

LIVING ENVIRONMENT

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

LIVING ENVIRONMENT

Wednesday, June 16, 2010 — 1:15 to 4:15 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.

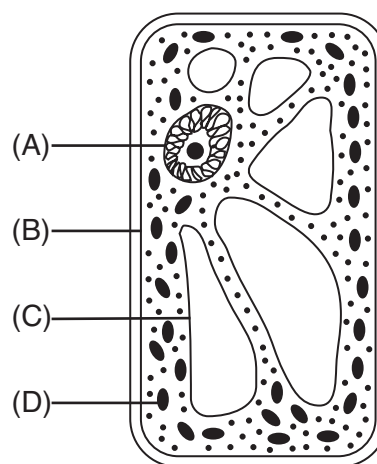
Part A

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.

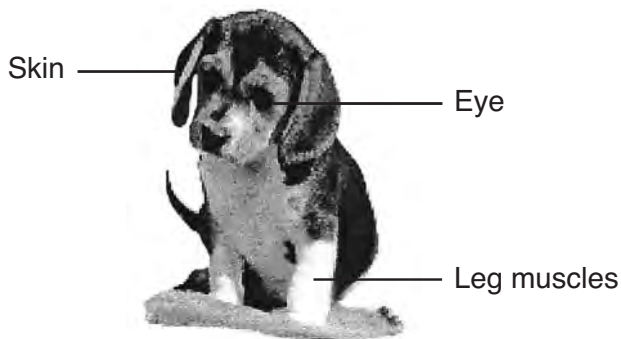
- Why is a mushroom considered a heterotroph?
 - It manufactures its own food.
 - It divides by mitosis.
 - It transforms light energy into chemical energy.
 - It obtains nutrients from its environment.
- Three days after an organism eats some meat, many of the organic molecules originally contained in the meat would be found in newly formed molecules of
 - glucose
 - protein
 - starch
 - oxygen
- Which body system is correctly paired with its function?
 - excretory—produces antibodies to fight disease-causing organisms
 - digestive—produces hormones for storage and insulation
 - circulatory—transports materials for energy release in body cells
 - respiratory—collects waste material for digestion
- Which statement best explains why some cells in the reproductive system only respond to certain hormones?
 - These cells have different DNA than the cells in other body systems.
 - These cells have specific types of receptors on their membranes.
 - Reproductive system cells could be harmed if they made contact with hormones from other body systems.
 - Cells associated with the female reproductive system only respond to the hormone testosterone.

- In the cell shown below, which lettered structure is responsible for the excretion of most cellular wastes?



- A
 - B
 - C
 - D
- What is the main function of a vacuole in a cell?
 - storage
 - coordination
 - synthesis of molecules
 - release of energy
- If 15% of a DNA sample is made up of thymine, T, what percentage of the sample is made up of cytosine, C?
 - 15%
 - 35%
 - 70%
 - 85%
- Global warming has been linked to a *decrease* in the
 - size of the polar ice caps
 - temperature of Earth
 - rate of species extinction
 - rate of carbon dioxide production

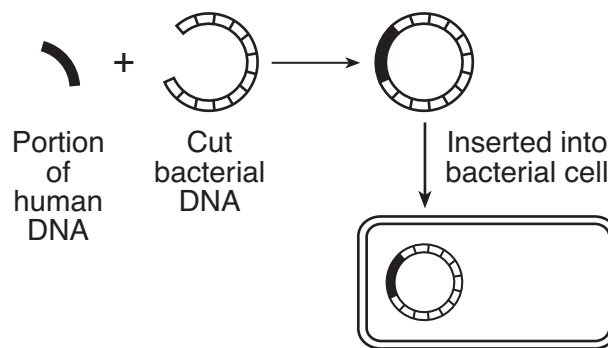
9 Several structures are labeled in the diagram of a puppy shown below.



Every cell in each of these structures contains

- (1) equal amounts of ATP
 - (2) identical genetic information
 - (3) proteins that are all identical
 - (4) organelles for the synthesis of glucose
- 10 A characteristic that an organism exhibits during its lifetime will only affect the evolution of its species if the characteristic
- (1) results from isolation of the organism from the rest of the population
 - (2) is due to a genetic code that is present in the gametes of the organism
 - (3) decreases the number of genes in the body cells of the organism
 - (4) causes a change in the environment surrounding the organism
- 11 Agriculturists have developed some varieties of vegetables from common wild mustard plants, which reproduce sexually. Which statement best explains the development of these different varieties of vegetables?
- (1) Different varieties can develop from a single species as a result of the recombination of genetic information.
 - (2) Different species can develop from a single species as a result of the effect of similar environmental conditions.
 - (3) Mutations will occur in the genes of a species only if the environment changes.
 - (4) Variations in a species will increase when the rate of mitosis is decreased.

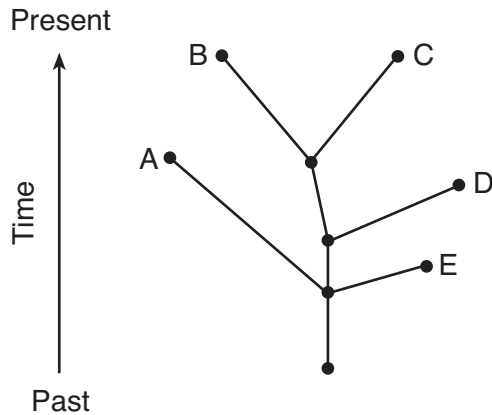
12 The diagram below represents a technique used in some molecular biology laboratories.



This technique is a type of

- (1) chromatography
 - (2) gel electrophoresis
 - (3) direct harvesting
 - (4) genetic engineering
- 13 A species of bird known as Bird of Paradise has been observed in the jungles of New Guinea. The males shake their bodies and sometimes hang upside down to show off their bright colors and long feathers to attract females. Females usually mate with the “flashiest” males. These observations can be used to support the concept that
- (1) unusual courtship behaviors lead to extinction
 - (2) some organisms are better adapted for asexual reproduction
 - (3) homeostasis in an organism is influenced by physical characteristics
 - (4) behaviors that lead to reproductive success have evolved

14 Which statement concerning the evolution of species *A*, *B*, *C*, *D*, and *E* is supported by the diagram below?



- (1) Species *B* and *C* can be found in today's environments.
- (2) Species *A* and *D* evolved from *E*.
- (3) Species *A* and *C* can still interbreed.
- (4) Species *A*, *B*, and *E* all evolved from a common ancestor and all are successful today.

15 The diagram below represents a process that occurs during human reproduction.



(Not drawn to scale)

The process represented by the arrow will ensure that the

- (1) zygote contains a complete set of genetic information
- (2) gametes contain a complete set of genetic information
- (3) zygote contains half of the genetic information
- (4) gametes contain half of the genetic information

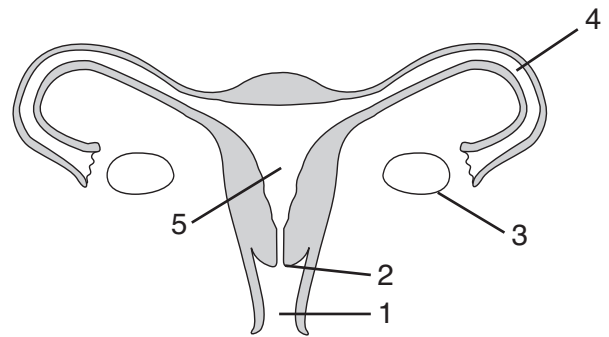
16 Even though identical twins have the same genetic material, they may develop slightly different characteristics because

- (1) each twin receives different chromosomes from the egg
- (2) one twin may only have genes from the father
- (3) gene expression may be influenced by factors that switch genes on and off
- (4) a gene mutation may have occurred before the zygote divided

17 What normally happens immediately after fertilization in sexual reproduction?

- (1) specialization of cells to form a fetus from an egg
- (2) production of daughter cells having twice the number of chromosomes as the parent cell
- (3) production of daughter cells having half the number of chromosomes as the parent cell
- (4) division of cells resulting in the development of an embryo from a zygote

18 The human female reproductive system is represented in the diagram below.

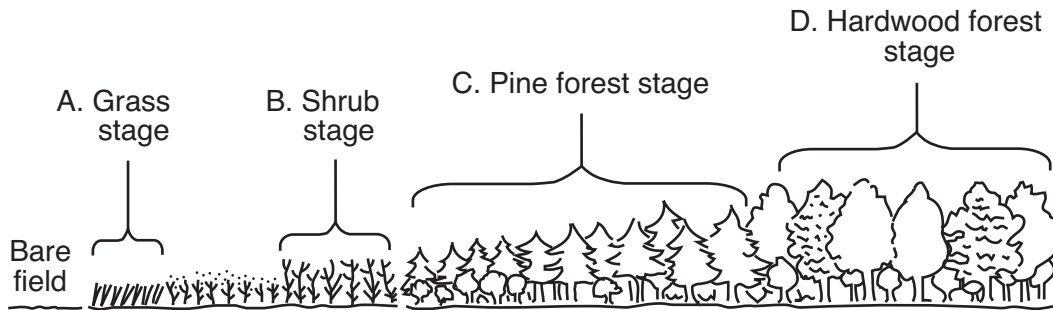


Production of gametes and support of the fetus normally occur in structures

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

- 19 Essential materials needed for development are transported to a human fetus through the
- (1) reproductive hormones
 - (2) egg cell
 - (3) placenta
 - (4) ovaries
- 20 The failure to regulate the pH of the blood can affect the activity of
- (1) enzymes that clot blood
 - (2) red blood cells that make antibodies
 - (3) chlorophyll that carries oxygen in the blood
 - (4) DNA that controls starch digestion in the blood
- 21 Young birds that have been raised in isolation from members of their species build nests characteristic of their species. This suggests that the nest-building behavior is
- (1) genetically inherited from parents
 - (2) learned by watching members of their species
 - (3) a disadvantage to the survival of the species
 - (4) a direct result of the type of food the bird eats
- 22 Some people with spinal cord injuries do not sweat below the area of the injury. Without the ability to sweat, the human body temperature begins to rise. Which statement would best describe this situation?
- (1) Feedback mechanisms regulate blood sugar levels.
 - (2) Gene mutations are increased.
 - (3) Energy from ATP is not available.
 - (4) Dynamic equilibrium is disrupted.
- 23 Decomposers are necessary in an ecosystem because they
- (1) produce food for plants by the process of photosynthesis
 - (2) provide energy for plants by the process of decay
 - (3) can rapidly reproduce and evolve
 - (4) make inorganic materials available to plants
- 24 A manatee is a water-dwelling herbivore on the list of endangered species. If manatees were to become extinct, what would be the most likely result in the areas where they had lived?
- (1) The biodiversity of these areas would not be affected.
 - (2) Certain producer organisms would become more abundant in these areas.
 - (3) Other manatees would move into these areas and restore the population.
 - (4) Predators in these areas would occupy higher levels on the energy pyramid.
- 25 A serious threat to biodiversity is
- (1) habitat destruction
 - (2) maintenance of food chains
 - (3) competition within a species
 - (4) a stable population size
- 26 Which action will result in the greatest *decrease* in rain forest stability?
- (1) removing one species of plant for medicine
 - (2) harvesting nuts from some trees
 - (3) cutting down all the trees for lumber
 - (4) powering all homes with wind energy
- 27 One way that humans could have a positive impact on local environments is to
- (1) generate waste products as a result of technological advances
 - (2) use resources that are renewable
 - (3) increase planting large areas of one crop
 - (4) increase the use of pesticides
- 28 Which statement provides evidence that evolution is still occurring at the present time?
- (1) The extinction rate of species has decreased in the last 50 years.
 - (2) Many bird species and some butterfly species make annual migrations.
 - (3) New varieties of plant species appear more frequently in regions undergoing climatic change.
 - (4) Through cloning, the genetic makeup of organisms can be predicted.

29 The diagram below represents the various stages of ecological succession in New York State.



If the ecosystem is not altered, which stage would be the most stable?

- (1) grass
- (2) shrub
- (3) pine forest
- (4) hardwood forest

30 Because of an attractive tax rebate, a homeowner decides to replace an oil furnace heating system with expensive solar panels. The trade-offs involved in making this decision include

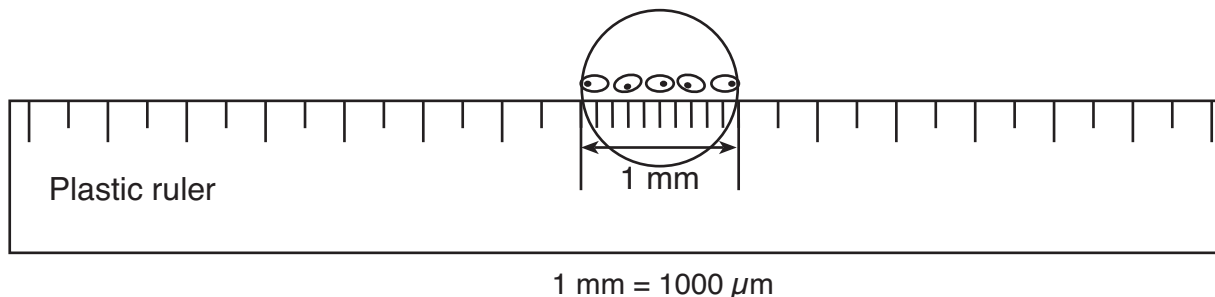
- (1) high cost of solar panels, reduced fuel costs, and lower taxes
 - (2) low cost of solar panels, increased fuel costs, and higher taxes
 - (3) increased use of fuel, more stable ecosystems, and less availability of solar radiation
 - (4) more air pollution, increased use of solar energy, and greater production of oil
-

Part B-1

Answer all questions in this part. [13]

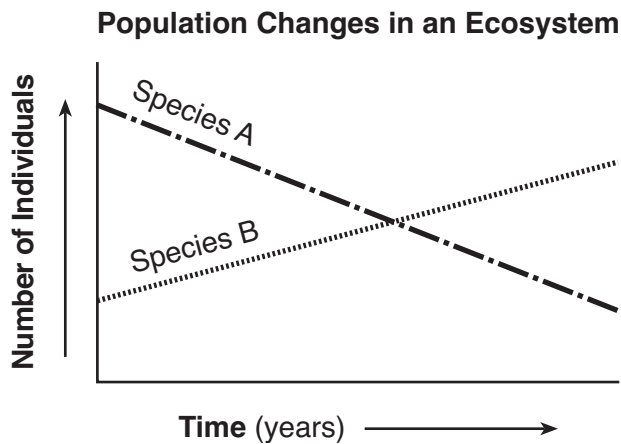
Directions (31–43): For *each* statement or question, write on the separate answer sheet the *number* of the word or expression that, of those given, best completes the statement or answers the question.

- 31 A clear plastic ruler is placed across the middle of the field of view of a compound light microscope. A row of cells can be seen under low-power magnification (100 \times).



What is the average length of a single cell in micrometers (μm)?

- (1) 10 μm (3) 200 μm
(2) 100 μm (4) 2000 μm
- 32 The graph below represents the populations of two different species in an ecosystem over a period of several years.



Which statement is a possible explanation for the changes shown?

- (1) Species A is better adapted to this environment.
(2) Species A is a predator of species B.
(3) Species B is better adapted to this environment.
(4) Species B is a parasite that has benefited species A.

33 A mineral supplement designed to prevent the flu was given to two groups of people during a scientific study. Dosages of the supplement were measured in milligrams per day, as shown in the table below.

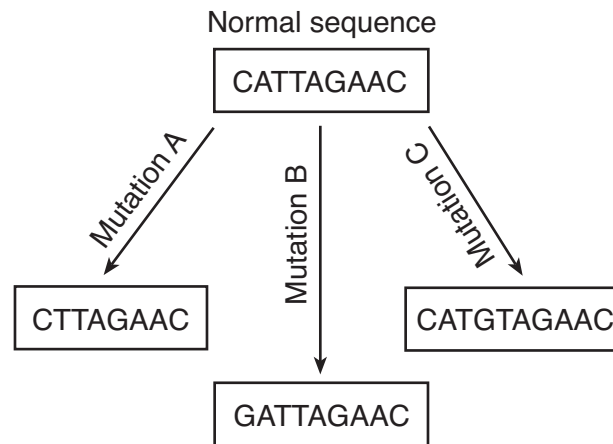
Supplement Dosages

Group	Dosage (mg/day)
A	100
B	200

After 10 weeks, neither group reported a case of the flu. Which procedure would have made the outcome of this study more valid?

- (1) test only one group with 200 mg of the supplement
- (2) test the supplement on both groups for 5 weeks instead of 10 weeks
- (3) test a third group that receives 150 mg of the supplement
- (4) test a third group that does not receive the supplement

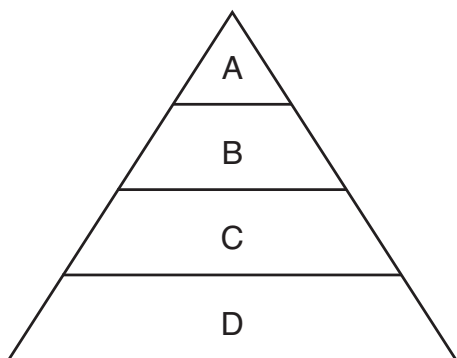
34 The diagram below shows a normal gene sequence and three mutated sequences of a segment of DNA.



Which row in the chart below correctly identifies the cause of each type of mutation?

Row	Mutation A	Mutation B	Mutation C
(1)	deletion	substitution	insertion
(2)	insertion	substitution	deletion
(3)	insertion	deletion	substitution
(4)	deletion	insertion	substitution

Base your answers to questions 35 and 36 on the energy pyramid below and on your knowledge of biology.



35 Which level includes organisms that receive their energy from level *B*?

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

36 Which level includes organisms that get their energy exclusively from a source other than the organisms in this ecosystem?

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

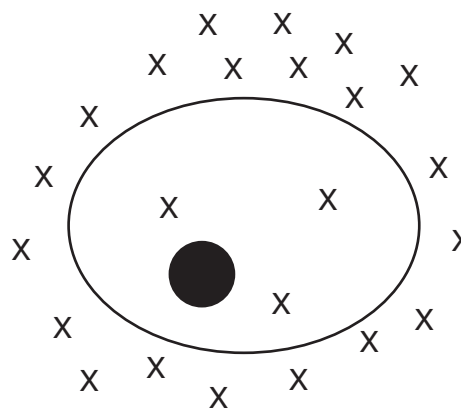
37 The chart below compares the size of three structures: a gene, a nucleus, and a chromosome.

Size	Structure
smallest in size	A
↓	B
greatest in size	C

Based on this information, structure *A* would most likely be a

- (1) chromosome that is part of structure *C*
- (2) chromosome that contains structures *B* and *C*
- (3) nucleus that contains both structure *B* and structure *A*
- (4) gene that is part of structure *B*

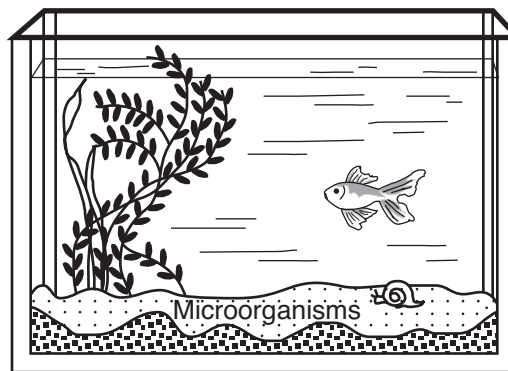
38 The diagram below shows molecules represented by X both outside and inside of a cell.



A process that would result in the movement of these molecules out of the cell requires the use of

- (1) DNA
- (2) ATP
- (3) antigens
- (4) antibodies

39 Which statement most accurately predicts what would happen in the aquarium shown below if it were tightly covered and maintained in natural light for one month?



- (1) The water temperature would rapidly decrease.
- (2) The process of respiration in the snail would decrease.
- (3) The rate of reproduction of the fish would be affected.
- (4) The organisms would probably survive because materials would cycle.

40 The data table below shows an effect of secondhand smoke on the birth weight of babies born to husbands and wives living together during pregnancy.

Effect of Secondhand Smoke on Birth Weight

	Wife: Nonsmoker Husband: Nonsmoker	Wife: Nonsmoker Husband: Smoker
Number of Couples	837	529
Average Weight of Baby at Birth	3.2 kg	2.9 kg

Based on these data, a reasonable conclusion that can be drawn about secondhand smoke during pregnancy is that secondhand smoke

- (1) is unable to pass from the mother to the fetus
- (2) slows the growth of the fetus
- (3) causes mutations in cells of the ovaries
- (4) blocks the receptors on antibody cells

41 A limiting factor unique to a field planted with corn year after year is most likely

- (1) temperature
- (2) sunlight
- (3) water
- (4) soil nutrients

Base your answers to questions 42 and 43 on the information below and on your knowledge of biology.

After the Aswan High Dam was built on the Nile River, the rate of parasitic blood-fluke infection doubled in the human population near the dam. As a result of building the dam, the flow of the Nile changed. This changed the habitat, which resulted in an increase in its population of a certain aquatic snail. The snails, which were infected, released larvae of the fluke. These larvae then infected humans.

42 This situation best illustrates that

- (1) the influence of humans on a natural system is always negative in the long term
- (2) the influence of humans on a natural system can have unpredictable negative impacts
- (3) human alteration of an ecosystem does not need to be studied to avoid ecological disaster
- (4) human alteration of an ecosystem will cause pollution and loss of finite resources

43 The role of the snail may be described as a

- (1) host
 - (2) parasite
 - (3) producer
 - (4) decomposer
-

Part B-2

Answer all questions in this part. [12]

Directions (44–55): For those questions that are followed by four choices, circle the *number* 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.

44 The table below shows the abundance of some greenhouse gases in the atmosphere.

Abundance of Some Atmospheric Greenhouse Gases

Greenhouse Gases	Abundance (%)
carbon dioxide (CO ₂)	99.438
methane (CH ₄)	0.471
nitrous oxide (N ₂ O)	0.084
other gases (CFCs, etc.)	0.007
Total	100.000

Identify the most abundant greenhouse gas and state *one* human activity that is a source of this gas. [1]

Greenhouse gas: _____

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Use Only**

44

45 The United States government does not allow travelers from foreign countries to bring plants, fruits, vegetables, animals, or other living organisms into this country. State *one* biological reason for keeping these out of the United States. [1]

45

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

**For Teacher
Use Only**

Birds colliding with aircraft either on the ground or in the air create problems for the Air Force. An organization known as BASH (Bird Aircraft Strike Hazard) studied the impact of birds colliding with aircraft. In 2001, there were 3854 bird collisions reported at a total cost to the Air Force of over 31 million dollars in damage—approximately eight thousand dollars per collision. August, September, and October were the busiest months with 1442 collisions. Nearly 50% of all these collisions occurred in the airfield environment, an environment that can most easily be controlled.

The top five species of birds involved in these collisions are listed in the data table below.

Top Five Bird Species Involved in Collisions in 2001

Type of Bird	Number of Collisions
American mourning dove (species A)	123
horned lark (species B)	100
barn swallow (species C)	83
American cliff swallow (species D)	55
American robin (species E)	55

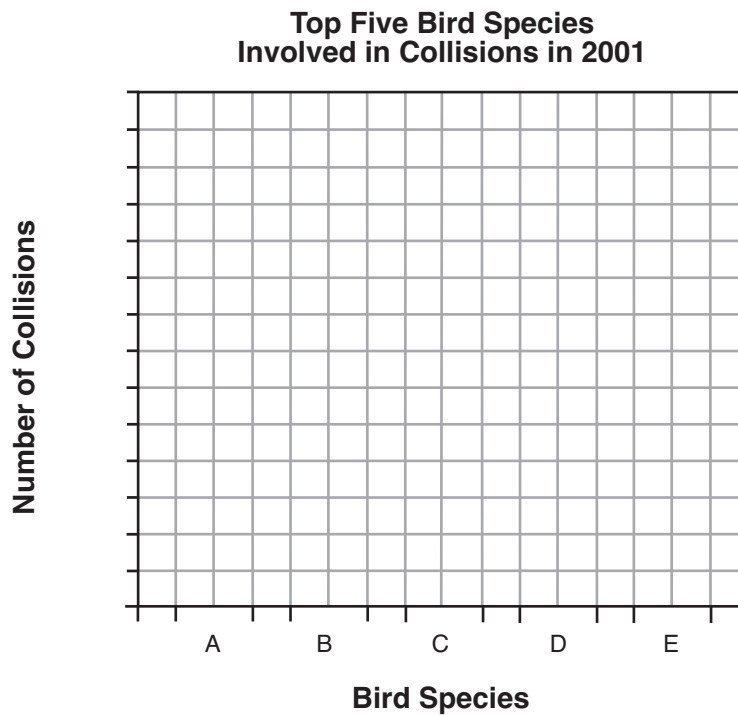
Source of data: Bird Aircraft Strike Hazard by Matt Granger, <http://www.find.articles.com>

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

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46 Mark an appropriate scale on the axis labeled “Number of Collisions.” [1]

47 Construct vertical bars to represent the data. Shade in each bar. [1]



46

47

48 Is the problem with birds and aircraft limited to birds living on or near airport grounds? Support your answer using information from the passage. [1]

48

49 State *one* possible reason that the greatest number of bird collisions occurs during August, September, and October. [1]

49

Base your answers to questions 50 through 53 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

The Control of Transpiration

Plants normally lose water from openings (stomates) in their leaves. The water loss typically occurs during daylight hours when plants are exposed to the Sun. This water loss, known as transpiration, is both beneficial and harmful to plants.

Scientists believe wind and high temperatures increase the rate of transpiration, but the size of each stomate opening can be regulated. Reducing the size of the openings during drought conditions may help reduce the dehydration and wilting that would otherwise occur.

A leaf may lose more than its own weight in water each day. Transpiration also lowers the internal temperature of the leaf as water evaporates. On hot days, temperatures in the leaves may be from 3° to 15°C cooler than the outside air. With stomates open, vital gases may be exchanged between the leaf tissues and the outside environment.

Researchers have also found many plants that use another response when leaf temperatures rise. Special molecules known as heat shock proteins are produced by plant cells and help to hold enzymes in their functional shapes.

50 State *one* way transpiration is beneficial to plants. [1]

50

51 Identify *two* of the “vital gases” that are exchanged between leaf tissues and the outside environment. [1]

_____ and _____

51

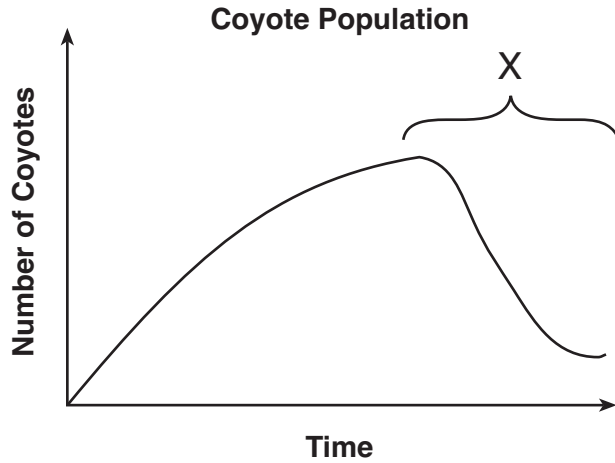
52 Identify the specific leaf structures that regulate the opening and closing of stomates. [1]

52

53 Explain why it is important for plants to “hold enzymes in their functional shapes.” [1]

53

54 The graph below shows the growth of a population of coyotes in a wilderness area.



State *one* possible cause for the population decrease at X. [1]

**For Teacher
Use Only**

54

55 The information in the chart below represents the sex chromosome arrangement in humans and birds. Sex chromosomes contain genes involved in sex determination.

Sex Chromosomes in Animals

Animal	Female	Male
humans	XX	XY
birds	ZW	ZZ

In humans, it is the male gamete that is responsible for determining the sex of the offspring. Identify which type of gamete determines the sex of the offspring in birds. Support your answer. [1]

Type of Gamete: _____

55

Part C

Answer all questions in this part. [17]

Directions (56–64): Record your answers in the spaces provided in this examination booklet.

Base your answer to question 56 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

Help for Aging Memories

As aging occurs, the ability to form memories begins to decrease. Research has shown that an increase in the production of a certain molecule, BDNF, seems to restore the processes involved in storing memories. BDNF is found in the central nervous system and seems to be important in maintaining nerve cell health. Researchers are testing a new drug that seems to increase the production of BDNF.

56 Design an experiment to test the effectiveness of the new drug to increase the production of BDNF in the brains of rats. In your answer, be sure to:

- state the hypothesis your experiment will test [1]
- describe how the control group will be treated differently from the experimental group [1]
- identify *two* factors that must be kept the same in both the experimental and control groups [1]
- identify the dependent variable in your experiment [1]

56

Base your answers to questions 57 through 59 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

Rabbits eat plants and in turn are eaten by predators such as foxes and wolves. A population of rabbits is found in which a few have a genetic trait that gives them much better than average leg strength.

57 Predict how the frequency of the trait for above average leg strength would be expected to change in the population over time. Explain your prediction. [1]

57

58 State what is likely to happen to the rabbits in the population that do *not* have the trait for above average leg strength. [1]

58

59 It was later discovered that the rabbits born with the trait for above average leg strength also inherited the trait for poor eyesight. Taking into account this new information, explain how your predictions would change. Support your answer. [1]

59

Base your answer to question 60 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

Bacterial resistance to antibiotic treatment is becoming an increasing problem for the medical community. It is estimated that 70% of bacteria that cause infections in hospitals are resistant to at least one of the drugs used for treatment. Dangerous strains of tuberculosis (TB) have emerged that are resistant to several major antibiotic drugs. While drug-resistant TB is generally treatable, it requires much longer treatments with several antibiotics that are very expensive.

- 60 Explain the loss of effectiveness of antibiotic drugs. In your explanation, be sure to:
- identify the genetic event that resulted in the original antibiotic resistance in some strains of bacteria [1]
 - explain how the overuse of antibiotics can increase bacterial resistance [1]

60

Base your answers to questions 61 and 62 on the information below and on your knowledge of biology.

The average life expectancy of humans in the United States increased from 63.3 years in 1943 to 77.6 years in 2003. This, combined with other factors, has led to an increase in population.

- 61 State *one* factor that contributed to the increase in life expectancy in the United States. [1]

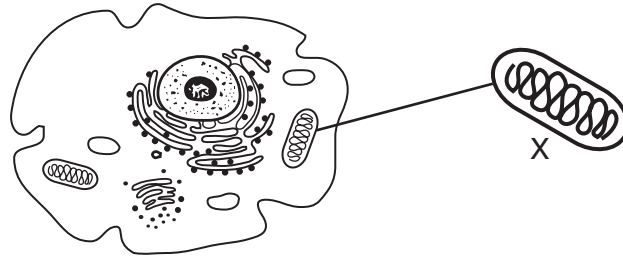
61

- 62 State *one* way the increase in population affects other species. [1]

62

63 The diagram below represents a cell found in some complex organisms. The enlarged section represents an organelle, labeled X, found in this cell.

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Describe the function of organelle X and explain how it is important to the survival of the cell. In your answer, be sure to:

- identify organelle X [1]
- state the process that this organelle performs [1]
- identify the *two* raw materials that are needed for this process to occur [1]
- identify *one* molecule produced by this organelle and explain why it is important to the organism [2]

63



Base your answer to question 64 on the passage below and on your knowledge of biology.

**For Teacher
Use Only**

The Arctic National Wildlife Refuge

The Arctic National Wildlife Refuge (ANWR) in Alaska is the last great wilderness in America. Many migratory animals stop there to feed and rest. This region also supports an abundance of wildlife, including various types of vegetation, herbivores such as musk oxen and reindeer, and carnivores such as polar bears and wolves.

64 Wolves often hunt reindeer for food. State the effect on the size of the wolf population if the amount of vegetation were to drop suddenly. Support your answer. [1]

64

Part D

Answer all questions in this part. [13]

Directions (65–77): 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.

65 The amino acid sequences of three species shown below were determined in an investigation of evolutionary relationships.

Species A:	Val	His	Leu	Ser	Pro	Val	Glu
Species B:	Val	His	Leu	Cys	Pro	Val	Glu
Species C:	Val	His	Thr	Ser	Pro	Glu	Glu

Based on these data, which *two* species are most closely related? Support your answer. [1]

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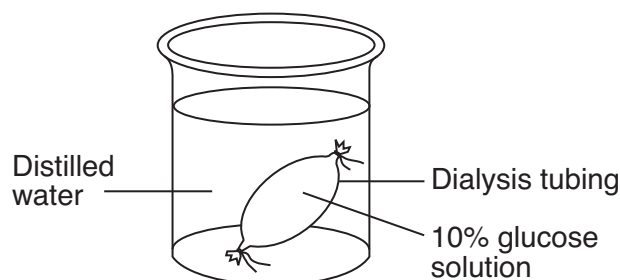
65

66 A student carried out a lab activity where she was asked to squeeze a clothespin as many times as she could in one minute and record that number. She immediately tried the same activity again, thinking she could do better the second time, but the number was lower. She immediately tried again, but the number was lower still.

State *one* reason why she continued to get lower numbers, even though she tried to increase the number of squeezes several times. [1]

66

67 A laboratory setup using an artificial cell made from dialysis tubing is shown in the diagram below.



Identify the process that would most likely be responsible for the movement of glucose from inside the artificial cell to the solution outside of the cell. [1]

67

Base your answers to questions 68 through 71 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

Scientists attempted to determine the evolutionary relationships between three different plant species, A, B, and C. In order to do this, they examined the stems and DNA of these species. Diagram 1 represents a microscopic view of the cross sections of the stems of these three species. DNA was extracted from all three species and analyzed using gel electrophoresis. The results are shown in diagram 2. Based on the data they collected, they drew diagram 3 to represent the possible evolutionary relationships.

Diagram 1

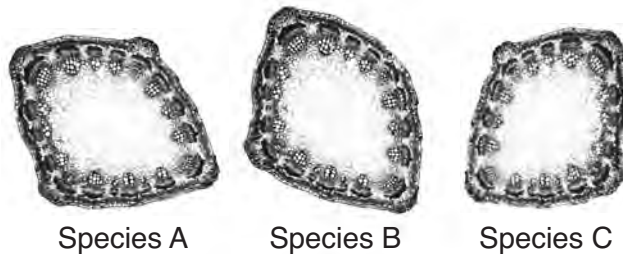


Diagram 2

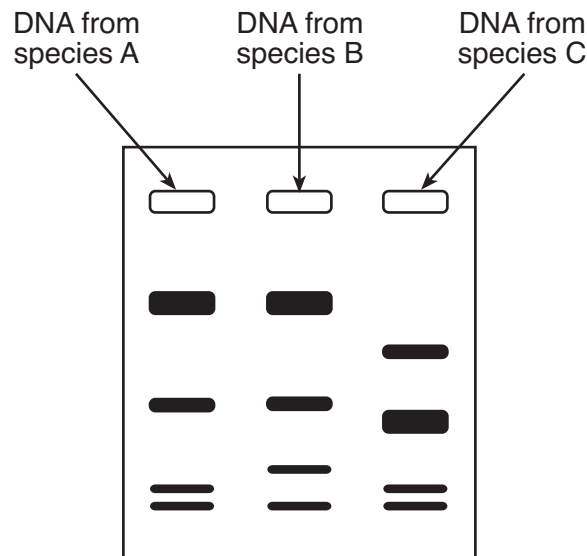
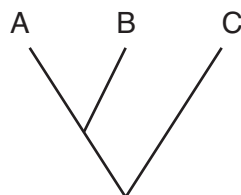


Diagram 3

**Possible Evolutionary Relationships
Between Species A, B, and C**



68 State why the evolutionary relationships shown in diagram 3 are *not* supported by the data provided by the stem cross sections in diagram 1. [1]

**For Teacher
Use Only**

68

69 Explain how the DNA banding pattern in diagram 2 supports the evolutionary relationships between the species shown in diagram 3. [1]

69

70 This technique used to analyze DNA involves the

- (1) synthesis of new DNA strands from subunits
- (2) separation of DNA fragments on the basis of size
- (3) production of genetically engineered DNA molecules
- (4) removal of defective genes from DNA

70

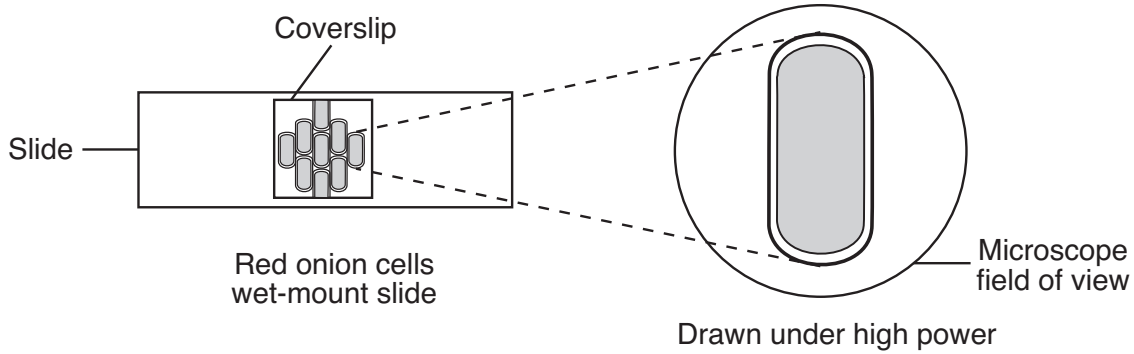
71 Explain why information obtained through DNA analysis is a more reliable indicator of evolutionary relationships than observations of stem cross sections with a microscope. [1]

71

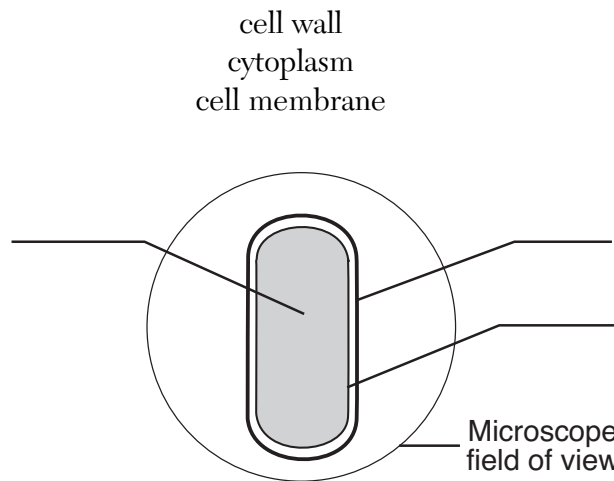
Base your answers to questions 72 through 74 on the information below and on your knowledge of biology.

**For Teacher
Use Only**

A wet-mount slide of red onion cells is studied using a compound light microscope. A drawing of one of the cells as seen under high power is shown below.



72 On the diagram below, label the location of each of the cell structures listed. [1]

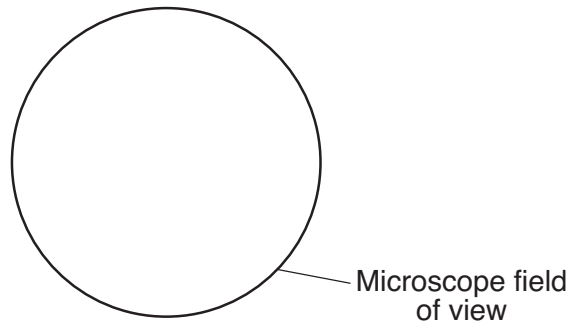


72

73 Describe the proper way to add a saltwater solution to the cells without removing the coverslip. [1]

73

74 In the space below, sketch how the cell would look after the saltwater solution is added to it. [1]



**For Teacher
Use Only**

74

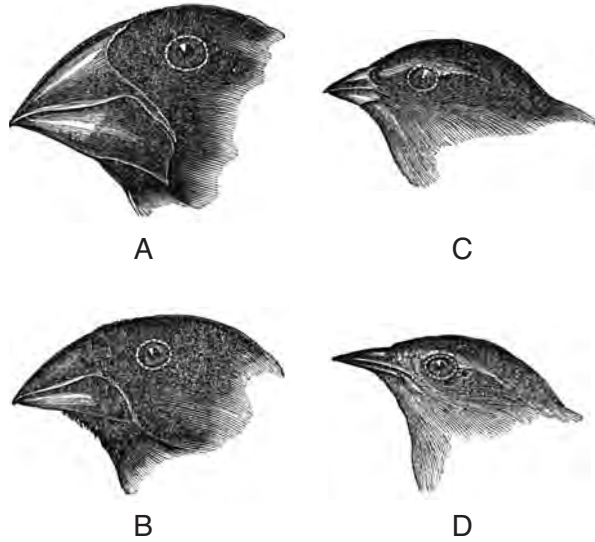
75 A student added an enzyme to a test tube containing a sample of DNA. After a period of time, analysis of the DNA sample indicated it was now broken into three segments. The purpose of the enzyme was most likely to

- (1) cut the DNA at a specific location
- (2) move the DNA to a different organism
- (3) copy the DNA for protein synthesis
- (4) alter the DNA sequence in the segment

75

Base your answers to questions 76 and 77 on the diagram below and on your knowledge of biology. The diagram shows the heads of four different species of Galapagos Islands finches.

**For Teacher
Use Only**



Source: <http://Darwin-online.org>

76 The four different types of beaks shown are most likely the result of

- (1) gene manipulation
- (2) natural selection
- (3) unchanging environmental conditions
- (4) patterns of behavior learned from parents

76

77 Scientists observed that when two closely related species of predatory birds live in different areas, they seek prey early in the morning. However, when their territories overlap, one species hunts at night and the other hunts in the morning. When these two species live in the same area, they apparently modify their

- (1) habitat
 - (2) niche
 - (3) ecosystem
 - (4) biodiversity
-

77

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Wednesday, June 16, 2010 — 1:15 to 4:15 p.m., only

ANSWER SHEET

Female

Student Sex: Male

Teacher

School Grade

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

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

Part A

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

Part A Score

Part B-1

- | | |
|----------|----------|
| 31 | 38 |
| 32 | 39 |
| 33 | 40 |
| 34 | 41 |
| 35 | 42 |
| 36 | 43 |
| 37 | |

Part B-1 Score

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

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

Signature

Tear Here

LIVING ENVIRONMENT

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LIVING ENVIRONMENT

FOR TEACHERS ONLY

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

LE

LIVING ENVIRONMENT

Wednesday, June 16, 2010 — 1:15 to 4:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

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

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

Part A and Part B-1

Allow 1 credit for each correct response.

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

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. On the front of the student's detachable answer sheet, raters must enter their initials on the lines next to "Rater 1" or "Rater 2."

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 Wednesday, June 16, 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.

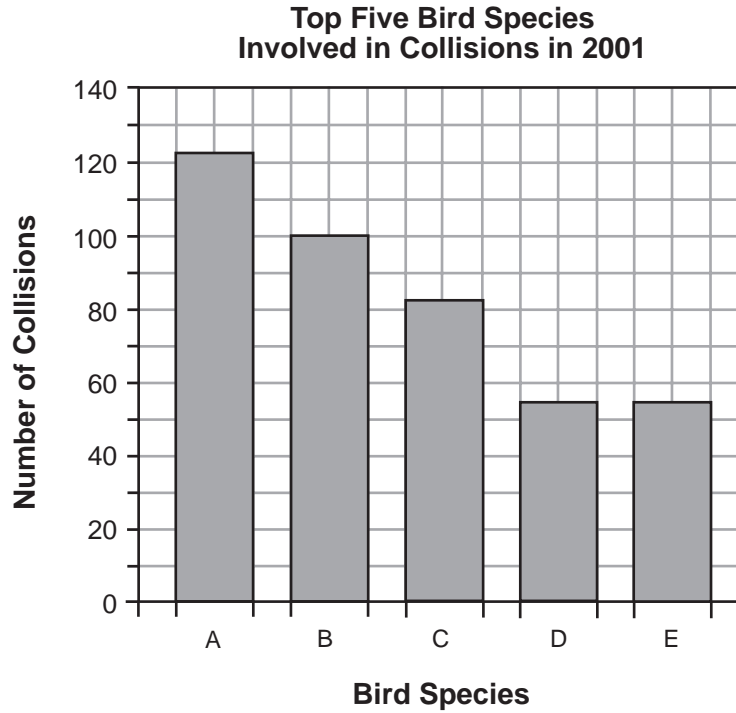
Part B-2

- 44** [1] Allow 1 credit for identifying CO₂ *or* carbon dioxide *and* stating *one* human activity that is a source of this gas. Acceptable responses include, but are not limited to:
- driving cars
 - respiration
 - burning fossil fuels
 - deforestation
- 45** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Organisms may contain parasites or diseases, which could spread to organisms in our country.
 - The imported organisms may compete better than domestic species.
 - Some introduced species may compete with native species for food and habitat.
 - no natural predators

46 [1] Allow 1 credit for marking an appropriate scale on the axis labeled “Number of Collisions.”

47 [1] Allow 1 credit for constructing vertical bars to represent the data.

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



Note: Allow credit if the correct data are clearly represented, even if the bars are *not* shaded. Make no assumptions about the origin unless it is labeled.

48 [1] Allow 1 credit for “No” and supporting the answer. Acceptable responses include, but are not limited to:

— The passage states that only about 50% occur in the airfield environment.

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

— Migration occurs during these months.

— Birds feed in this area at this time.

LIVING ENVIRONMENT – *continued*

- 50** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Transpiration helps plants cool off on hot days.
 - While transpiration is occurring, the stomates are open, allowing the exchange of important gases.
- 51** [1] Allow 1 credit for *two* acceptable responses. Acceptable responses include, but are not limited to:
- oxygen
 - water vapor
 - carbon dioxide
- 52** [1] Allow 1 credit for guard cells.
- 53** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- If the shape of an enzyme changes, it may not function or it may function differently.
 - Key activities may slow down or stop.
 - The shape of an enzyme determines its function.
- 54** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- disease
 - harsh winter
 - food supply decreased
 - predators
- Note:** Do *not* accept “death” or “they died” without a corresponding cause.
- 55** [1] Allow 1 credit for female *or* egg *or* zw and supporting the answer. Acceptable responses include, but are not limited to:
- Female gametes have one of two different types of sex chromosomes.
 - The egg may contain one of two different types of sex chromosomes.

Part C

56 [4] Allow a maximum of 4 credits, allocated as follows:

- Allow 1 credit for stating the hypothesis the experiment will test. Acceptable responses include, but are not limited to:
 - Rats that are given the drug will show an increase in BDNF in their brains.
 - The drug affects memory formation in rats.

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

- Allow 1 credit for describing how the control group will be treated differently from the experimental group. Acceptable responses include, but are not limited to:
 - The control group will not get the drug; the experimental group will.
 - The control group will get a placebo.
- Allow 1 credit for identifying *two* factors that must be kept the same in both the experimental and control groups. Acceptable responses include, but are not limited to:
 - Both groups should have the same number of rats.
 - rats of the same age
 - kept in same conditions
 - given the same food
- Allow 1 credit for identifying the dependent variable in the experiment.
 - amount of BDNF found in their nerve tissue
 - ability to form/store memories

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

- The above average leg-strength trait would increase in frequency because the rabbits with the stronger legs would be more likely to get away from predators.

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

- The rabbits that do not have the stronger leg-strength trait will start to decrease in number.
- They might be eaten by predators.

Note: Allow credit for an answer that is consistent with the student’s response to question 57.

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

- The frequency of the trait for above average leg strength might actually decrease because the poor eyesight might be more of a disadvantage than the leg strength is an advantage.
- Now it seems that the frequency will more likely decrease because they will not see well enough to get away.
- The frequency of the trait for above average leg strength will remain the same because the advantage will be canceled out by a disadvantage.

60 [2] Allow a maximum of 2 credits, allocated as follows:

- Allow 1 credit for identifying the genetic event that resulted in the original antibiotic resistance in some strains of bacteria. Acceptable responses include, but are not limited to:
 - mutation
 - a change in the DNA code
- Allow 1 credit for explaining how the overuse of antibiotics can increase bacterial resistance. Acceptable responses include, but are not limited to:
 - Antibiotics kill only nonresistant strains. Resistant bacteria survive and reproduce.
 - Overuse of antibiotics selects for resistant strains of bacteria.

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

- better medical treatments
- better sanitation

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

- Human requirements for space, food, and resources often harm other species.
- As humans build more homes/roads/malls, animal habitats are destroyed.
- Increased population increases competition with other species for limited resources.

63 [5] Allow a maximum of 5 credits, allocated as follows:

- Allow 1 credit for identifying organelle *X* as a mitochondrion.
- Allow 1 credit for stating the process this organelle performs. Acceptable responses include, but are not limited to:
 - respiration
 - aerobic respiration
 - releases energy

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

- Allow 1 credit for identifying the *two* raw materials needed for this process to occur. Acceptable responses include, but are not limited to:
 - sugar/glucose
 - oxygen (O₂)

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

- Allow a maximum of 2 credits, 1 credit for identifying *one* molecule produced by this organelle and 1 credit for explaining why it is important to the organism. Acceptable responses include, but are not limited to:
 - ATP – This molecule makes energy available for life functions.
 - Water – This molecule is important for chemical reactions.
 - CO₂ – This is a waste product that needs to be removed to maintain homeostasis.

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

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

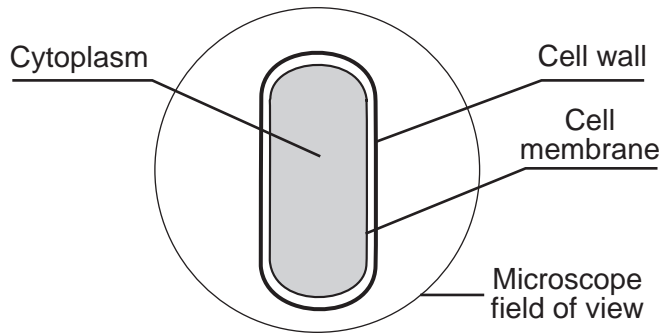
- As the amount of vegetation decreases, the number of wolves will also decrease. The wolves will eventually starve because the animals they eat (herbivores) have less food.
- The wolves will decrease because they have less food.

Part D

- 65** [1] Allow 1 credit for species *A* and *B* and for supporting the answer. Acceptable responses include, but are not limited to:
- They are most closely related because there is only one difference in the sequence.
 - They have the most in common.
- 66** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- As she continued to use her hand, her muscles became fatigued.
 - Wastes built up.
 - ATP was used up.
- 67** [1] Allow 1 credit for diffusion *or* passive transport.
- 68** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- According to diagram 3, *C* should look different from *A* and *B*.
 - The stem cross sections show that *A*, *B*, and *C* have similar stem structure, indicating that they are most likely closely related. Diagram 3 shows that only *A* and *B* are closely related.
- 69** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- *A* and *B* have the most bands in common.
- 70** 2
- 71** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- DNA analysis is more reliable since the more similar the DNA, the closer the relationship.
 - Organisms can have similar features, but the DNA coding for these features can be very different.
 - DNA analysis might reveal the actual genetic makeup.

- 72 [1] Allow 1 credit for labeling the locations of the cell wall *and* the cell membrane *and* cytoplasm on the diagram.

Example of a 1-credit response:

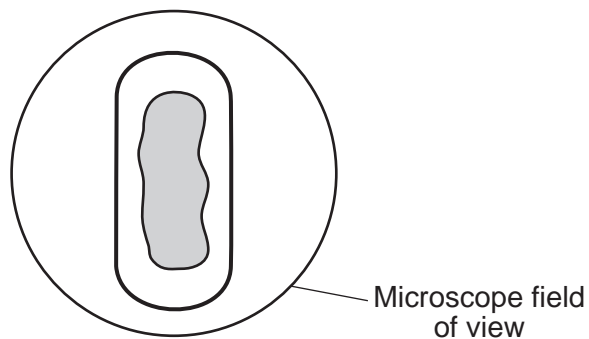


Note: All three must be correctly labeled to receive this credit.

- 73 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Place saltwater solution on one side of the coverslip. Then draw the saltwater solution under the coverslip by placing a piece of paper towel on the opposite side.
 - Place a drop of saltwater solution on one side of a coverslip and a paper towel on the other side.

- 74 [1] Allow 1 credit for showing that the membrane has pulled away from the cell wall.

Example of a 1-credit response:



Note: Allow credit if the cell is correctly drawn but *not* shaded.

75 1

76 2

77 2

The *Chart for Determining the Final Examination Score for the June 2010 Regents Examination in Living Environment* will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Wednesday, June 16, 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

June 2010 Living Environment

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

Part D 65–77	
Lab 1	65,68,69,70,71,75
Lab 2	66
Lab 3	76,77
Lab 5	67,72,73,74



Regents Examination in Living Environment

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

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.