

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

# LIVING ENVIRONMENT

**Tuesday, June 11, 2013 — 1:15 to 4:15 p.m., only**

Student Name \_\_\_\_\_

School Name \_\_\_\_\_

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

Print your name and the name of your school on the lines above.

A separate answer sheet for multiple-choice questions in Parts A, B-1, B-2, and D has been provided to you. Follow the instructions from the proctor for completing the student information on your answer sheet.

You are to answer all questions in all parts of this examination. Record your answers for all multiple-choice questions, including those in Parts B-2 and D, on the separate answer sheet. Record your answers for all open-ended questions directly in this examination booklet. All answers in this examination booklet 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 or in this examination booklet as directed.

When you have completed the examination, you must sign the declaration 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.

**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, record on the separate answer sheet the *number* of the word or expression that, of those given, best completes the statement or answers the question.

1 Fish absorb oxygen through the gills, earthworms absorb oxygen through the skin, amebas take in oxygen through the cell membranes, and cows inhale oxygen through the nasal passages into their lungs. This statement demonstrates that living things

- (1) rely on similar or the same processes, but accomplish them in different ways
- (2) rely on different processes and accomplish them in different ways
- (3) rely on different processes, but perform them in the same or related ways
- (4) have no relationship to one another, and are all independent individuals

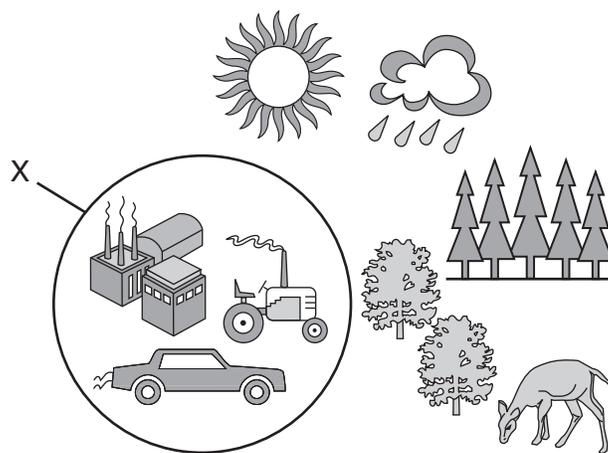
2 In New York State, small farms that were abandoned many years ago have become hardwood forests. This is an example of

- (1) local deforestation
- (2) biotechnology
- (3) ecological succession
- (4) habitat loss

3 Goats have been genetically modified to produce an anticlotting protein in their milk. The protein is extracted from the milk and given to people who have inherited a disorder that causes their bodies to produce blood clots, which can be fatal. A benefit of the technology used to produce this protein is that it

- (1) can be used to overcome the effects of a harmful mutation
- (2) can provide people with a new kind of nutrient-rich milk
- (3) will result in healthier goats with more nutritious milk for their offspring
- (4) will reduce blood clots in other farm animals that are modified in this way

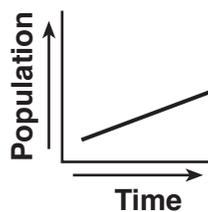
4 The diagram below represents factors that affect New York State ecosystems.



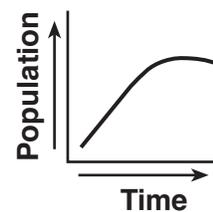
An increase in human activity at X would most likely result in

- (1) a decrease in rainfall in the area
- (2) a decrease in available carbon dioxide
- (3) an increase in air pollution in the area
- (4) an increase in the supply of fossil fuels

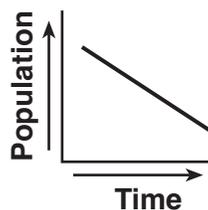
5 Which graph correctly represents the pattern of human population growth over the past 5000 years?



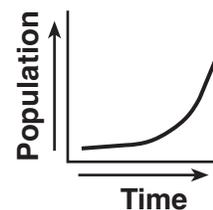
(1)



(3)



(2)

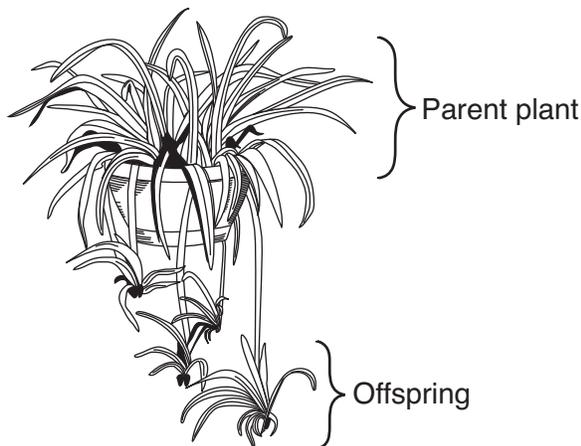


(4)

6 The fossil record of ancient life forms provides scientific evidence of

- (1) direct harvesting
- (2) selective breeding
- (3) gene manipulation
- (4) evolutionary changes

7 Spider plants can reproduce both sexually and asexually. The diagram below represents a spider plant reproducing asexually by a method known as vegetative propagation.



Which statement best describes the relationship between the parent plant and the offspring in the diagram?

- (1) The cells of the offspring contain half the amount of DNA as the cells of the parent plant.
- (2) The parent plant provides genetic material to the offspring through its gametes.
- (3) The cells of the offspring have the same genetic content as the cells of the parent plant.
- (4) The cells of the parent plant have more genetic diversity, compared to the cells of the offspring.

8 The processes of deletion, insertion, and substitution can alter genes in a skin cell. The altered genes will most likely be passed on to

- (1) sperm cells
- (2) egg cells
- (3) every cell that develops from that skin cell
- (4) only a few of the cells that develop from that skin cell

9 Before starch can enter a cell, it must be

- (1) absorbed by simple sugars
- (2) diffused into simple sugars
- (3) digested to form simple sugars
- (4) actively transported by simple sugars

10 In a cell, protein synthesis is the primary function of

- (1) ribosomes
- (2) mitochondria
- (3) chloroplasts
- (4) vacuoles

11 In a multicellular organism, organs carry out a variety of life functions. In a single-celled organism, these functions are performed by

- (1) tissues
- (2) organelles
- (3) organ systems
- (4) organs

12 Chlorophyll gives plants their green color. Chlorophyll is produced only when plants are exposed to light, so plants kept in darkness have no chlorophyll and appear white. The best explanation for this is that

- (1) chlorophyll is not needed by green plants at night
- (2) darkness mutates the chlorophyll genes, causing them to produce a white color
- (3) light is required for chlorophyll genes to be expressed
- (4) genetic information in cells is not influenced by the outside environment

13 In order for the human body to maintain homeostasis, the breakdown of glucose to release energy must be followed by the

- (1) production of oxygen
- (2) division of the cell
- (3) removal of wastes
- (4) production of receptor molecules

14 In the past, humans developed varieties of dogs, such as the German shepherd and the bearded collie, using

- (1) selective breeding for particular traits
- (2) recombination of genes during mitosis
- (3) mutations present only in body cells
- (4) natural selection of favorable traits

15 In an organism, a muscle cell has the same DNA as a nerve cell, yet the cells perform different functions. This is possible because

- (1) different mutations occur in each cell type, changing the genetic instructions
- (2) temperature variations within the body alter DNA
- (3) proteins in each cell type change the structure of DNA
- (4) different parts of the genetic instructions are used in each type of cell

16 Which sequence best represents sexual reproduction?

- (1) mitosis → gametes → zygote → fertilization
- (2) gametes → meiosis → mitosis → fertilization
- (3) fertilization → gametes → meiosis → zygote
- (4) meiosis → gametes → fertilization → zygote

17 The reproductive system of a male mammal provides

- (1) support for the internal development of the embryo
- (2) materials through the placenta
- (3) a means for the delivery of gametes
- (4) the ovaries for gamete production

18 The energy used to obtain, transfer, and transport materials within an organism comes directly from

- (1) ATP
- (2) DNA
- (3) sunlight
- (4) starch

19 The failure of the human body to effectively maintain dynamic equilibrium can result in

- (1) reproductive success
- (2) gene manipulation
- (3) differentiation
- (4) disease

20 Melanoma is a type of cancer in which abnormal skin cells divide uncontrollably. Some chemotherapy drugs, which stop the growth of the cancer, directly interfere with the process of

- (1) meiosis
- (2) coordination
- (3) mitosis
- (4) recombination

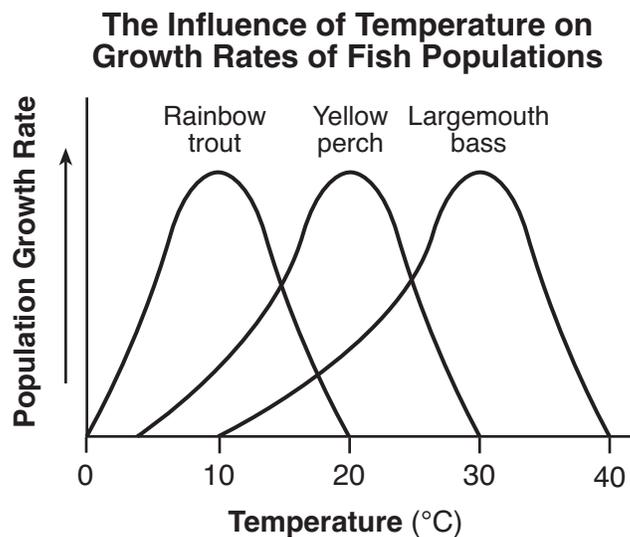
21 Riding a bicycle requires balance and constant adjustment and monitoring by the rider in order to continue cycling. Successfully riding a bicycle most directly results from the ability to

- (1) sexually reproduce
- (2) grow and develop
- (3) detect and respond to change
- (4) metabolize food for energy

22 The first successful transplant of insulin-producing cells from a living donor pancreas was completed in April 2000 in Japan. This enabled the body of the recipient to

- (1) regulate fat concentration by a feedback mechanism
- (2) provide protection against an infectious disease
- (3) slow down the heart rate after a period of activity ends
- (4) maintain blood sugar levels throughout the day

23 A study was done on three different fish species living in a pond in New York State. The influence of temperature on the growth rates of the fish populations is shown in the graph below.



In this pond where these fish live, temperature is a

- (1) limiting factor
- (2) hereditary factor
- (3) source of ATP
- (4) source of solar energy

24 A 6-year-old child ate a peanut butter sandwich at snack time in school. Five minutes later, her throat became swollen and she collapsed. This allergic reaction occurred because her body

- (1) recognized an antigen in peanut butter and produced antibiotics against it
- (2) digested the white blood cells that can recognize an antigen in peanut butter
- (3) did not recognize an antigen in peanut butter and could not produce antibodies against it
- (4) recognized an antigen in peanut butter and produced an immune response

25 Which type of organism helps to reduce atmospheric carbon dioxide?

- |                |                 |
|----------------|-----------------|
| (1) carnivores | (3) decomposers |
| (2) producers  | (4) herbivores  |

26 Which statement best describes an ecosystem maintaining a state of approximate equilibrium?

- (1) Nutrients from decayed organisms are recycled in a forest ecosystem.
- (2) All the frog species in a South American rain forest become extinct.
- (3) A mutation spreads through a species of bacterium, making them unable to decompose wastes.
- (4) Mice are released into a field ecosystem as food for a declining predator population.

27 In some parts of the world, forests are being cut down and burned to clear land for new homes and new farmland. A *negative* effect of these activities might be

- (1) an increase in global warming
- (2) destruction of the ozone shield
- (3) a decrease in the average temperature of the atmosphere
- (4) an increase in biodiversity of the deforested areas

28 The photograph below shows two penguins of the same species displaying different feather color patterns.

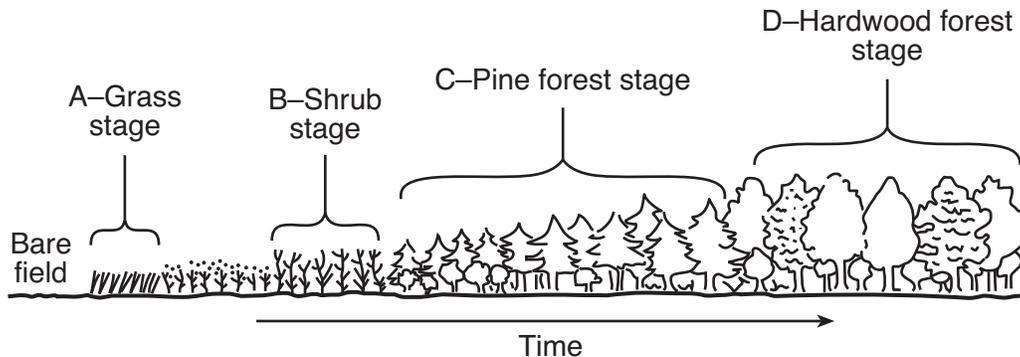


Source: [http://green.yahoo.com/blog/guest\\_bloggers/24/all-black-penguin-discovered.html](http://green.yahoo.com/blog/guest_bloggers/24/all-black-penguin-discovered.html)

The newly discovered all-black penguin had only black feathers since emerging from the egg. The sudden appearance of this characteristic was most likely due to

- (1) a change in environmental conditions
- (2) deposition of oil on the feathers due to pollution
- (3) a random change in the sequences of bases in DNA
- (4) a change in the diet of the penguin chick

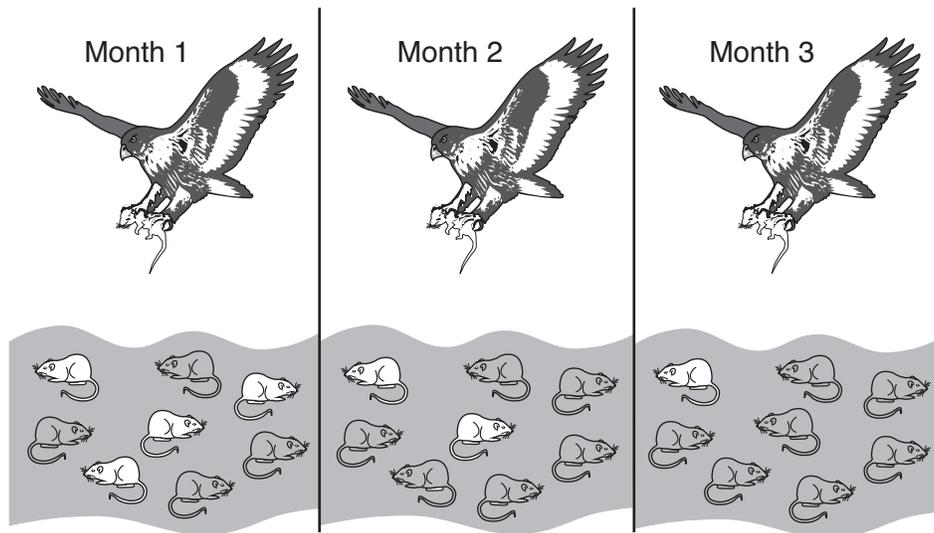
29 The diagram below represents different stages of an ecosystem over a period of time.



Which stage of the ecosystem has the greatest long-term stability?

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

30 The diagram below represents the same field of mice hunted by a hawk over a period of three months.



The overall changes in the population of mice can be explained best by

- (1) natural selection
- (2) succession
- (3) reproduction
- (4) mouse extinction

**Part B-1**

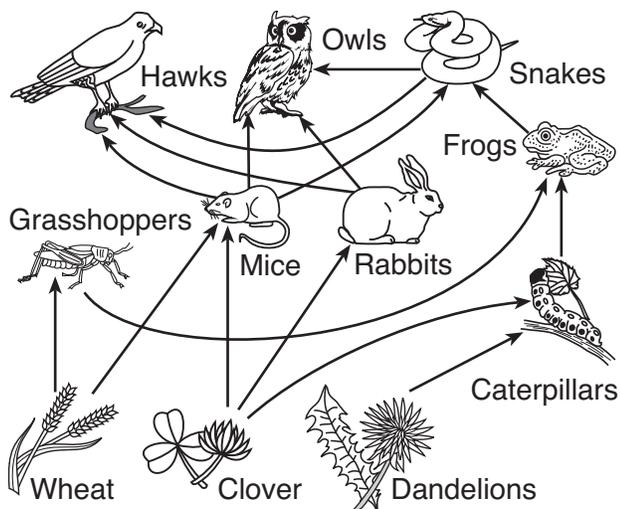
**Answer all questions in this part.** [13]

*Directions (31–43):* For *each* statement or question, record 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 Testosterone directly affects the

- (1) formation of a zygote
- (2) changes within an ovary
- (3) production of sperm cells
- (4) development of a placenta

Base your answers to questions 32 through 34 on the diagram below and on your knowledge of biology. The diagram represents a food web in an ecosystem.



32 If the population of hawks in this area increases, their prey populations might decrease. Later, with fewer prey, the hawk population might decrease. The prey populations might then increase. This is an example of

- (1) an ecosystem that is completely out of balance
- (2) how ecosystems maintain stability over time
- (3) interaction between biotic and abiotic factors within an ecosystem
- (4) ecological succession in an ecosystem

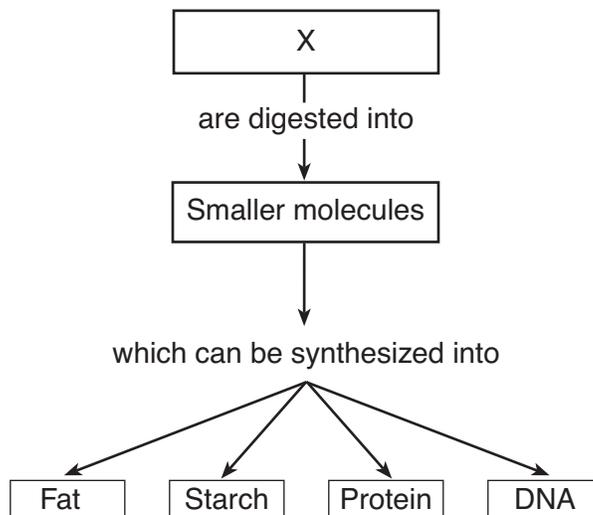
33 Missing from the diagram of this ecosystem are the

- (1) biotic factors and decomposers
- (2) abiotic factors and decomposers
- (3) autotrophs, only
- (4) heterotrophs, only

34 Which row in the chart below best identifies the relationship between the mice and the wheat?

Row	Role of Mice	Role of Wheat
(1)	producer	consumer
(2)	predator	host
(3)	host	predator
(4)	consumer	producer

35 The diagram below represents a sequence of events that occurs in living things.



Letter *X* represents

- (1) inorganic molecules
- (2) organic molecules
- (3) biological catalysts
- (4) simple sugars

36 In the cells of the human body, oxygen molecules are used directly in a process that

- (1) releases energy
- (2) digests fats
- (3) synthesizes carbohydrate molecules
- (4) alters the genetic traits of the cell

- 37 Which statement explains the importance of maintaining a constant internal environment to ensure proper enzyme functioning?
- (1) Changes in pH and temperature will cause the enzyme reaction rate to be too fast.
  - (2) Temperature and pH determine amino acid sequences in enzymes.
  - (3) Changes in pH will change the genetic instructions of enzymes.
  - (4) Increasing the temperature and pH can alter the specific shape of enzymes.

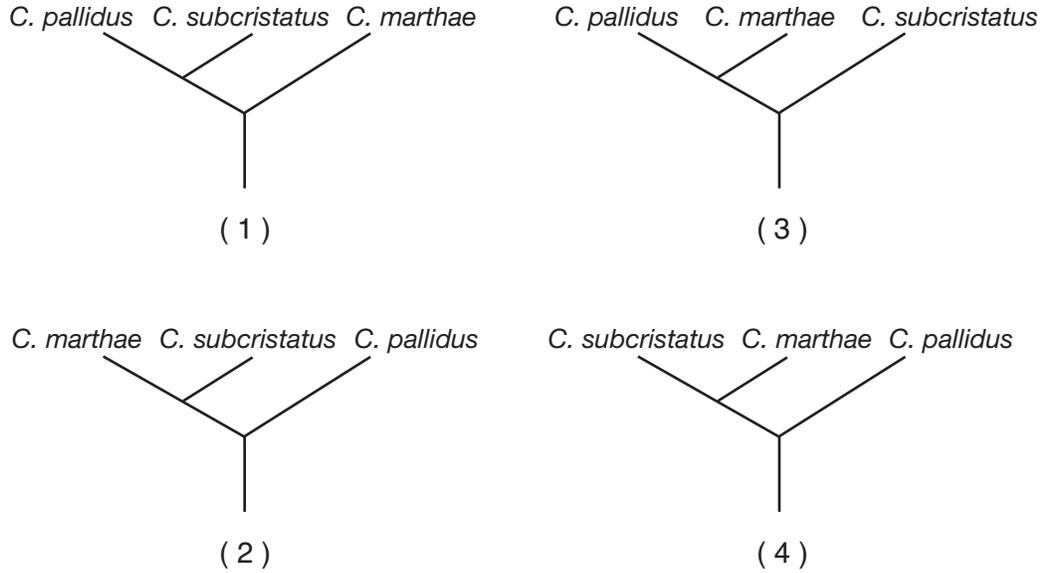
Base your answers to questions 38 through 41 on the information below and on your knowledge of biology.

The Galapagos pink land iguana, *Conolophus marthae* (*C. marthae*), is native to only one of the Galapagos Islands. Its entire range is currently limited to Wolf Volcano on Isabella Island. The iguana was first discovered on this island in 1986. Genetic studies of the animal began sometime later, and it was identified as a species separate from other iguana populations on the Galapagos in 2009. Its population might have been as high as 100 in 1986, but now there might be as few as 10 of the animals left alive.

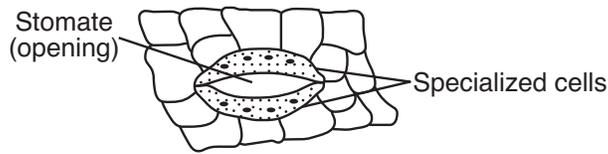
Other evidence indicates that this species could have diverged from another line of iguanas about 5.7 million years ago. After that, the other line of iguanas diverged into two other species, *C. pallidus* and *C. subcristatus*.

- 38 In the future, the current population of about ten pink land iguanas will probably
- (1) migrate to new islands in the Galapagos in order to survive
  - (2) soon become extinct, because they have little genetic diversity
  - (3) undergo evolution by natural selection and survive
  - (4) soon become extinct, because they have too much genetic diversity
- 39 The testing that revealed that these iguanas are a separate species from the other iguanas present in the Galapagos most likely included
- (1) genetic engineering
  - (2) cloning studies
  - (3) DNA analysis
  - (4) the use of paper chromatography
- 40 One likely reason for the existence of these pink land iguanas today is that their ancestors
- (1) had the same variations as other iguanas but, after a long period of changing environmental conditions, mutated to the pink form when the environment eventually stabilized
  - (2) had variations not present in other iguanas that allowed them to live in a particular environment more successfully than the other iguanas
  - (3) lived on several other islands long ago, but migrated to Isabella Island around 1980 to have the environment to themselves, without predators to harm them
  - (4) found that they were less visible to predators if they made themselves pink to blend in with the plants growing around them

41 Which evolutionary tree best represents the information about the pink land iguana provided in the passage?



42 The diagram below represents specialized cells in the surface of the leaf of a green plant.

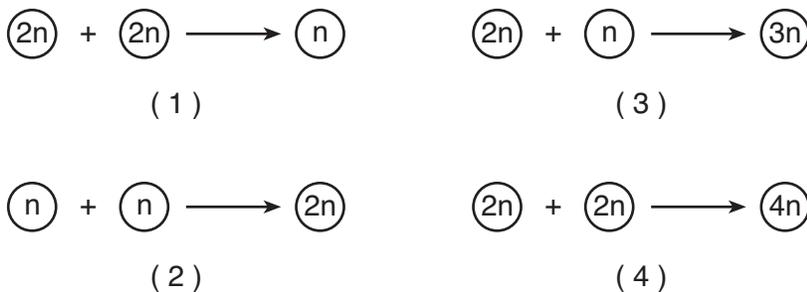


The main function of these cells is to

- (1) change the size of the stomate to regulate water loss
- (2) close the stomate to keep dust and dirt out of the leaf
- (3) directly provide leaf cells with the water involved in photosynthesis
- (4) allow newly formed glucose to be released from the leaf

43 Which diagram correctly represents a step in the normal process of human reproduction?

Key	
$(2n)$	= total genetic material of a human cell
$(n)$	= one half of the total genetic material of a human cell



**Part B-2**

**Answer all questions in this part.** [12]

*Directions (44–55):* For those questions that are multiple choice, record on the separate answer sheet the *number* of the choice that, of those given, best completes each statement or answers each question. For all other questions in this part, follow the directions given and record your answers in the spaces provided in this examination booklet.

Base your answers to questions 44 through 47 on the data table below and on your knowledge of biology. The data table shows the number of breeding pairs of bald eagles in New York State from 1991 to 2003.

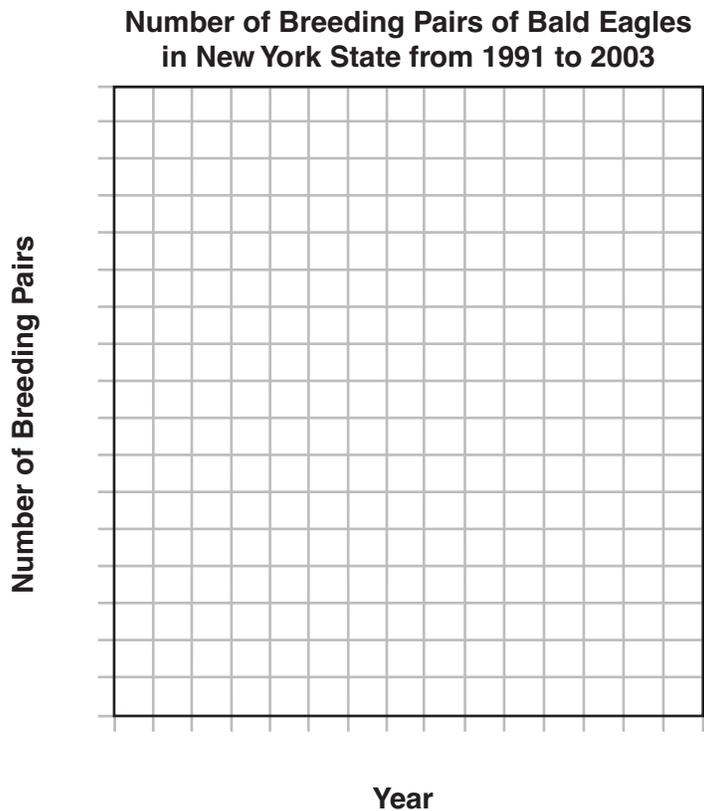
**Number of Breeding Pairs of  
Bald Eagles in New York State from 1991 to 2003**

<b>Year</b>	<b>Number of Breeding Pairs</b>
1991	15
1993	20
1995	25
1997	35
1999	45
2001	65
2003	75

Directions (44–45): Using the information in the data table, construct a line graph on the grid below, following the directions below.

44 Mark an appropriate scale, without any breaks, on each labeled axis. [1]

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



46 State *one* possible reason for the increase in the number of breeding pairs of bald eagles in New York State. [1]

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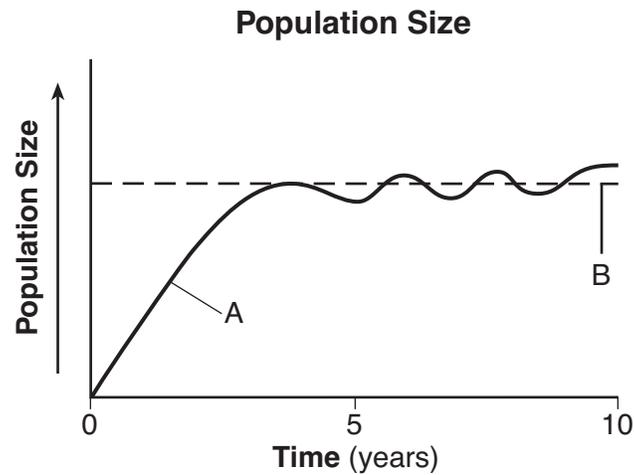
**Note: The answer to question 47 should be recorded on your separate answer sheet.**

47 In which time period did New York State see the largest increase in breeding pairs of bald eagles?

- (1) 1991–1993
- (2) 1993–1995
- (3) 1995–1997
- (4) 1999–2001

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Base your answers to questions 48 and 49 on the graph below and on your knowledge of biology. The graph shows the size of a population over time.



48 State *one* reason for the changes in population size represented by line A between years 5 and 10. [1]

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**Note: The answer to question 49 should be recorded on your separate answer sheet.**

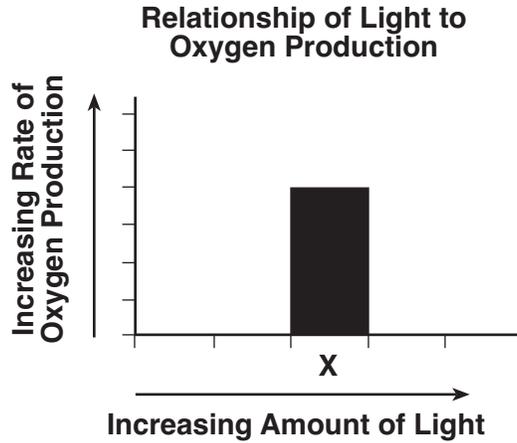
49 Which term best identifies line B in the graph?

- |   |  |
|---|--|
| (1) niche of the species in the environment | (3) carrying capacity of the environment     |
| (2) biodiversity in the environment         | (4) number of populations in the environment |

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Base your answers to questions 50 through 52 on the information and graph below and on your knowledge of biology.

A student conducts an experiment to determine how the amount of light affects the rate of oxygen production in a plant. The graph represents the rate of oxygen produced for one trial, X, in the experiment. By the end of the experiment, the plant had not reached maximum oxygen production.

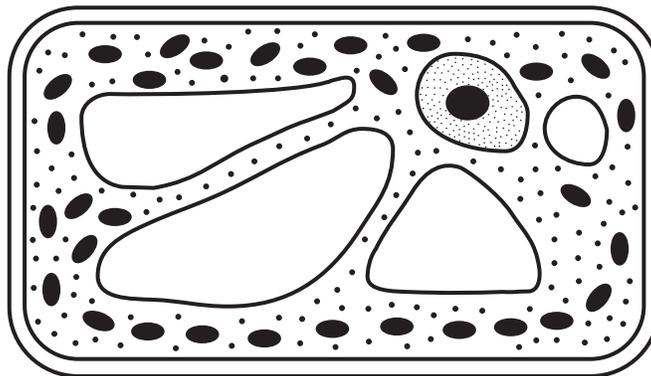


**Note: The answer to question 50 should be recorded on your separate answer sheet.**

50 If a student supplies more light than was received during trial X, a bar placed on the graph to represent the results would most likely be

- (1) shorter than bar X and placed to the left of bar X
- (2) shorter than bar X and placed to the right of bar X
- (3) taller than bar X and placed to the left of bar X
- (4) taller than bar X and placed to the right of bar X

51 The diagram below represents a cell from the plant being used in the study. Draw an arrow to a cell structure directly responsible for oxygen production in this cell. The tip of the arrow must touch the cell structure. [1]



52 Identify the biochemical process occurring in this cell that produces the oxygen. [1]

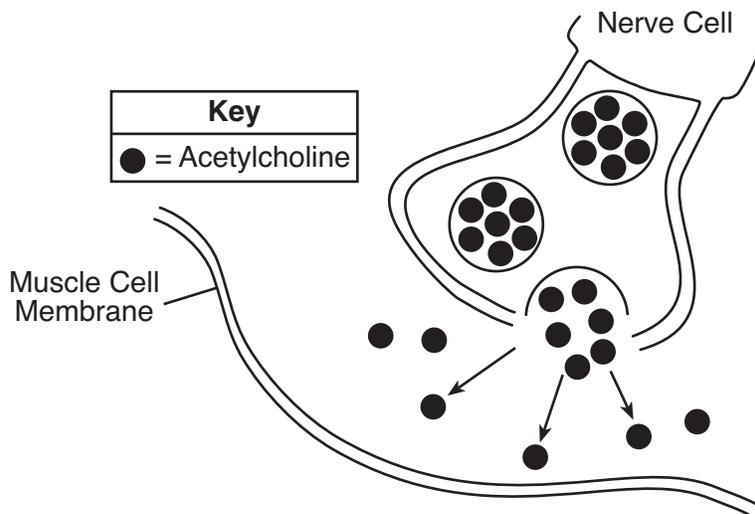
Process: \_\_\_\_\_

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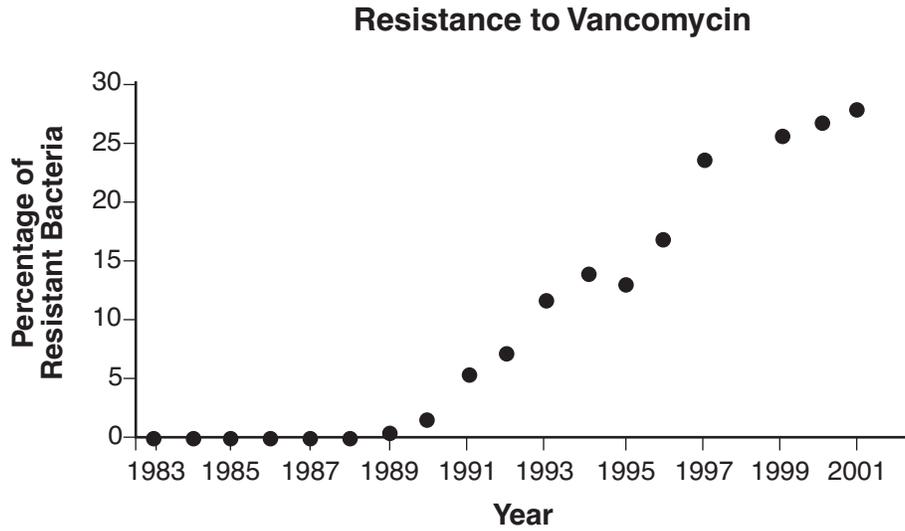
Base your answer to question 53 on the information below and on your knowledge of biology.

Botulinum toxin is a protein produced by the bacterium *Clostridium botulinum*. It causes a serious form of food poisoning in humans. In a very dilute form, it is also commonly used to eliminate some signs of aging, such as wrinkles. It does this by preventing nerves from releasing a chemical messenger called acetylcholine into the synapse (space between a nerve cell and a muscle cell). The toxin affects the process that causes the muscle cell to contract and form wrinkles.

53 The diagram below represents a process that is involved in the formation of wrinkles. Complete the diagram by drawing an appropriate structure on the muscle cell membrane that would allow the nerve cell to communicate with the muscle cell. [1]



Base your answers to questions 54 and 55 on the scatter-plot graph below and on your knowledge of biology. The graph shows changes in the percentage of vancomycin-resistant bacteria in a population between the years 1983 and 2001.



Source: [http://evolution.berkeley.edu/evolibrary/article/bergstrom\\_03](http://evolution.berkeley.edu/evolibrary/article/bergstrom_03)

54 Explain why the percentage of resistant bacteria increased over time. [1]

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55 State what scientists might do to successfully combat bacteria that are resistant to vancomycin. [1]

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**Part C**

**Answer all questions in this part.** [17]

*Directions (56–72):* Record your answers in the spaces provided in this examination booklet.

- 56 When insects are accidentally transported from one country to a new habitat in another country, the population of these insects often increases rapidly. State *one* environmental factor in the new habitat that would account for this increase in the population. [1]

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Base your answer to question 57–60 on the information below and on your knowledge of biology.

The year 2010 was declared the International Year of Biodiversity. However, significant loss of biodiversity is still occurring. Researchers around the world are working on a variety of ways to protect natural resources. According to an article in *Science News*, March 13, 2010, “reversing the downward spiral of biodiversity will take more than protecting wild places, but that’s where scientists are starting.”

- 57–60 Explain the importance of biodiversity to an ecosystem. In your answer, be sure to:
- state *one* effect of a loss of biodiversity in an ecosystem [1]
  - identify a source of variation within a species that leads to biodiversity [1]
  - identify *one* specific ecosystem that has shown a decrease in biodiversity and state *one* cause of the decrease in biodiversity in the ecosystem you identified [1]
  - identify *one* human activity, other than setting up protected wildlife areas, that has helped to preserve biodiversity [1]

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Base your answer to question 61–64 on the information below and on your knowledge of biology.

Scientists have been experimenting with different forms of alternate energy to help reduce the amount of fossil fuels that are burned. They studied yeast, which convert plant materials into ethanol, a form of alcohol that can be used in automobiles. These experiments were carried out at room temperature. The scientists wondered whether more ethanol would be produced at different temperatures.

61–64 Design an experiment to determine the effect of temperature on ethanol production by yeast. In your answer, be sure to:

- state *one* hypothesis the experiment would test [1]
- state how the control group would 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 independent variable in the experiment [1]

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Base your answers to questions 65 and 66 on the passage below and on your knowledge of biology.

### Smoking is Dumb

A study by Prof. Mark Weiner of Tel Aviv University's Department of Psychiatry and the Sheba Medical Center of Tel Hashomer Hospital has determined that young men who smoke are likely to have lower IQs than their nonsmoking peers. Tracking 18- to 21-year-old men enlisted in the Israeli army in the largest study of its kind, he has been able to demonstrate an important connection between the number of cigarettes young males smoke and their IQ.

The average IQ for a nonsmoker was about 101, while the smokers' average was more than seven IQ points lower at about 94, the study determined. The IQs of young men who smoked more than a pack a day were lower still, at about 90. An IQ score in a healthy population of such young men, with no mental disorders, falls within the range of 84 to 116.

Source: *Science Daily* April 2, 2010

- 65 Based on the information given in the passage, state the relationship between the number of cigarettes young males smoke and their IQ. [1]

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- 66 Explain how chemicals present in cigarette smoke are able to enter the body *and* reach the brain. [1]

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Base your answers to questions 67 through 70 on the information below and on your knowledge of biology.

The rapidly growing biofuel industry converts resources such as corn plants, vegetable oils, and industrial wastes into products that can be used to power cars and trucks, and heat homes. The increased demand for fossil fuel has led to the construction of factories to produce biofuels. A proposal has been made to build a biofuel factory near Syracuse in New York State.

- 67 State *one* advantage, other than decreased reliance on fossil fuels, of the increased production of biofuels in New York State. [1]

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- 68 State *one disadvantage* of the increased use of corn for biofuels. [1]

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69 State *one* economic advantage of constructing a biofuel factory. [1]

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70 State *one* concern that local residents might have about having a biofuel factory in their area. [1]

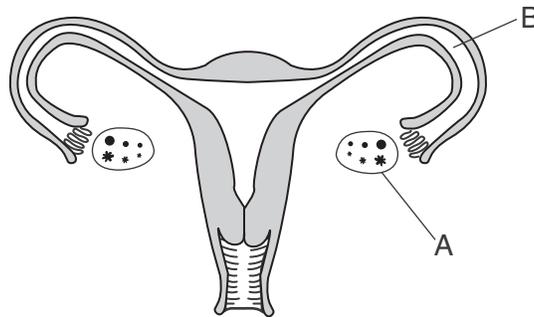
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Base your answers to questions 71 and 72 on the information and diagram below and on your knowledge of biology.

Endometriosis is a condition that occurs in some women, causing multiple cells or layers of cells to grow outside of the uterus. In some cases, these growths can actually cover the entire ovary or cause the tube leading from the ovary to the uterus to be blocked. The diagram below represents the female reproductive system. Two structures, A and B, are labeled.



71 Select structure A or B and indicate your selection on the line below. Describe specifically how the growths that are characteristic of endometriosis at the location you selected could affect the ability of a female to become pregnant. [1]

Structure: \_\_\_\_\_

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72 Select either surgical procedure or hormone therapy and explain why it can be an effective treatment for endometriosis. [1]

Effective treatment: \_\_\_\_\_

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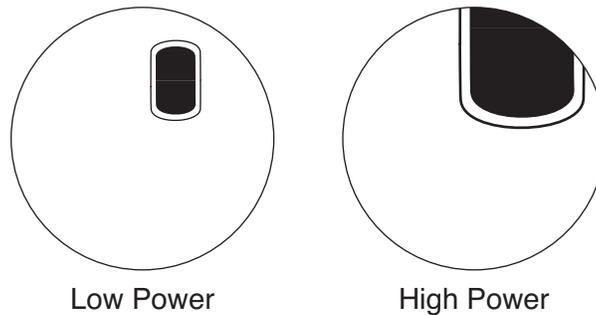
## Part D

Answer all questions in this part. [13]

*Directions (73–85):* For those questions that are multiple choice, record on the separate answer sheet 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 and record your answers in the spaces provided in this examination booklet.

Base your answers to questions 73 and 74 on the information below and on your knowledge of biology.

A student observes a red onion cell with a compound light microscope using low, then high power. The two views are represented below.

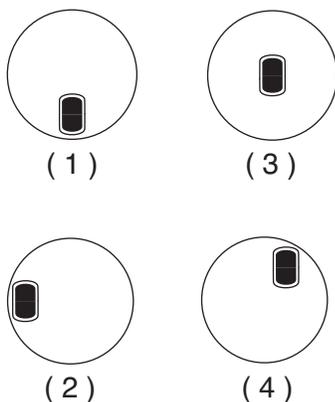


**Note: The answers to questions 73 and 74 should be recorded on your separate answer sheet.**

73 The best explanation for the changes observed by the student is that, when switching from low to high power, the

- (1) diameter of the field of view decreases
- (2) slide was accidentally moved
- (3) diameter of the field of view increases
- (4) image is inverted and reversed

74 Which diagram represents where the cell should be located in the low-power field of view to be sure the entire cell will be visible after switching to high power?



**Note: The answer to question 75 should be recorded on your separate answer sheet.**

- 75 Hospital patients are often given intravenous fluids (IVs) to maintain proper levels of water and salts in the body. Great care is used in preparing these solutions. If a manufacturer accidentally prepared a batch of IV fluid that contained much more than the usual amount of salt, harm to the patient could result. The most likely effect on a patient if this incorrectly prepared IV fluid was used is that
- (1) water would move into body cells and cause them to burst
  - (2) water would move out of body cells and cause them to dehydrate
  - (3) salt and water would both move out of body cells and disrupt homeostasis
  - (4) salt and water would both move into body cells and preserve homeostasis

**Note: The answer to question 76 should be recorded on your separate answer sheet.**

- 76 Which technique could be used to determine the relative number of bases in fragments taken from a sample of DNA?
- (1) electrophoresis
  - (2) cloning
  - (3) paper chromatography
  - (4) light microscopy

Base your answers to questions 77 and 78 on the DNA base sequence below and on your knowledge of biology.

AAC–GCC–GTC–CGC–TAG

- 77 Identify the mRNA codons that would be produced using this DNA as a template. [1]

DNA base sequence: AAC    GCC    GTC    CGC    TAG

mRNA codons:        \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_    \_\_\_\_\_

- 78 If a mutation occurs, leaving 12 bases, what is the maximum number of amino acids that could be coded for by this DNA segment? [1]

\_\_\_\_\_ **amino acids**

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Base your answers to questions 79 and 80 on the diagram below and on your knowledge of biology. The diagram represents a cell and its changes as a result of two laboratory procedures, A and B.



79 Describe procedure A and explain why it would cause the change shown. [1]

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80 Explain why procedure B has the opposite effect of procedure A. [1]

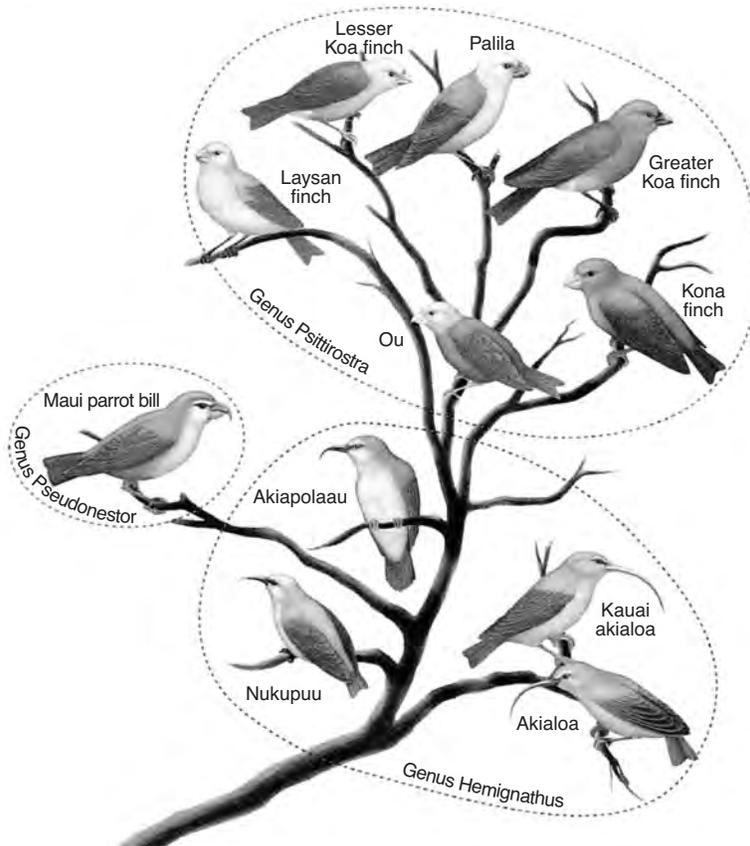
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Base your answers to questions 81 through 83 on the information and diagram below and on your knowledge of biology.

The circled areas in the diagram represent bird species that are in the same genus, a classification group that includes closely related species. These birds are found on the Hawaiian Islands.



Source: *Biology, 9th Edition*, Mader, McGraw-Hill, Boston, MA, 2007, p.313

**Note: The answers to questions 81 and 82 should be recorded on your separate answer sheet.**

81 Which processes are directly responsible for the presence of the different species of birds shown in the diagram?

- (1) mitosis and differentiation
- (2) gene manipulation and overpopulation
- (3) gene mutations and natural selection
- (4) competition and cloning

82 Which two finches are most closely related?

- (1) Lesser Koa finch and Nukupuu
- (2) Akialoa and Ou
- (3) Kauai akialoa and Maui parrot bill
- (4) Ou and Greater Koa finch

83 If the Akialoa migrated to an ecosystem occupied by a Greater Koa finch, could both species survive? Support your answer. [1]

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84 Identify *one* specific molecule that will increase in concentration in the blood as a result of increased activity of the circulatory system during physical exercise. [1]

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85 Before deciding whether a conclusion was valid or invalid, students looked at the results of the entire class. Explain why the results of the entire class were analyzed, rather than just the results of one individual student. [1]

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LIVING ENVIRONMENT

Printed on Recycled Paper

# FOR TEACHERS ONLY

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

# LE

## LIVING ENVIRONMENT

Tuesday, June 11, 2013 — 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 at: <http://www.p12.nysed.gov/assessment/> and select the link "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.

**Multiple Choice for Parts A, B-1, B-2, and D**  
**Allow 1 credit for each correct response.**

Part A			
1 ..... 1 .....	9 ..... 3 .....	17 ..... 3 .....	25 ..... 2 .....
2 ..... 3 .....	10 ..... 1 .....	18 ..... 1 .....	26 ..... 1 .....
3 ..... 1 .....	11 ..... 2 .....	19 ..... 4 .....	27 ..... 1 .....
4 ..... 3 .....	12 ..... 3 .....	20 ..... 3 .....	28 ..... 3 .....
5 ..... 4 .....	13 ..... 3 .....	21 ..... 3 .....	29 ..... 4 .....
6 ..... 4 .....	14 ..... 1 .....	22 ..... 4 .....	30 ..... 1 .....
7 ..... 3 .....	15 ..... 4 .....	23 ..... 1 .....	
8 ..... 3 .....	16 ..... 4 .....	24 ..... 4 .....	
Part B-1			
31 ..... 3 .....	35 ..... 2 .....	39 ..... 3 .....	43 ..... 2 .....
32 ..... 2 .....	36 ..... 1 .....	40 ..... 2 .....	
33 ..... 2 .....	37 ..... 4 .....	41 ..... 1 .....	
34 ..... 4 .....	38 ..... 2 .....	42 ..... 1 .....	
Part B-2			
47 ..... 4 .....	49 ..... 3 .....	50 ..... 4 .....	
Part D			
73 ..... 1 .....	75 ..... 2 .....	81 ..... 3 .....	
74 ..... 3 .....	76 ..... 1 .....	82 ..... 4 .....	

## Directions to the Teacher

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*.

**Do not attempt to correct the student's work by making insertions or changes of any kind. If the student's responses for the multiple-choice questions are being hand scored prior to being scanned, the scorer must be careful not to make any marks on the answer sheet except to record the scores in the designated score boxes. Marks elsewhere on the answer sheet will interfere with the accuracy of the scanning.**

Allow 1 credit for each correct response.

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 more than approximately one-half of the open-ended questions on a student's answer paper. Teachers may not score their own students' answer papers.

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. On the student's separate answer sheet, for each question, record the number of credits earned and the teacher's assigned rater/scorer letter.

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.

For hand scoring, raters should enter the scores earned in the appropriate boxes printed on the separate answer sheet. Next, the rater should add these scores and enter the total in the box labeled "Total Raw Score." Then the student's raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Tuesday, June 11, 2013. The student's scale score should be entered in the box labeled "Scale Score" on the student's answer sheet. The scale score is the student's final examination score.

**Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.**

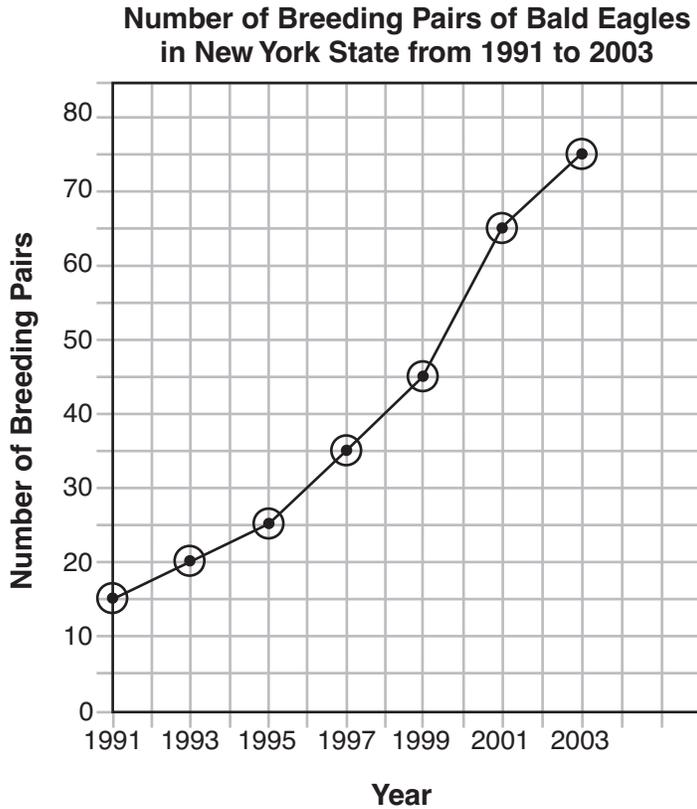
Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score.

**Part B–2**

44 [1] Allow 1 credit for marking an appropriate scale, without any breaks, on each labeled axis.

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

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



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

Do *not* assume that the intersection of the  $x$ - and  $y$ -axes is the origin  $(0,0)$ , unless it is labeled. An appropriate scale only needs to include the data range in the data table.

Do *not* allow credit if points are plotted that are not in the data table, e.g.,  $(0,0)$ , or for extending lines beyond the data points.

46 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- decreased pesticide use
- decreased human impact on their environment
- more food available
- They were protected by laws.
- Breeding programs were established.

47 MC on scoring key

48 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Populations grow until they exceed the limits of the environment, and then they die off until they fall below environmental limits.
- Changes in available food cause changes in population size.
- Parasites/disease/starvation causes population sizes to vary.
- Variations in predator populations will cause changes in prey populations.
- competition
- seasonal/environmental changes

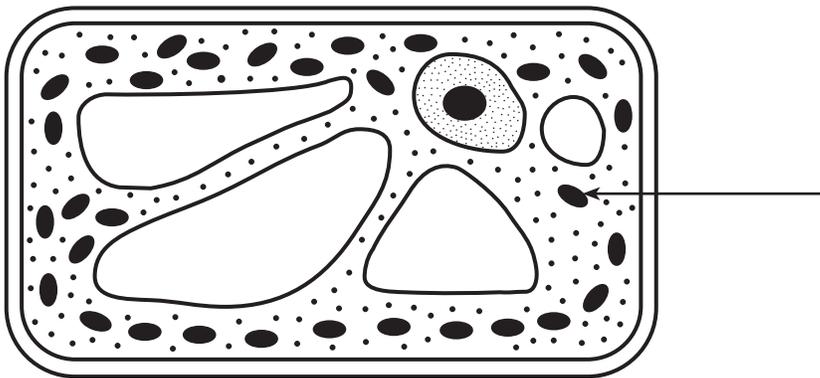
**Note:** Do *not* allow credit for carrying capacity that does not address a reason for the changes in population size.

49 MC on scoring key

50 MC on scoring key

51 [1] Allow 1 credit.

**Example of a 1-credit response:**

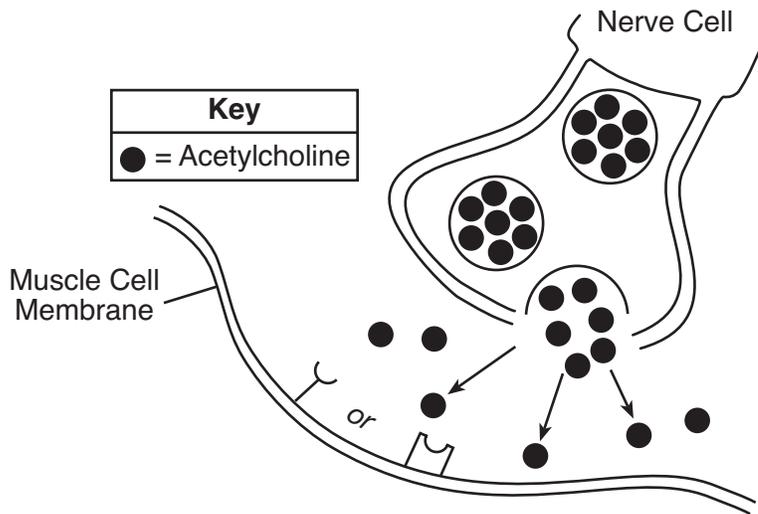


**Note:** Allow credit for any line, with or without an arrowhead, that touches a chloroplast. If more than one arrow is drawn, *all* arrows must be correct to receive credit.

52 [1] Allow 1 credit for photosynthesis *or* autotrophic nutrition *or* photolysis.

53 [1] Allow 1 credit.

**Example of a 1-credit response:**



**Note:** Acceptable responses include a receptor drawn on the muscle cell membrane that has a shape that acetylcholine could fit into.

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

- The resistant bacteria survived, reproduced, and passed on the gene for resistance.
- More of the resistant ones survived and reproduced.

55 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Find a new chemical to fight the bacteria.
- They might develop new antibiotics.
- They can genetically engineer new antibiotics.
- They might develop vaccines against disease-causing bacteria.
- Use different antibiotics.

## Part C

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

- abundant food supply
- no natural predators in the new environment
- There is a more favorable climate.
- fewer competitors

**Note:** The student's response to the bulleted items in question 57–60 need *not* appear in the following order.

**57** [1] Allow 1 credit for stating *one* effect of a loss of biodiversity in an ecosystem. Acceptable responses include, but are not limited to:

- The less biodiversity there is in an ecosystem, the less stable the ecosystem will be.
- A loss of biodiversity would make it harder for the ecosystem to maintain stability.
- It would reduce resources/food/shelter that are used by the organisms in the ecosystem.
- A species might become extinct.

**Note:** Allow credit only for an “effect of a loss of biodiversity,” not just less biodiversity.

**58** [1] Allow 1 credit for identifying a source of variation within a species that leads to biodiversity. Acceptable responses include, but are not limited to:

- mutations
- genetic changes
- genetic recombination
- sexual reproduction

**59** [1] Allow 1 credit identifying *one* specific ecosystem that has shown a decrease in biodiversity and for stating *one* cause of the decrease in biodiversity in the ecosystem identified. Acceptable responses include, but are not limited to:

- a tropical rain forest – deforestation
- Lake Erie – agricultural runoff/overfishing/introduction of non-native species
- Gulf of Mexico – oil spill
- lakes in Adirondack Mountains – acid rain
- arctic seas – global warming

- 60** [1] Allow 1 credit for identifying *one* human activity, other than setting up protected wildlife areas, that has helped to preserve biodiversity. Acceptable responses include, but are not limited to:
- establishing endangered species lists and laws that protect endangered species and their habitats
  - setting up laws that regulate the release of pollutants
  - enacting hunting or fishing regulations that protect endangered species
  - recycling of metals and plastics
  - replanting trees
  - stopping/slowing deforestation
  - breeding programs
  - regulating what chemicals can be used on farms

**Note:** The student's response to the bulleted items in question 61–64 need *not* appear in the following order.

- 61** [1] Allow 1 credit for stating *one* hypothesis the experiment would test. Acceptable responses include, but are not limited to:
- Increasing the temperature will increase the rate of ethanol production.
  - Decreasing the temperature will increase the rate of ethanol production.
  - Temperature affects the rate of ethanol production.

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

- 62** [1] Allow 1 credit for stating how the control group would be treated differently from the experimental group. Acceptable responses include, but are not limited to:
- The control group will be kept at room temperature, while the experimental group will be kept at a higher/lower temperature.
  - The control group would be kept at room temperature.

**Note:** Allow credit for an answer consistent with the student's hypothesis for question 61.

- 63** [1] 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:
- amount of yeast used
  - amount of plant material used
  - type of plant material used
  - species of yeast used

**Note:** Allow credit for an answer consistent with the student's hypothesis for question 61.

- 64** [1] Allow 1 credit for identifying the independent variable in the experiment as temperature.

**Note:** Allow credit for an answer consistent with the student's hypothesis for question 61.

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

- The more cigarettes a young man smokes, the lower his IQ.

**Note:** Allow credit *only* for responses that address the number/quantity of cigarettes smoked.

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

- Smoke enters the lungs. Chemicals diffuse into the blood and are transported to all parts of the body, including the brain.
- Chemicals reach the brain through the blood. They enter the body through the lungs.
- They inhaled the smoke and it was absorbed into the blood.

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

- This is a domestic fuel source.
- They are a renewable resource.
- provide more jobs in the Syracuse area
- It is a beneficial use of industrial wastes.

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

- There will be less corn for food.
- There will be less farmland available to grow crops other than corn.
- The cost of corn food products could go up.
- Burning ethanol produces carbon dioxide, just like fossil fuels.

**69** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Construction of the factory would mean more jobs.
- An increased local supply of fuel might reduce fuel costs.
- It could generate tax revenues.

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

- There would be more traffic in the area.
- There might be increased pollution.
- A loss of habitat for animals and plants would occur.
- There would be a loss of open space for recreation.

**71** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Structure: *A*

— Growths covering the ovary could prevent the egg from being released from the ovary (or entering the oviduct).

Structure: *B*

— Blocking the oviduct (tube) could prevent the sperm from reaching the egg.

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

Effective treatment: surgical procedure

— surgical procedure because the growths physically block reproductive structures and need to be removed

Effective treatment: hormone therapy

— The hormones might lessen or shrink the growths.

— These hormones might block the influence of estrogen, which sometimes stimulates the growths.

## Part D

73 MC on scoring key

74 MC on scoring key

75 MC on scoring key

76 MC on scoring key

77 [1] Allow 1 credit for completing the chart as shown below.

DNA base sequence:	AAC	GCC	GTC	CGC	TAG
mRNA codons:	<u>UUG</u>	<u>CGG</u>	<u>CAG</u>	<u>GCG</u>	<u>AUC</u>

78 [1] Allow 1 credit for 4.

79 [1] Allow 1 credit for stating *both* a description of the procedure and an explanation. Acceptable responses include, but are not limited to:

- In procedure *A*, salt water is added to the cell. The reduced water concentration outside results in water leaving the cell and its cytoplasm shrinks away from the cell wall.
- Put the cell in salt solution. Water moves out of the cell and the cell contents shrink.

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

- In procedure *B*, distilled water is added to the cell. The distilled water goes into the cell and restores the cytoplasm to the normal size.
- Process *B* is to add distilled water to dilute the salt water. Water will move into the cell and fill it back up.
- Process *B* adds a new substance that causes water to reenter the cell.

81 MC on scoring key

82 MC on scoring key

- 83** [1] Allow 1 credit for indicating if both species could survive and supporting the answer. Acceptable responses include, but are not limited to:
- Yes, but only if there is food that the Akialoa can eat, since it has a very different beak.
  - No, because the environment might not contain the type of food the Akialoa can eat.
  - Yes, because they won't compete for food.
  - Yes, if they have different niches.
  - No, it is not the habitat that the Akialoa are adapted to.
  - Yes, because based on beak shape, they eat different foods.

- 84** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- oxygen (O<sub>2</sub>)
  - carbon dioxide (CO<sub>2</sub>)
  - lactic acid
  - adrenaline

- 85** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Results from a larger sample are more reliable than results from a small sample.
  - Using data from more students makes it more likely that the results will be accurate.
  - You could compare the results for both boys and girls, which makes the study more valid.

**The *Chart for Determining the Final Examination Score for the June 2013 Regents Examination in Living Environment* will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Tuesday, June 11, 2013. 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 <http://www.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm>.
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 2013 Living Environment

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

Part D 73–85	
Lab 1	76, 77, 78
Lab 2	84, 85
Lab 3	81, 82, 83
Lab 5	73, 74, 75, 79, 80

## Regents Examination in Living Environment – June 2013

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	75	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	71	17	35
74	90	45	70	16	33
73	90	44	69	15	31
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	84	35	60	6	14
63	83	34	59	5	12
62	82	33	58	4	9
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 “Scale Score” on the student’s answer sheet.

**Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.**

Because scale scores corresponding to raw scores in the conversion chart change from one administration 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.