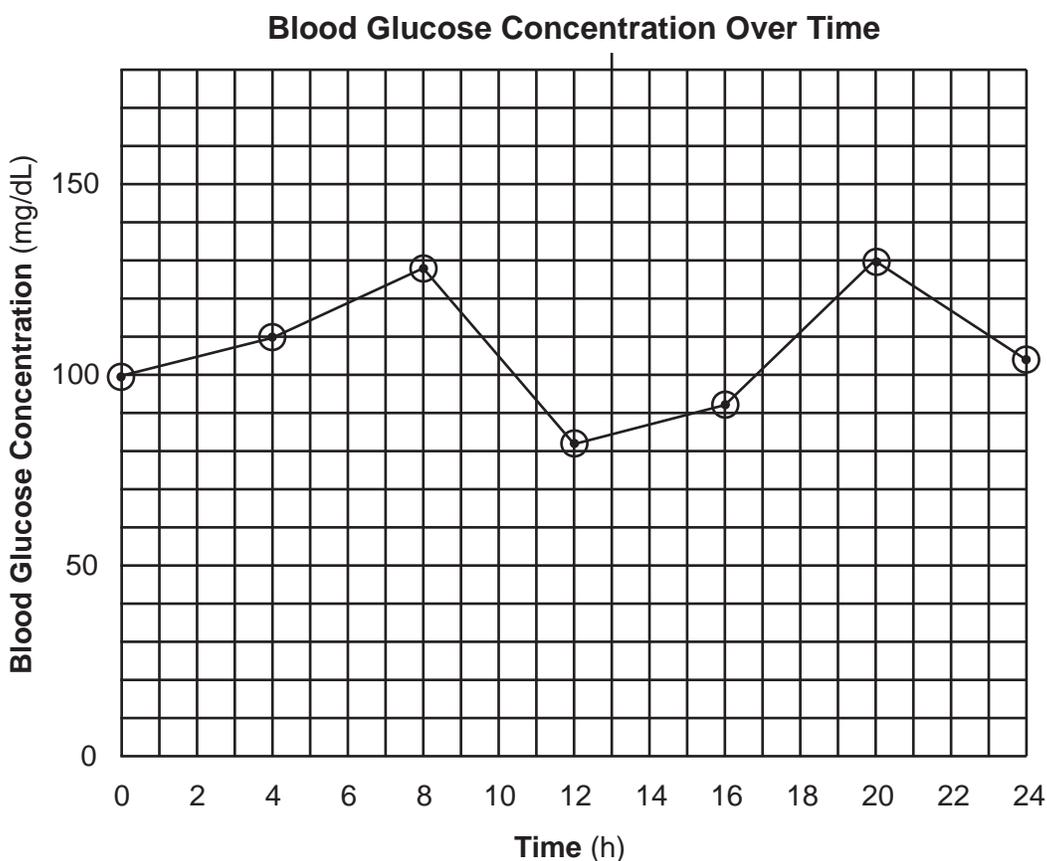
50 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- The individual ate.
- insulin level dropped

51 [1] Allow 1 credit for marking an appropriate scale on the axis labeled “Blood Glucose Concentration (mg/dL).”

52 [1] Allow 1 credit for correctly plotting the data and connecting the points.

Example of a 2-credit response for questions 51 and 52:



Note: Allow credit if the points are correctly plotted but *not* circled.
 Make no assumptions about the origin unless it is labeled.
 Do *not* allow credit for plotting points that are not in the data table, e.g., (0,0), or for extending lines beyond the data points.

53 3

54 4

Part C

55 [5] Allow a maximum of 5 credits, allocated as follows:

- Allow 1 credit for stating a hypothesis to be tested. Acceptable responses include, but are not limited to:
 - Radish seedlings grow faster when exposed to goldenrod solution.
 - Radish seedlings treated with the solution will not grow as tall as the control group.
 - The solution will not affect the height of radish seedlings.

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

- Allow 1 credit for describing how the experimental group will be treated differently from the control group. Acceptable responses include, but are not limited to:
 - The experimental group will be given the solution while the control group is given plain water.
 - The experimental group will have ground up goldenrod in the soil.
- Allow 1 credit for explaining why the number of seedlings used for the experiment should be large. Acceptable responses include, but are not limited to:
 - A large sample will increase the validity of the results.
 - Since some may die, there will be enough left to do the experiment.
- Allow 1 credit for identifying the type of data that will be collected based on the student's hypothesis. Acceptable responses include, but are not limited to:
 - The number of seedlings that survive in each group will be counted.
 - the height of the seedlings

Note: Do *not* accept just “growth.” The type of data must be measurable.

- Allow 1 credit for describing experimental results that would support the student's hypothesis. Acceptable responses include, but are not limited to:
 - Radish seedlings exposed to goldenrod solution were twice as tall as the control group in two weeks.
 - If the radish seedlings treated with the solution do not grow as tall as those in the control group, the hypothesis is supported.
 - If there is no difference between the height of the group treated with the solution as compared to the control group, the hypothesis will be supported.

LIVING ENVIRONMENT – *continued*

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

- Use selective breeding/artificial selection.
- Cross sweet-berry blueberry plants with large-berry blueberry plants.
- Use recombinant DNA to move the sweet gene into the large-berry plants.

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

- cloning
- vegetative propagation
- cuttings
- asexual reproduction

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

- The predator gets a bad taste from the monarch butterfly and then recognizes other members of that species and does not eat them.

59 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Since the viceroy butterfly resembles the monarch, predators that have tasted a monarch butterfly do not eat viceroy butterflies.

60 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- bacteria
- fungi
- pathogenic organisms

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

- High temperatures can destroy biological catalysts in organisms.
- High temperatures cause enzymes to change shape (denature).

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

- High salt concentrations can remove water from cells.
- disrupts water balance in cells
- water leaves the cells by osmosis
- causes dehydration

LIVING ENVIRONMENT – *continued*

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

- As these plants are eaten by certain fish, the chemical may be transferred to birds that eat these fish, causing the birds to die.

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

- photosynthesis
- respiration
- combustion

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

- burning fossil fuels
- human population increase
- more cars
- more industry
- deforestation

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

- global warming
- increased average daily temperatures
- climate change

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

- use alternative fuels
- plant more trees
- reduce deforestation
- drive less

Part D

68 3

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

- to determine evolutionary relationships
- screening for a genetic disorder
- to determine paternity
- to determine whether the hospital mixed up babies and parents
- to identify suspects in criminal investigations

70 4

71 1

72 2

73 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- The students were different sizes or weights.
- The students were different sexes.
- The students had different levels of physical fitness.
- Metabolic rates vary.
- genetic variation

74 1

75 3

76 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- starch — The solution in beaker 2 changed color.

LIVING ENVIRONMENT – *concluded*

77 2

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

- osmosis
- diffusion
- passive transport

79 4

80 3

The *Chart for Determining the Final Examination Score for the January 2009 Regents Examination in Living Environment* will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Tuesday, January 27, 2009. Conversion charts provided for previous administrations of the Regents Examination in Living Environment must NOT be used to determine students' final scores for this administration.

Online Submission of Teacher Evaluations of the Test to the Department

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

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

Map to Core Curriculum

January 2009 Living Environment

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

Part D 68–80	
Lab 1	68,69,70
Lab 2	71,72,73
Lab 3	74,75
Lab 5	76,77,78,79,80



Regents Examination in Living Environment January 2009

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

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

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

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

Because scale scores corresponding to raw scores in the conversion chart change from one examination to another, it is crucial that for each administration, the conversion chart provided for that administration be used to determine the student's final score. The chart above is usable only for this administration of the Living Environment Examination.