

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

LIVING ENVIRONMENT

Thursday, January 30, 2003 — 9:15 a.m. to 12:15 p.m., only

Student Name _____

School Name _____

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

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

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

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

Part A

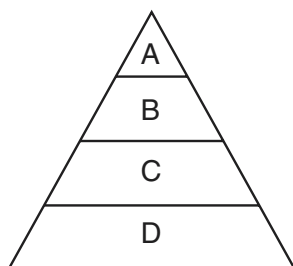
Answer all questions in this part. [35]

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

1 A biologist reported success in breeding a tiger with a lion, producing healthy offspring. Other biologists will accept this report as fact only if

- (1) research shows that other animals can be crossbred
- (2) the offspring are given a scientific name
- (3) the biologist included a control in the experiment
- (4) other researchers can replicate the experiment

2 The diagram below represents a pyramid of energy in an ecosystem.



Which level in the pyramid would most likely contain members of the plant kingdom?

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

3 Which condition would cause an ecosystem to become *unstable*?

- (1) only heterotrophic organisms remain after a change in the environment
- (2) a slight increase in the number of heterotrophic and autotrophic organisms occurs
- (3) a variety of nonliving factors are used by the living factors
- (4) biotic and abiotic resources interact

4 Nerve cells are essential to an animal because they directly provide

- (1) communication between cells
- (2) transport of nutrients to various organs
- (3) regulation of reproductive rates within other cells
- (4) an exchange of gases within the body

5 Certain bacteria produce a chemical that makes them resistant to penicillin. Since these bacteria reproduce asexually, they usually produce offspring that

- (1) can be destroyed by penicillin
- (2) mutate into another species
- (3) are genetically different from their parents
- (4) survive exposure to penicillin

6 A sudden change in the DNA of a chromosome can usually be passed on to future generations if the change occurs in a

- (1) skin cell
- (2) liver cell
- (3) sex cell
- (4) brain cell

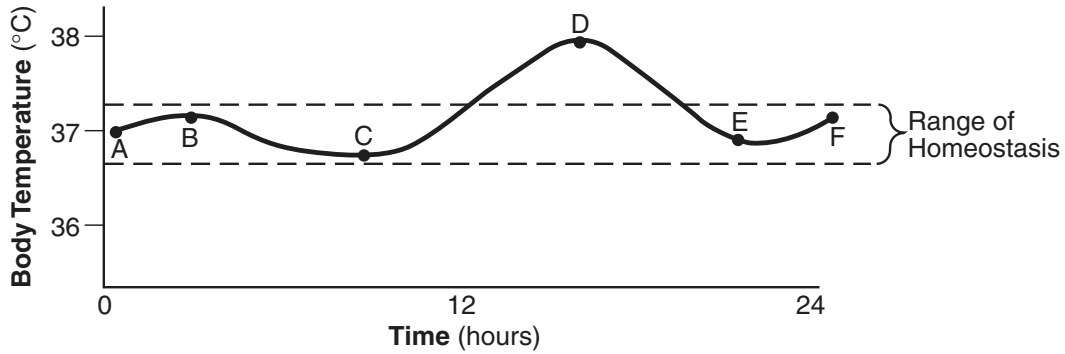
7 A change in the order of DNA bases that code for a respiratory protein will most likely cause

- (1) the production of a starch that has a similar function
- (2) the digestion of the altered gene by enzymes
- (3) a change in the sequence of amino acids determined by the gene
- (4) the release of antibodies by certain cells to correct the error

8 Many vaccinations stimulate the immune system by exposing it to

- (1) antibodies
- (2) enzymes
- (3) mutated genes
- (4) weakened microbes

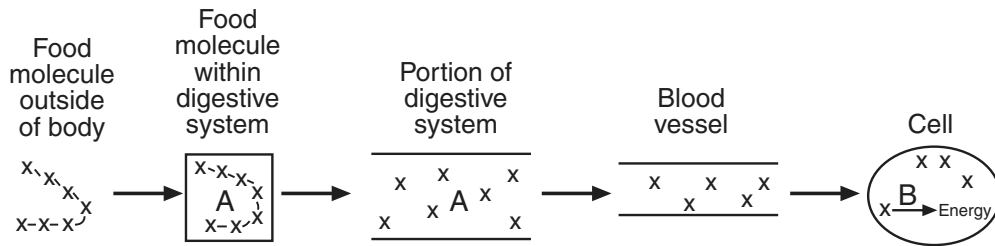
9 The data in the graph below show evidence of disease in the human body.



A disruption in dynamic equilibrium is indicated by the temperature change between points

- (1) A and B
- (2) B and C
- (3) C and D
- (4) E and F

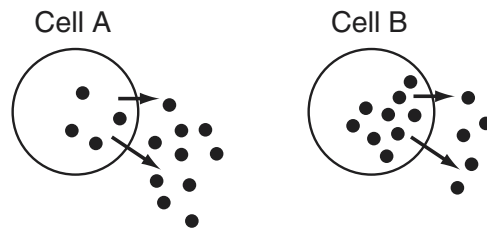
10 The diagram below represents events involved as energy is ultimately released from food.



Which row in the table below best represents the chain of Xs and letters A and B in the diagram?

X-X-X-X-X-X-X	A and B
(1) nutrient	antibodies
(2) nutrient	enzymes
(3) hemoglobin	wastes
(4) hemoglobin	hormones

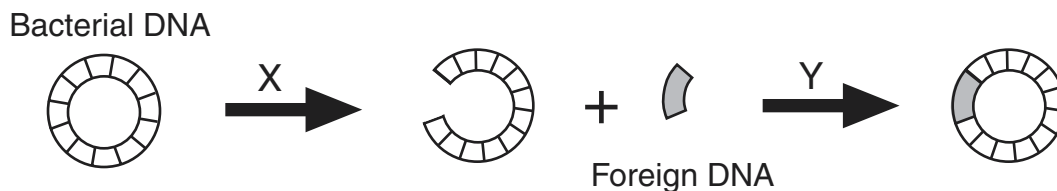
11 In the diagram below, the dark dots indicate small molecules. These molecules are moving out of the cells, as indicated by the arrows. The number of dots inside and outside of the two cells represents the relative concentrations of the molecules inside and outside of the cells.



ATP is being used to move the molecules out of the cell by

- (1) cell A, only
- (2) cell B, only
- (3) both cell A and cell B
- (4) neither cell A nor cell B

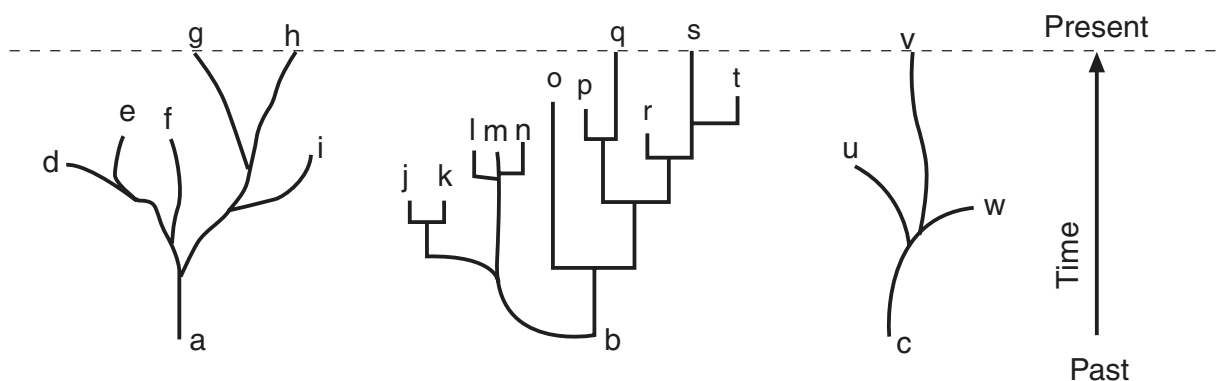
12 The diagrams below represent some steps in a procedure used in biotechnology.



Letters X and Y represent the

- (1) hormones that stimulate the replication of bacterial DNA
- (2) biochemical catalysts involved in the insertion of genes into other organisms
- (3) hormones that trigger rapid mutation of genetic information
- (4) gases needed to produce the energy required for gene manipulation

13 According to some scientists, patterns of evolution can be illustrated by the diagrams below.



Which statement best explains the patterns seen in these diagrams?

- (1) The organisms at the end of each branch can be found in the environment today.
- (2) The organisms that are living today have all evolved at the same rate and have undergone the same kinds of changes.
- (3) Evolution involves changes that give rise to a variety of organisms, some of which continue to change through time while others die out.
- (4) These patterns cannot be used to illustrate the evolution of extinct organisms.

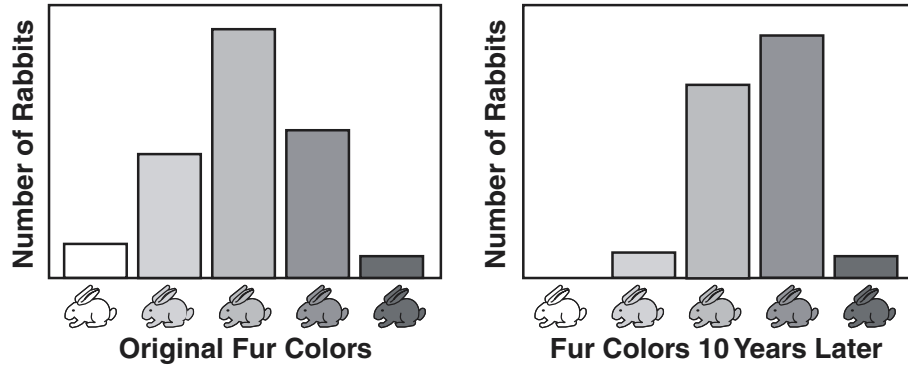
14 Which statement best illustrates a rapid biological adaptation that has actually occurred?

- (1) Pesticide-resistant insects have developed in certain environments.
- (2) Scientific evidence indicates that dinosaurs once lived on land.
- (3) Paving large areas of land has decreased habitats for certain organisms.
- (4) The characteristics of sharks have remained unchanged over a long period of time.

15 During meiosis, crossing-over (gene exchange between chromosomes) may occur. Crossing-over usually results in

- (1) overproduction of gametes
- (2) fertilization and development
- (3) the formation of identical offspring
- (4) variation within the species

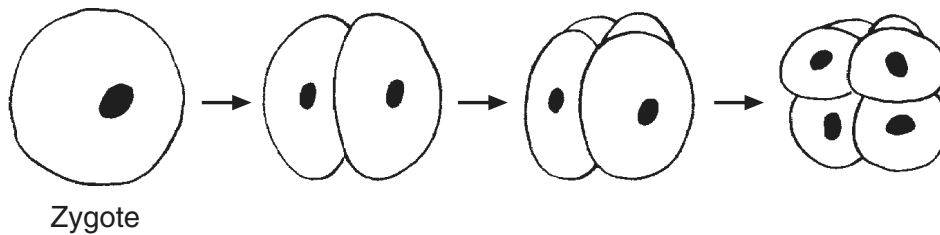
16 The diagram below illustrates the change that occurred in the physical appearance of a rabbit population over a 10-year period.



Which condition would explain this change over time?

- (1) a decrease in the mutation rate of the rabbits with black fur
- (2) a decrease in the advantage of having white fur
- (3) an increase in the advantage of having white fur
- (4) an increase in the chromosome number of the rabbits with black fur

17 The diagram below represents some stages of early embryonic development.



Which process is represented by the arrows in the diagram?

- (1) meiosis
- (2) fertilization
- (3) mitosis
- (4) evolution

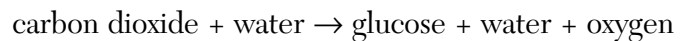
18 The reproductive system of the human male produces gametes and

- (1) transfers gametes to the female for internal fertilization
- (2) produces enzymes that prevent fertilization
- (3) releases hormones involved in external fertilization
- (4) provides an area for fertilization

19 Blood can be tested to determine the presence of the virus associated with the development of AIDS. This blood test is used directly for

- (1) cure
- (2) treatment
- (3) diagnosis
- (4) prevention

20 The equation below represents a summary of a biological process.



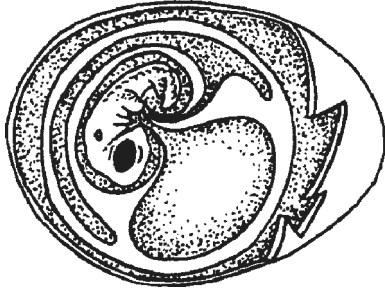
This process is completed in

- (1) mitochondria
- (2) ribosomes
- (3) cell membranes
- (4) chloroplasts

21 In a stable, long-existing community, the establishment of a single species per niche is most directly the result of

- (1) parasitism
- (2) interbreeding
- (3) competition
- (4) overproduction

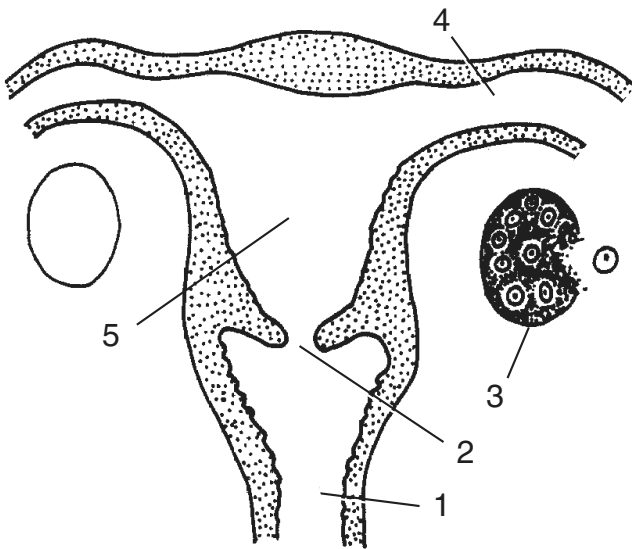
22 The diagram below represents a developing bird egg.



What is the primary function of this egg?

- (1) food supply for predators to preserve predator populations
- (2) adaptation to allow maximum freedom for parent birds
- (3) continuation of the species through reproduction
- (4) preservation of the exact genetic code of the parent birds

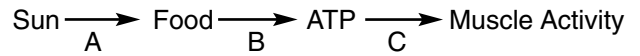
23 The diagram below represents part of the human female reproductive system.



Fertilization and development normally occur in structures

- (1) 1 and 5
- (2) 2 and 4
- (3) 3 and 1
- (4) 4 and 5

24 The flow of energy through an ecosystem involves many energy transfers. The diagram below summarizes the transfer of energy that eventually powers muscle activity.



The process of cellular respiration is represented by

- (1) arrow A, only
- (2) arrow B, only
- (3) arrow C, only
- (4) arrows A, B, and C

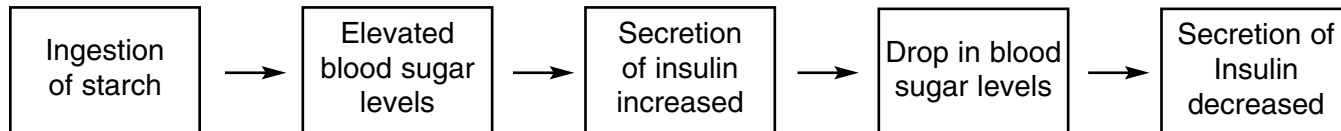
25 The presence of parasites in an animal will usually result in

- (1) an increase in meiotic activity within structures of the host
- (2) the inability of the host to maintain homeostasis
- (3) the death of the host organism within twenty-four hours
- (4) an increase in genetic mutation rate in the host organism

26 In Texas, researchers gave a cholesterol-reducing drug to 2,335 people and an inactive substitute (placebo) to 2,081. Most of the volunteers were men who had normal cholesterol levels and no history of heart disease. After 5 years, 97 people getting the placebo had suffered heart attacks compared to only 57 people who had received the actual drug. The researchers are recommending that to help prevent heart attacks, all people (even those without high cholesterol) take these cholesterol-reducing drugs. In addition to the information above, what is another piece of information that the researchers must have before support for the recommendation can be justified?

- (1) Were the eating habits of the two groups similar?
- (2) How does a heart attack affect cholesterol levels?
- (3) Did the heart attacks result in deaths?
- (4) What chemical is in the placebo?

27 What is represented by the sequence below?



- (1) a feedback mechanism in multicellular organisms
(2) an immune response by cells of the pancreas
(3) differentiation of organic molecules
(4) the disruption of cellular communication

28 In an ecosystem, which component is *not* recycled?

- (1) water
(2) energy
(3) oxygen
(4) carbon

29 Vultures, which are classified as scavengers, are an important part of an ecosystem because they

- (1) hunt herbivores, limiting their populations in an ecosystem
(2) feed on dead animals, which aids in the recycling of environmental materials
(3) cause the decay of dead organisms, which releases usable energy to herbivores and carnivores
(4) are the first level in food webs and make energy available to all the other organisms in the web

30 "Natural ecosystems provide an array of basic processes that affect humans."

Which statement does *not* support this quotation?

- (1) Bacteria of decay help recycle materials.
(2) Trees add to the amount of atmospheric oxygen.
(3) Treated sewage is less damaging to the environment than untreated sewage.
(4) Lichens and mosses living on rocks help to break the rocks down, forming soil.

31 The carrying capacity of a given environment is *least* dependent upon

- (1) recycling of materials
(2) the available energy
(3) the availability of food and water
(4) daily temperature fluctuations

32 Increased efforts to conserve areas such as rain forests are necessary in order to

- (1) protect biodiversity
(2) promote extinction of species
(3) exploit finite resources
(4) increase industrialization

33 Which practice would most likely deplete a non-renewable natural resource?

- (1) harvesting trees on a tree farm
(2) burning coal to generate electricity in a power plant
(3) restricting water usage during a period of water shortage
(4) building a dam and a power plant to use water to generate electricity

34 Changes in the chemical composition of the atmosphere that may produce acid rain are most closely associated with

- (1) insects that excrete acids
(2) runoff from acidic soils
(3) industrial smoke stack emissions
(4) flocks of migrating birds

35 One way to help provide suitable environments for future generations is to urge individuals to

- (1) apply ecological principles when making decisions that will have an environmental impact
(2) control all aspects of natural environments
(3) agree that population controls have no impact on environmental matters
(4) work toward increasing global warming

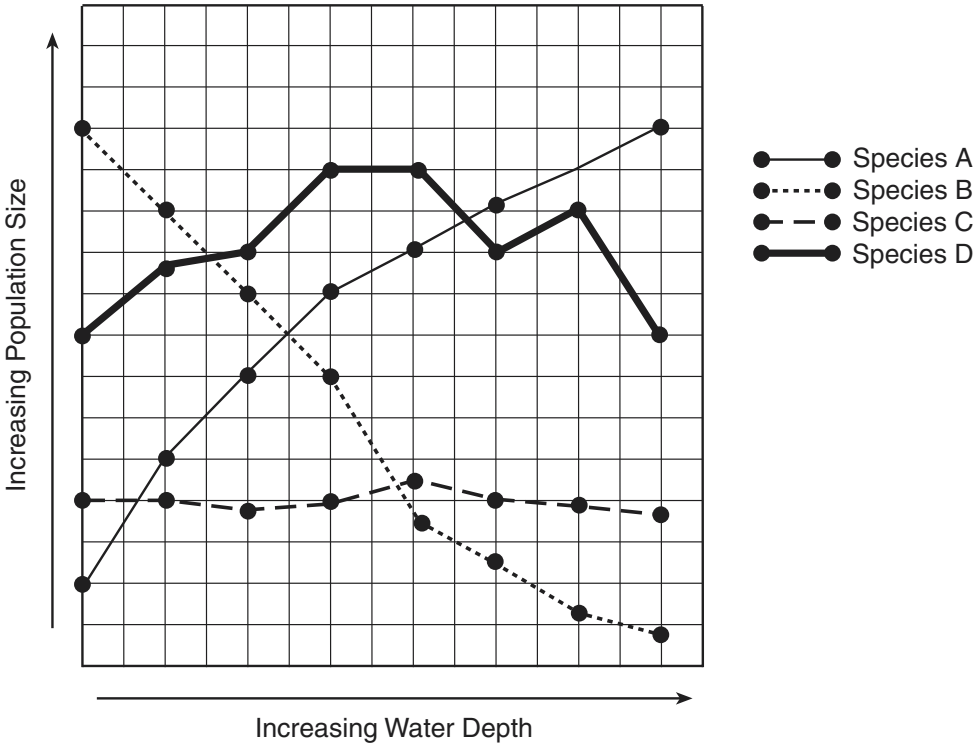
Part B

Answer all questions in this part. [30]

Directions (36–64): For those questions that are followed by four choices, circle the number of the choice that best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question and record your answers in the spaces provided.

36 As the depth of the ocean increases, the amount of light that penetrates to that depth decreases. At about 200 meters, little, if any, light is present. The graph below illustrates the population size of four different species at different water depths.

**For Teacher
Use Only**



Which species most likely performs photosynthesis?

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

36

37 Which structure is best observed using a compound light microscope?

- (1) a cell
- (2) a virus
- (3) a DNA sequence
- (4) the inner surface of a mitochondrion

**For Teacher
Use Only**

37

38 Which words best complete the lettered blanks in the two sentences below?

Organic compounds, such as proteins and starches, are too A to diffuse into cells. Proteins are digested into B and starches are digested into C.

- (1) A—large, B—simple sugars, C—amino acids
- (2) A—small, B—simple sugars, C—amino acids
- (3) A—large, B—amino acids, C—simple sugars
- (4) A—small, B—amino acids, C—simple sugars

38

39 The photographs below show some physical similarities between John Lennon and his son Julian.



Lewis, Ricki *Life* 3rd edition WCB/McGraw Hill

Which conclusion can be drawn regarding these similarities?

- (1) The DNA present in their body cells is identical.
- (2) The percentage of their proteins with the same molecular composition is high.
- (3) The base sequences of their genes are identical.
- (4) The mutation rate is the same in their body cells.

39

Base your answers to questions 40 through 43 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

A decade after the Exxon Valdez oil tanker spilled millions of gallons of crude [oil] off Prince William Sound in Alaska, most of the fish and wildlife species that were injured have not fully recovered.

Only two out of the 28 species, the river otter and the bald eagle, listed as being injured from the 1989 spill are considered to be recovered said a new report, which was released by a coalition of federal and Alaska agencies working to help restore the oil spill region.

Eight species are considered to have made little or no progress toward recovery since the spill, including killer whales, harbor seals, and common loons [a type of bird].

Several other species, including sea otters and Pacific herring, have made significant progress toward recovery, but are still not at levels seen before the accident the report said.

More than 10.8 million gallons of crude oil spilled into the water when the tanker Exxon Valdez ran aground 25 miles south of Valdez on March 24, 1989.

The spill killed an estimated 250,000 seabirds, 2,800 sea otters, 300 harbor seals, 250 bald eagles, and up to 22 killer whales.

Billions of salmon and herring eggs, as well as tidal plants and animals, were also smothered in oil.

Reuters

40 Identify *two* species that appear to have been *least* affected by the oil spill. [1]

(1) _____

(2) _____

40

41 The oil spilled by the Exxon Valdez tanker is an example of a

(1) nonrenewable resource and is a source of energy

(2) renewable resource and is a source of ATP

(3) nonrenewable resource and synthesizes ATP

(4) renewable resource and is a fossil fuel

41

42 The impact that the oil spill made on the environment is still being experienced. State information from the reading passage that supports this statement. [1]

**For Teacher
Use Only**

42

43 Which autotrophic organisms were *negatively* affected by the oil spill? [1]

43

44 Although paramecia (single-celled organisms) usually reproduce asexually, some have developed a method by which they exchange genetic material with each other in a simple form of sexual reproduction. State *one* advantage this simple form of sexual reproduction would provide over asexual reproduction for the survival of these single-celled organisms. [1]

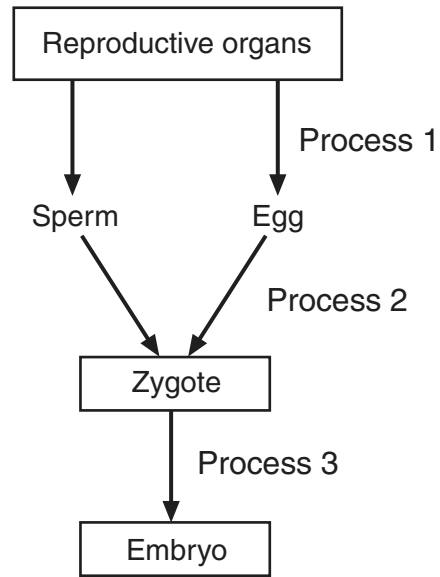
44

45 Identify a specific structure in a single-celled organism. State how that structure is involved in the survival of the organism. [2]

45

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

**For Teacher
Use Only**



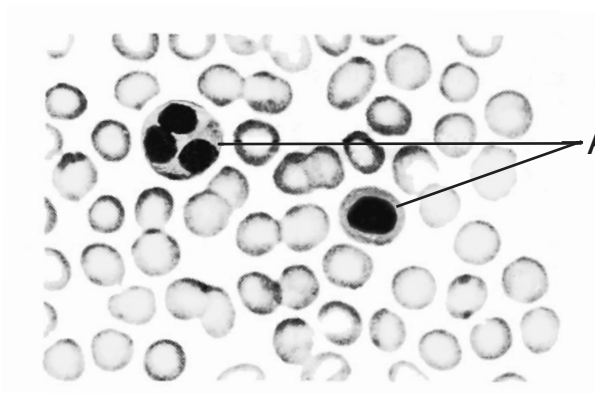
46 State why Process 2 is necessary in sexual reproduction. [1]

46

47 State *one* difference between the cells produced by Process 1 and the cells produced by Process 3. [1]

47

Base your answers to questions 48 and 49 on the diagram of a slide of normal human blood below and on your knowledge of biology.



A (Cells involved in immunity)

**For Teacher
Use Only**

48 An increase in the production of the cells labeled A is a response to an internal environmental change. State a change that might cause this response. [1]

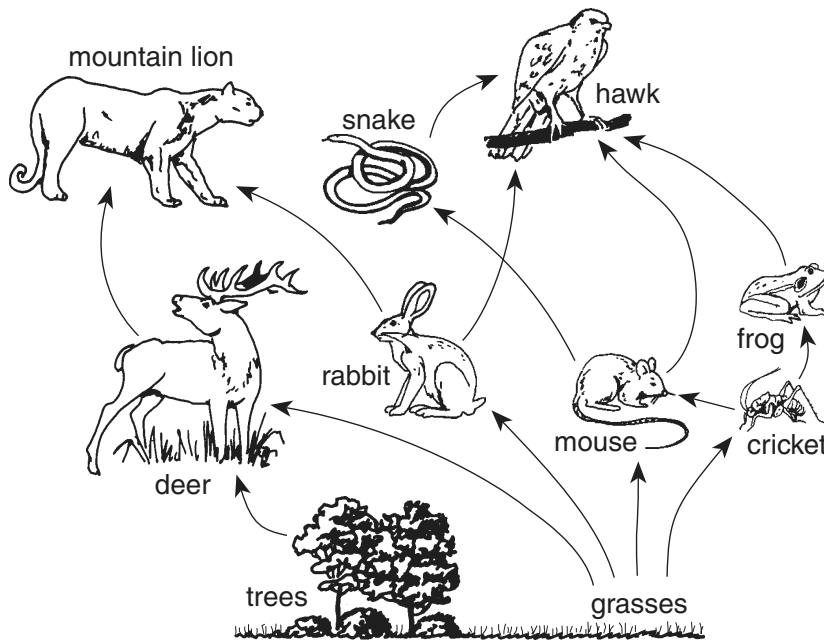
48

49 Describe *one* possible immune response, other than an increase in number, that one of the cells labeled A would carry out. [1]

49

Base your answers to questions 50 through 53 on the diagram of a food web below and on your knowledge of biology.

**For Teacher
Use Only**



50 If the population of mice is reduced by disease, which change will most likely occur in the food web?

- (1) The cricket population will increase.
- (2) The snake population will increase.
- (3) The grasses will decrease.
- (4) The deer population will decrease.

50

51 What is the original source of energy for this food web?

- (1) chemical bonds in sugar molecules
- (2) enzymatic reactions
- (3) the Sun
- (4) chemical reactions of bacteria

51

52 Which organisms are *not* shown in this diagram but are essential to a balanced ecosystem?

- (1) heterotrophs
- (2) autotrophs
- (3) producers
- (4) decomposers

**For Teacher
Use Only**

52

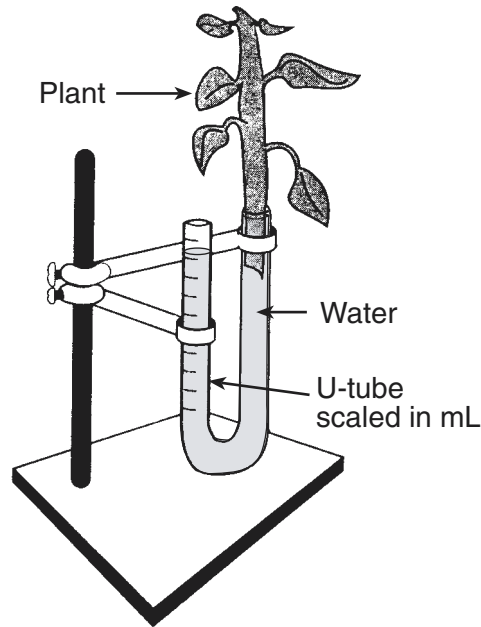
53 State *one* example of a predator-prey relationship found in the food web. Indicate which organism is the predator and which is the prey. [1]

53

Base your answers to questions 54 through 58 on the information, diagram, and data table below and on your knowledge of biology.

**For Teacher
Use Only**

A student conducted an investigation to determine the effect of various environmental factors on the rate of transpiration (water loss through the leaves) in plants. The student prepared 4 groups of plants. Each group contained 10 plants of the same species and leaf area. Each group was exposed to different environmental factors. The apparatus shown in the diagram was constructed to measure water loss by the plants over time in 10-minute intervals for 30 minutes. The results are shown in the data table.

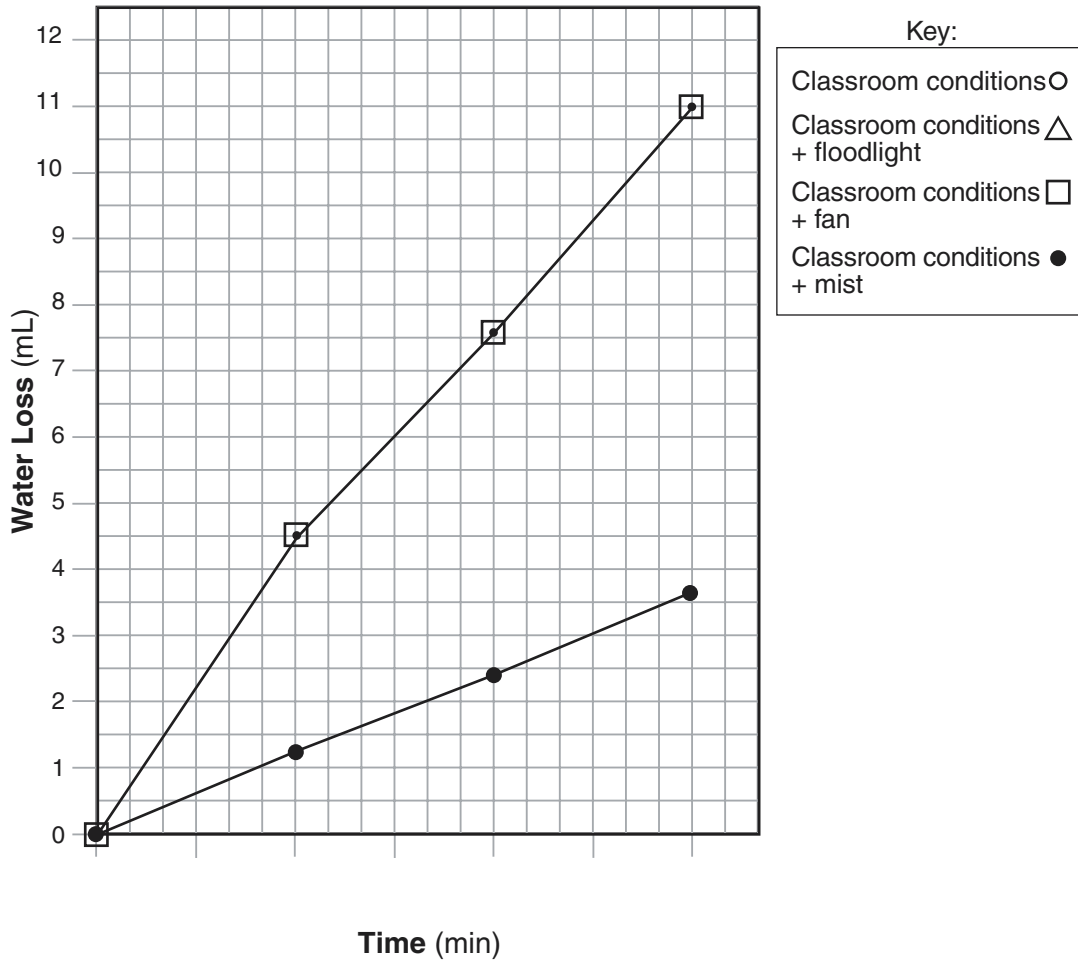


Environmental Factors	Average Total Water Loss in mL Over Time			
	0 min	10 min	20 min	30 min
Classroom Conditions	0.0	2.2	4.6	6.6
Classroom Conditions + Floodlight	0.0	4.2	7.6	11.7
Classroom Conditions + Fan	0.0	4.5	7.6	11.0
Classroom Conditions + Mist	0.0	1.3	2.4	3.7

Directions (54–56): Using the information in the data table, construct a line graph on the grid, following the directions below. The data for fan and mist conditions have been plotted for you.

For Teacher Use Only

Average Total Water Loss in mL Over Time



54 Mark an appropriate scale on the axis labeled “Time (min).” [1]

55 Plot the data for the classroom conditions from the data table. Surround each point with a small circle and connect the points. [1]



56 Plot the data for classroom conditions + floodlight from the data table. Surround each point with a small triangle and connect the points. [1]



57 Identify the environmental factor that resulted in the lowest rate of transpiration. [1]

57

58 Identify the control group of plants in this experiment. [1]

58

Base your answers to questions 59 through 61 on the passage below and on your knowledge of biology.

The number in the parenthesis () at the end of a sentence is used to identify that sentence.

They Sure Do Look Like Dinosaurs

When making movies about dinosaurs, film producers often use ordinary lizards and enlarge their images thousands of times (1). We all know, however, that while they look like dinosaurs and are related to dinosaurs, lizards are not actually dinosaurs (2).

Recently, some scientists have developed a hypothesis that challenges this view (3). These scientists believe that some dinosaurs were actually the same species as some modern lizards that had grown to unbelievable sizes (4). They think that such growth might be due to a special type of DNA called repetitive DNA, often referred to as “junk” DNA because scientists do not understand its functions (5). These scientists studied pumpkins that can reach sizes of nearly 1,000 pounds and found them to contain large amounts of repetitive DNA (6). Other pumpkins that grow to only a few ounces in weight have very little of this kind of DNA (7). In addition, cells that reproduce uncontrollably have almost always been found to contain large amounts of this type of DNA (8).

59 State *one* reason why scientists formerly thought of repetitive DNA as “junk.” [1]

59

60 Which kind of cells would most likely contain large amounts of repetitive DNA?

- (1) red blood cells
- (2) cancer cells
- (3) nerve cells
- (4) cells that are unable to reproduce

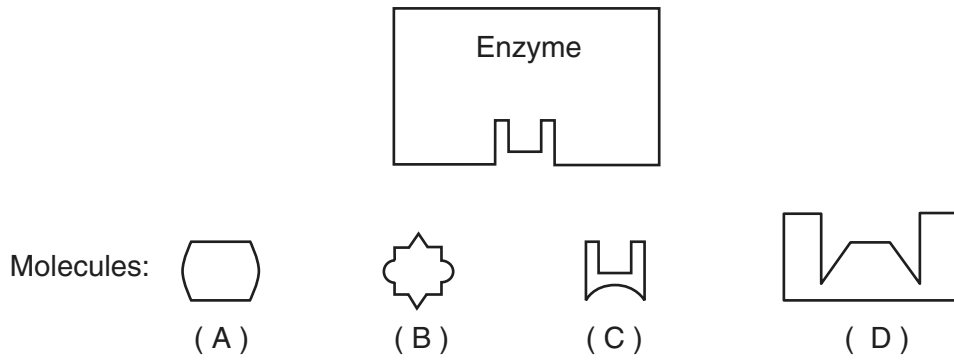
**For Teacher
Use Only**

60

61 Write the number of a sentence that provides evidence that supports the hypothesis that increasing amounts of repetitive DNA are responsible for increased sizes of organisms. [1]

61

62 An enzyme and four different molecules are shown in the diagram below.



The enzyme would most likely affect reactions involving

- (1) molecule A, only
- (2) molecule C, only
- (3) molecules B and D
- (4) molecules A and C

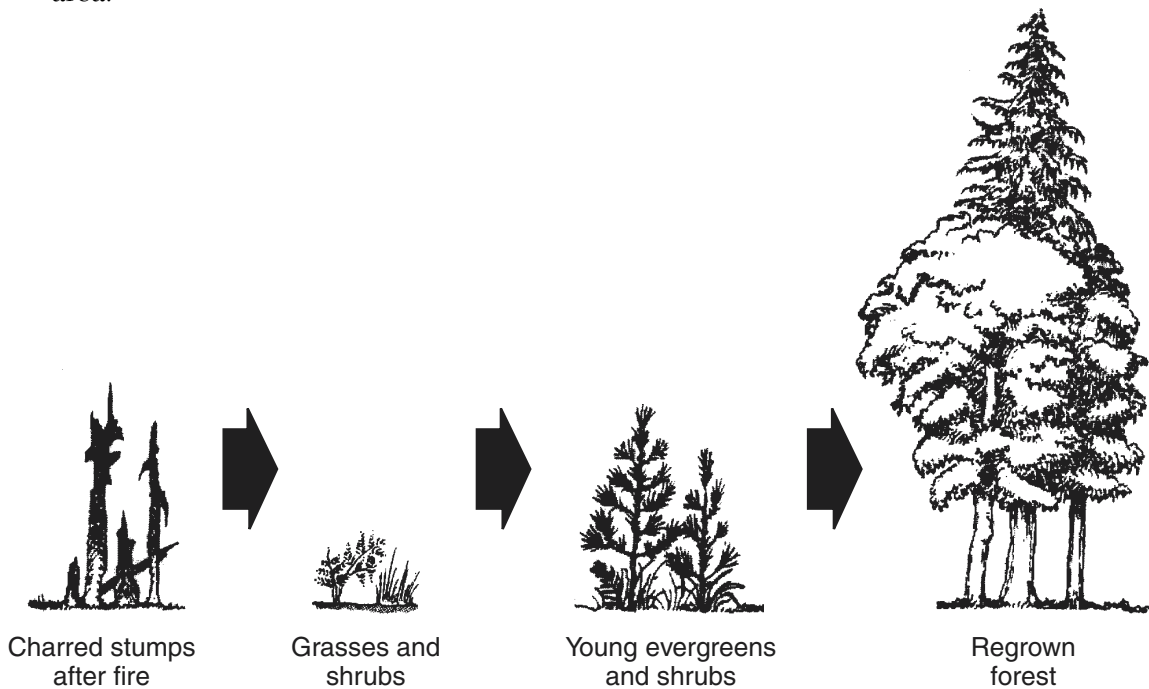
62

63 The temperature of the environment in which alligator embryos develop influences the sex of the embryos. At higher temperatures, more embryos develop into males while at lower temperatures, more develop into females. What effect might global warming have on the ability of these alligators to survive as a species? [1]

**For Teacher
Use Only**

63

64 The diagram below shows changes that might occur over time after a fire in a forest area.



Which statement is most closely related to the events shown in the diagram?

- (1) The lack of animals in an altered ecosystem speeds natural succession.
- (2) Abrupt changes in an ecosystem only result from human activities.
- (3) Stable ecosystems never become established after a natural disaster.
- (4) An abrupt environmental change can cause a long-term gradual change in an ecosystem.

64

Part C

Answer all questions in this part. [20]

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

65 In an experiment to test the effect of light on plant growth, a student used two marigold plants of the same age. The plants were grown in separate pots. One pot was exposed to sunlight, the other to artificial light. All other conditions were kept the same. The height of each plant was measured at the start and at the end of the experiment. The student's data are shown in the table below.

Data Table

Plant Grown In	Increase in Plant Height (cm)
Sunlight	9
Artificial light	8

The student concluded that all plants grow more rapidly in sunlight than in artificial light.

Discuss whether this conclusion is valid. Your answer must include at least:

- the significance of the difference in the results shown in the data table [1]
- the significance of the number of individual plants used in the experiment [1]
- the significance of the number of species of plants used in the experiment [1]

**For Teacher
Use Only**

65

66 Select *one* human body system from the list below.

Body Systems

- Digestive
- Circulatory
- Respiratory
- Excretory
- Nervous

Describe a malfunction that can occur in the system chosen. Your answer must include at least:

- the name of the system and a malfunction that can occur in this system [1]
- a description of a possible cause of the malfunction identified [1]
- an effect this malfunction may have on any other body system [1]

**For Teacher
Use Only**

66



67 Biological research has generated knowledge used to diagnose genetic disorders in humans. Explain how a specific genetic disorder can be diagnosed. Your answer must include at least:

- the name of a genetic disorder that can be diagnosed [1]
- the name or description of a technique used to diagnose the disorder [1]
- a description of *one* characteristic of the disorder [1]

**For Teacher
Use Only**

67

68 State *two* safety procedures that should be followed when conducting an experiment that involves heating protein in a test tube containing water, an acid, and a digestive enzyme. [2]

(1)

(2)

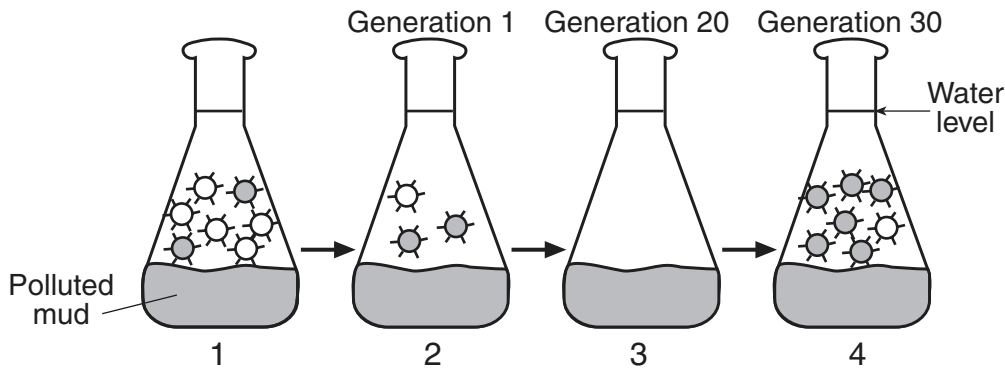
68

Base your answers to questions 69 and 70 on the information below and on your knowledge of biology.

For Teacher Use Only

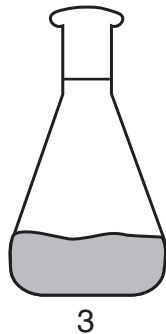
Over the last 30 years, a part of the Hudson River known as Foundry Cove has been the site for many factories that have dumped toxic chemicals into the river. Some of these pollutants have accumulated in the mud at the bottom of the river. The polluted cove water contains many single-celled organisms and simple multicellular animals. Curiously, when the same species from nearby regions with non-polluted sediments are moved to the polluted cove water, they die.

Scientists hypothesized that the organisms living in the cove have evolved so that they are able to survive in polluted water. To test this hypothesis, biologists tried to duplicate the history of the cove in the laboratory. They took a large number of one species of simple animal from a cove with unpolluted mud and placed them in a flask that contained polluted mud from Foundry Cove (diagram 1). Most of the animals died, but a few survived (diagram 2). The scientists then bred the survivors with each other for several generations producing offspring that were descendants of the survivors. When placed in Foundry Cove, most of these descendants survived. The diagrams below represent the steps in this investigation.



☉ = Pollution-sensitive individuals ☉ = Pollution-resistant individuals

69 On the diagram of the flask below, sketch the animals that would be present in flask 3 after several generations of breeding in the laboratory. [1]



69

70 Explain how the simple animals of Foundry Cove adapted to the polluted water. Your answer must include an explanation of the role of *three* of the following in this process. [3]

- environment
- genetic variation
- selection
- reproduction
- survival of the fittest

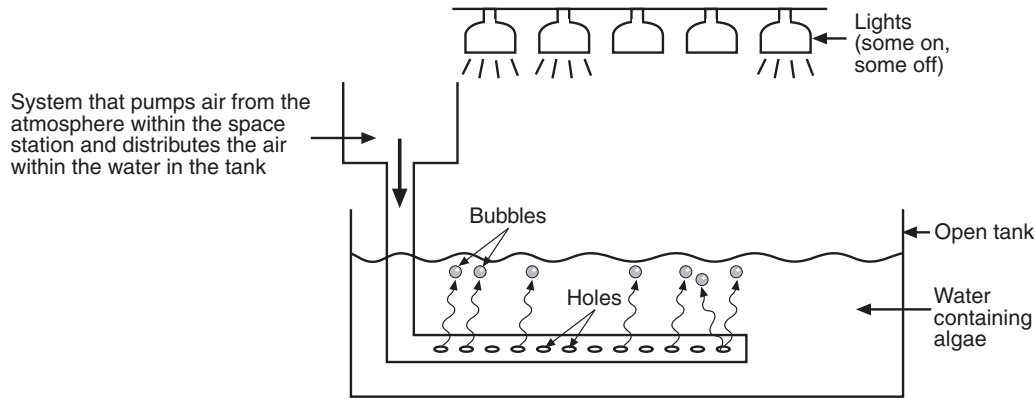
**For Teacher
Use Only**

70

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

**For Teacher
Use Only**

The diagram represents a system in a space station that includes a tank containing algae. An astronaut from a spaceship boards the space station.



71 Identify *one* process being controlled in the setup shown in the diagram. [1]

71

72 State *two* changes in the chemical composition of the space station atmosphere as a result of the astronaut coming on board the space station. [2]

72

73 State *two* changes in the chemical composition of the space station atmosphere that would result from turning on more lights. [2]

73

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Thursday, January 30, 2003 — 9:15 a.m. to 12:15 p.m., only

ANSWER SHEET

Student Sex: Female
 Male

Teacher

School Grade

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

Record your answers to Part A on this answer sheet.

Part A

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

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

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

Signature

Tear Here

Tear Here

Tear Here

FOR TEACHERS ONLY

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

Le

LIVING ENVIRONMENT

Wednesday, January 30, 2003 — 9:15 a.m. to 12:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

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

Part A (35 credits)

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

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

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 Administering and Scoring Regents Examinations in the Sciences*.

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

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

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

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

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

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

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

Part B

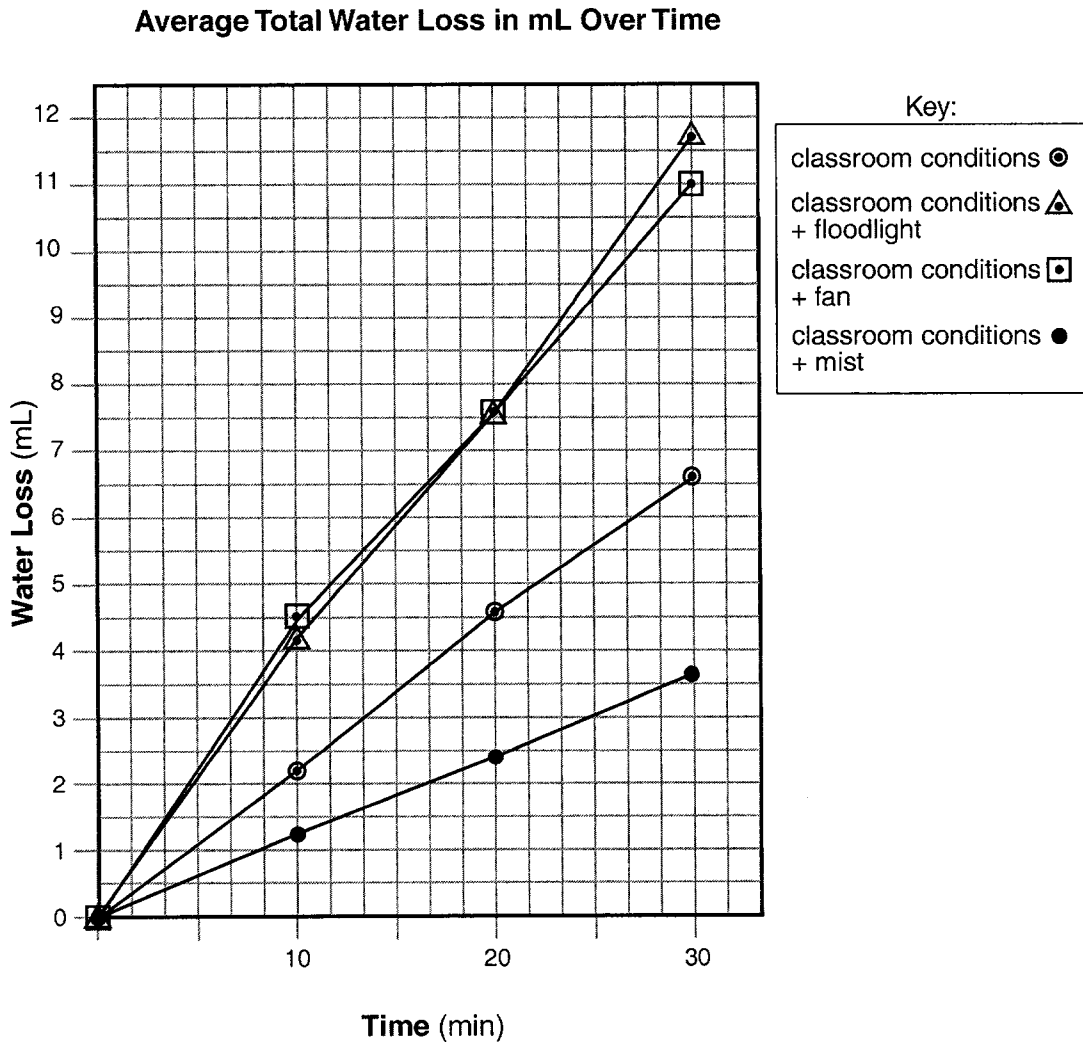
- (36) 2
- (37) 1
- (38) 3
- (39) 2
- (40) Allow 1 credit for indicating that both the river otter and the bald eagle appear to have been least affected by the oil spill.
- (41) 1
- (42) Allow 1 credit for citing information from the passage that indicates that the impact of the oil spill on the environment is still being experienced. Acceptable responses include, but are not limited to:
- A decade after the Exxon Valdez oil tanker spilled million of gallons of crude oil off Prince William Sound in Alaska, most of the fish and wildlife species that were injured have not fully recovered.
 - Eight species are considered to have made little or no progress toward recovery since the spill, including killer whales, harbor seals, and common loons.
 - Several other species, including sea otters and Pacific herring, have made significant progress toward recovery but are still not at levels seen before the accident.
- (43) Allow 1 credit for indicating that tidal plants (or other plants) were the autotrophic organisms negatively affected by the oil spill.
- (44) Allow 1 credit for indicating that exchanging genetic information provides genetic variations.
- (45) Allow a maximum of 2 credits, 1 for identifying a structure in a single-celled organism and 1 for stating how that structure is involved in the survival of the organism. Acceptable responses include, but are not limited to:
- mitochondrion: site of respiration or releases energy
 - cell membrane: regulates what enters (or leaves) the cell
- (46) Allow 1 credit for indicating that Process 2 restores the normal species number of chromosomes or that fertilization is necessary to produce offspring.

LIVING ENVIRONMENT – *continued*

- (47) Allow 1 credit for stating a difference between the cells produced by Process 1 and the cells produced by Process 3. Acceptable responses include, but are not limited to:
- Cells resulting from Process 1 have half the number of chromosomes as cells produced by Process 3.
 - Cells produced by Process 1 are sex cells and those produced by Process 3 are body cells.
- (48) Allow 1 credit for stating a change in the internal environment that might cause an increase in the cells labeled A. Acceptable responses include, but are not limited to:
- invasion of the body by any of the following:
 - bacteria, fungi, viruses, antigens, foreign proteins, allergens, foreign substances, disease-causing organisms
 - pregnancy
 - sickness
 - cancer
- (49) Allow 1 credit for describing one possible immune response, other than an increase in number, that one of the cells labeled A would carry out. Acceptable responses include, but are not limited to:
- attack or destroy a pathogen/antigen
 - produce antibodies
 - move to site of antigen
 - engulf invaders
- (50) 1
- (51) 3
- (52) 4
- (53) Allow 1 credit for indicating a predator-prey relationship found in the food web and indicating which organism is the predator and which is the prey. Acceptable responses include, but are not limited to:
- Predator/Prey
- lion/deer
 - lion/rabbit
 - hawk/mouse
 - mouse/cricket
 - frog/cricket
- (54) Allow 1 credit for marking an appropriate scale on the axis labeled “Time.”
- (55) Allow 1 credit for plotting the data for classroom conditions correctly, surrounding each point with a small circle, and connecting the points.

- (56) Allow 1 credit for plotting the data for classroom conditions + floodlight correctly, surrounding each point with a small triangle, and connecting the points.

Example of an Appropriate Graph



- (57) Allow 1 credit for indicating that classroom conditions + mist resulted in the lowest rate of transpiration.
- (58) Allow 1 credit for indicating that the group of plants in classroom conditions was the control.
- (59) Allow 1 credit for indicating that scientists formerly thought of repetitive DNA as “junk” because they did not understand its functions.
- (60) 2
- (61) Allow 1 credit for indicating that sentence 6 or 7 provides evidence that supports the hypothesis that increased amounts of repetitive DNA are responsible for increased size of organisms.

LIVING ENVIRONMENT – *continued*

(62) 2

(63) Allow 1 credit for indicating that global warming could decrease the ability of alligators to survive as a species.

(64) 4

Part C

(65) Allow a maximum of 3 credits, 1 for each of the three components in the response.

- For significance of the difference in the results: [1]
Acceptable responses include, but are not limited to:
 - One centimeter is not a significant difference.
 - The difference could be the result of human error.
- For significance of the number of plants used: [1]
Acceptable responses include, but are not limited to:
 - Growing one marigold in each location is not enough.
 - A larger sample size is needed to make valid conclusions.
- For significance of the number of species of plants used: [1]
Acceptable responses include, but are not limited to:
 - The student cannot conclude that all plants grow more rapidly in sunlight when this observation was based on only one species.
 - The student would need to conduct the investigation with many different species in order to support a conclusion relating to all plants.

(66) Allow a maximum of 3 credits, allocated as follows:

- Allow 1 credit for stating a malfunction associated with the selected system.
Acceptable responses include, but are not limited to:
 - digestive – ulcer
 - circulatory – heart attack
 - respiratory – emphysema
 - excretory – kidney stones
 - nervous – Parkinson’s disease
- Allow 1 credit for stating a direct or indirect cause of the malfunction identified.
Acceptable responses include, but are not limited to:
 - ulcer – excess stomach acid
 - heart attack – high fat diet
 - emphysema – smoking
 - kidney stones – genetic cause
 - Parkinson’s disease–brain stops making a sufficient supply of a critical chemical (dopamine)

LIVING ENVIRONMENT – *continued*

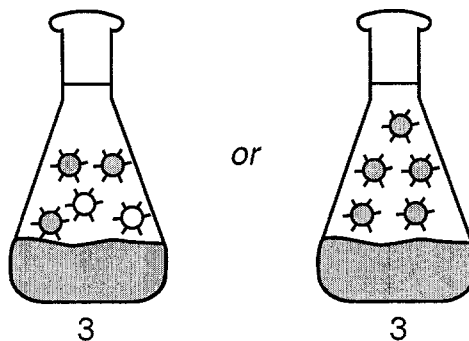
- Allow 1 credit for stating the effect the malfunction has on any other system. Acceptable responses include, but are not limited to:
 - ulcer – causes bleeding
 - heart attack – reduces oxygen to the brain
 - emphysema – reduces oxygen in the circulatory system
 - kidney stones – stimulates nervous system resulting in pain
 - Parkinson’s disease – involuntary muscular contractions

- (67) Allow a maximum of 3 credits, 1 each for the name of the genetic disorder, the technique used in diagnosis, and one characteristic of the disorder. Acceptable responses include, but are not limited to:
 - sickle cell anemia, microscopic examination of blood, low oxygen supply to the cells
 - Down syndrome, karyotype analysis, mental retardation
 - PKU, urine analysis, mental retardation

- (68) Allow a maximum of 2 credits, 1 for each appropriate safety procedure that should be followed when conducting an experiment that involves heating protein in a test tube containing water, an acid, and a digestive enzyme. Acceptable responses include, but are not limited to:
 - wear goggles
 - wear gloves
 - wear apron
 - handle chemicals properly
 - point test tube opening away from self and others
 - don’t stopper test tube

- (69) Allow 1 credit for a sketch that shows more than three “organisms,” with more than half (or possibly all) shaded.

Examples of Appropriate Sketches



LIVING ENVIRONMENT – *concluded*

(70) Allow a maximum of 3 credits, 1 for each accurate explanation of three different components in the response. Acceptable responses include, but are not limited to:

- Not all of the animals were identical. They had *genetic variations*.
- By *reproduction*, more organisms will be produced than can survive.
- Only those organisms best adapted to their *environment* will survive. This is known as *survival of the fittest*.
- Those animals that survive will *reproduce* and pass those favorable traits on to their offspring.
- As the *environment* became more polluted, the pollution caused some animals to die. This is known as *selection*.

Note: No Lamarckian answers are acceptable. No credit should be allowed for responses that simply repeat the prompt and/or name the terms listed without an explanation.

(71) Allow 1 credit for naming a process being controlled in the setup. Acceptable answers include, but are not limited to:

- photosynthesis
- energy flow
- carbon dioxide – oxygen cycle

(72) Allow a maximum of 2 credits, 1 for each of two changes in chemical composition of the space station atmosphere as a result of the astronaut coming on board. Acceptable responses include, but are not limited to:

- an increase in the level of water vapor
- an increase in the CO₂ level
- a decrease in the O₂ level

(73) Allow a maximum of 2 credits, 1 for each of two changes in the chemical composition of the space station atmosphere that would result from turning on more lights. Acceptable responses include, but are not limited to:

- increase in oxygen level
- decrease in the CO₂ level

Regents Examination in Living Environment

January 2003

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	74	27	51
84	99	55	74	26	50
83	97	54	73	25	48
82	96	53	72	24	47
81	95	52	72	23	46
80	94	51	71	22	44
79	93	50	70	21	43
78	92	49	70	20	42
77	91	48	69	19	40
76	90	47	68	18	39
75	89	46	68	17	37
74	88	45	67	16	35
73	87	44	66	15	34
72	86	43	66	14	32
71	85	42	65	13	30
70	84	41	64	12	28
69	83	40	63	11	26
68	83	39	63	10	24
67	82	38	62	9	22
66	81	37	61	8	20
65	80	36	60	7	18
64	80	35	59	6	15
63	79	34	58	5	13
62	78	33	57	4	10
61	77	32	56	3	8
60	77	31	55	2	5
59	76	30	54	1	3
58	76	29	53	0	0
57	75	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 in the scoring key for the administration be used to determine the student's final score. The chart above is usable only for this administration of the living environment examination.

Map to Core Curriculum

January 2003 Living Environment

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