

LIVING ENVIRONMENT

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

LIVING ENVIRONMENT

Wednesday, June 21, 2006 — 9:15 a.m. to 12:15 p.m., only

Student Name _____

School Name _____

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

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

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

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

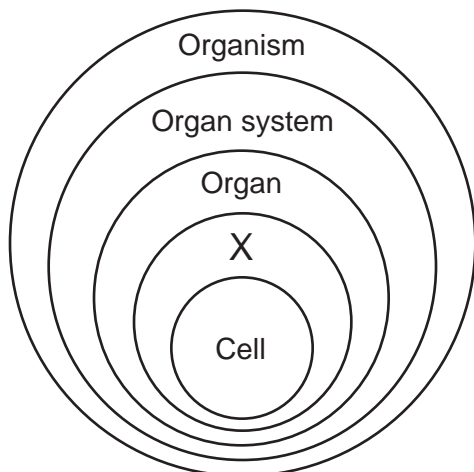
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Part A

Answer all questions in this part. [30]

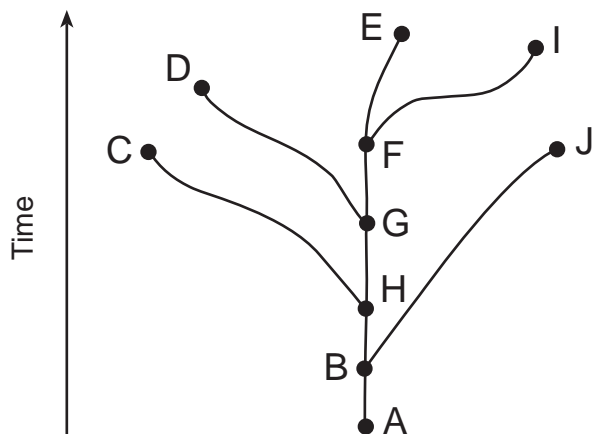
Directions (1–30): For *each* statement or question, write on your separate answer sheet the *number* of the word or expression that, of those given, best completes the statement or answers the question.

- 1 The diagram below represents levels of organization in living things.



Which term would best represent X?

- (1) human (3) stomach
 (2) tissue (4) organelle
- 2 The evolutionary pathways of ten different species are represented in the diagram below.



Which two species are the most closely related?

- (1) C and D (3) G and J
 (2) E and I (4) A and F

- 3 Which row in the chart below best describes the active transport of molecule X through a cell membrane?

Row	Movement of Molecule X	ATP
(1)	high concentration → low concentration	used
(2)	high concentration → low concentration	not used
(3)	low concentration → high concentration	used
(4)	low concentration → high concentration	not used

- 4 Hereditary information is stored inside the
- (1) ribosomes, which have chromosomes that contain many genes
 (2) ribosomes, which have genes that contain many chromosomes
 (3) nucleus, which has chromosomes that contain many genes
 (4) nucleus, which has genes that contain many chromosomes
- 5 A human liver cell is very different in structure and function from a nerve cell in the same person. This is best explained by the fact that
- (1) different genes function in each type of cell
 (2) liver cells can reproduce while the nerve cells cannot
 (3) liver cells contain fewer chromosomes than nerve cells
 (4) different DNA is present in each type of cell

6 Most of the starch stored in the cells of a potato is composed of molecules that originally entered these cells as

- (1) enzymes
- (2) simple sugars
- (3) amino acids
- (4) minerals

7 Hereditary traits are transmitted from generation to generation by means of

- (1) specific sequences of bases in DNA in reproductive cells
- (2) proteins in body cells
- (3) carbohydrates in body cells
- (4) specific starches making up DNA in reproductive cells

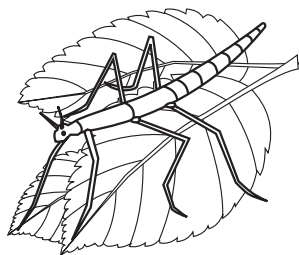
8 Which process can produce new inheritable characteristics within a multicellular species?

- (1) cloning of the zygote
- (2) mitosis in muscle cells
- (3) gene alterations in gametes
- (4) differentiation in nerve cells

9 Which two processes result in variations that commonly influence the evolution of sexually reproducing species?

- (1) mutation and genetic recombination
- (2) mitosis and natural selection
- (3) extinction and gene replacement
- (4) environmental selection and selective breeding

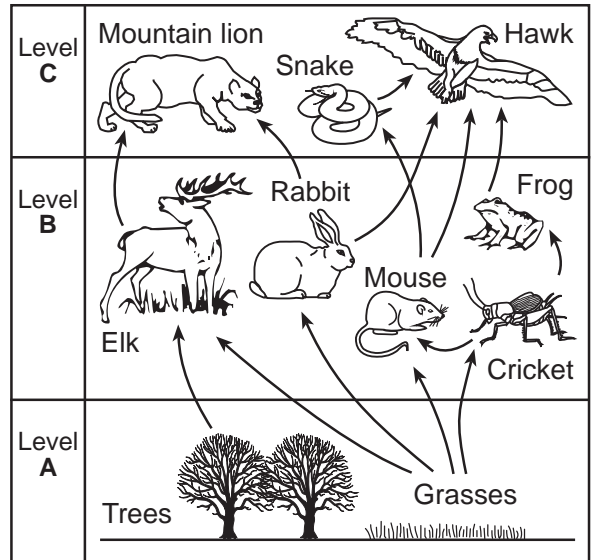
10 The illustration below shows an insect resting on some green leaves.



The size, shape, and green color of this insect are adaptations that would most likely help the insect to

- (1) compete successfully with all birds
- (2) make its own food
- (3) hide from predators
- (4) avoid toxic waste materials

11 A food web is represented below.



Which statement best describes energy in this food web?

- (1) The energy content of level B depends on the energy content of level C.
- (2) The energy content of level A depends on energy provided from an abiotic source.
- (3) The energy content of level C is greater than the energy content of level A.
- (4) The energy content of level B is transferred to level A.

12 Which statement concerning proteins is *not* correct?

- (1) Proteins are long, usually folded, chains.
- (2) The shape of a protein molecule determines its function.
- (3) Proteins can be broken down and used for energy.
- (4) Proteins are bonded together, resulting in simple sugars.

13 All chemical breakdown processes in cells directly involve

- (1) reactions that are controlled by catalysts
- (2) enzymes that are stored in mitochondria
- (3) the production of catalysts in vacuoles
- (4) enzymes that have the same genetic base sequence

14 Steps in a reproductive process used to produce a sheep with certain traits are listed below.

Step 1 — The nucleus was removed from an unfertilized egg taken from sheep *A*.

Step 2 — The nucleus of a body cell taken from sheep *B* was then inserted into this unfertilized egg from sheep *A*.

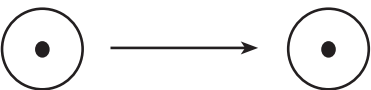
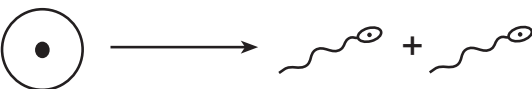
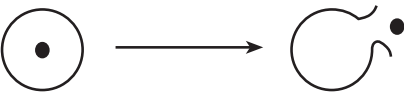
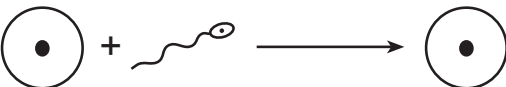
Step 3 — The resulting cell was then implanted into the uterus of sheep *C*.

Step 4 — Sheep *C* gave birth to sheep *D*.

Which sheep would be most genetically similar to sheep *D*?

- (1) sheep *A*, only
- (2) sheep *B*, only
- (3) both sheep *A* and *B*
- (4) both sheep *A* and *C*

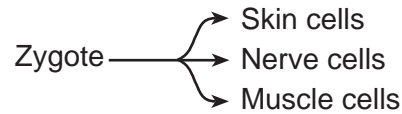
15 Which diagram best illustrates an event in sexual reproduction that would most directly lead to the formation of a human embryo?

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

16 Offspring that result from meiosis and fertilization each have

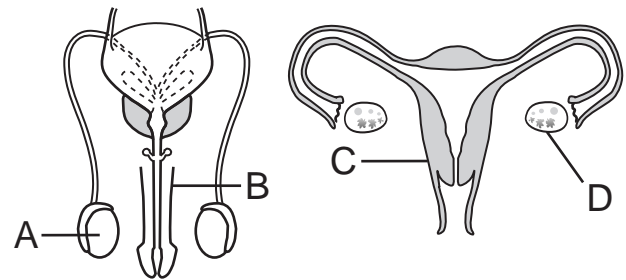
- (1) twice as many chromosomes as their parents
- (2) one-half as many chromosomes as their parents
- (3) gene combinations different from those of either parent
- (4) gene combinations identical to those of each parent

17 Which developmental process is represented by the diagram below?



- (1) fertilization
- (2) differentiation
- (3) evolution
- (4) mutation

18 The diagram below represents human reproductive systems.



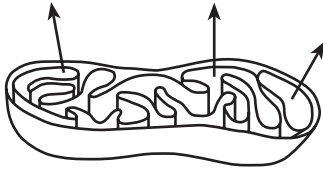
Which statement best describes part of the human reproductive process?

- (1) Testosterone produced in *A* is transferred to *D*, where it influences embryonic development.
- (2) Testosterone produced in *D* influences formation of sperm within *B*.
- (3) Estrogen and progesterone influence the activity of *C*.
- (4) Progesterone stimulates the division of the egg within *C*.

19 Which order of metabolic processes converts nutrients consumed by an organism into cell parts?

- (1) digestion → absorption → circulation → diffusion → synthesis
- (2) absorption → circulation → digestion → diffusion → synthesis
- (3) digestion → synthesis → diffusion → circulation → absorption
- (4) synthesis → absorption → digestion → diffusion → circulation

- 20 The diagram below represents a cell organelle involved in the transfer of energy from organic compounds.



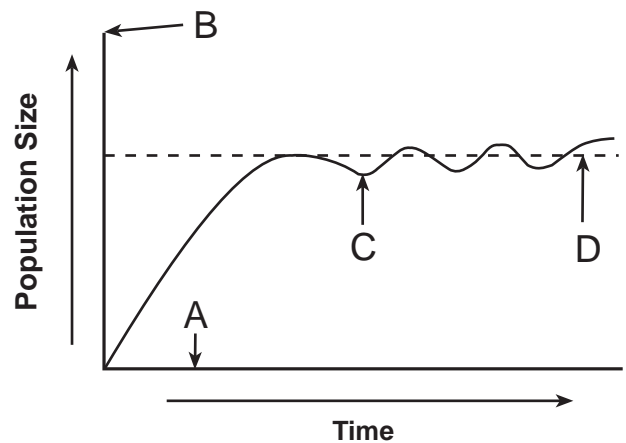
The arrows in the diagram could represent the release of

- (1) ATP from a chloroplast carrying out photosynthesis
 - (2) oxygen from a mitochondrion carrying out photosynthesis
 - (3) glucose from a chloroplast carrying out respiration
 - (4) carbon dioxide from a mitochondrion carrying out respiration
- 21 Which process illustrates a feedback mechanism in plants?
- (1) Chloroplasts take in more nitrogen, which increases the rate of photosynthesis.
 - (2) Chloroplasts release more oxygen in response to a decreased rate of photosynthesis.
 - (3) Guard cells change the size of leaf openings, regulating the exchange of gases.
 - (4) Guard cells release oxygen from the leaf at night.
- 22 Which human activity would have the most positive effect on the environment of an area?
- (1) using fire to eliminate most plants in the area
 - (2) clearing the area to eliminate weed species
 - (3) protecting native flowers and grasses in the area
 - (4) introducing a foreign plant species to the area
- 23 What impact do the amounts of available energy, water, and oxygen have on an ecosystem?
- (1) They act as limiting factors.
 - (2) They are used as nutrients.
 - (3) They recycle the residue of dead organisms.
 - (4) They control environmental temperature.

- 24 Many years ago, a volcanic eruption killed many plants and animals on an island. Today the island looks much as it did before the eruption. Which statement is the best possible explanation for this?

- (1) Altered ecosystems regain stability through the evolution of new plant species.
- (2) Destroyed environments can recover as a result of the process of ecological succession.
- (3) Geographic barriers prevent the migration of animals to island habitats.
- (4) Destroyed ecosystems always return to their original state.

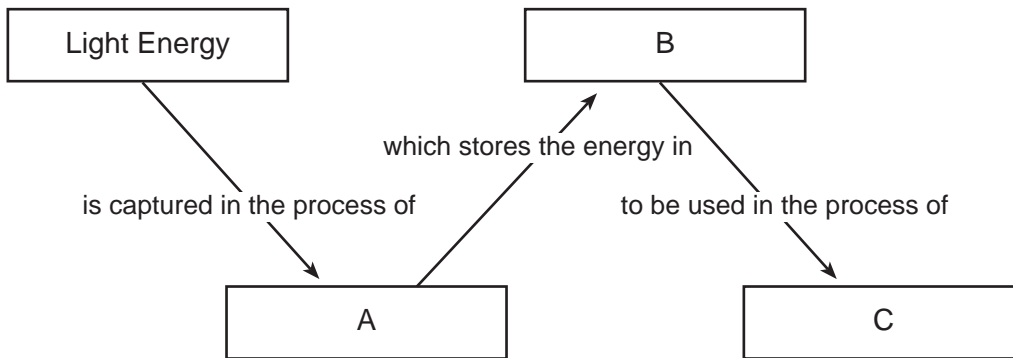
- 25 The growth of a population is shown in the graph below.



Which letter indicates the carrying capacity of the environment for this population?

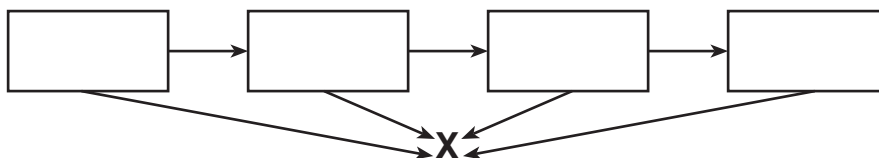
- (1) A
 - (2) B
 - (3) C
 - (4) D
- 26 When habitats are destroyed, there are usually fewer niches for animals and plants. This action would most likely *not* lead to a change in the amount of
- (1) biodiversity
 - (2) competition
 - (3) interaction between species
 - (4) solar radiation reaching the area

27 Which set of terms best identifies the letters in the diagram below?



	A	B	C
(1)	photosynthesis	inorganic molecules	decomposition
(2)	respiration	organic molecules	digestion
(3)	photosynthesis	organic molecules	respiration
(4)	respiration	inorganic molecules	photosynthesis

28 The diagram below represents some energy transfers in an ecosystem.



Which type of organism is most likely represented by letter X?

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

29 Some farmers currently grow genetically engineered crops. An argument *against* the use of this technology is that

- (1) it increases crop production
- (2) it produces insect-resistant plants
- (3) its long-term effects on humans are still being investigated
- (4) it always results in crops that do not taste good

30 The removal of nearly all the predators from an ecosystem would most likely result in

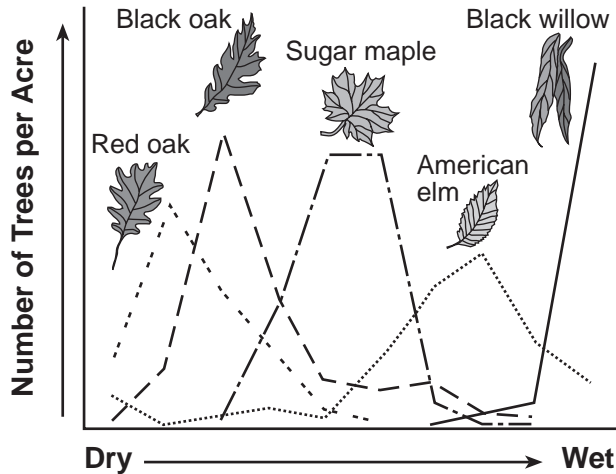
- (1) an increase in the number of carnivore species
- (2) a decrease in new predators migrating into the ecosystem
- (3) a decrease in the size of decomposers
- (4) an increase in the number of herbivores

Part B-1

Answer all questions in this part. [13]

Directions (31–43): 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.

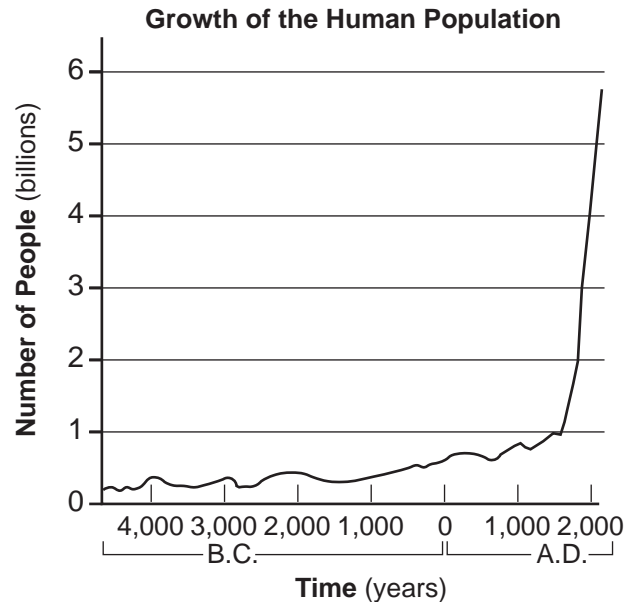
31 The graph below shows the effect of moisture on the number of trees per acre of five tree species.



Which observation best represents information shown in the graph?

- (1) All five species grow in the same habitat.
 - (2) The American elm grows in the widest range of moisture conditions.
 - (3) Red oaks can grow in wetter conditions than black willows.
 - (4) Sugar maples can grow anywhere black oaks can grow.
- 32 A science researcher is reviewing another scientist's experiment and conclusion. The reviewer would most likely consider the experiment *invalid* if
- (1) the sample size produced a great deal of data
 - (2) other individuals are able to duplicate the results
 - (3) it contains conclusions not explained by the evidence given
 - (4) the hypothesis was not supported by the data obtained

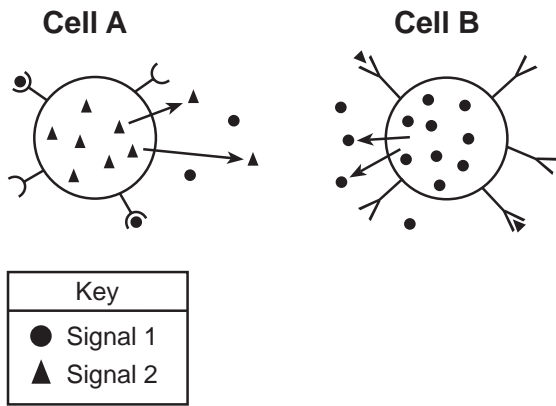
33 The graph below shows how the human population has grown over the last several thousand years.



Which statement is a valid inference that can be made if the human population continues to grow at a rate similar to the rate shown between 1000 A.D. and 2000 A.D.?

- (1) Future ecosystems will be stressed and many animal habitats may be destroyed.
- (2) Global warming will decrease as a result of a lower demand for fossil fuels.
- (3) One hundred years after all resources are used up, the human population will level off.
- (4) All environmental problems can be solved without a reduction in the growth rate of the human population.

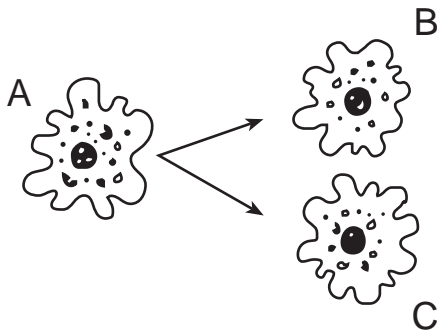
34 Cellular communication is illustrated in the diagram below.



Information can be sent from

- (1) cell A to cell B because cell B is able to recognize signal 1
- (2) cell A to cell B because cell A is able to recognize signal 2
- (3) cell B to cell A because cell A is able to recognize signal 1
- (4) cell B to cell A because cell B is able to recognize signal 2

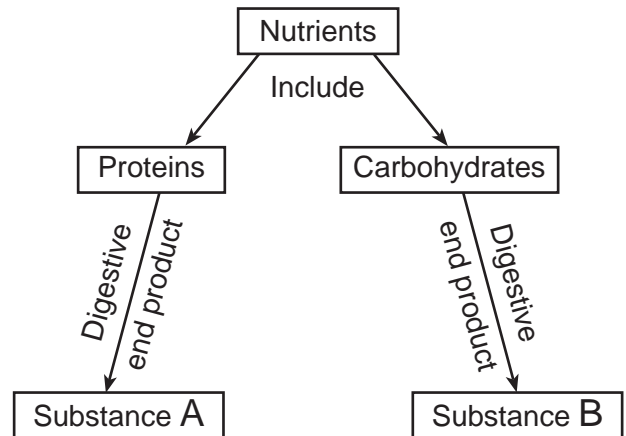
35 The diagram below represents single-celled organism A dividing by mitosis to form cells B and C.



Cells A, B, and C all produced protein X. What can best be inferred from this observation?

- (1) Protein X is found in all organisms.
- (2) The gene for protein X is found in single-celled organisms, only.
- (3) Cells A, B, and C ingested food containing the gene to produce protein X.
- (4) The gene to produce protein X was passed from cell A to cells B and C.

Base your answers to questions 36 and 37 on the information in the diagram below and on your knowledge of biology.



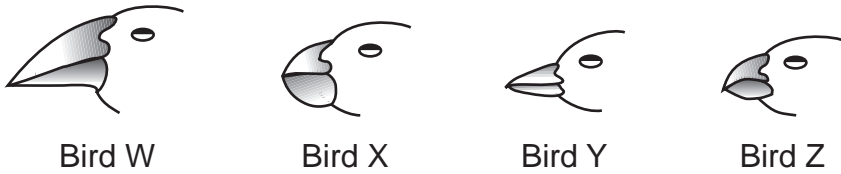
36 In an autotrophic organism, substance B functions as a

- (1) source of energy
- (2) hormone
- (3) vitamin
- (4) biotic resource

37 In a heterotrophic organism, substance A could be used directly for

- (1) photosynthesis
- (2) synthesis of enzymes
- (3) a building block of starch
- (4) a genetic code

38 The dichotomous key shown below can be used to identify birds W, X, Y, and Z.

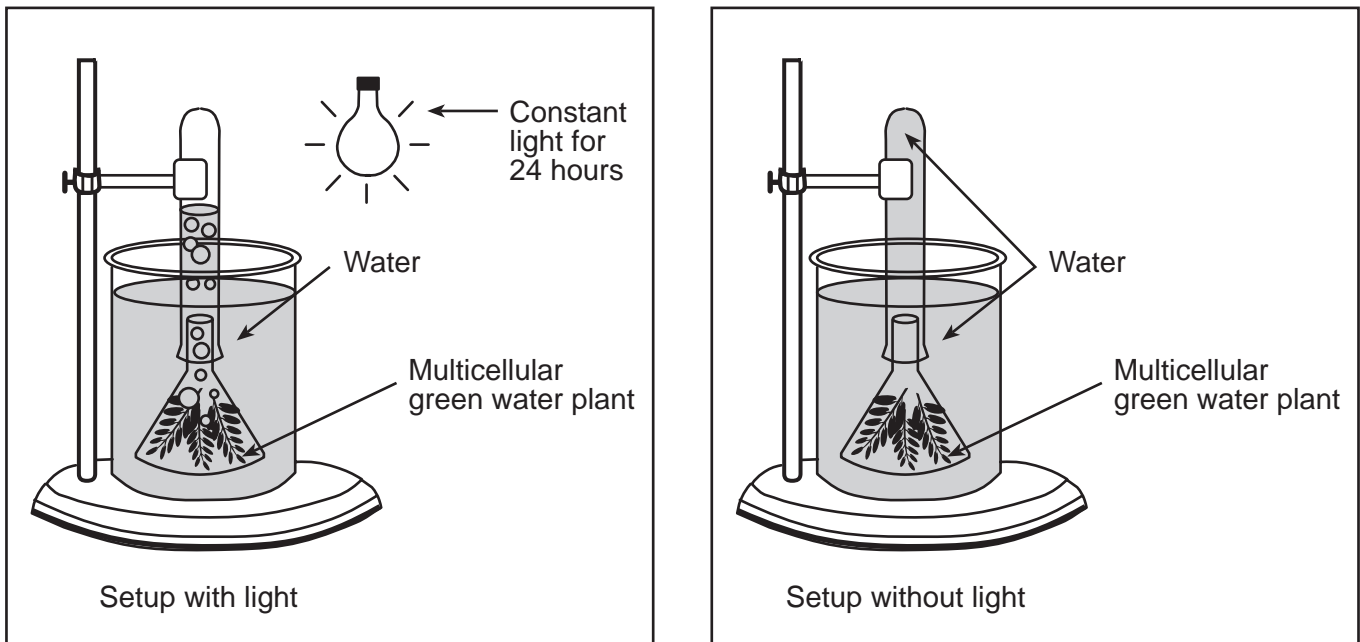


Dichotomous Key to Representative Birds	
1. a.	The beak is relatively long and slender..... <i>Certhidea</i>
1. b.	The beak is relatively stout and heavy.....go to 2
2. a.	The bottom surface of the lower beak is flat and straight <i>Geospiza</i>
2. b.	The bottom surface of the lower beak is curvedgo to 3
3. a.	The lower edge of the upper beak has a distinct bend <i>Camarhynchus</i>
3. b.	The lower edge of the upper beak is mostly flat <i>Platyspiza</i>

Bird X is most likely

- (1) *Certhidea*
- (2) *Geospiza*
- (3) *Camarhynchus*
- (4) *Platyspiza*

39 An experimental setup is shown in the diagram below.



Which hypothesis would most likely be tested using this setup?

- (1) Green water plants release a gas in the presence of light.
- (2) Roots of water plants absorb minerals in the absence of light.
- (3) Green plants need light for cell division.
- (4) Plants grow best in the absence of light.

Base your answers to questions 40 through 42 on the passage below which describes an ecosystem in New York State and on your knowledge of biology.

The Pine Bush ecosystem near Albany, New York, is one of the last known habitats of the nearly extinct Karner Blue butterfly. The butterfly's larvae feed on the wild green plant, lupine. The larvae are in turn consumed by predatory wasps. The four groups below represent other organisms living in this ecosystem.

Group A	Group B	Group C	Group D
algae mosses ferns pine trees oak trees	rabbits tent caterpillars moths	hawks moles hognosed snakes toads	soil bacteria molds mushrooms

40 The Karner Blue larvae belong in which group?

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

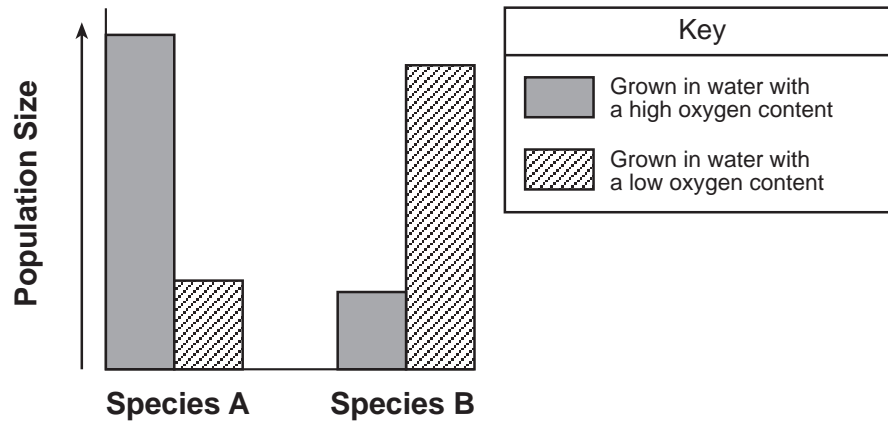
41 Which food chain best represents information in the passage?

- (1) lupine → Karner Blue larvae → wasps
- (2) wasps → Karner Blue larvae → lupine
- (3) Karner Blue larvae → lupine → wasps
- (4) lupine → wasps → Karner Blue larvae

42 Which group contains decomposers?

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

43 A graph of the population growth of two different species is shown below.



Which conclusion can be drawn from information in the graph?

- (1) Oxygen concentration affects population sizes of different species in the same manner.
 - (2) Species A requires a high oxygen concentration for maximum population growth.
 - (3) Species B requires a high oxygen concentration to stimulate population growth.
 - (4) Low oxygen concentration does not limit the population size of either species observed.
-

Part B-2

Answer all questions in this part. [12]

Directions (44–55): For those questions that are followed by four choices, circle the *number* of the choice that best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question.

Base your answers to questions 44 through 48 on the passage and data table below and on your knowledge of biology.

**For Teacher
Use Only**

The amount of oxygen gas dissolved in water is important to the organisms that live in a river. The amount of dissolved oxygen varies with changes in both physical factors and biological processes. The temperature of the water is one physical factor affecting dissolved oxygen levels as shown in the data table below. The amount of dissolved oxygen is expressed in parts per million (ppm).

Dissolved Oxygen Levels at Various Temperatures

Water Temperature (°C)	Level of Dissolved Oxygen (ppm)
1	14
10	11
15	10
20	9
25	8
30	7

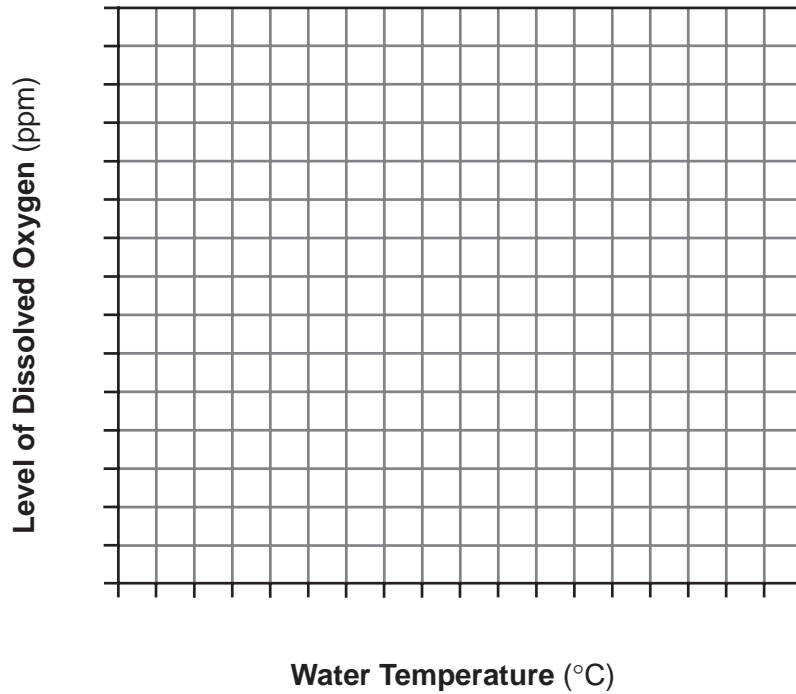
Directions (44–45): Using the information given, construct a line graph on the grid on page 13, following the directions below.

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

45 Plot the data for dissolved oxygen on the grid. Surround each point with a small circle and connect the points. [1]



Dissolved Oxygen Levels at Various Temperatures



For Teacher
Use Only

44

45

46 If the trend continues as shown in the data, what would the dissolved oxygen level most likely be if the temperature of the water was 35°C? [1]

_____ ppm

46

47 State the relationship between the level of dissolved oxygen and water temperature. [1]

47

48 Identify *one* physical or biological process taking place within the river, other than temperature change, that would affect the level of dissolved oxygen and state whether this process would increase or decrease the level of dissolved oxygen. [1]

48

Base your answers to questions 49 through 51 on the passage below and on your knowledge of biology.

**For Teacher
Use Only**

In Search of a Low-Allergy Peanut

Many people are allergic to substances in the environment. Of the many foods that contain allergens (allergy-inducing substances), peanuts cause some of the most severe reactions. Mildly allergic people may only get hives. Highly allergic people can go into a form of shock. Some people die each year from reactions to peanuts.

A group of scientists is attempting to produce peanuts that lack the allergy-inducing proteins by using traditional selective breeding methods. They are searching for varieties of peanuts that are free of the allergens. By crossing those varieties with popular commercial types, they hope to produce peanuts that will be less likely to cause allergic reactions and still taste good. So far, they have found one variety that has 80 percent less of one of three complex proteins linked to allergic reactions. Removing all three of these allergens may be impossible, but even removing one could help.

Other researchers are attempting to alter the genes that code for the three major allergens in peanuts. All of this research is seen as a possible long-term solution to peanut allergies.

49 Allergic reactions usually occur when the immune system produces

- (1) antibiotics against usually harmless antigens
- (2) antigens against usually harmless antibodies
- (3) antibodies against usually harmless antigens
- (4) enzymes against usually harmless antibodies

49

50 How does altering the DNA of a peanut affect the proteins in peanuts that cause allergic reactions?

- (1) The altered DNA is used to synthesize changed forms of these proteins.
- (2) The altered DNA leaves the nucleus and becomes part of the allergy-producing protein.
- (3) The altered DNA is the code for the antibodies against the allergens.
- (4) The altered DNA is used as an enzyme to break down the allergens in peanuts.

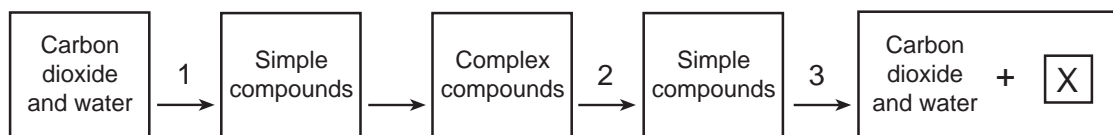
50

51 Explain how selective breeding is being used to try to produce commercial peanuts that will *not* cause allergic reactions in people. [1]

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Use Only**

51

Base your answers to questions 52 through 55 on the diagram below and on your knowledge of biology. The arrows in the diagram represent biological processes.



52 Identify *one* type of organism that carries out process 1. [1]

52

53 Explain why process 2 is essential in humans. [1]

53

54 Identify process 3. [1]

54

55 Identify what letter *X* represents. [1]

55

Part C

Answer all questions in this part. [17]

Directions (56–62): Record your answers in the spaces provided in this examination booklet.

56 Growers of fruit trees have always had problems with insects. Insects can cause visible damage to fruits, making them less appealing to consumers. As a result of this damage, much of the fruit cannot be sold. Insecticides have been useful for controlling these insects, but, in recent years, some insecticides have been much less effective. In some cases, insecticides do nothing to stop the insect attacks.

Provide a biological explanation for this loss of effectiveness of the insecticides. In your answer, be sure to:

- identify the original event that resulted in the evolution of insecticide resistance in some insects [1]
- explain why the percentage of resistant insects in the population has increased [1]
- describe *one* alternative form of insect control, other than using a different insecticide, that fruit growers could use to protect their crops from insect attack [1]

**For Teacher
Use Only**

56

**For Teacher
Use Only**

57 The concentration of salt in water affects the hatching of brine shrimp eggs. Brine shrimp eggs will develop and hatch at room temperature in glass containers of salt solution. Describe a controlled experiment using three experimental groups that could be used to determine the best concentration of salt solution in which to hatch brine shrimp eggs. Your answer must include at least:

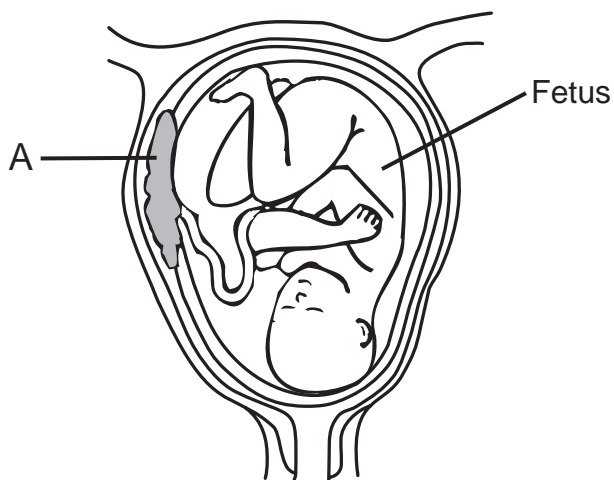
- a description of how the control group and each of the three experimental groups will be different [1]
- *two* conditions that must be kept constant in the control group and the experimental groups [2]
- data that should be collected [1]
- *one* example of experimental results that would indicate the best concentration of salt solution in which to hatch brine shrimp eggs [1]

57

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

**For Teacher
Use Only**

Women are advised to avoid consuming alcoholic beverages during pregnancy.



58 Identify the structure labeled A and explain how the functioning of structure A is essential for the normal development of the fetus. [2]

Structure A: _____

58

59 Explain why consumption of alcoholic beverages by a pregnant woman is likely to be more harmful to her fetus than to herself. [1]

59

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

**For Teacher
Use Only**

Some internal environmental factors may interfere with the ability of an enzyme to function efficiently.

60 Identify *two* internal environmental factors that directly influence the rate of enzyme action. [2]

60

61 Explain why changing the shape of an enzyme could affect the ability of the enzyme to function. [1]

61

62 Deforestation is viewed as a problem in the world today. Describe a cause and an effect of deforestation and a way to lessen this effect. In your answer, be sure to:

- state *one* reason deforestation is occurring [1]
- state *one* environmental problem that results from widespread deforestation [1]
- state *one* way to lessen the effects of deforestation, other than planting trees [1]

62

Part D

Answer all questions in this part. [13]

Directions (63–74): 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 63 through 65 on the Universal Genetic Code Chart on page 21 and on your knowledge of biology. Some DNA, RNA, and amino acid information from four similar sequences of four plant species is shown in the chart below.

For Teacher Use Only

63 Using the information given, fill in the missing mRNA base sequence for species *B* in the chart below. [1]

64 Using the Universal Genetic Code Chart on page 21, fill in the missing amino acid sequence for species *C* in the chart below. [1]

Species A	DNA base sequence mRNA base sequence Amino acid sequence	CCG GGC GLY	TGC ACG THR	ATA UAU TYR	CAG GUC VAL	GTA CAU HIS
Species B	DNA base sequence mRNA base sequence Amino acid sequence	TGC _____ THR	TGC _____ THR	ATA _____ TYR	CAG _____ VAL	GTA _____ HIS
Species C	DNA base sequence mRNA base sequence Amino acid sequence	CCG GGC _____	TGC ACG _____	ATA UAU _____	CAG GUC _____	GTT CAA _____
Species D	DNA base sequence mRNA base sequence Amino acid sequence	CCT GGA GLY	TGT ACA THR	ATG UAC TYR	CAC GUG VAL	GTC CAG GLN

63

64

65 According to these amino acid sequences, which *two* plant species are the most closely related? Support your answer. [1]

Species _____ and _____

65

Universal Genetic Code Chart
 Messenger RNA Codons and the Amino Acids They Code For

SECOND BASE																	
		U		C		A		G									
F	U	UUU	}	PHE	UCU	}	SER	UAU	}	TYR	UGU	}	CYS	U	C	A	G
		UUC			UCC			UAC			UGC						
		UUA	}	LEU	UCA	}	STOP	UGA	}	STOP	}	TRP					
		UUG			UCG			UAG					UGG				
C	C	CUU	}	LEU	CCU	}	PRO	CAU	}	HIS	CGU	}	ARG	U	C	A	G
		CUC			CCC			CAC			CGC						
		CUA	}	LEU	CCA	}	GLN	CGA	}	ARG							
		CUG			CCG			CAG			CGG						
A	A	AUU	}	ILE	ACU	}	THR	AAU	}	ASN	AGU	}	SER	U	C	A	G
		AUC			ACC			AAC			AGC						
		AUA	}	ILE	ACA	}	LYS	AGA	}	ARG							
		AUG			ACG			AAG			AGG						
G	G	GUU	}	VAL	GCU	}	ALA	GAU	}	ASP	GGU	}	GLY	U	C	A	G
		GUC			GCC			GAC			GGC						
		GUA	}	VAL	GCA	}	GLU	GGA	}	GLY							
		GUG			GCG			GAG			GGG						

66 A student was comparing preserved specimens of three plant species, X, Y, and Z, in a classroom. Which statement is an example of an observation the student could have made and *not* an inference?

- (1) The leaves produced by plant X are 4 cm across and 8 cm in length.
- (2) Plant Y has large purple flowers that open at night.
- (3) Plant X produces many seeds that are highly attractive to finches.
- (4) The flowers of plant Z are poisonous to household pets.

66

Base your answers to questions 67 and 68 on the information below and on your knowledge of biology.

A student squeezes and releases a clothespin as often as possible for 2 minutes and then takes his pulse for 20 seconds. After a 2-minute rest, he repeats the procedure. This pattern is repeated one more time. The student's 20-second pulse counts were 23, 26, and 21.

67 Complete the "Pulse/Min" column in the data table below for all three trials as well as the average pulse rate per minute. [1]

Pulse Rate After Activity

Trial	20-Second Pulse Counts	Pulse/Min
1	23	
2	26	
3	21	
Average		

67

68 What additional data should the student have collected in order to determine the effect of squeezing a clothespin on his pulse rate? [1]

68

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

**For Teacher
Use Only**

When Charles Darwin traveled to the Galapagos Islands, he observed 14 distinct varieties of finches on the islands. Darwin also observed that each finch variety ate a different type of food and lived in a slightly different habitat from the other finches. Darwin concluded that the finches all shared a common ancestor but had developed different beak structures.

69 The 14 varieties of finches are most likely the result of

- (1) absence of biodiversity
- (2) biological evolution
- (3) asexual reproduction
- (4) lack of competition

69

70 The second sentence best describes

- (1) an ecosystem
- (2) a food web
- (3) a niche
- (4) a predator/prey relationship

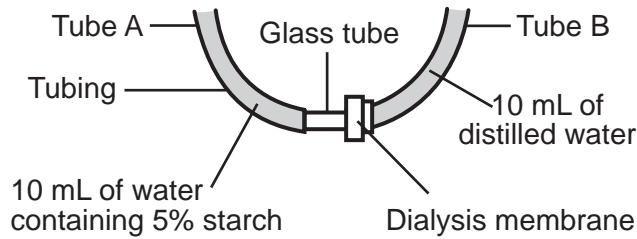
70

71 The different beak structures mentioned in the last sentence were most likely influenced by

- (1) selection for favorable variations
 - (2) environmental conditions identical to those of the common ancestor
 - (3) abnormal mitotic cell division
 - (4) characteristics that are acquired during the bird's lifetime
-

71

72 The diagram below represents a laboratory setup used by a student during an investigation of diffusion.

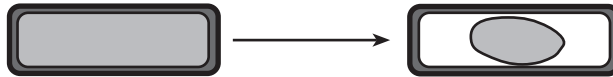


Which statement best explains why the liquid in tube A will rise over a period of time?

- (1) The starch concentrations are equal on both sides of the membrane.
- (2) The water will pass from a region of lower starch concentration to one of higher starch concentration.
- (3) Water and starch volumes are the same in both tubes A and B.
- (4) The fluids in both tubes A and B will change from a higher temperature to a lower temperature.

72

73 A red onion cell has undergone a change, as represented in the diagram below.

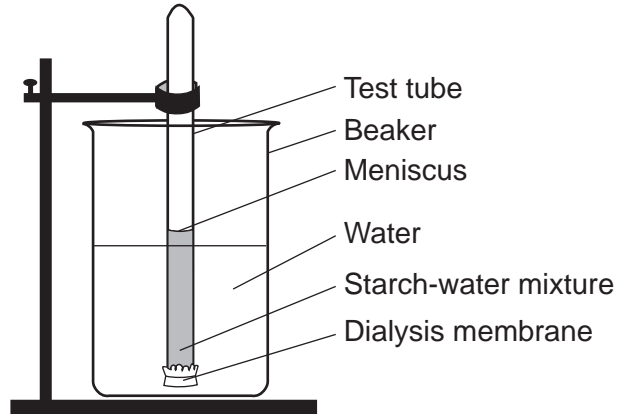


This change is most likely due to the cell being placed in

- (1) distilled water
- (2) light
- (3) salt water
- (4) darkness

73

74 A laboratory setup for a demonstration is represented in the diagram below.



**For Teacher
Use Only**

Describe how an indicator can be used to determine if starch diffuses through the membrane into the beaker. In your answer, be sure to include:

- the procedure used [1]
- how to interpret the results [1]

74

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Wednesday, June 21, 2006 — 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	13	
B-2	12	
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 | 38 |
| 32 | 39 |
| 33 | 40 |
| 34 | 41 |
| 35 | 42 |
| 36 | 43 |
| 37 | |

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

Wednesday, June 21, 2006 — 9:15 a.m. to 12:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

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

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

Part A and Part B-1

Allow 1 credit for each correct response.

Part A			Part B-1	
1 2	11 2	21 3	31 2	38 4
2 2	12 4	22 3	32 3	39 1
3 3	13 1	23 1	33 1	40 2
4 3	14 2	24 2	34 3	41 1
5 1	15 4	25 4	35 4	42 4
6 2	16 3	26 4	36 1	43 2
7 1	17 2	27 3	37 2	
8 3	18 3	28 1		
9 1	19 1	29 3		
10 3	20 4	30 4		

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 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 Wednesday, June 21, 2006. 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.

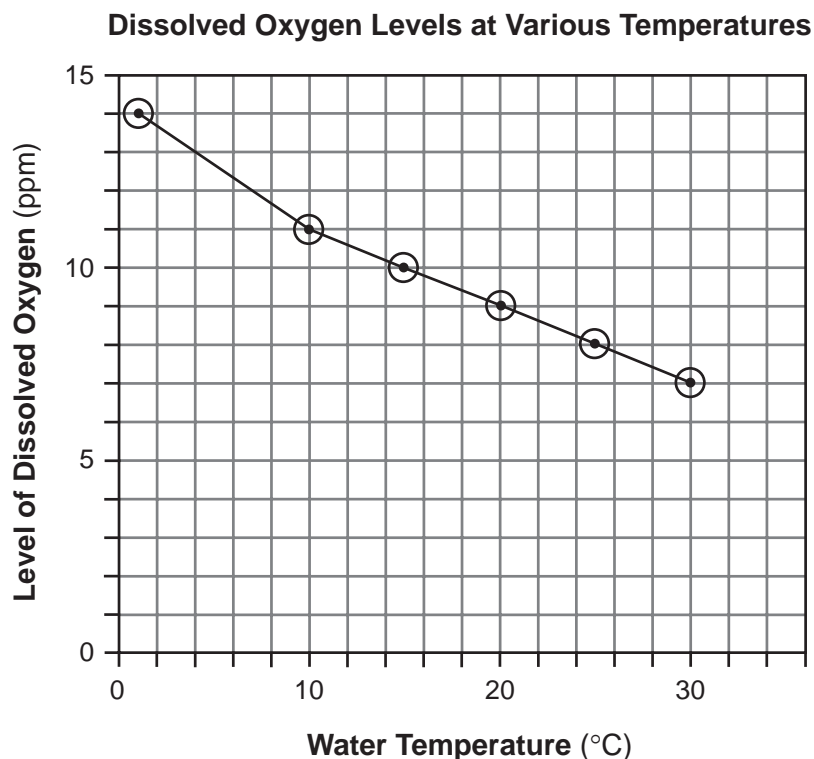
Part B–2

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

45 Allow 1 credit for plotting the data correctly and connecting the points.

Note: Allow credit if the points are plotted correctly but not circled. Do *not* allow credit for plotting points that are not in the data table, e.g., (0,0).

Example of a 2-credit graph for questions 44 and 45:



46 Allow 1 credit for indicating that the approximate dissolved oxygen level would be 6 ppm (± 0.5 ppm) or an answer that is consistent with the student's graph.

47 Allow 1 credit for stating the relationship between the level of dissolved oxygen and water temperature. Acceptable responses include, but are not limited to:

- As the water temperature rises, the level of dissolved oxygen decreases.
- As the water temperature decreases, the level of dissolved oxygen increases.

LIVING ENVIRONMENT – *continued*

48 Allow 1 credit for identifying *one* physical or biological process taking place within the river, other than temperature change, that would affect the level of dissolved oxygen and stating whether the process identified would increase or decrease the level of dissolved oxygen. Acceptable responses include, but are not limited to:

- Photosynthesis would increase the level of dissolved oxygen.
- Respiration would decrease the level of dissolved oxygen.
- Decomposition would decrease the level of dissolved oxygen.
- Turbulence of the river water will increase the level of dissolved oxygen.

49 3

50 1

51 Allow 1 credit for explaining how selective breeding is being used to try to produce commercial peanuts that will not cause allergic reactions in people. Acceptable responses include, but are not limited to:

- Varieties of peanuts that are low in the allergens will be crossed with commercial types.
- Varieties of peanuts that are free of the allergens will be crossed with commercial types.
- A variety of peanut that has 80% less of one of the allergens will be crossed with commercial types.

52 Allow 1 credit for identifying *one* type of organism that carries out process 1. Acceptable responses include, but are not limited to:

- plants
- autotroph
- producer
- trees

53 Allow 1 credit for explaining why process 2 is essential in humans. Acceptable responses include, but are not limited to:

- to make food molecules small enough to be transported (or diffused)
- so that energy can be released

54 Allow 1 credit for identifying process 3. Acceptable responses include, but are not limited to:

- respiration

55 Allow 1 credit for identifying what letter X represents. Acceptable responses include, but are not limited to:

- ATP
- energy

Part C

56 Allow a maximum of 3 credits for providing a biological explanation for the loss of effectiveness of the insecticides, allocated as follows:

- Allow 1 credit for identifying the original event that resulted in the evolution of insecticide resistance in some insects. Acceptable responses include, but are not limited to:
 - A mutation (or genetic change) probably occurred that led to the resistance to the insecticide.

Note: Do *not* accept that the insects became “immune” to the insecticide.

- Allow 1 credit for explaining why the percentage of resistant insects in the population has increased. Acceptable responses include, but are not limited to:
 - The percentage of resistant insects in the population has increased over the years because they survived when the insecticide was used, and were then able to reproduce and pass on the resistance.

Note: Do *not* allow credit for simply stating that they survived.

- Allow 1 credit for describing *one* alternative form of insect control, other than using a different insecticide, that fruit growers could use to protect their crops from insect attack. Acceptable responses include, but are not limited to:
 - release natural predators of the insects
 - the release of large numbers of sterile males of insect species that damage fruits
 - provide conditions that help predators of the insects live in the area
 - genetically engineer insect-resistant plants

57 Allow a maximum of 5 credits for describing a controlled experiment using three experimental groups that could be used to determine the best concentration of salt solution in which to hatch brine shrimp eggs, allocated as follows:

- Allow 1 credit for describing how the control group and each of the three experimental groups will be different. Acceptable responses include, but are not limited to:
 - The control group will be in a 0% salt solution while the experimental groups will be in varying salt concentrations, such as 2%, 4%, and 6%.
 - The control group will be in normal seawater while the experimental groups will have different salt concentrations.

LIVING ENVIRONMENT – *continued*

- Allow a maximum of 2 credits, 1 credit for each of *two* conditions that must be kept constant in the control group and the experimental groups. Acceptable responses include, but are not limited to:
 - the number of brine shrimp eggs in each group
 - species of brine shrimp
 - the number of days observed
 - the temperature
 - the amount of liquid in each container
 - the size of each container
 - the type of container
- Allow 1 credit for indicating data that should be collected. Acceptable responses include, but are not limited to:
 - the total number of brine shrimp eggs hatched after a given time in each of the different salt concentrations
- Allow 1 credit for *one* example of experimental results that would indicate the best concentration of salt solution in which to hatch brine shrimp eggs. Acceptable responses include, but are not limited to:
 - the concentration of salt in which the greatest number of shrimp eggs hatched by the end of the experiment
 - The concentration in which brine shrimp eggs hatch soonest is best.

58 Allow a maximum of 2 credits, allocated as follows:

- Allow 1 credit for identifying the structure labeled *A* as the placenta.
- Allow 1 credit for explaining how the functioning of structure *A* is essential for the normal development of the fetus. Acceptable responses include, but are not limited to:
 - exchange surface for nutrients *or* wastes *or* O₂ between mother and fetus

59 Allow 1 credit for explaining why the consumption of alcoholic beverages by a pregnant woman is likely to be more harmful to her fetus than to herself. Acceptable responses include, but are not limited to:

- When the alcohol from the mother’s bloodstream enters the fetus, the relative amount is much greater due to the smaller size of the fetus.
- The fetus is still developing.

LIVING ENVIRONMENT – *continued*

- 60** Allow a maximum of 2 credits, 1 credit for each of *two* internal environmental factors that directly influence the rate of enzyme action. Acceptable responses include, but are not limited to:
- temperature
 - pH
 - concentration of enzyme
 - substrate
- 61** Allow 1 credit for explaining why changing the shape of an enzyme could affect the ability of the enzyme to function. Acceptable responses include, but are not limited to:
- If the shape changes, it will not fit with the same substrate.
 - The enzyme no longer fits with the molecules with which it interacted before.
 - Shape determines function.
- 62** Allow a maximum of 3 credits for describing a cause and an effect of deforestation and a way to lessen this effect, allocated as follows:
- Allow 1 credit for stating *one* reason deforestation is occurring. Acceptable responses include, but are not limited to:
 - There is a great demand for lumber for building new homes and other structures.
 - Forested areas are being cut down to allow for grazing areas for animals.
 - Allow 1 credit for stating *one* environmental problem that results from widespread deforestation. Acceptable responses include, but are not limited to:
 - Habitats are lost.
 - When many trees are cut down, the carbon dioxide they would normally use remains in the atmosphere (and may intensify the process of global warming).
 - Deforestation promotes erosion.
 - Allow 1 credit for stating *one* way to lessen the effects of deforestation other than planting trees. Acceptable responses include, but are not limited to:
 - protect present forested areas
 - allow succession to take place on deforested land
 - reduce the amount of CO₂ that is released to the atmosphere
 - recycle paper
 - cut down fewer trees

Part D

63 Allow 1 credit for filling in the missing mRNA base sequence for species *B*:

ACG ACG UAU GUC CAU

64 Allow 1 credit for filling in the missing amino acid sequence for species *C*:

GLY THR TYR VAL GLN

65 Allow 1 credit for stating which *two* plant species are most closely related and supporting the answer. Acceptable responses include, but are not limited to:

— species *C* and *D* because the amino acid sequences are identical

Note: Allow credit for an answer that is consistent with the student’s response to question 64.

66 1

67 Allow 1 credit for correctly completing the data table:

Pulse Rate After Activity

Trial	20-Second Pulse Counts	Pulse/Min
1	23	69
2	26	78
3	21	63
Average		70

68 Allow 1 credit for indicating that the student would need the resting pulse rate for comparison.

LIVING ENVIRONMENT – *concluded*

69 2

70 3

71 1

72 2

73 3

74 Allow a maximum of 2 credits for describing how an indicator can be used to determine if starch diffuses through the membrane into the beaker.

Example of a 2-credit response:

Add starch indicator solution to the water in the beaker. If the indicator solution changes color, then starch is present (no color change, no starch).

The *Chart for Determining the Final Examination Score for the June 2006 Regents Examination in Living Environment* will be posted on the Department's web site <http://www.emsc.nysed.gov/osa> on Wednesday, June 21, 2006. Conversion charts provided for previous administrations of the Regents Examination in Living Environment must NOT be used to determine students' final scores for this administration.

Submitting Teacher Evaluations of the Test to the Department

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

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

Map to Core Curriculum

June 2006 Living Environment

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

Part D 63–74	
Lab 1	63,64,65,66
Lab 2	67,68
Lab 3	69,70,71
Lab 5	72,73,74



Regents Examination in Living Environment June 2006

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

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.