The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Friday, January 28, 2005 — 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.

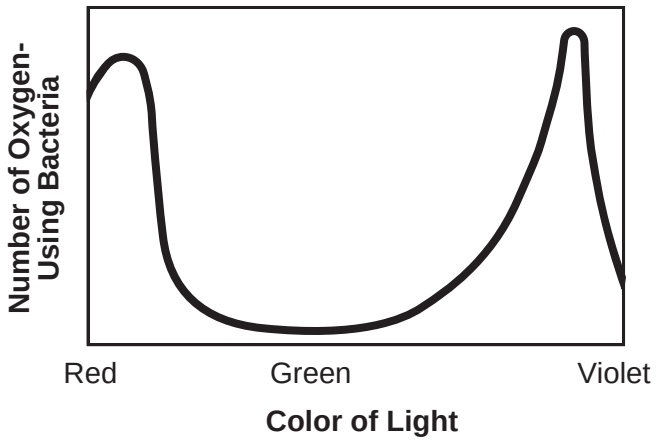
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

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 The graph below shows the results of an experiment in which a container of oxygen-using bacteria and strands of a green alga were exposed to light of different colors.



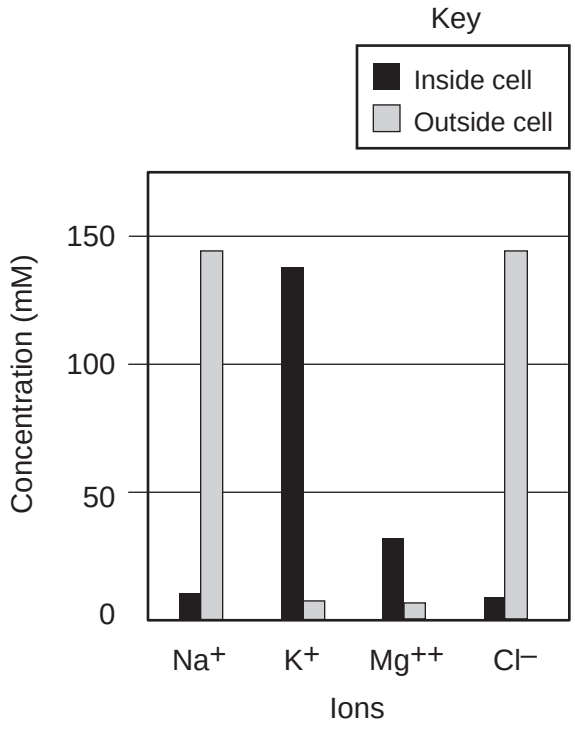
Which statement best explains the results of this experiment?

(1) The rate of photosynthesis is affected by variations in the light.
(2) In all environments light is a vital resource.
(3) The activities of bacteria and algae are not related.
(4) Uneven numbers and types of species can upset ecosystem stability.

2 Which statement best describes the relationship between cells, DNA, and proteins?

(1) Cells contain DNA that controls the production of proteins.
(2) DNA is composed of proteins that carry coded information for how cells function.
(3) Proteins are used to produce cells that link amino acids together into DNA.
(4) Cells are linked together by proteins to make different kinds of DNA molecules.

3 The graph below shows the relative concentrations of different ions inside and outside of an animal cell.



Which process is directly responsible for the net movement of K^+ and Mg^{++} into the animal cell?

(1) electrophoresis
(2) diffusion
(3) active transport
(4) circulation

4 Which sequence of terms represents a *decrease* from the greatest number of structures to the least number of structures present in a cell?

(1) nucleus → gene → chromosome
(2) gene → nucleus → chromosome
(3) gene → chromosome → nucleus
(4) chromosome → gene → nucleus

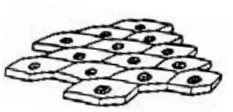
5 An established ecosystem may remain stable over hundreds of years because

(1) species interdependence is absent
(2) there is a lack of variety in the species
(3) no competition exists between the species
(4) there are natural checks on species

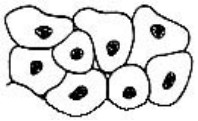
6 Which two organ systems provide materials required for the human body to produce ATP?

(1) reproductive and excretory
(2) digestive and respiratory
(3) respiratory and immune
(4) digestive and reproductive

7 Some human body cells are shown in the diagrams below.


Cells from skin


Blood cells


Cells from lining of bladder


Cells from lining of trachea

These groups of cells represent different

(1) tissues in which similar cells function together
(2) organs that help to carry out a specific life activity
(3) systems that are responsible for a specific life activity
(4) organelles that carry out different functions

8 Which process is *least* likely to add to the variety of traits in a population?

(1) deletion of bases from DNA
(2) genetic engineering
(3) accurate replication of DNA
(4) exchange of segments between chromosomes

9 Strawberries can reproduce by means of runners, which are stems that grow horizontally along the ground. At the region of the runner that touches the ground, a new plant develops. The new plant is genetically identical to the parent because

(1) it was produced sexually
(2) nuclei traveled to the new plant through the runner to fertilize it
(3) it was produced asexually
(4) there were no other strawberry plants in the area to provide fertilization

10 Genes involved in the production of abnormal red blood cells have an abnormal sequence of

(1) ATP molecules
(2) amino acids
(3) sugars
(4) bases

11 Research has shown that certain body cells, known as stem cells, can develop into a variety of specialized cells. Various factors can cause stem cells to develop into different types of mature cells. These different types of mature cells result from

(1) different antibodies and mitotic cell division
(2) identical genetic codes and meiotic cell division
(3) different environments of the cells and the functioning of different parts of the genetic code
(4) similar steps in the development of the cells and a reduction in the number of chromosomes in each cell

12 Which statement describing a cause of extinction includes the other three?

(1) Members of the extinct species were unable to compete for food.
(2) Members of the extinct species were unable to conceal their presence by camouflage.
(3) Members of the extinct species lacked adaptations essential for survival.
(4) Members of the extinct species were too slow to escape from predators.

13 Scientists compared fossil remains of a species that lived 5,000 years ago with members of the same species living today. Scientists concluded that this species had changed very little over the entire time period. Which statement best accounts for this lack of change?

(1) The environment changed significantly and those offspring without favorable characteristics died.
(2) The environment changed significantly, but the species had no natural enemies for a long period of time.
(3) The environment did not change significantly and those offspring expressing new characteristics survived their natural enemies.
(4) The environment did not change significantly and those offspring expressing new characteristics did not survive.

14 Which statement is true of both mitosis and meiosis?

(1) Both are involved in asexual reproduction.
(2) Both occur only in reproductive cells.
(3) The number of chromosomes is reduced by half.
(4) DNA replication occurs before the division of the nucleus.

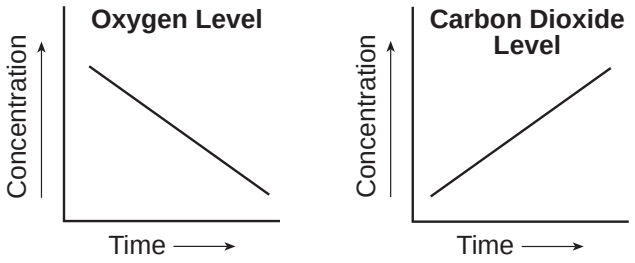
15 A cell resulting from the fertilization of an egg begins to divide. Two cells are formed that normally remain attached and could develop into a new individual. If the two cells become separated, which statement describes what would most likely occur?

(1) The cells would each have all of the needed genetic information, and both could survive.
(2) The cells would each have only one-half of the needed genetic information, so both would die.
(3) One cell would have all of the needed genetic information and would survive, but the other would have none of the needed genetic information and would die.
(4) Each cell would have some of the needed genetic information, but would be unable to share it, so both would die.

16 Down syndrome is a genetic disorder caused by the presence of an extra chromosome in the body cells of humans. This extra chromosome occurs in a gamete as a result of

(1) an error in the process of cloning
(2) an error in meiotic cell division
(3) a gene mutation
(4) replication of a single chromosome during mitosis

17 The graphs below show the changes in the relative concentrations of two gases in the air surrounding a group of mice.



Which process in the mice most likely accounts for the changes shown?

(1) active transport
(2) evaporation
(3) respiration
(4) photosynthesis

18 Plants in areas with short growing seasons often have more chloroplasts in their cells than plants in areas with longer growing seasons. Compared to plants in areas with longer growing seasons, plants in areas with shorter growing seasons most likely

(1) make and store food more quickly
(2) have a higher rate of protein metabolism
(3) grow taller
(4) have a different method of respiration

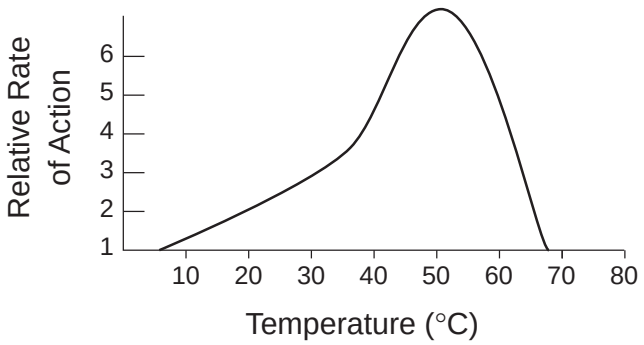
19 The reason that organisms can *not* produce populations of unlimited size is that

(1) the resources of Earth are finite
(2) there is no carrying capacity on Earth
(3) species rarely compete with one another
(4) interactions between organisms are unchanging

20 Which activity is *not* a function of white blood cells in response to an invasion of the body by bacteria?

(1) engulfing these bacteria
(2) producing antibodies to act against this type of bacteria
(3) preparing for future invasions of this type of bacteria
(4) speeding transmissions of nerve impulses to detect these bacteria

21 The graph below shows the effect of temperature on the relative rate of action of enzyme *X* on a protein.



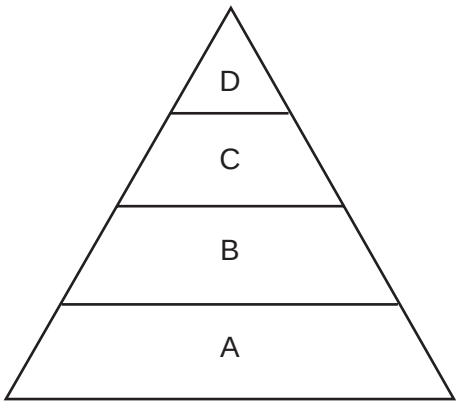
Which change would *not* affect the relative rate of action of enzyme *X*?

(1) the addition of cold water when the reaction is at 50°C
(2) an increase in temperature from 70°C to 80°C
(3) the removal of the protein when the reaction is at 30°C
(4) a decrease in temperature from 40°C to 10°C

22 When organisms break the bonds of organic compounds, the organisms can

(1) use the smaller molecules to plug the gaps in the cell membrane to slow diffusion
(2) use the energy obtained to digest molecules produced by respiration that uses oxygen
(3) obtain energy or reassemble the resulting materials to form different compounds
(4) excrete smaller amounts of solid waste materials during vigorous exercise

23 Which statement about the pyramid of energy shown below is correct?



(1) The amount of energy needed to sustain the pyramid enters at level *D*.
(2) The total amount of energy decreases with each successive feeding level from *D* to *A*.
(3) The amount of energy is identical in each level of the pyramid.
(4) The total amount of energy at level *D* is less than the total amount of energy at level *B*.

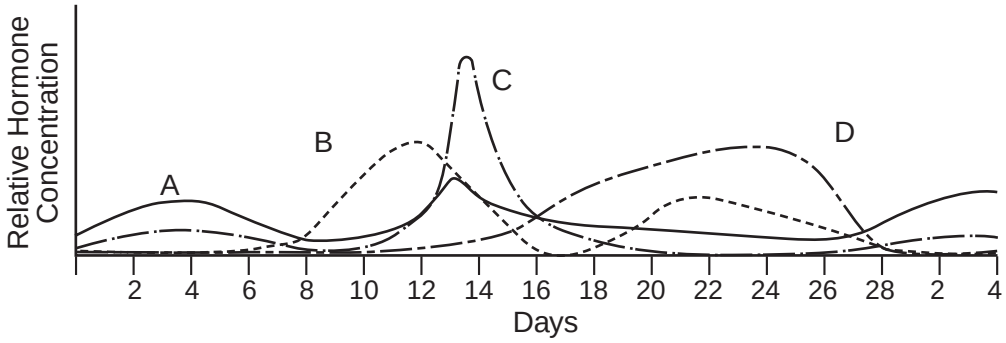
24 Some organizations are buying up sections of forest land. Once purchased, these sections of forest will never be cut down. The main reason for protecting these sections of forest is to

(1) cause the extinction of undesirable animal species
(2) prevent these trees from reproducing too fast
(3) maintain the diversity of the living environment
(4) provide more land for agricultural purposes

25 The rapid destruction of tropical rain forests may be harmful because

(1) removing trees will prevent scientists from studying ecological succession
(2) genetic material that may be useful for future medical discoveries will be lost
(3) energy cycling in the environment will stop
(4) the removal of trees will limit the construction of factories that will pollute the environment

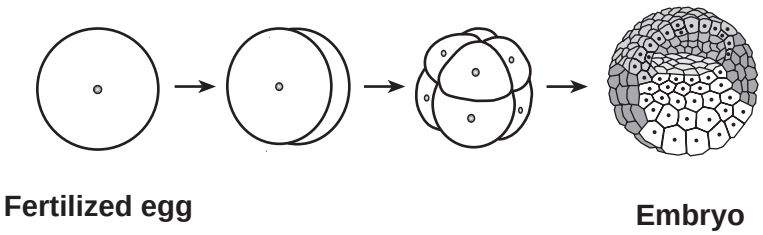
26 The graph below shows the different concentrations of female reproductive hormones *A*, *B*, *C*, and *D* over a 28-day cycle.



Although the data used to make this graph was originally entered in a data table, most scientists prefer to see the information in the form of a graph because

(1) the information in a graph is more accurate than the information in a data table
(2) it is easier to see relationships between variables in a graph than in a data table
(3) it is possible to put more information in a graph than in a data table
(4) only graphs can be used to predict future trends

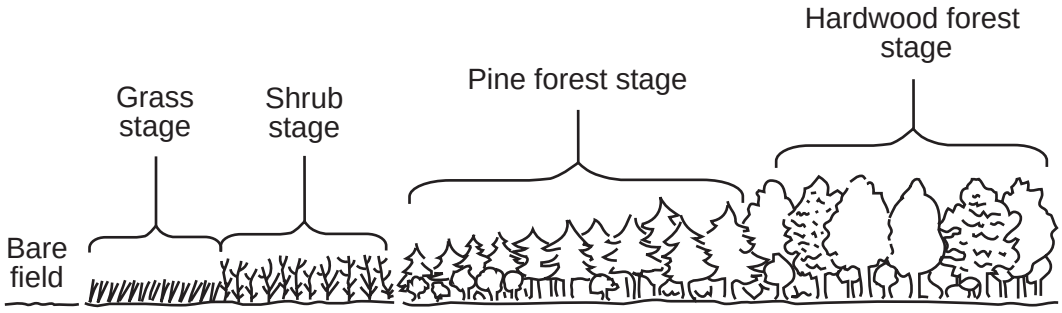
27 Part of embryonic development in a species is illustrated in the diagram below.



Which set of factors plays the most direct role in controlling the events shown in the diagram?

(1) genes, hormones, and cell location
(2) antibodies, insulin, and starch
(3) ATP, amino acids, and inorganic compounds
(4) abiotic resources, homeostasis, and selective breeding

28 Which of the stages in the diagram below consists of plant species that modify the environment, eventually making it more suitable for another community?



(1) grass stage, only
(2) grass, shrub, and pine forest stages
(3) shrub, pine forest, and hardwood forest stages
(4) hardwood forest stage, only

29 Increased production of goods makes our lives more comfortable, but causes an increase in the demand for energy and other resources. One *negative* impact of this situation on ecosystems is an increase in

(1) living space for wildlife
(2) renewable resources
(3) the diversity of plant species
(4) pollution levels in the atmosphere

30 Humans are responsible for some of the *negative* changes that occur in nature because they

(1) have encouraged the development of wildlife refuges and parks
(2) have passed laws to preserve the environment
(3) are able to preserve scarce resources
(4) are able to modify habitats more than any other species

Part B–1

Answer all questions in this part. [5]

Directions (31–35): 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.

Base your answers to questions 31 and 32 on the information below and on your knowledge of biology.

In a class, each student made three models of the small intestine using three artificial membrane tubes. They filled each of the three tubes with equal amounts of water, starch, protein, and vitamin C. They added starch-digesting enzyme to tube 1. They added protein-digesting enzyme to tube 2. No enzyme was added to tube 3. The ends of the membrane tubes were sealed and the tubes were soaked for 24 hours in beakers of pure water. The beakers were numbered 1, 2, and 3, corresponding to the number of the tube they contained. At the end of the experiment, the students removed the tubes and tested the water in the beakers for the presence of nutrients.

31 Sugar would most likely be present in the water in

(1) beaker 1, only
(2) beaker 2, only
(3) beakers 1 and 3, only
(4) beakers 1, 2, and 3

32 Which statement would be a valid inference if vitamin C had been present in the water in each beaker?

(1) The water synthesized vitamin C.
(2) Vitamin C is a small molecule.
(3) The membrane tube produced vitamin C.
(4) The concentration of vitamin C is higher in the beaker than in the membrane tube.

Base your answer to question 33 on the information below and on your knowledge of biology.

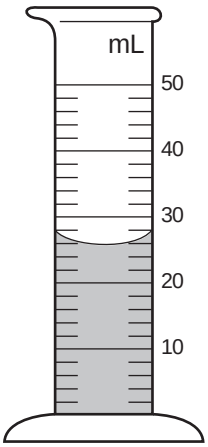
The dodo bird inhabited the island of Mauritius in the Indian Ocean, where it lived undisturbed for years. It lost its ability to fly and it lived and nested on the ground where it ate fruits that had fallen from trees. There were no mammals living on the island.

In 1505, the first humans set foot on Mauritius. The island quickly became a stopover for ships engaged in the spice trade. The dodo was a welcome source of fresh meat for the sailors and large numbers of dodos were killed for food. In time, pigs, monkeys, and rats brought to the island ate the dodo eggs in the ground nests.

33 Which statement describes what most likely happened to the dodo bird within 100 years of the arrival of humans on Mauritius?

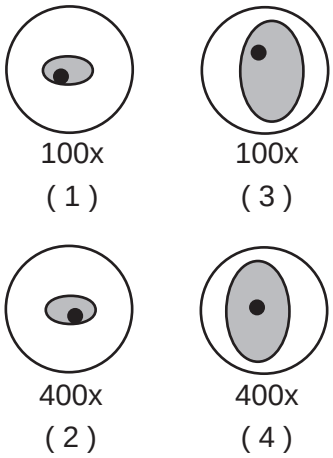
(1) Dodo birds developed the ability to fly in order to escape predation and their population increased.
(2) The dodo bird population increased after the birds learned to build their nests in trees.
(3) Human exploitation and introduced species significantly reduced dodo bird populations.
(4) The dodo bird population became smaller because they preyed upon the introduced species.

34 What is the volume of the liquid in the graduated cylinder shown below?



(1) 23 mL
(2) 26 mL
(3) 27 mL
(4) 28 mL

35 The diagrams below show four different one-celled organisms (shaded) in the field of view of the same microscope using different magnifications. Which illustration shows the largest one-celled organism?



Part B–2

Answer all questions in this part. [20]

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Directions (36–54): 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.

36 A student performed an experiment to determine if treating 500 tomato plants with an auxin (a plant growth hormone) will make them grow faster. The results are shown in the table below.

Days	Average Stem Height (cm)
1	10
5	13
10	19
15	26
20	32
25	40

Explain why the student can *not* draw a valid conclusion from these results. [1]

_____

_____

36 ☐

37 The diagram below represents a food web.

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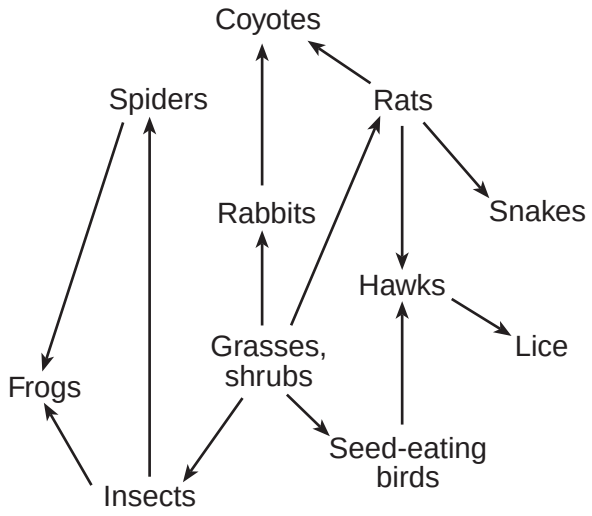

The arrows only point away from "Grasses, shrubs" and not toward them. State one biological reason that this is so. [1]

_____

_____

37 ☐

38 The chart below contains a number of characteristics for three different organisms. The characteristics can be used in classifying these organisms.

Characteristics	Organism A	Organism B	Organism C
Number of cells	unicellular	multicellular	unicellular
Type of nutrition	autotrophic	autotrophic	heterotrophic
Nuclear membrane	absent	present	absent
DNA	present	present	present

Which *two* organisms would be expected to have the most similar genetic material? Support your answer using information from the chart. [2]

_____ and _____

_____

_____

38 ☐

Base your answers to questions 39 through 42 on the information and data table below and on your knowledge of biology.

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A student grew two separate cultures of single-celled organisms. One culture contained *Paramecium caudatum* and the other contained *Paramecium aurelia*. The cultures were grown under the same conditions and the number of paramecia (per drop) in each culture was estimated every 2 days for a period of 16 days. The results are shown in data table 1 below.

Data Table 1: Growth of *Paramecium aurelia* and *Paramecium caudatum* in Individual Cultures

Days	Number of *Paramecium caudatum* (per drop)	Number of *Paramecium aurelia* (per drop)
0	4	4
2	10	10
4	30	46
6	48	66
8	58	70
10	62	69
12	60	71
14	61	71
16	60	71

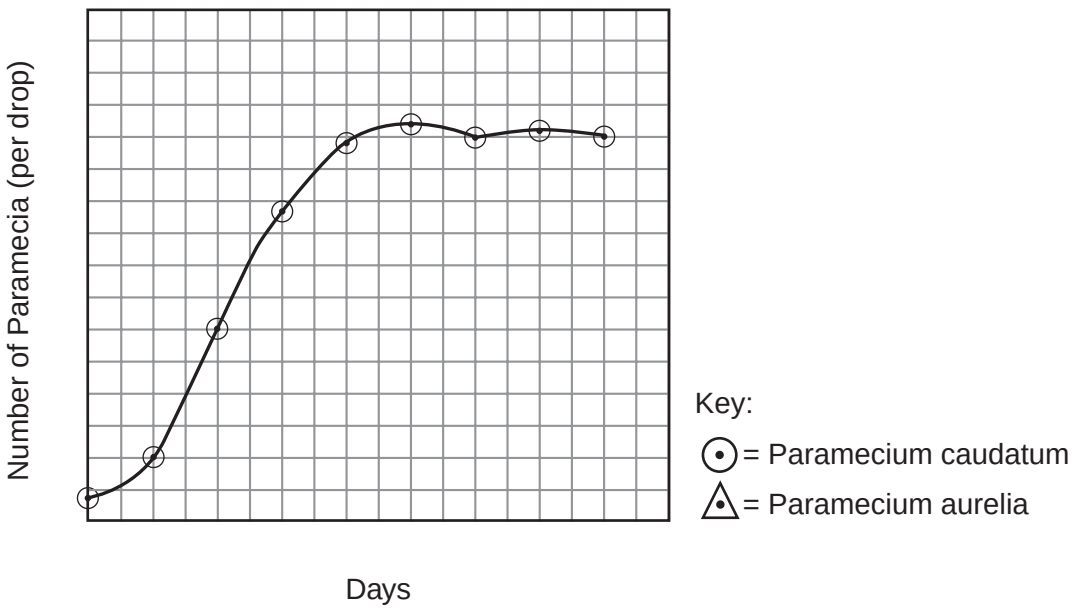
Directions (39–40): Using the information in the data table, construct a line graph on the grid provided on the next page, following the directions below.

39 Mark a scale on each labeled axis appropriate for the data for *Paramecium caudatum* that has already been plotted on the grid. [1]

40 Plot the data for *Paramecium aurelia* on the grid. Surround each point with a small triangle and connect the points. [1]

Example: 

Growth of *Paramecium aurelia* and *Paramecium caudatum* in Individual Cultures



39 ☐

40 ☐

41 Describe the change in the two populations between days 0 and 8. [1]

_____

_____ 41 ☐

42 State one possible reason for the difference in the rates of change in the two populations of paramecia between days 0 and 8. [1]

_____

_____ 42 ☐

Base your answers to questions 43 through 45 on the diagrams below of two cells, *X* and *Y*, and on your knowledge of biology.

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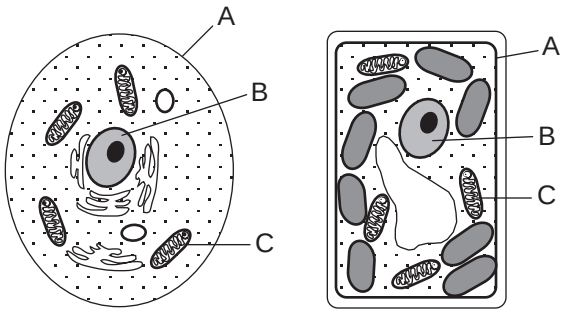


Cell X **Cell Y**

43 Select one lettered organelle and write the letter of that organelle in the space below. Identify the organelle you selected. [1]

_____

_____

43 ☐

44 State one function of the organelle that you identified in question 43. [1]

_____

44 ☐

45 Identify one process that is carried out in cell *Y* that is *not* carried out in cell *X*. [1]

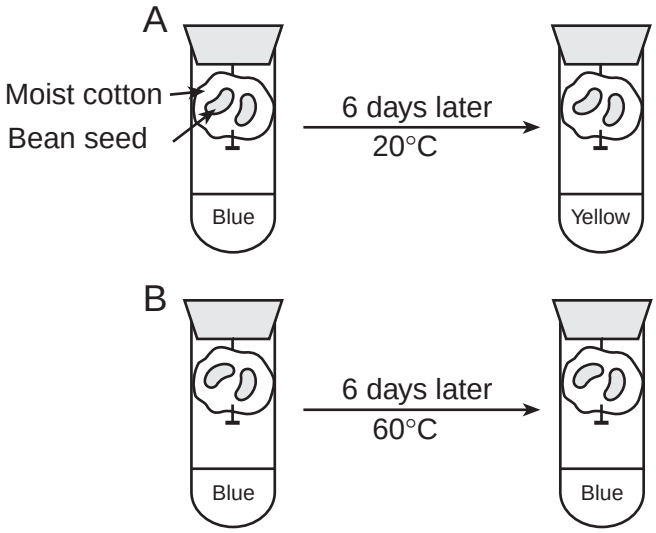
_____

_____

45 ☐

Base your answers to questions 46 and 47 on the information and diagram below and on your knowledge of biology.

Two test tubes, *A* and *B*, were set up as shown in the diagram below. Bromthymol blue, which turns from blue to yellow in the presence of carbon dioxide, was added to the water at the bottom of each tube before the tubes were sealed. The tubes were maintained at the temperatures shown for six days. (Average room temperature is 20°C.)



46 Identify the life process responsible for the change in tube *A*. [1]

_____

46 ☐

47 Explain how the temperature difference could lead to the different results in tubes *A* and *B* after six days. [1]

_____

_____

_____

47 ☐

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Base your answers to questions 48 through 50 on the passage below and on your knowledge of biology.

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Great Effects on the Great Lakes due to Global Warming

Trees such as the jack pine, yellow birch, red pine, and white pine may no longer be able to grow in the Great Lakes region because summers are becoming warmer. However, other trees such as black walnut and black cherry may grow in the area, given enough time. The change in weather would favor these new tree species.

The Great Lakes region is the only place in the world where the endangered Kirtland's Warbler breeds. This bird species nests in young jack pine trees (5 to 23 years old). The vegetation must have specific characteristics or the birds will not nest. A specific area of Michigan is one of the few preferred areas. If the jack pines can no longer grow in this area, the consequences for the Kirtland's Warbler could be devastating.

Recent research findings also suggest that algae production in Lake Ontario and several other Great Lakes will be affected as warmer weather leads to warmer lake water. An increase in water temperature reduces the ability of water to hold dissolved oxygen. These changes have implications for the entire Great Lakes food web. Changes in deep-water oxygen levels and other habitat changes may prevent the more sensitive cold-water fish from occupying their preferred niches in a warmer climate.

All other factors being equal, climatic changes may not have a negative effect on every species in the Great Lakes region. This is because the length of the growing season would be increased. Some temperature-sensitive fish could move to cooler, deeper water when the surface water temperatures become too high. The total impact of global warming is difficult to predict.

48 Explain how the habitat of the Kirtland's Warbler may be changed as a result of global warming. [1]

_____

_____

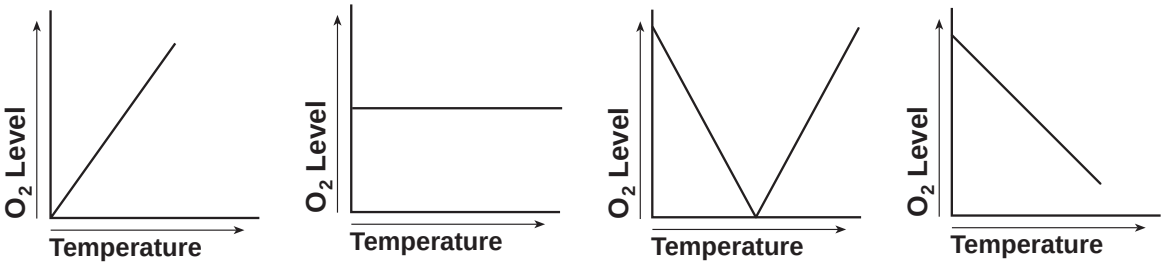
48 ☐

49 Identify one producer found in the water of Lake Ontario. [1]

_____

49 ☐

50 Which graph best shows the relationship between changes in temperature in the Great Lakes waters and the amount of dissolved oxygen those waters can hold?



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50 ☐

Base your answers to questions 51 through 54 on the lake ecosystem represented below and on your knowledge of biology.

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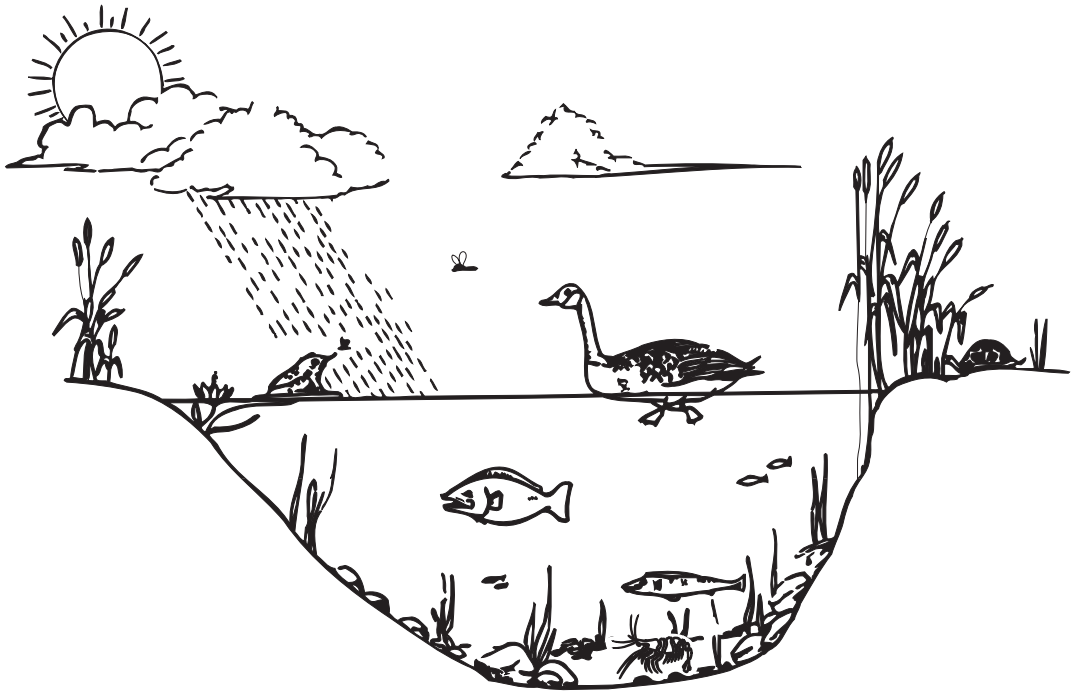


51 Identify one organism represented in the diagram that provides the vital link for the transfer of energy from the Sun to the other organisms in the ecosystem. [1]

_____

51 ☐

52 Identify one predator/prey relationship that may occur in this ecosystem. [1]

Predator: _____ Prey: _____

52 ☐

53 State one piece of evidence from the diagram that indicates that light penetrates to the bottom of the lake. [1]

_____

_____

53 ☐

54 Identify the type of organism that is *not* visible in the diagram but *must* be present in this ecosystem to recycle the remains of dead organisms. [1]

_____

54 ☐

Part C

Answer all questions in this part. [17]

For Teacher Use Only

Directions (55–65): Record your answers in the spaces provided in this examination booklet.

55 Organ systems of the human body interact to maintain a balanced internal environment. As blood flows through certain organs of the body, the composition of the blood changes because of interactions with those organs. State one change in the composition of the blood as it flows through the digestive system. [1]

_____

_____

55 ☐

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

Mutations are often referred to as the "raw materials" of evolution.

56 State one reason that mutations are often referred to as the "raw materials" of evolution. [1]

_____

_____

_____

56 ☐

57 Use appropriate letters to write a 9-base DNA sequence that could represent a portion of a gene. [1]

_____

57 ☐

58 Show one example of what could happen to the 9-base DNA sequence you wrote in question 57 if a mutation occurred in that gene. [1]

_____

58 ☐

59 Define fertilization and describe the resulting development of a human embryo. In your answer, be sure to include a definition of fertilization and the functions of the ovary, uterus, and placenta. Circle the terms *fertilization*, *ovary*, *uterus*, and *placenta* in your description. [4]

For Teacher Use Only

59 ☐

Base your answers to questions 60 and 61 on the information below and on your knowledge of biology.

The reproductive cycle in a human female is not functioning properly. An imbalance of hormones is diagnosed as the cause.

60 Identify one hormone directly involved in the human female reproductive system that could cause this problem. [1]

60 ☐

61 Explain why some cells in a female's body respond to reproductive hormones while other cells do not. [1]

61 ☐

62 The energy demands of a cell or an organism are met as a result of interactions between several life functions.

- Identify *two* life functions involved in meeting the energy demands of a cell or an organism. [2]

_____ and _____

- Explain how these two life functions interact to make energy available. [2]

_____

_____ 62 ☐

For Teacher Use Only

Base your answers to questions 63 through 65 on the information below and on your knowledge of biology.

> Gaurs, which are large oxlike animals found in South Asia, have been hunted for sport for many generations. Most recently, as human populations have increased, the gaur's habitats of forests, bamboo jungles, and grasslands have dwindled. The gaur is now considered an endangered species.
>
> Scientists have succeeded in preserving endangered species by cloning. Recently, a gaur was cloned and the resulting embryo was placed inside a domestic cow, which then gave birth to a baby gaur.

63 Describe how gaurs produced through normal means are different from gaurs produced by cloning. [1]

_____

_____ 63 ☐

64 State one biological benefit of preserving endangered species. [1]

_____ 64 ☐

65 State one way, other than cloning, that gaurs might be saved from extinction. [1]

_____

_____ 65 ☐

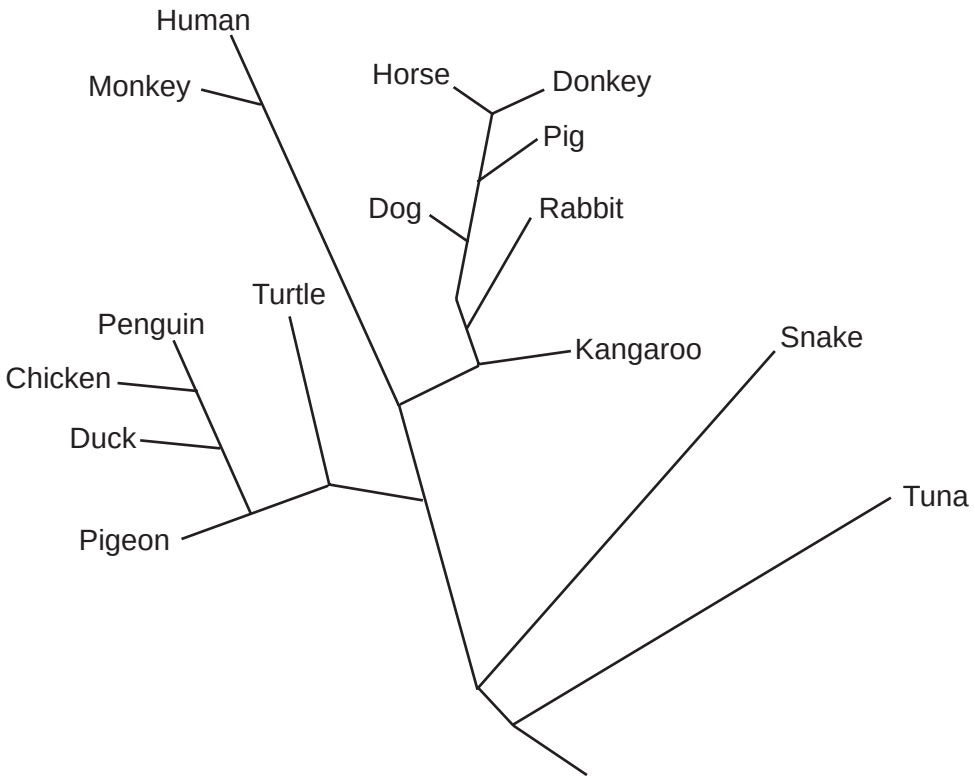
Part D

Answer all questions in this part. [13]

Directions (66–73): For those questions that are followed by four choices, circle the *number* of the choice that best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question.

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

Based on their analysis of the differences in amino acid sequences of one kind of protein, scientists prepared the evolutionary tree shown below.



66 According to this diagram, the DNA of which pair of organisms would show the greatest similarity?

(1) penguin and turtle

(2) horse and donkey

(3) snake and tuna

(4) turtle and rabbit

66 ☐

For Teacher Use Only

67 Older systems of classification always placed penguins, chickens, ducks, and pigeons in the bird group and turtles and snakes in the reptile group. Does this diagram support the older system of classification? Explain your answer. [1]

For Teacher Use Only

_____

_____

67 ☐

68 According to this diagram, is the pig more closely related to the dog or the kangaroo? Justify your answer. [1]

_____

_____

68 ☐

69 An increase in heart rate will most likely result in

(1) a decrease in metabolic rate

(2) an increase in pulse rate

(3) an increase in cell division

(4) a decrease in body temperature

69 ☐

70 A student squeezed a clothespin as many times as possible in a 30-second time period. The student repeated this procedure nine more times in quick succession. The data obtained are in the chart below.

Trial	Number of Squeezes in 30 Seconds
1	32
2	29
3	28
4	27
5	26
6	25
7	23
8	21
9	19
10	17

State one hypothesis that this data would support concerning the relationship between number of trials and number of squeezes in 30 seconds. [1]

_____

_____ 70 ☐

71 Beak structures differ between individuals of one species of bird. These differences most likely indicate

(1) the presence of a variety of food sources

(2) a reduced rate of reproduction

(3) a large supply of one kind of food

(4) an abundance of predators 71 ☐

For Teacher Use Only

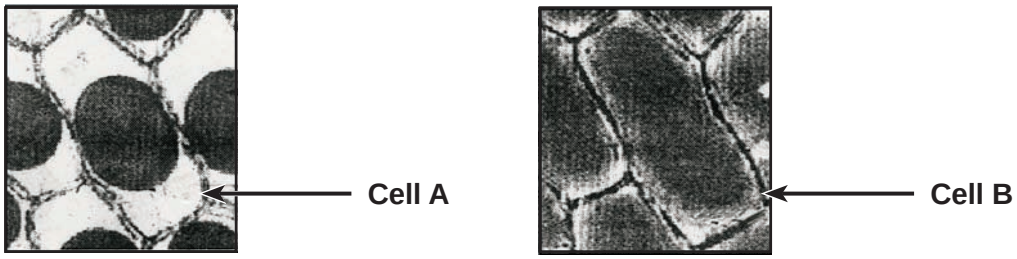
72 A hawk has a genetic trait that gives it much better eyesight than other hawks of the same species in the same area. Explain how this could lead to evolutionary change within this species of hawk over a long period of time. In your answer, be sure to include an explanation of:

- competition within the hawk population [1]
- survival of various individuals in the population [1]
- how the frequency of the better-eyesight trait would be expected to change over time within the population [1]
- what would most likely happen to the hawks having the better-eyesight trait if they also had unusually weak wing muscles [1]

For Teacher Use Only

72

73 The photos below show two red onion cells viewed with the high power of a compound light microscope. Describe the steps that could be used to make cell *A* resemble cell *B* using a piece of paper towel and an eyedropper or a pipette *without removing the coverslip*. [3]



For Teacher Use Only

73

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Friday, January 28, 2005 — 9:15 a.m. to 12:15 p.m., only

ANSWER SHEET

Student ..... Sex: ☐ Female ☐ Male

Teacher .....

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

Part	Maximum Score	Student's Score
A	30	
B–1	5	
B–2	20	
C	17	
D	13	
Total Raw Score (maximum Raw Score: 85)		
Final Score (from conversion chart)		

Raters' Initials

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

Record your answers to Part A and Part B–1 on this answer sheet.

Part A

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

Part A Score

Part B–1

31	34 .....
32	35 .....
33	

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

Friday, January 28, 2005 — 9:15 a.m. to 12:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

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

Updated information regarding the rating of this examination may be posted on the New York State Education Department's web site during the rating period. Visit the site http://www.emsc.nysed.gov/osa/ and select the link "Latest Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and at least one more time before the final scores for the examination are recorded

Part A and Part B–1

Allow one credit for each correct answer.

Part A

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

Part B–1

(31)	**1**	(34)	**2**
(32)	**2**	(35)	**3**
(33)	**3**		

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

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

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

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

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

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

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

Raters should enter the scores earned for Part A, Part B–1, Part B–2, Part C, and Part D on the appropriate lines in the box printed on the answer sheet and should add these 5 scores and enter the total in the box labeled "Total Raw Score." Then the student's raw score should be converted to a scaled score by using the conversion chart that will be posted on the Department's web site http://www.emsc.nysed.gov/osa/ on Friday, January 28, 2005. The student's scaled score should be entered in the box labeled "Final Score" on the student's answer booklet. 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

36 Allow 1 credit for explaining why the student can *not* draw a valid conclusion. Acceptable responses include, but are not limited to:

— There is no control group.
— There is no basis for comparison.
— There is no data on "normal" growth.

37 Allow 1 credit for stating one biological reason that the arrows only point away from "Grasses, shrubs" and not toward them. Acceptable responses include, but are not limited to:

— The grasses and shrubs produce the food which is then transferred to other members of the food web.
— Grasses and shrubs are not consumers.
— They don't eat other members of the food web.
— Arrows show the direction of energy flow.
— Arrows point to organisms that eat them.

38 Allow a maximum of 2 credits, 1 credit for identifying the two organisms that would be expected to have the most similar genetic material and 1 credit for using information from the chart to support the answer.

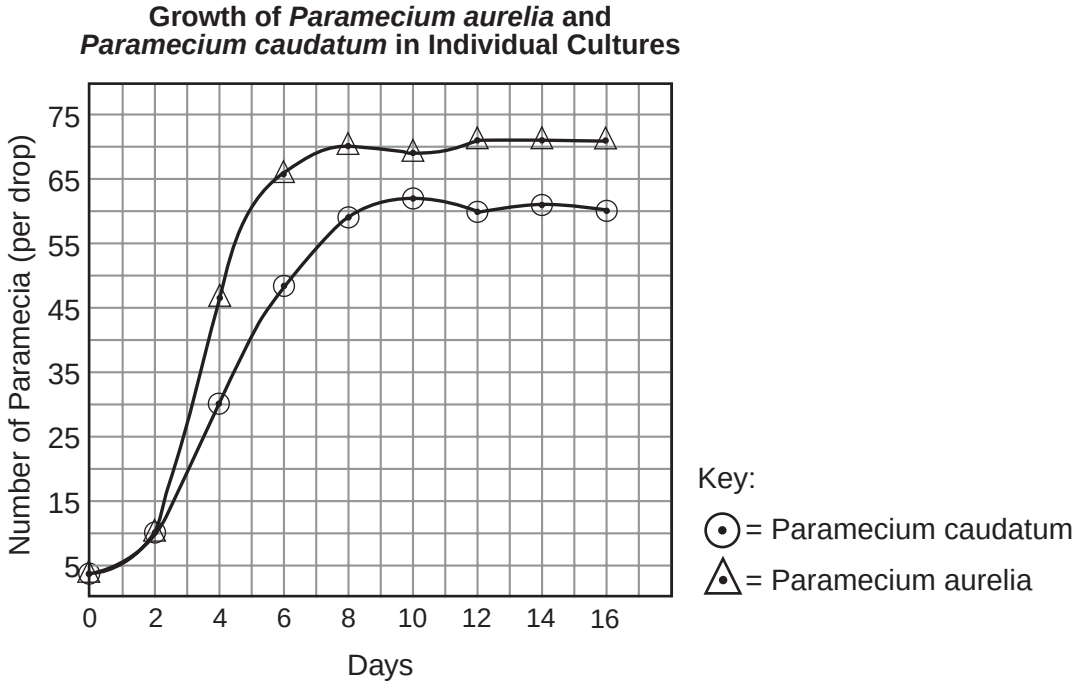
Example of a 2-Credit Response

A and *C* would probably have the most similar genetic material. *A* and *C* have more of the given characteristics in common than any other pair.

39 Allow 1 credit for marking a scale on each labeled axis appropriate for the data for *Paramecium caudatum* that has already been plotted.

40 Allow 1 credit for plotting the data for *Paramecium aurelia* correctly (based on the student's axes), surrounding each point with a triangle, and connecting the points.

Example of a 2-Credit Graph



41 Allow 1 credit for describing the change in the two populations between days 0 and 8. Acceptable responses include, but are not limited to:

— Both populations increased in number.
— The population of *Paramecium aurelia* increased at a slightly greater rate than *Paramecium caudatum*.

42 Allow 1 credit for indicating that *Paramecium aurelia* grows (reproduces) faster than *Paramecium caudatum* or that *Paramecium aurelia* is better adapted to the environment than *Paramecium caudatum*.

43 Allow 1 credit for *A* — cell/plasma membrane *or B* — nucleus *or C* — mitochondrion.

44 Allow 1 credit for stating one function of the organelle selected. Acceptable responses include, but are not limited to:

— *A* (cell membrane) regulates what enters and leaves the cell.

— *B* (nucleus) controls cell activities or contains the genetic codes. (Do *not* accept "brain" or "control center" without further explanation.)

— *C* (mitochondrion) respiration or energy release or production of ATP (Do *not* accept "power house" without further explanation.)

Note: If the response specifies the letter or organelle name, the function must match it. If only a function is given, and if the response to question 43 is incorrect, allow credit for this question if the response correctly matches a function with either the letter or organelle identified in the response for question 43.

45 Allow 1 credit for identifying one process carried out in cell *Y* that is not carried out in cell *X*. Acceptable responses include, but are not limited to:

— photosynthesis
— production of cellulose
— produces chlorophyll
— producing its own food

46 Allow 1 credit for identifying the life process responsible for the change in tube *A*. Acceptable responses include, but are not limited to:

— cellular respiration
— respiration

47 Allow 1 credit for explaining how the temperature difference could lead to the different results in tubes *A* and *B* after six days. Acceptable responses include, but are not limited to:

— The shape of enzymes changes at high temperatures.
— The rate at which the enzymes work is affected by the temperature.
— Tube *B* is too hot.
— The beans will not grow at 60° so they will not respire and will not produce CO_2.

48 Allow 1 credit for explaining how the habitat of Kirtland's Warbler may be changed as a result of global warming. Acceptable responses include, but are not limited to:

— Global warming may result in the dying out of the young jack pines where the Kirtland's Warbler lives.
— Temperature increases could reduce the population of jack pine.

49 Allow 1 credit for identifying one producer found in the water of Lake Ontario. Acceptable responses include, but are not limited to:

— algae
— plants

50 4

51 Allow 1 credit for identifying one organism represented in the diagram that provides the vital link for the transfer of energy from the Sun to the other organisms in the ecosystem. Acceptable responses include, but are not limited to:

— plant
— cattail
— pond lily
— producers
— autotrophs

52 Allow 1 credit for identifying one predator/prey relationship that may occur in this ecosystem. Acceptable responses include, but are not limited to:

— frog/insect
— big fish/little fish
— fish/crayfish
— duck or goose/frog
— duck or goose /insect

53 Allow 1 credit for stating one piece of evidence from the diagram that indicates that light penetrates to the bottom of the lake. Acceptable responses include, but are not limited to:

— There are plants growing on the lake bottom.
— Plants are living in the deepest part of the lake.

54 Allow 1 credit for identifying the type of organism that is not visible in the diagram but must be present in this ecosystem to recycle the remains of dead organisms. Acceptable responses include, but are not limited to:

— decomposers
— bacteria
— fungi

Part C

55 Allow 1 credit for stating one change in the composition of the blood as it flows through the digestive system. Acceptable responses include, but are not limited to:

— The blood absorbs nutrients.
— Food is added to the blood as it flows through the digestive system.
— Sugar is added.
— Amino acids are added.
— decrease in oxygen

56 Allow 1 credit for stating one reason that mutations are often referred to as the "raw materials" of evolution. Acceptable responses include, but are not limited to:

— Mutations may result in variations that may promote survival.
— A mutation can result in the production of a new variation that could be passed on to offspring.
— Mutations cause variations.

57 Allow 1 credit for using appropriate letters to write a 9-base DNA sequence that could represent a portion of a gene. Acceptable responses include, but are not limited to:

— AACCTGCTC
— CCTACGGCA

58 Allow 1 credit for showing one example of what could happen to the 9-base DNA sequence if a mutation occurred in that gene. At least one change to the student's answer to question 57 must be indicated.

59 Allow a maximum of 4 credits for a definition of the process of fertilization and a description of the resulting development of a human embryo. The answer must include:

- a definition of fertilization [1]
- the function of the following structures
  — ovary [1]
  — uterus [1]
  — placenta [1]

Example of a 4-Credit Response

Eggs are produced in the ovaries. Fertilization occurs when a sperm unites with an egg. An embryo forms and is implanted into the uterus. A placenta develops and helps provide nutrients for the embryo. (The placenta also provides oxygen for the embryo and it helps to remove wastes from the embryo.)

Note: Do *not* deduct credit if the student does not circle the terms.

60 Allow 1 credit for identifying one hormone directly involved in the human female reproductive system that could cause this problem. Acceptable responses include, but are not limited to:

— estrogen
— progesterone
— FSH
— LH

61 Allow 1 credit for explaining why some cells in a female's body respond to reproductive hormones while other cells do not. Acceptable responses include, but are not limited to:

— The cells that respond have appropriate receptors.
— Cells that don't respond do not have appropriate receptors.
— The shape of the hormone molecule is recognized by cells in the reproductive system.
— Some cells recognize the reproductive hormones and respond to them. (The student must indicate recognition.)
— Specific reproductive hormones target specific cells.

Note: Do *not* allow credit for stating that only cells in the reproductive system will respond without explaining why they respond.

62 Allow a maximum of 4 credits for identifying two life functions involved in meeting the energy demands of a cell or organism and explaining how they interact to make energy available, allocated as follows:

- Allow a maximum of 2 credits, 1 for each of two life functions involved in meeting energy demands of a cell or organism. Acceptable responses include, but are not limited to:

  — digestion
  — transport
  — respiration
  — photosynthesis

- Allow a maximum of 2 credits, 1 for explaining how each life function identified interacts with the other to make energy available. Acceptable responses include, but are not limited to:

  — Digestion breaks food down into smaller molecules which can pass across the lining of the intestine and enter the blood and be transported to cells for energy release.
  — Photosynthesis produces food that is broken down by respiration to make energy available.

63 Allow 1 credit for describing how gaurs produced through normal means are different from gaurs produced by cloning. Acceptable responses include, but are not limited to:

— Gaurs produced by normal means have more variations than gaurs produced by cloning.
— Gaurs produced by normal means have genetic material from both parents.
— Gaurs produced by cloning are genetically identical.

64 Allow 1 credit for stating one biological benefit of preserving endangered species. Acceptable responses include, but are not limited to:

— helps preserve biodiversity
— ensures availability of a variety of genetic material

65 Allow 1 credit for stating one way, other than cloning, that gaurs might be saved from extinction. Acceptable responses include, but are not limited to:

— preserving the habitats in which they live
— restricting hunting of gaurs

Part D

66 2

67 Allow 1 credit for stating that the diagram does not support the older system of classification and providing an explanation. Acceptable responses include, but are not limited to:

— Snakes are in their own group, rather than grouped with turtles.
— Turtles are on the same branch as the birds.
— Snakes have one kind of protein that is very different from that found in turtles and birds.

68 Allow 1 credit for stating that the pig is more closely related to the dog than it is to the kangaroo, and justifying that answer. Acceptable responses include, but are not limited to:

— separated more recently
— closer together on the tree
— have a more recent common ancestor
— The protein in the pig is more similar to that in the dog.

69 2

70 Allow 1 credit for stating a hypothesis relating the number of trials and number of squeezes in 30 seconds that is supported by the data. Acceptable responses include, but are not limited to:

— The number of squeezes in 30 seconds will decrease with each consecutive trial.
— As the number of trials increases, the number of squeezes decreases.

71 1

72 Allow a maximum of 4 credits for explaining how a genetic trait that gives a hawk better eyesight than other hawks of the same species in the same area could lead to evolutionary change within this species of hawk over a long period of time. The answer must include an explanation of:

- competition within the hawk population [1]
  Acceptable responses include, but are not limited to:

  — The hawk with the better eyesight would compete more successfully.
  — The hawks with the better eyesight would have a better chance of obtaining food.

- survival of various individuals in the population [1]
  Acceptable responses include, but are not limited to:

  — Individuals with the better-eyesight trait would have a better chance to survive.

- how the frequency of the better-eyesight trait would be expected to change over time within the population [1]
  Acceptable responses include, but are not limited to:

  — The frequency of the better-eyesight trait would increase.

- what would most likely happen to the hawks having the better-eyesight trait if they also had unusually weak wing muscles [1]
  Acceptable responses include, but are not limited to:

  — If the hawks have better eyesight and weak wings, they will not have the same advantage as those with better eyesight and normal wings.

73 Allow a maximum of 3 credits for describing the steps that could be used to make cell *A* resemble cell *B* using a piece of paper towel and an eye-dropper or a pipette without removing the coverslip, allocated as follows:

- Allow 1 credit for stating that the paper towel should be placed along one edge of the coverslip.
- Allow 1 credit for stating that water is needed.
- Allow 1 credit for stating that the water (liquid) should be placed along the edge of the coverslip opposite the paper towel.

The *Chart for Determining the Final Examination Score for the January 2005 Regents Examination in Living Environment* will be posted on the Department's web site http://www.emsc.nysed.gov/osa on Friday, January 28, 2005. 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.

Map to Core Curriculum

January 2005 Living Environment

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

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

University of the State of New York
State Education Department

Regents Examination in Living Environment
January 2005

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

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

Because scaled scores corresponding to raw scores in the conversion chart may change from one examination to another, it is crucial that for each administration, the conversion chart provided 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.