

LIVING ENVIRONMENT

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

LIVING ENVIRONMENT

Tuesday, January 26, 2010 — 9:15 a.m. to 12:15 p.m., only

Student Name _____

School Name _____

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

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

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

Notice...

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

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

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

Part A

Answer all questions in this part. [30]

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

1 Which type of organism can obtain energy directly from any of the other organisms in an ecosystem?

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

2 Which structures are listed in order from the least complex to the most complex?

- (1) plant cell, leaf, chloroplast, rose bush
- (2) chloroplast, plant cell, leaf, rose bush
- (3) chloroplast, leaf, plant cell, rose bush
- (4) rose bush, leaf, plant cell, chloroplast

3 The ameba represented in the diagram below is a single-celled organism.



Which two processes are most closely associated with structure A?

- (1) insertion and deletion
- (2) nervous regulation and circulation
- (3) active transport and diffusion
- (4) replication and photosynthesis

4 The virus that causes bird flu can attach to the cells of the lower part of the respiratory system in humans, but not to the cells of the upper part of the respiratory system. The most likely reason for this is that these two groups of cells have different

- (1) DNA codes in their nuclei
- (2) enzymes in their mitochondria
- (3) amounts of water in their cytoplasm
- (4) receptor molecules on their membranes

5 A piece of refrigerated, cooked meat will remain safe to eat for a longer period of time than a refrigerated piece of raw meat of similar size. Which statement is a valid inference based on this information?

- (1) Cooking meat kills many bacteria and fungi.
- (2) Cool temperatures stimulate the growth of microbes on raw meat.
- (3) Raw meat cannot be preserved.
- (4) Cooked meat contains antibodies that destroy decomposers.

6 Some bloodsucking insects insert their mouthparts directly into a blood vessel and withdraw blood. Other bloodsucking insects have mouthparts that cut through the skin and blood vessels and produce a small pool of blood from which they feed. Both mouthpart types are specialized for

- (1) autotrophic nutrition
- (2) heterotrophic nutrition
- (3) regulation
- (4) excretion

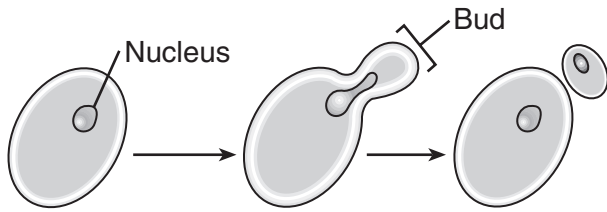
7 If the ribosomes of a cell were destroyed, what effect would this most likely have on the cell?

- (1) It would stimulate mitotic cell division.
- (2) The cell would be unable to synthesize proteins.
- (3) Development of abnormal hereditary features would occur in the cell.
- (4) Increased protein absorption would occur through the cell membrane.

8 Which substances play an important role in communication between cells in a multicellular organism by acting as chemical messengers?

- (1) fats
- (2) antibiotics
- (3) minerals
- (4) hormones

9 The diagram below illustrates asexual reproduction in yeast.



Yeast produce offspring that usually have

- (1) genes that are different from those of the parent
 - (2) genes that are identical to those of the parent
 - (3) half of the genetic information of the parent
 - (4) organelles that are not found in the parent
- 10 The molecule represented below is found in living things.



Which statement describes one characteristic of this molecule?

- (1) It is the template for the replication of genetic information.
 - (2) Organic catalysts are made up of these molecules.
 - (3) It is different in each cell of an organism.
 - (4) Cell membranes contain many of these molecules.
- 11 Which reproductive pattern would be associated with a species that is most likely to undergo rapid evolutionary change?
- (1) asexual reproduction with a short reproductive cycle
 - (2) sexual reproduction with a short reproductive cycle
 - (3) asexual reproduction with a long reproductive cycle
 - (4) sexual reproduction with a long reproductive cycle

12 If a gene is inserted into the DNA of a bacterial cell, every cell produced by that cell will have

- (1) DNA that is different from that of the other cells produced
 - (2) a 50% chance of having a copy of the inserted gene
 - (3) a copy of the inserted gene
 - (4) a new type of DNA base
- 13 The shape of a protein is most directly determined by the
- (1) amount of energy available for synthesis of the protein
 - (2) kind and sequence of amino acids in the protein
 - (3) type and number of DNA molecules in a cell
 - (4) mistakes made when the DNA is copied

14 Researchers have found that formaldehyde and asbestos can alter DNA base sequences. Based on this research, the use of these chemicals has been greatly reduced because they

- (1) may act as fertilizers, increasing the growth of algae in ponds
 - (2) have been replaced by more toxic compounds
 - (3) are capable of causing mutations in humans
 - (4) interfere with the production of antibiotics by white blood cells
- 15 When the adaptive characteristics of a species are insufficient to allow its survival, that species is likely to
- (1) mate with other species
 - (2) produce a beneficial mutation
 - (3) form a fossil
 - (4) become extinct

16 If a chemical that interrupts cell division is added to a culture of human liver tissue, which process would stop?

- (1) meiosis
- (2) mitosis
- (3) breakdown of glucose
- (4) diffusion of nutrients

17 Sexual reproduction involves the processes listed below.

Processes

- A. Differentiation
- B. Fertilization
- C. Gamete production
- D. Mitosis

Which sequence represents the order in which these processes occur?

- (1) $A \rightarrow B \rightarrow C \rightarrow D$
- (2) $B \rightarrow A \rightarrow C \rightarrow D$
- (3) $C \rightarrow B \rightarrow D \rightarrow A$
- (4) $D \rightarrow B \rightarrow C \rightarrow A$

18 A dogfish shark contains 24 chromosomes in each of its muscle cells. How many chromosomes are normally found in each of its gametes?

- (1) 6
- (2) 12
- (3) 24
- (4) 48

19 Which structure is correctly paired with its function?

- (1) testis — produces nutrients for the offspring
- (2) placenta — allows nutrients to diffuse from the mother to the embryo
- (3) uterus — produces testosterone used in egg production
- (4) ovary — provides a place for the internal development of the embryo

20 The maintenance of homeostasis in the body is most directly related to

- (1) cellular communication
- (2) cycling of energy
- (3) aging of the organism
- (4) recombination of chromosomes

21 Abiotic factors that affect the growth of grass in a lawn include

- (1) bacteria and soil
- (2) earthworms and nutrients
- (3) moisture and minerals
- (4) fertilizer and decomposers

22 Which statement best describes the flow of energy and the movement of chemical compounds in an ecosystem?

- (1) Energy flows into living organisms and remains there, while chemical compounds are transferred from organism to organism.
- (2) Chemical compounds flow in one direction in a food chain and energy is produced.
- (3) Energy is transferred from organism to organism in a food chain and chemical compounds are recycled.
- (4) Energy flows out of living organisms and is lost, while chemical compounds remain permanently inside organisms.

23 The carrying capacity for herbivores in a habitat is most directly affected by the availability of

- (1) heat energy released by carnivores
- (2) carbon dioxide in the atmosphere
- (3) photosynthetic organisms
- (4) decomposers in the soil

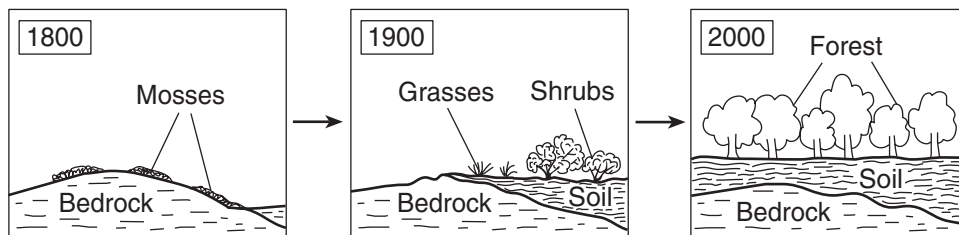
24 One advantage of biodiversity in an ecosystem is that it

- (1) guarantees that the largest organisms will dominate the area
- (2) ensures a large amount of identical genetic material
- (3) develops relationships between organisms that are always positive over long periods of time
- (4) increases the chance that some organisms will survive a major change in the environment

25 In 1960, an invasive species of fish was introduced into the stable ecosystem of a river. Since then, the population of a native fish species has declined. This situation is an example of an

- (1) ecosystem that has recovered
- (2) ecosystem altered through the activities of an organism
- (3) environmental impact caused by physical factors
- (4) ecological niche without competition

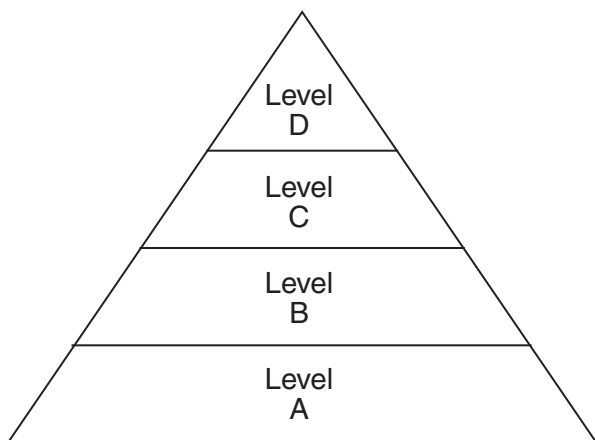
26 The diagram below represents a process that occurs in nature.



This diagram can be used to illustrate the

- (1) effects of reduced competition between different types of plant life
- (2) effect of human intervention on a stable ecosystem
- (3) ecological succession from bare rock to stable ecosystem
- (4) evolution of mosses to trees over 200 years

27 An energy pyramid is represented below.



The energy for use by organisms in level A originally comes from

- (1) producers
- (2) the Sun
- (3) level B
- (4) level D

28 Which human activity would most likely deplete finite resources?

- (1) use of natural enemies to eliminate insect pests
- (2) development of wildlife refuges
- (3) governmental restriction of industrial pollution
- (4) uncontrolled population growth

29 The Audubon Society recently released a study that showed that the populations of some bird species have decreased in number by as much as 50% since 1966. The study eliminated food and water shortages and natural cycles as causes for the decrease. Which factor might have contributed to this decline?

- (1) overproduction of bird offspring
- (2) destruction of natural habitats
- (3) fewer predators
- (4) an energy-rich diet

30 The increasing demands for fossil fuels has led government and businesses to consider several possibilities to solve the energy crisis. Which solution will reduce the impact of this crisis on the environment and future generations?

- (1) increase the number of drilling sites for crude oil in North America
- (2) build more power plants away from population centers
- (3) limit the number of people in each vehicle
- (4) develop alternative fuel sources that can be produced from renewable resources

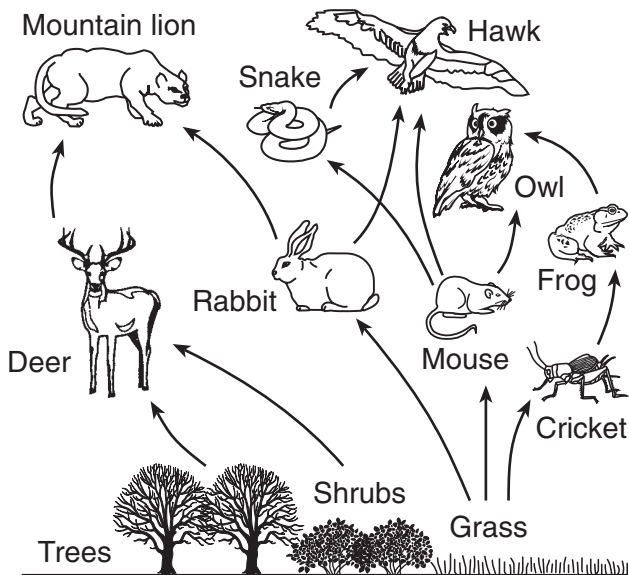
Part B-1

Answer all questions in this part. [12]

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

- 31 Conclusions based on an experiment are most likely to be accepted when
- (1) they are consistent with experimental data and observations
 - (2) they are derived from investigations having many experimental variables
 - (3) scientists agree that only one hypothesis has been tested
 - (4) hypotheses are based on one experimental design

32 A food web is represented below.



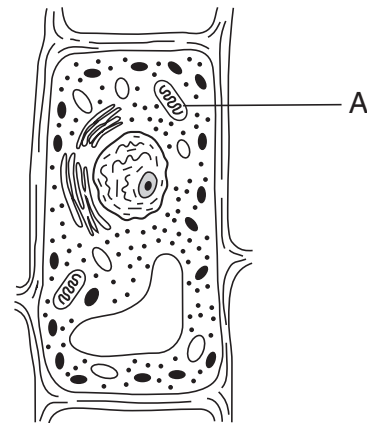
A continuous *decrease* in the size of the rabbit population would most likely cause a *decrease* in which other population?

- (1) frog
- (2) cricket
- (3) grass
- (4) mountain lion

33 Maple trees and tulips are classified as autotrophs because they both

- (1) produce gametes by the process of mitosis
- (2) produce carbon dioxide and water as metabolic wastes
- (3) are able to obtain complex organic materials from the environment
- (4) are able to synthesize organic molecules from inorganic raw materials

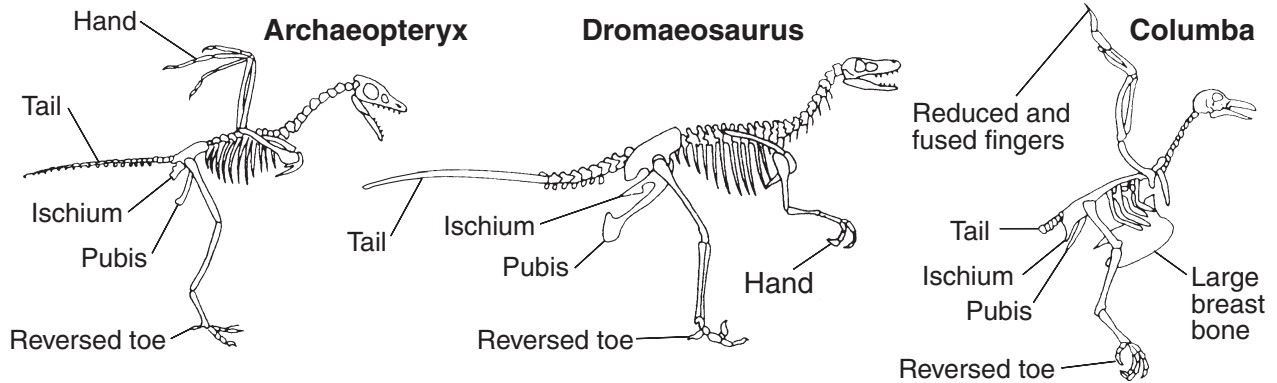
34 The diagram below represents a plant cell.



Which process takes place in structure A?

- (1) cellular respiration
- (2) heterotrophic nutrition
- (3) digestion of fats
- (4) protein synthesis

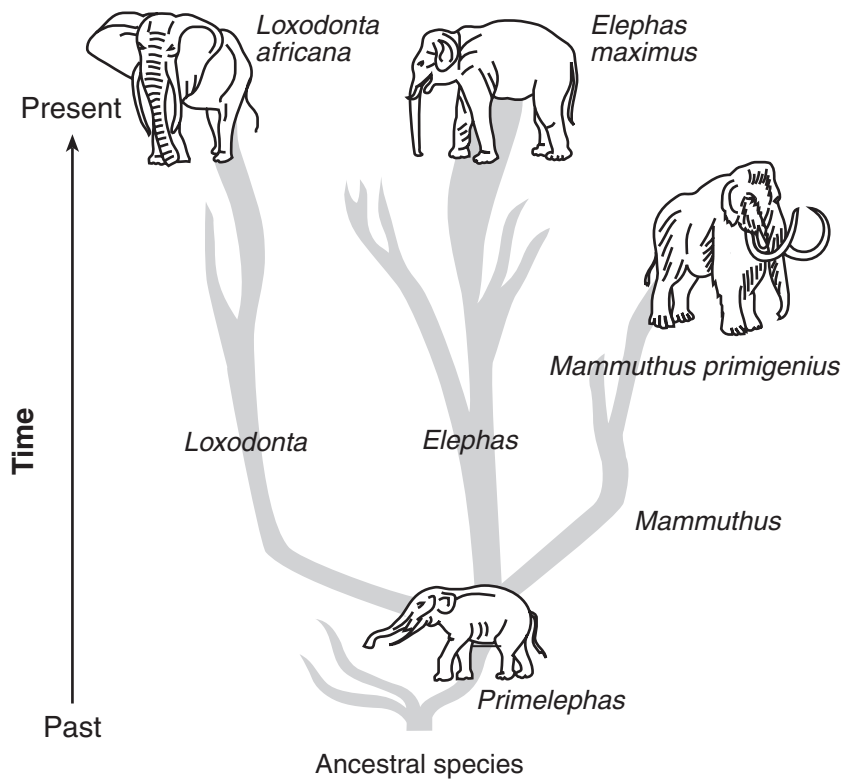
35 The remains of three organisms are shown below.



A study of these remains would indicate that these organisms have

- (1) identical food preferences
- (2) identical body sizes
- (3) structural similarities
- (4) habitat similarities

36 One possible pathway for the evolution of elephants is represented in the diagram below.



Which statement concerning this pattern of evolution is correct?

- (1) Evolution always results in favorable traits.
- (2) Evolution does not always result in a species that will survive to present time.
- (3) Evolution leads to less complex organisms.
- (4) Evolution results in the same changes in all species.

Base your answers to questions 37 and 38 on the information below and on your knowledge of biology.

Organisms living in a bog environment must be able to tolerate nitrogen-poor, acidic conditions. Bog plants such as the Venus flytrap and sundew are able to obtain their nitrogen by attracting and consuming insects. These plants produce chemicals that break down the insects into usable compounds.

37 The chemicals present in the plants that break down the insects are most likely

- (1) fats
- (2) hormones
- (3) enzymes
- (4) carbohydrates

38 Which compounds present in insects are composed of the amino acids that provide the Venus flytrap and sundew with much of their nitrogen?

- (1) proteins
 - (2) sugars
 - (3) carbohydrates
 - (4) fats
-

39 The amounts of all the organisms present in four different aquariums are shown below. Which aquarium would be the most stable?

Organism	Amount
aquatic plants	300 g
fish that eat plants	30 g
fish that eat fish	3 g
bacteria	.001 g

(1)

Organism	Amount
aquatic plants	.1 g
fish that eat plants	3 g
fish that eat fish	30 g

(3)

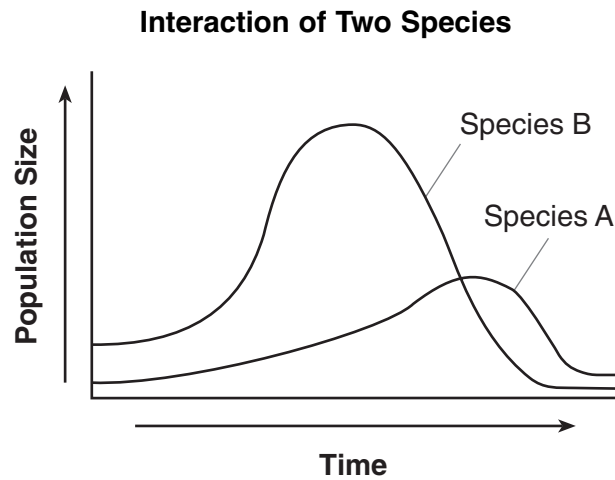
Organism	Amount
aquatic plants	.1 g
fish that eat plants	3 g
fish that eat fish	30 g
bacteria	300 g

(2)

Organism	Amount
aquatic plants	300 g
fish that eat plants	30 g
fish that eat fish	3 g

(4)

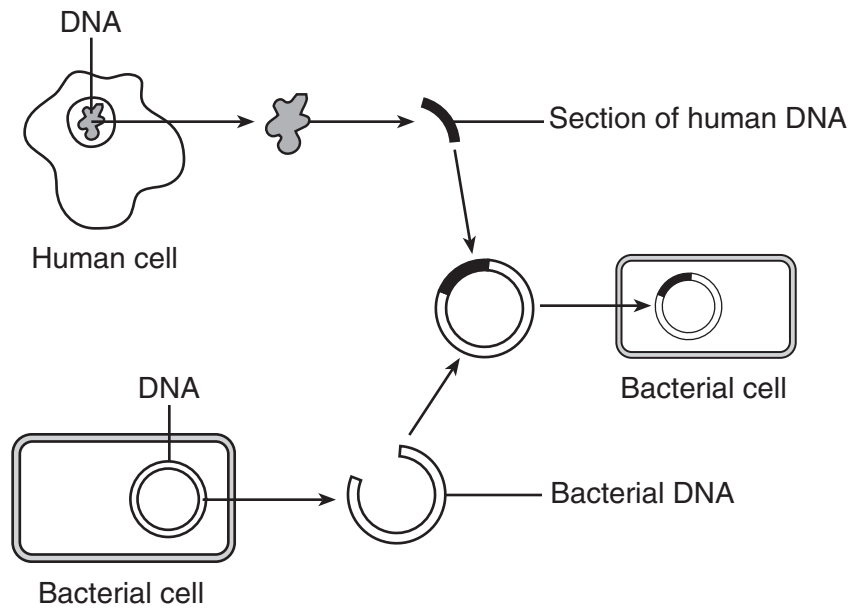
40 The graph below shows changes in the populations of two species that interact only with each other over a period of time.



Which statement best describes these two species?

- (1) Species A is a producer and species B is its consumer.
- (2) Species A is a host and species B is its parasite.
- (3) Species A is a predator and species B is its prey.
- (4) Species A is a scavenger and species B is its decomposer.

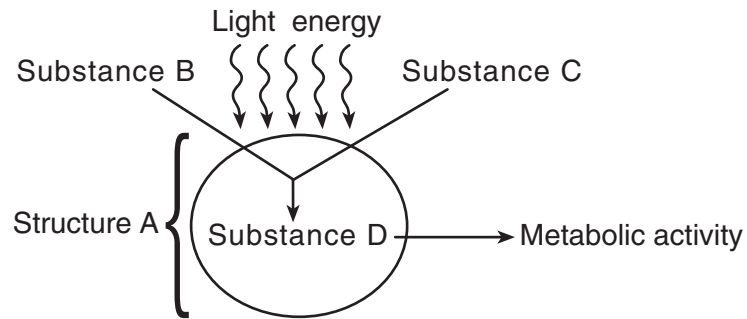
41 The diagram below represents one technique used in biotechnology.



The organic compound used to cut the bacterial DNA so that the human DNA could be inserted is a

- (1) molecular base
- (2) carbohydrate
- (3) specific enzyme
- (4) hormone

42 The diagram below represents a process that occurs in a structure of a specialized cell.



Which row in the chart correctly identifies the letters in the diagram?

Row	A	B	C	D
(1)	ribosome	oxygen	carbon dioxide	water
(2)	mitochondrion	water	oxygen	protein
(3)	nucleus	nitrogen	carbon	starch
(4)	chloroplast	carbon dioxide	water	glucose

Part B-2

Answer all questions in this part. [13]

Directions (43–55): For those questions that are followed by four choices, circle the *number* preceding the choice that, of those given, best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question and record your answers in the spaces provided.

Base your answers to questions 43 through 45 on the passage below and on your knowledge of biology.

**For Teacher
Use Only**

A normally healthy 35-year-old woman was found to have a severe intestinal infection usually seen in much older and sicker patients in hospitals. Because of so many cases like hers, some doctors became alarmed that the organism responsible could spread rapidly and cause unusually severe illnesses and some deaths. Scientists suspect that the cause is a mutated form of an organism that has a resistance to some of the most common treatments.

- 43 Since it is difficult to cure an infection caused by this organism, it might be easier to prevent these infections by using a vaccine. Identify the specific material a vaccine would have to contain to prevent future infections. [1]

43

- 44 Explain how this vaccine would prevent future infections. [1]

44

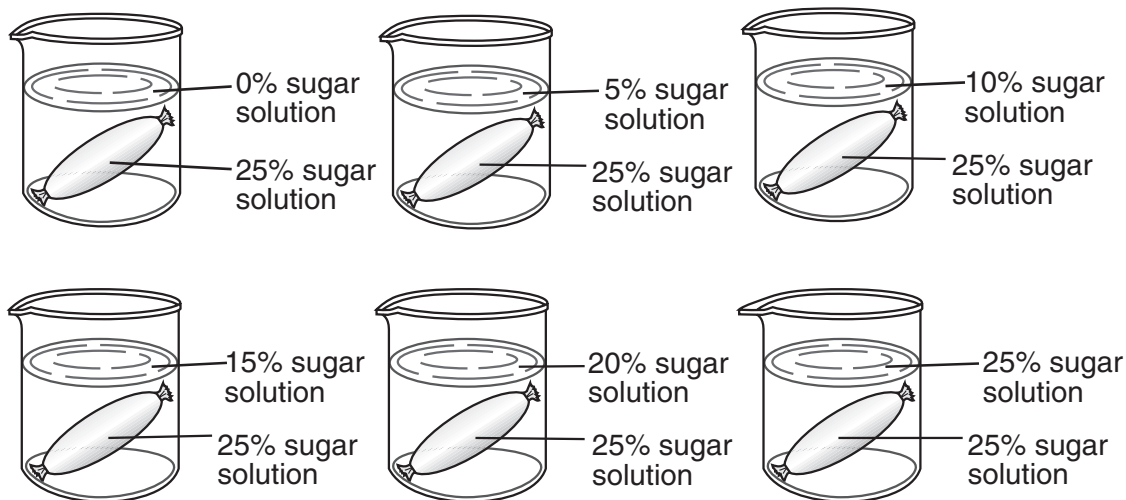
- 45 The mutated form of this type of organism could result from a change in a molecule within one member of the original population. Identify the molecule. [1]

45

Base your answers to questions 46 through 49 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

The masses of six sections of dialysis tubing, each containing 20 mL of a 25% sugar solution, were recorded. They were then placed in beakers each containing 100-mL solutions of varying sugar concentrations, as shown in the diagrams below.



The sections of tubing remained in the beakers for 30 minutes. They were then removed and the outside of each section of tubing was blotted dry. Following this, the mass of each section of tubing was measured again. The mass change of each section of tubing in the different sugar solutions is indicated in the data table below.

**Mass Change of Dialysis Tubing
Sections in Different Sugar Solutions**

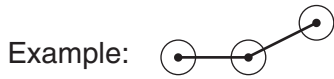
Sugar Concentration in the Beaker (%)	Mass Change of the Tubing (g)
0	5.1
5	4.7
10	4.4
15	2.5
20	1.4
25	0.0

Directions (46 and 47): Using the information in the data table, construct a line graph on the grid, following the directions below.

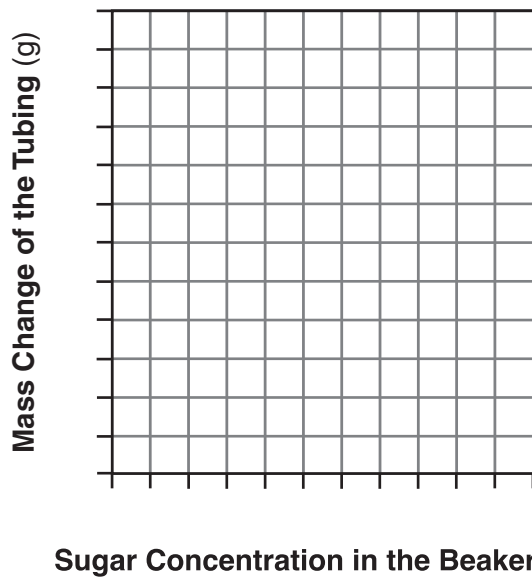
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46 Mark an appropriate scale on each axis. [1]

47 Plot the data on the grid. Surround each point with a small circle and connect the points. [1]



Mass Change of Dialysis Tubing Sections in Different Sugar Solutions



46

47

48 If another dialysis tube containing a 25% sugar solution were placed in a beaker containing a 12% sugar solution for 30 minutes, the change in the mass of the tubing would most likely be closest to

- (1) 1.2 g
- (2) 1.9 g
- (3) 2.6 g
- (4) 3.8 g

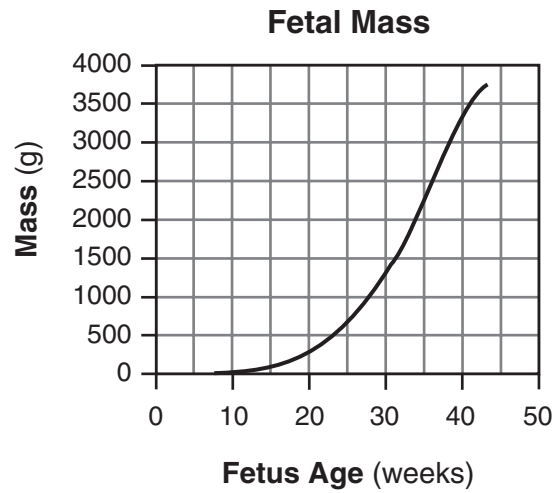
48

49 Identify the process responsible for the change in mass of the dialysis tubing in the beakers. [1]

49

Base your answers to questions 50 and 51 on the graph below and on your knowledge of biology. The graph represents changes in the mass of a fetus from week 8 to its birth at week 43.

**For Teacher
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50 Identify *one* factor that could cause a fetus to grow at a slower rate than that shown in the graph. [1]

50

51 During which five-week period did the fetal mass increase at the greatest rate?

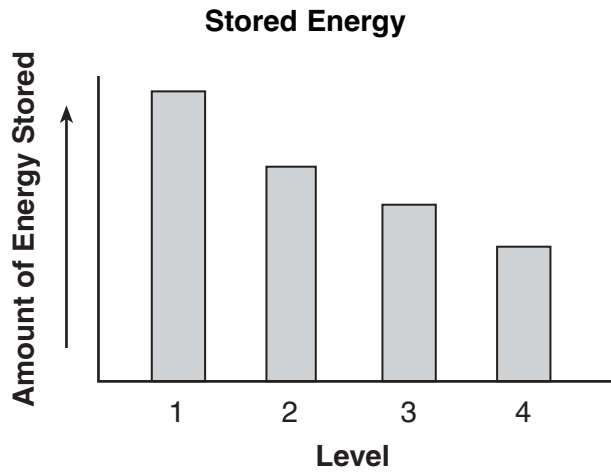
- (1) weeks 10–15
- (2) weeks 15–20
- (3) weeks 25–30
- (4) weeks 30–35

51

Base your answers to questions 52 and 53 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

The graph below represents the amount of energy stored in each level of an energy pyramid.



52 Which level most likely represents the autotrophs in the energy pyramid? Support your answer. [1]

52

53 State *one* reason why the amount of energy in level 3 is greater than that in level 4. [1]

53

54 Rabbits introduced into Australia over 100 years ago have become serious pests to farmers. Rabbit populations increased so drastically that they displaced many native species of herbivores. State *one* possible reason why the rabbit population was able to displace the native species. [1]

**For Teacher
Use Only**

54

55 A dichotomous key is shown below.

Dichotomous Key

- 1. a. tail fins are horizontal.....go to 2
- b. tail fins are vertical.....go to 3

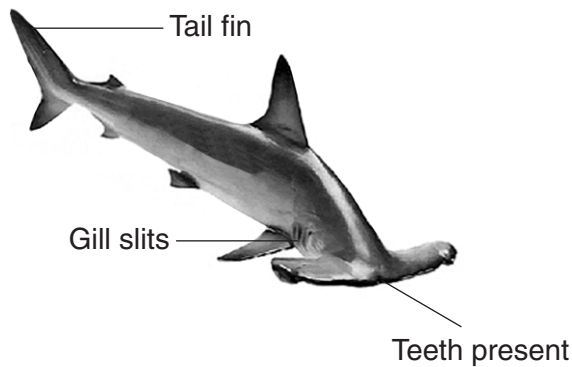
- 2. a. has teeth or tusk.....go to 4
- b. has no teeth.....***Balaena mysticetus***

- 3. a. has gill slits behind mouth.....go to 5
- b. has no gill slits.....***Lepidosiren paradoxa***

- 4. a. black with white underside.....***Orcinus orca***
- b. tusk, gray with dark spots.....***Monodon monoceros***

- 5. a. head is hammer shaped.....***Sphyrna mokarran***
- b. tail fins are half the body length.....***Alopias vulpinus***

Use the dichotomous key to identify the scientific name of the organism represented below. [1]



55

Part C

Answer all questions in this part. [17]

Directions (56–68): Record your answers in the spaces provided in this examination booklet.

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

Humans are changing the quality of the atmosphere and some of these changes may be harmful to the environment.

56 Identify *one* specific pollutant resulting from human activity that has contributed to changing the quality of the atmosphere. [1]

57 State *one* specific example of how the pollutant you identified in question 56 may be harmful to the environment. [1]

58 In much of the northeastern United States, the populations of white-tailed deer have increased so much that they have become a problem because they eat crops, flowers, and shrubs. The elimination of the main predators of the deer and the lack of other natural enemies are often given as reasons for this population increase. Three possible methods of controlling the deer population are listed below.

- A spread poisoned food in the habitat of the deer
- B introduce a new predator of deer from another region
- C introduce another animal species to compete with the deer for food

Choose *one* of these methods and write its letter in the space below. State how this method might have a *negative* impact, other than killing deer, on the local ecosystem. [1]

Method: _____

**For Teacher
Use Only**

56

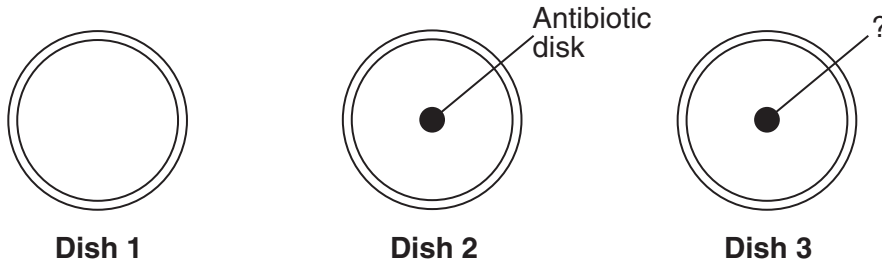
57

58

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

**For Teacher
Use Only**

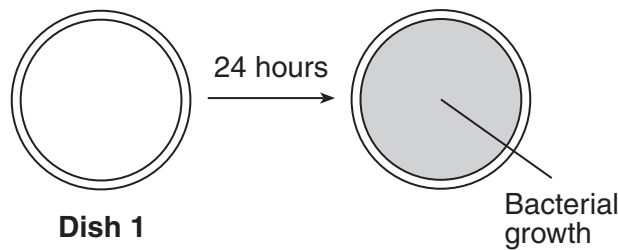
A researcher wanted to test the effectiveness of a new antibiotic on *Streptococcus pyrogenes*, the species of bacteria that causes strep throat. Bacteria were added to dish 1, dish 2, and dish 3. A disk soaked in the new antibiotic was then placed in dish 2. Dish 3 was set up as the control. The dishes are shown in the diagram below.



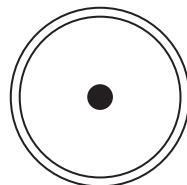
59 State *one* appropriate hypothesis for this experiment. [1]

59

60 All three dishes were placed in an incubator at 37°C for 24 hours. The results for dish 1 are shown below.



Complete the diagram of dish 2 below to represent an example of experimental results that would support your hypothesis. Explain how your diagram supports your hypothesis. [1]



Dish 2 after 24 hours

60

61 Describe how the disk in dish 3 should be prepared so it can serve as the control for this experiment. [1]

**For Teacher
Use Only**

61

62 Cardinals are birds that do not migrate but spend the winter in New York State. Many people feed these birds sunflower seeds during the winter months. Explain how the starches present in the sunflower seeds help the cardinals to survive. In your answer, be sure to:

- identify the building blocks of starches [1]
- identify the process used to produce these building blocks [1]
- state *one* way cardinals use these building blocks to survive [1]

62

63 A child is born with a genetic disorder to parents who show no symptoms of the disorder. Explain the type of information a genetic counselor might provide to these parents. In your answer, be sure to:

- explain why the child exhibits symptoms of the genetic disorder even though the parents do *not* [1]
- identify *one* technique that can be used to detect a genetic disorder [1]
- identify *one* genetic disorder [1]

63

Base your answers to questions 64 and 65 on the passage below and on your knowledge of biology.

**For Teacher
Use Only**

Scientists often use different species in the laboratory for research into human organ development. Zebra fish and mice have been used in this research. Both have internal organs that function in a manner similar to human organs.

Genetic engineering can be used to produce zebra fish and mice that have genes that result in problems with development. In order to analyze the genes involved in the formation of different organs, scientists would need to use thousands of mice over many years of study. It would also be difficult to watch the development of organs in the embryos of mice since this development takes place in the mother's uterus.

Scientists began to use zebra fish in the laboratory because they have several advantages over mice. They develop into adults in about 90 days and produce hundreds of offspring from one mating. The embryo is transparent and develops outside the body of the female. Scientists can actually see organs developing.

64 State *one* advantage of using the zebra fish as a research animal. [1]

64

65 State *one disadvantage* of using mice for observing the early development of internal organs. [1]

65

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

**For Teacher
Use Only**

A town located in New York State has a 500-acre piece of land available for development. The town board has to decide how to respond to two groups interested in the land.

Characteristics of the land:

- mostly trees with some grassland and several small streams
- a large lake which supports a great variety of fish and other wildlife

Two different groups are interested in developing the property:

Group A — a logging company that wants to use the trees for lumber

Group B — an environmental organization that wants to make it a park

66 State *one* benefit that implementing the group A proposal may provide for the town. [1]

66

67 State *one* specific *negative* consequence of having group A develop the land. [1]

67

68 State *one* specific positive consequence of implementing the proposal of group B. [1]

68

Part D

Answer all questions in this part. [13]

Directions (69–80): For those questions that are followed by four choices, circle the *number* of the choice that, of those given, best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question and record your answers in the spaces provided.

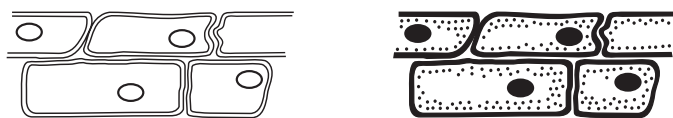
Base your answers to questions 69 and 70 on the information below and on your knowledge of biology.

A plant known as caltrop is found on one of the Galapagos Islands. The caltrop plant produces seeds with tough, spiny coats. There is a bird species, *Geospiza fortis*, that can crack the tough seed coat and eat the contents inside. On one part of the island where there are many of these birds, the caltrop plants produce fewer seeds and the coats of the seeds have longer and more numerous spines. On another part of the island where there are few of these birds, the plants produce more seeds and the seed coats have fewer, shorter spines.

69 Identify *one* variation the caltrop seeds have for survival. [1]

70 Identify *one* process that can result in adaptations. [1]

71 A student observes some cells with a compound light microscope as shown in view A below.



View A

View B

What did the student most likely do to obtain view B?

- (1) applied a biological stain to the slide
- (2) applied distilled water to the slide
- (3) used electrophoresis
- (4) used a higher magnification

**For Teacher
Use Only**

69

70

71

Base your answers to questions 72 and 73 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

Two students each design their own investigations to determine whether resting or exercising beforehand allows a person to squeeze a clothespin more times over a certain period of time.

Student A squeezes the clothespin as many times as he can after sitting quietly for two minutes. In the second trial he runs in place for two minutes and then squeezes the clothespin as many times as he can. He records the results of each trial in his data table.

Student B uses the same procedure as student A. She also asks that the other 25 boys and girls in her class carry out the same procedure and she records their data. She then calculates the average number of times that the clothespins had been squeezed without exercise and with exercise before the trials.

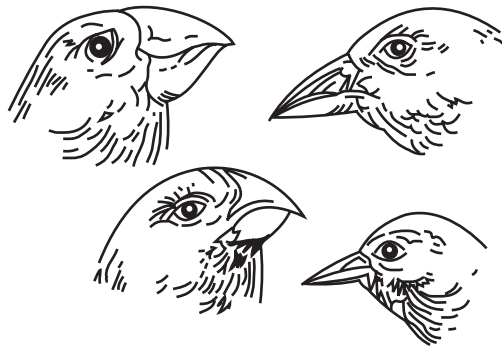
- 72 Based on the description given of the investigations, state *one* reason why student B's investigation will give more reliable results than student A's. [1]

72

- 73 Student B states that exercising before the second trial will always have the same effect on this type of muscular activity. Explain why the statement made by student B could be questioned. [1]

73

74 The diagram below shows four species of birds that evolved from an ancestral species that had a small, pointed beak. Today, all four species inhabit the same island.

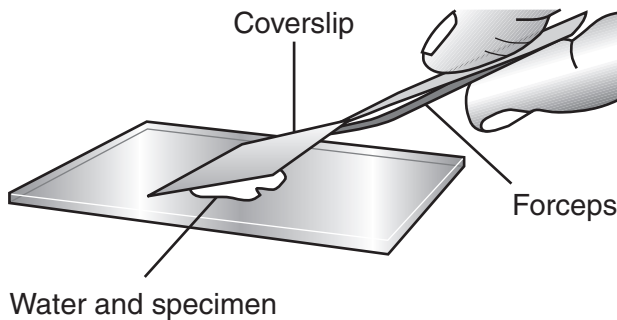


Which statement best explains the variation in the beaks of these four species?

- (1) Over time, an abundance of seeds for food led to increased similarities between the species.
- (2) Over time, an abundance of seeds for food led to increased differences between the species.
- (3) Competition for limited food resources led to selection for similar traits.
- (4) Competition for limited food resources led to selection for different traits.

74

75 A laboratory technique is illustrated in the diagram below.



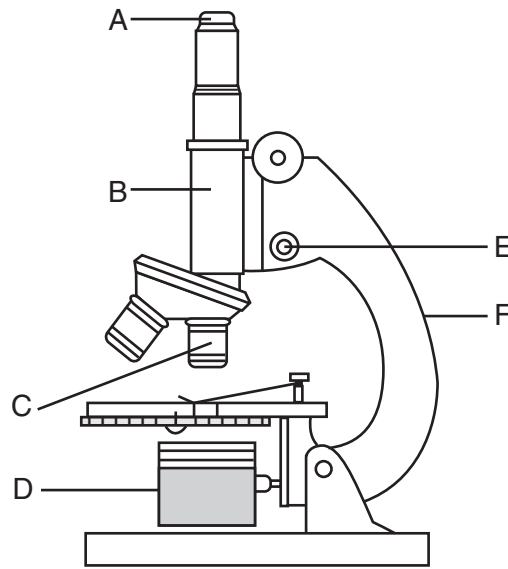
The technique of lowering the coverslip at an angle is used to

- (1) make organelles more visible
- (2) reduce the formation of air bubbles
- (3) make the specimen transparent
- (4) reduce the size of the specimen

75

Base your answers to questions 76 through 78 on the diagram of a microscope below and on your knowledge of biology.

**For Teacher
Use Only**



76 Information about which *two* lettered parts is needed in order to determine the total magnification of an object viewed with the microscope in the position shown? [1]

_____ and _____

76

77 Which lettered part should be used to focus the image while using high power? [1]

77

78 State *two* ways the image seen through the microscope differs from the actual specimen being observed. [1]

_____ and _____

78

Base your answers to questions 79 and 80 on the information and chart below, which represents a portion of the mRNA codon chart and on your knowledge of biology.

**For Teacher
Use Only**

AUU } AUC } ILE AUA }	ACU } ACC } THR ACA } ACG }	AAU } AAC } ASN	AGU } AGC } SER
AUG } MET		AAA } AAG } LYS	AGA } AGG } ARG

Researchers studying plants in the rain forest have discovered a new species of plant. A fragment of DNA is cut from a chromosome in this plant. The base sequence of the cut DNA fragment is represented below.

DNA base sequence: T A C T T A T C A T A G

79 Complete the chart below to show the mRNA codons and amino acids coded for by the DNA base sequence. [2]

DNA base sequence	T A C	T T A	T C A	T A G
mRNA codons	_____	_____	_____	_____
Amino acids	_____	_____	_____	_____

79

80 State *one* reason why the researchers would be interested in finding new plant species in rain forests. [1]

80

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Tuesday, January 26, 2010 — 9:15 a.m. to 12:15 p.m., only

ANSWER SHEET

Female

Student Sex: Male

Teacher

School Grade

Part	Maximum Score	Student's Score
A	30	
B-1	12	
B-2	13	
C	17	
D	13	
Total Raw Score (maximum Raw Score: 85)		<input type="text"/>
Final Score (from conversion chart)		<input type="text"/>
Raters' Initials		
Rater 1		Rater 2

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

Part A

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

Part A Score

Part B-1

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

Part B-1 Score

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

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

Signature

Tear Here

LIVING ENVIRONMENT

Tear Here

Tear Here

LIVING ENVIRONMENT

FOR TEACHERS ONLY

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

LE

LIVING ENVIRONMENT

Tuesday, January 26, 2010 — 9:15 a.m. to 12:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

Refer to the directions on page 2 before rating student papers.

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

Part A and Part B-1

Allow 1 credit for each correct response.

Part A			Part B-1	
1 2	11 2	21 3	31 1	37 3
2 2	12 3	22 3	32 4	38 1
3 3	13 2	23 3	33 4	39 1
4 4	14 3	24 4	34 1	40 3
5 1	15 4	25 2	35 3	41 3
6 2	16 2	26 3	36 2	42 4
7 2	17 3	27 2		
8 4	18 2	28 4		
9 2	19 2	29 2		
10 1	20 1	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 check mark each incorrect or omitted answer to multiple-choice questions. In the box provided in the upper right corner of the answer sheet, record the number of questions the student answered correctly for each of these parts.

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

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

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

Raters should enter the scores earned for Part A, Part B–1, Part B–2, Part C, and Part D on the appropriate lines in the box printed on the answer sheet and should add these five scores and enter the total in the box labeled "Total Raw Score." Then the student's raw score should be converted to a scaled score by using the conversion chart that will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Tuesday, January 26, 2010. The student's scaled score should be entered in the box labeled "Final Score" on the student's answer sheet. The scaled score is the student's final examination score.

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

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

Part B-2

43 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- dead/weakened organisms that cause this infection

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

- The vaccine would stimulate antibody production.
- The vaccinated person would produce antibodies against this organism.
- produce an immune response
- stimulates the formation of memory cells

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

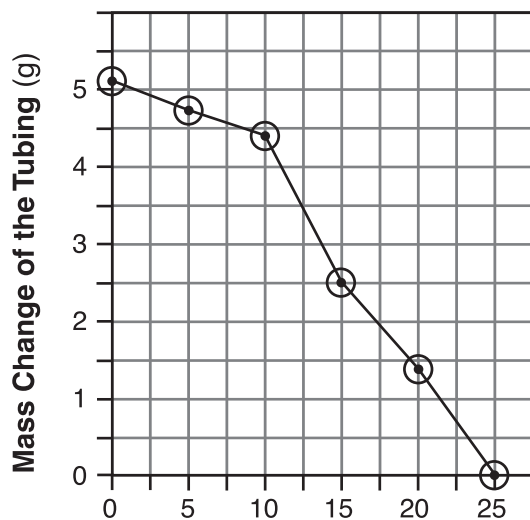
- DNA

46 [1] Allow 1 credit for marking an appropriate scale on each axis.

47 [1] Allow 1 credit for correctly plotting the data, surrounding each point with a small circle, and connecting the points.

Example of a 2-credit graph for questions 46 and 47:

**Mass Change of Dialysis Tubing Sections
in Different Sugar Solutions**



Sugar Concentration in the Beaker (%)

Note: Allow credit if the points are plotted correctly but *not* circled.

Make no assumption about the origin unless it is labeled.

Do *not* allow credit for plotting points that are not in the data table; e.g., (0,0).

48 4

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

- diffusion
- passive transport
- osmosis

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

- faults in its genes
- its mother's inadequate diet
- environmental factors such as alcohol/drugs/tobacco
- toxins
- infections
- multiple fetuses

51 4

52 [1] Allow 1 credit for level 1 and supporting the answer. Acceptable responses include, but are not limited to:

- has the greatest amount of stored energy

53 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Energy is lost at each feeding level.

54 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- There are few effective predators to keep the rabbit population in check.
- They have a faster reproductive rate than the native species.
- Rabbits are better adapted.

55 [1] Allow 1 credit for *Sphyrna mokarran* or *S. mokarran*.

Part C

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

- gases associated with acid rain, such as nitrogen and sulfur oxides
- CO₂
- sulfur compounds

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

- CO₂: leads to global warming
- sulfur/nitrogen compounds: dissolve in the rain to produce acid rain that damages plants

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

- A — The poisoned food supplies may poison animals other than the deer.
 - The poison may get into streams and cause water pollution.
- B — The new predator may not have any natural enemies in the northeast and it may become a problem if it overpopulates.
 - The introduced predator may feed on animals that do not need to be controlled.
- C — The other animal species may replace the deer and cause greater problems than those caused by the deer.
 - The combined effect of the deer and the introduced animal species may increase crop destruction.

LIVING ENVIRONMENT – *continued*

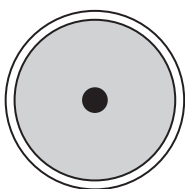
59 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- This antibiotic will have no effect on the growth of this bacterium.
- The new antibiotic will slow down bacterial growth.
- The antibiotic will kill the bacteria.

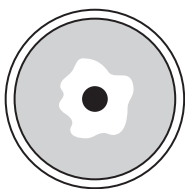
Note: Do *not* allow credit for a hypothesis in the form of a question.

60 [1] Allow 1 credit for completing the diagram to represent an example of experimental results that would support the student's hypothesis in question 59 *and* supporting the answer.

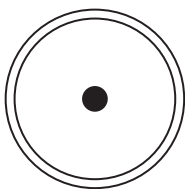
Examples of 1-credit responses:



- The bacteria continued to grow, so the antibiotic was not effective.
- The antibiotic did not kill the bacteria.



- Some of the bacteria in the dish died off, so the antibiotic was somewhat effective.
- The antibiotic killed some of the bacteria.



- All the bacteria were killed, so the antibiotic was very effective.
- The antibiotic killed all the bacteria.

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

- Soak the disk in sterile water.
- Do not add any antibiotic to the disk.

62 [3] Allow a maximum of 3 credits, allocated as follows:

- Allow 1 credit for identifying the building blocks of starches. Acceptable responses include, but are not limited to:
 - simple sugars
 - glucose
- Allow 1 credit for identifying the process used to produce these building blocks. Acceptable responses include, but are not limited to:
 - photosynthesis
 - digestion
 - synthesis
- Allow 1 credit for stating *one* way cardinals use these building blocks to survive. Acceptable responses include, but are not limited to:
 - as an energy source
 - as a building unit for some cell parts

63 [3] Allow a maximum of 3 credits, allocated as follows:

- Allow 1 credit for explaining why the child exhibits symptoms of the genetic disorder even though the parents do *not*. Acceptable responses include, but are not limited to:
 - Nondisjunction could have occurred.
 - A mutation might have taken place.
 - The child may have inherited two recessive alleles.
- Allow 1 credit for identifying *one* technique that can be used to detect a genetic disorder. Acceptable responses include, but are not limited to:
 - amniocentesis
 - karyotyping
 - blood screening
 - electrophoresis
- Allow 1 credit for identifying *one* genetic disorder. Acceptable responses include, but are not limited to:
 - Down syndrome
 - sickle-cell anemia
 - hemophilia

LIVING ENVIRONMENT – *continued*

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

- short development time
- embryo develops outside body of female allowing for easier observation of development
- The embryo is transparent.
- hundreds of offspring

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

- It takes thousands of mice/many years.
- The fetus develops inside the mother, so you cannot see it.
- The embryo is not transparent.

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

- building materials for the residents living in the town
- employment opportunities for the town
- clear land for farming

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

- destruction of habitat
- loss of biodiversity
- loss of O₂/increased CO₂
- erosion
- contribute to global warming

68 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- parkland for the residents to enjoy
- education center for schools and/or families
- recreational opportunities
- preserve habitats
- prevent soil erosion

Part D

69 [1] Allow 1 credit for tough seed coats *or* spiny seed coats.

70 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- natural selection
- mutation
- sexual reproduction

71 1

72 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- sample size is larger
- results are averaged
- including both males and females rather than just one sex

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

- The students may not all be in similar physical condition.
- relatively small sample size used
- Not all people will respond in the same way.

74 4

75 2

76 [1] Allow 1 credit for *both* A and C.

77 [1] Allow 1 credit for E.

78 [1] Allow 1 credit for stating *two* acceptable responses. Acceptable responses include, but are not limited to:

- enlarged
- upside down
- backward
- more detail

79 [2] Allow a maximum of 2 credits, 1 credit for *all* of the correct mRNA codons, and 1 credit for *all* of the correct amino acids.

Example of a 2-credit response:

mRNA codons: AUG AAU AGU AUC

Amino acids: MET ASN SER ILE

Note: Allow credit for amino acids that are consistent with the mRNA codons.

80 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- may be a source of new medicines
- may give new evidence for evolutionary pathways or relationships
- may be new source of food
- may be commercially important

The *Chart for Determining the Final Examination Score for the January 2010 Regents Examination in Living Environment* will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Tuesday, January 26, 2010. Conversion charts provided for previous administrations of the Regents Examination in Living Environment must NOT be used to determine students' final scores for this administration.

Online Submission of Teacher Evaluations of the Test to the Department

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

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

Map to Core Curriculum

January 2010 Living Environment

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

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



Regents Examination in Living Environment January 2010

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

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

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

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

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