

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

# LIVING ENVIRONMENT

**Thursday, August 14, 2014 — 12:30 to 3:30 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.

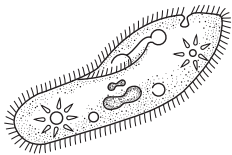
1 A function of cell membranes in humans is the

- (1) synthesis of the amino acids
- (2) production of energy
- (3) replication of genetic material
- (4) recognition of certain chemicals

2 Forests, mountains, rivers, and marshes are examples of the wide variety of ecosystems in New York State. The diversity of these ecosystems is most likely the result of

- (1) the variety of abiotic conditions in these regions
- (2) interactions between producers and decomposers
- (3) increased efforts to protect endangered species
- (4) a lack of competition between the heterotrophs living there

3 The diagram below represents two organisms.



Organism A  
single-celled



Organism B  
multicellular

Which statement concerning organism A and organism B is correct?

- (1) Organism A contains organs, whereas organism B lacks organs.
- (2) Organism A and organism B have the same organ systems.
- (3) Organism A and organism B both have structures that perform life processes.
- (4) Organism A lacks structures that help maintain dynamic equilibrium.

4 Which statement best describes the organelles in a cell?

- (1) All organelles are involved directly with communication between cells.
- (2) Organelles must work together and their activities must be coordinated.
- (3) Organelles function only when there is a disruption in homeostasis.
- (4) Each organelle must function independently of the others in order to maintain homeostasis.

5 A substance directly involved in cellular communication within the human body is

- (1) an antibody
- (2) an antibiotic
- (3) a hormone
- (4) a starch

6 The list below includes three organ systems that are directly used when a human runs.

circulatory system  
muscular system  
skeletal system

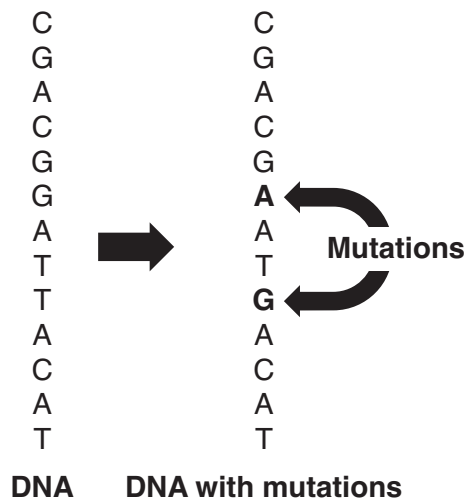
Which system should also be included in the list?

- (1) immune system
- (2) reproductive system
- (3) digestive system
- (4) nervous system

7 In a pine forest, there are different species of birds known as warblers that are able to coexist on the same pine trees. The Cape May warblers feed on insects located on the tips of the highest pine branches. The yellow-rumped warblers feed on insects on lower branches of the same trees. The different feeding locations for these two species of warblers indicate that they have different

- (1) niches
- (2) ecosystems
- (3) methods of asexual reproduction
- (4) methods of selective breeding

8 The diagram below represents the locations of two mutations in a strand of a DNA molecule.



If this DNA is located in the nucleus of a skin cell, the cell will

- (1) pass the mutations on to only half the cells that develop from it
- (2) delete all of the DNA in the nucleus and synthesize new DNA
- (3) correct the mutations after several generations
- (4) pass the mutations on to the cells that develop from it

9 A human skin cell contains 46 chromosomes. A frog sperm cell contains 12 chromosomes. Which pair of numbers shows the chromosome number of a normal gamete from each of these species?

- (1) human 46; frog 12      (3) human 23; frog 24
- (2) human 46; frog 24      (4) human 23; frog 12

10 According to the theory of biological evolution, most present-day species of organisms

- (1) developed from similar, smaller prehistoric organisms
- (2) have always existed in the form they have today
- (3) developed from fossils of the other organisms
- (4) descended from earlier, different species of organisms

11 Corn seeds with identical genetic information were planted on two adjacent farms. The corn plants on one farm were well fertilized and grew large, while the plants on the other farm were not given fertilizer and did not grow as large. The best explanation for these observations is that

- (1) crops grow differently in different climates
- (2) the corn plants all contained mutated genes that made them grow
- (3) environmental conditions affect gene expression
- (4) the plants on one farm had different genes from the plants on the other farm

12 The male red-winged blackbird defends its territory and uses loud vocalizations to attract a mate. Such behavior directly benefits these birds because it results in

- (1) increased competition for food
- (2) greater reproductive success
- (3) reduced biodiversity
- (4) global stability

13 Extinction occurs when the environment changes and

- (1) a species can reproduce successfully
- (2) an individual has adaptive characteristics insufficient to allow survival
- (3) all members of a species are no longer living
- (4) one individual produces some offspring that evolve into a new species

14 All the information necessary for growth, development, and eventual reproduction of sexually reproducing organisms is present in

- (1) sperm cells, only
- (2) egg cells, only
- (3) zygotes
- (4) either sperm cells or egg cells

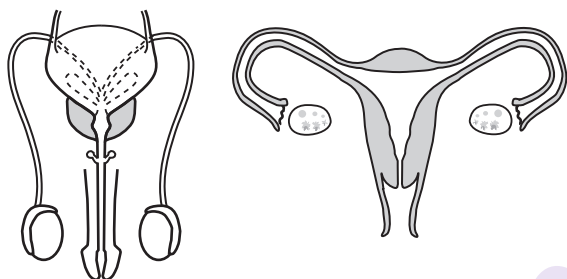
15 Which activity can occur without the use of energy?

- (1) contraction of muscle tissue
- (2) protein synthesis in a cell
- (3) active transport of minerals
- (4) movement of water across a membrane

16 An alternative to the use of insecticides to combat the Mediterranean fruit fly is the Sterile Insect Technique (SIT). SIT involves the sterilization of male insects by radiation, which prevents the formation of functional male gametes. When these male insects mate with female insects of the same species, the result would be that

- (1) only female offspring would be produced
- (2) no offspring would be produced
- (3) the offspring would have a reduced number of chromosomes
- (4) the offspring would no longer be sterile

17 The diagrams below represent a human organ system.



The major function of the system is to

- (1) provide immunity essential for the survival of each individual in a population
- (2) provide cells that are necessary for the survival of the species
- (3) produce chemical messages that are necessary for nerve cell development
- (4) control the passage of nutrients into and out of a developing fetus

18 Sheep were the first species of mammals to be cloned. Which statement about cloned sheep is correct?

- (1) Different kinds of body cells in a cloned sheep contain different DNA.
- (2) Cloned sheep cannot produce offspring if they are mated with noncloned sheep.
- (3) Two sheep cloned from the same parent cannot mate and have offspring.
- (4) Many cells in cloned sheep have two identical nuclei, instead of a single nucleus.

19 In a sexually reproducing species, evolution could occur as a result of

- (1) modification of genes in body cells
- (2) modification of genes in sex cells
- (3) increased reproduction among individuals with identical chromosomes
- (4) recombination of genes in cells reproducing by mitosis

20 An increase in the level of hormone A causes an increase in the level of hormone B. The increase in the level of hormone B then causes a decrease in the level of hormone A. This process is an example of

- (1) a failure to maintain homeostasis
- (2) the breakdown of chemicals
- (3) a disruption in cellular coordination
- (4) a feedback mechanism

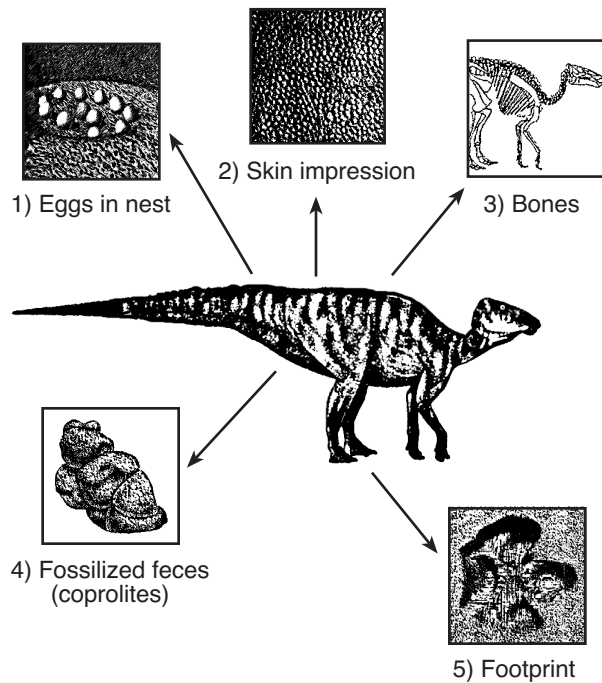
21 Human population growth has led to a reduction in the populations of predators throughout natural ecosystems across the United States. Scientists consider the loss of these predators to have a

- (1) positive effect, because an increase in their prey helps to maintain stability in the ecosystem
- (2) positive effect, because predators usually eliminate the species they prey on
- (3) negative effect, since predators have always made up a large portion of our food supply
- (4) negative effect, because predators have an important role in maintaining stable ecosystems

22 Which environmental change would cause the greatest reduction in the biodiversity of a large ecosystem?

- (1) building a new home
- (2) building a new store in a shopping mall
- (3) widespread use of pesticides
- (4) widespread recycling programs

- 23 The diagram below represents a variety of fossil types, which can be found in many rocks.



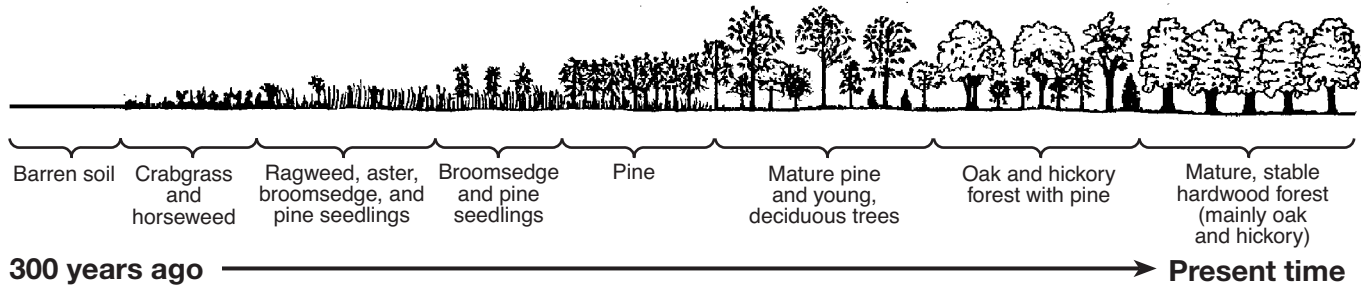
Source: Audesir, Audesir, Byers,  
Biology: Life on Earth, Prentice Hall, 2002

These fossils can be best used to provide information that could be used in a study of

- (1) evolutionary relationships
  - (2) dynamic equilibrium
  - (3) selective breeding
  - (4) cell specialization
- 24 The bottom of Onondaga Lake in upstate New York contains large amounts of pollutants. One proposal to clean the lake bottom requires that the pollutants be removed and stored nearby. People who live near the proposed storage sites are opposed to this plan. The officials who must decide on the proposal will examine both the benefits and risks of the plan. The decision made by the officials will most likely involve
- (1) increased industrialization
  - (2) direct harvesting
  - (3) an increase in finite resources
  - (4) consideration of trade-offs

- 25 The increased use of wind turbines and solar collectors to generate electric power will
- (1) negatively affect ecosystems by increasing biodiversity
  - (2) negatively alter the chemical composition of soil and water
  - (3) reduce the amount of pollution that comes from the burning of fossil fuels
  - (4) increase oil consumption for business and industry
- 26 Antibiotics are substances used to help fight an infection of *Streptococcus*, a bacterium that causes strep throat. Overuse of these antibiotics can
- (1) prevent future infections by these pathogens
  - (2) cause a decrease in the production of enzymes
  - (3) allow organic molecules to be synthesized
  - (4) select for resistant organisms
- 27 An allergic reaction to certain types of natural, unprocessed foods, such as peanuts, is caused by
- (1) a lack of digestive enzymes
  - (2) a response to specific antigens
  - (3) microorganisms living within the food
  - (4) high levels of carbon dioxide in the air
- 28 A variety of pear tree, known as Bradford, was originally introduced into the eastern United States in the 1960s. Today, this tree is crowding out other plants in these states. This situation best illustrates
- (1) an unintentional negative effect of altering an ecosystem
  - (2) how a foreign species is controlled in the eastern United States
  - (3) that the introduction of a foreign species does not affect food webs
  - (4) that serious environmental consequences can be avoided by importing a foreign species

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



If the oak and hickory trees were burned in a forest fire, leaving bare soil, which group of plants would most likely be the first to grow back?

- (1) crabgrass and horseweed
- (2) oak and hickory trees
- (3) broomsedge and pine seedlings
- (4) mature pine and young deciduous trees

30 A growing mass of plastic garbage is collecting in an area of the Pacific Ocean. This is caused by plastic garbage that is discarded by people, and it ends up in rivers that carry it to the ocean. Over time, ocean currents cause it to accumulate in this area of the Pacific. Currently, the mass is estimated to cover an area of ocean twice the size of Texas. As these plastics slowly break down, chemicals enter the water, and can enter ocean organisms that we might eventually use for food. This sequence of events illustrates that

- (1) humans modify ecosystems as a result of population growth, consumption, and technology
- (2) human activities that degrade ecosystems result in an increase in diversity of ecosystems
- (3) when humans alter ecosystems by adding specific organisms, serious consequences could result
- (4) industrialization brings a reduced demand for fossil and nuclear fuels



## Part B-1

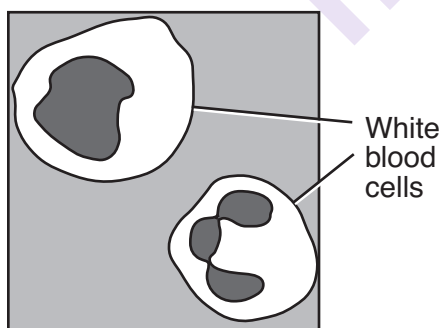
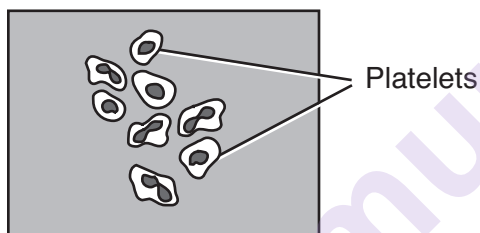
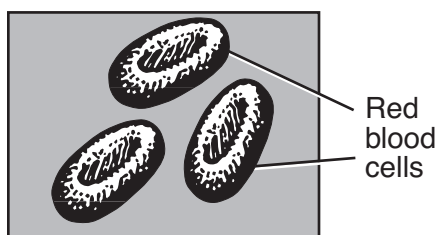
Answer all questions in this part. [13]

*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 Which organic compounds would be the best to analyze in order to determine if two species are closely related?

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

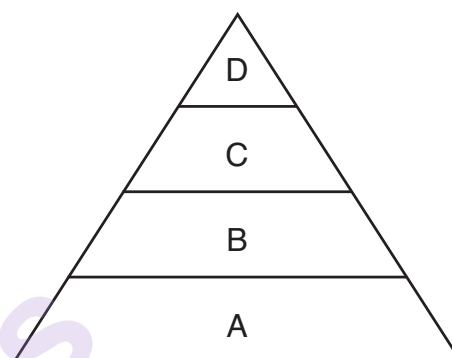
32 The diagram below represents some structures observed in a drop of human blood.



Which statement correctly describes all of these structures in human blood?

- (1) They produce antibiotics that fight disease.
- (2) They are useful in the digestion of oxygen.
- (3) They use all of the DNA present in the cells of the body.
- (4) They perform specific functions that aid in maintaining homeostasis.

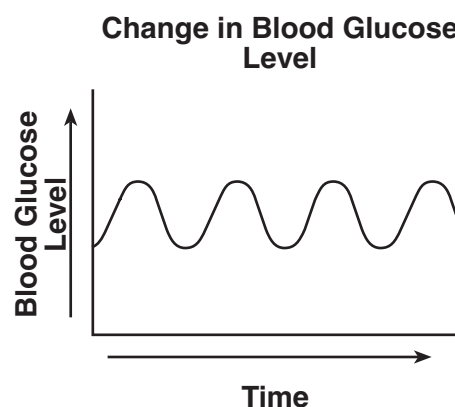
Base your answer to question 33 on the energy pyramid below and on your knowledge of biology.



33 Letter A in the pyramid represents

- (1) scavengers
- (2) producers
- (3) carnivores
- (4) herbivores

34 The graph below shows changes in the level of glucose in the blood of a person over a period of time.



The graph represents the

- (1) maintenance of dynamic equilibrium
- (2) failure of homeostasis
- (3) reaction of white blood cells to a pathogen
- (4) oxygen carrying capacity of the blood

Base your answer to question 35 on the information and data table below and on your knowledge of biology.

The Thousand Islands region in upstate New York has many isolated islands. On one island, a fire burned most of the trees. The data table below indicates the percentages of tan beetles and dark-brown beetles present before and after the fire.

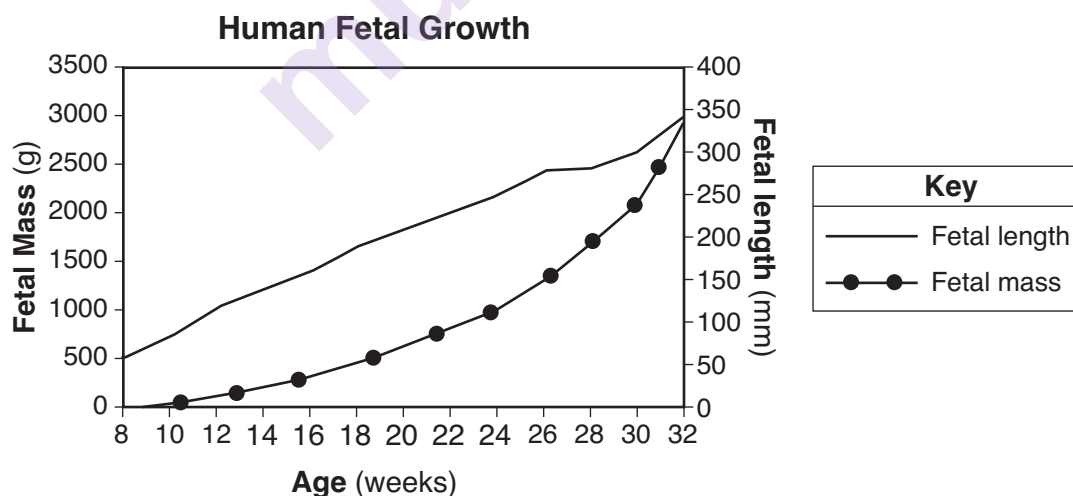
**Changes in Beetles Population**

Time	Tan Beetles (%)	Dark-Brown Beetles (%)
before fire	88	12
8 months after fire	80	20
16 months after fire	70	30
24 months after fire	65	35
48 months after fire	60	40
60 months after fire	56	44

35 The increase in the percentage of dark-brown beetles over time was most likely due to the fact that the

- (1) dark-brown beetles could not find food as well as the tan beetles
- (2) dark-brown beetles were harder for predators to locate
- (3) tan beetles turned dark brown to blend in with the darker, ash-covered ground
- (4) exposure to ash from the fire changed the DNA of some of the tan beetles

36 The graph below represents the growth in length and mass of a fetus up to week 32. The length is measured in millimeters (mm) and the mass in grams (g).

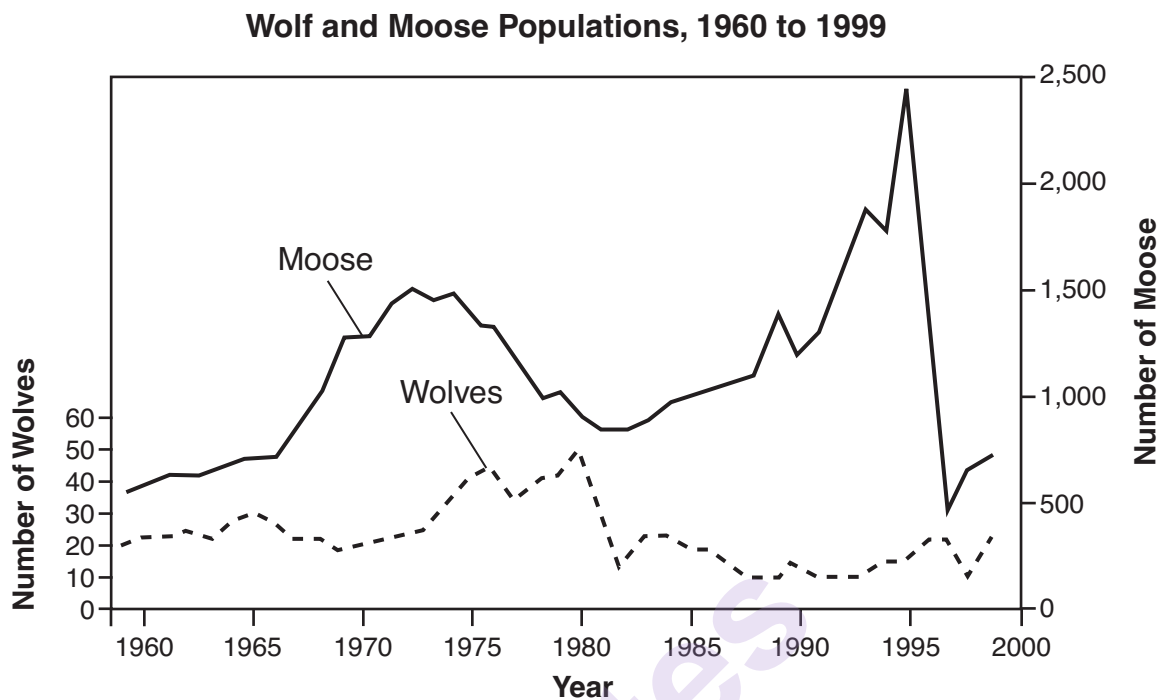


Which statement best describes human fetal growth between weeks 26 and 32?

- (1) There is a faster rate of increase in mass than in length.
- (2) The rate of increase in mass levels off, while the increase in length constantly increases.
- (3) The fetal mass increases by 750 g and the fetal length increases by about 100 mm.
- (4) There are slight decreases in both length and mass.



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



Source: Ecological Studies of Wolves on Isle Royale, Rolf O. Peterson,  
School of Forestry and Wood Products, Michigan Technological University

37 The population of wolves in 1980 was close to

- (1) 20
- (2) 50
- (3) 800
- (4) 1000

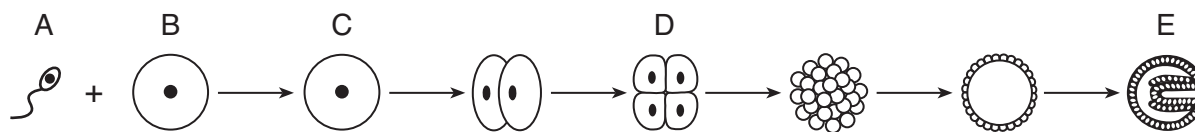
38 An observable trend in the wolf and moose data between 1980 and 1995 is

- (1) as the wolf population decreases, the moose population increases
- (2) as the wolf population decreases, the moose population decreases
- (3) the numbers of wolves and moose are relatively constant
- (4) the numbers of wolves and moose appear to be unrelated

39 A student wants to test the hypothesis that an acidic environment will decrease enzyme activity. In the experiment, the student used an enzyme that breaks down hydrogen peroxide into water and bubbles of oxygen. To test the hypothesis, the student should collect data on the number of oxygen bubbles produced at different

- (1) temperatures
- (2) pH levels
- (3) enzyme concentrations
- (4) concentrations of hydrogen peroxide

Base your answers to questions 40 and 41 on the diagram below and on your knowledge of biology. The diagram represents events that occur during embryonic development. Letters A through E represent structures.



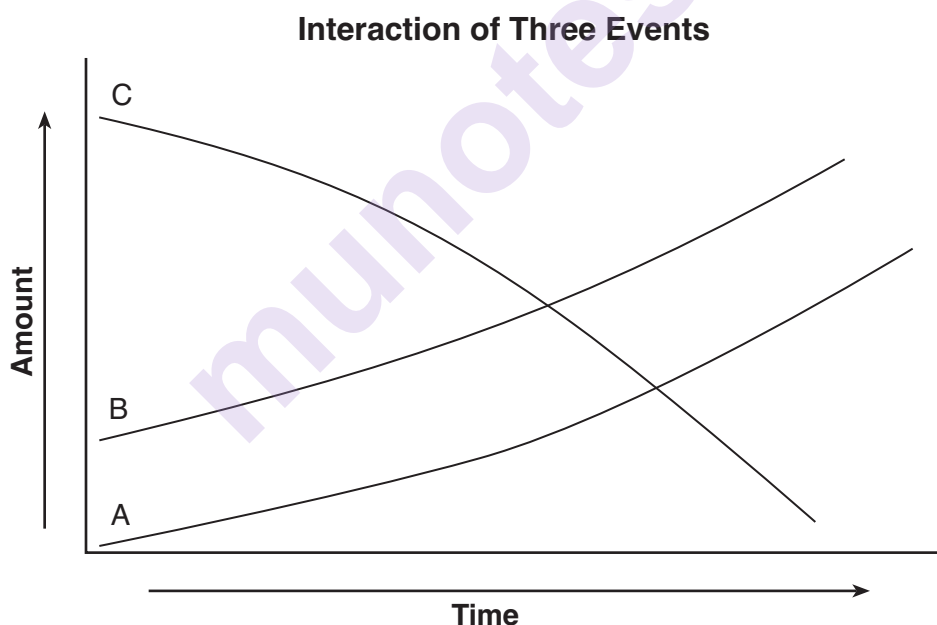
40 Between which two letters does mitosis occur?

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

41 Between which two letters does differentiation occur?

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

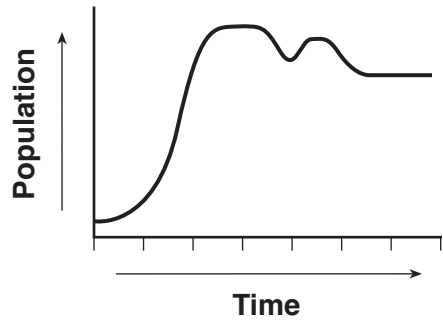
42 The graph below represents a change in event A that leads to changes in events B and C.



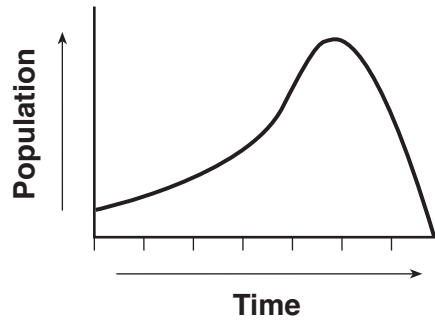
Which row in the chart best identifies each event in the graph?

Row	A	B	C
(1)	deforestation	amount of biodiversity	atmospheric concentration of carbon dioxide
(2)	industrialization	energy consumption	global temperature
(3)	loss of ozone layer	global warming	rate of skin cancer
(4)	human population	consumption of resources	habitat preservation

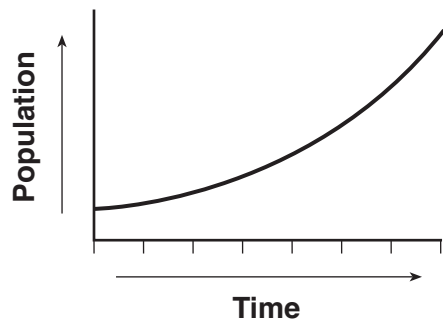
43 Which graph best shows changes in a population of yeast that develops in a test tube and completely consumes a limited supply of food?



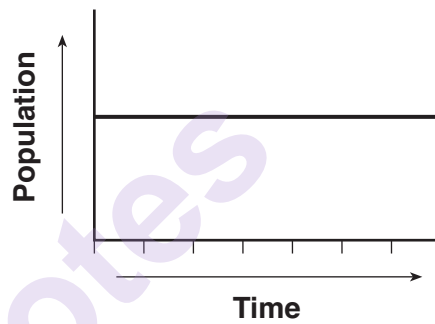
( 1 )



( 3 )



( 2 )



( 4 )

## 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 48 on the information below and on your knowledge of biology.

Five groups of corn seeds, each containing 275 seeds, were soaked for 1 hour in different concentrations of gibberellic acid, a plant growth hormone. After 1 hour, the seeds were rinsed in tap water and drained of all excess water. The seeds were then placed on paper towels and kept moist for 7 days. After 7 days, the growing stems were cut and weighed to determine the increase in growth. Then, the percent increase in growth compared to the growth of a group of untreated seeds was calculated. The results were recorded and are shown in the data table below.

**Growth Rate in Corn Plants Treated with Gibberellic Acid**

<b>Concentration of Gibberellic Acid in Parts per Million (ppm)</b>	<b>Increase in Growth * (%)</b>
225	15
300	30
400	23
500	15
600	6

\* percent increase in growth compared to the growth of untreated seeds

Source: Adapted from [www.super-grow.biz/GibberellicAcid.jsp](http://www.super-grow.biz/GibberellicAcid.jsp)

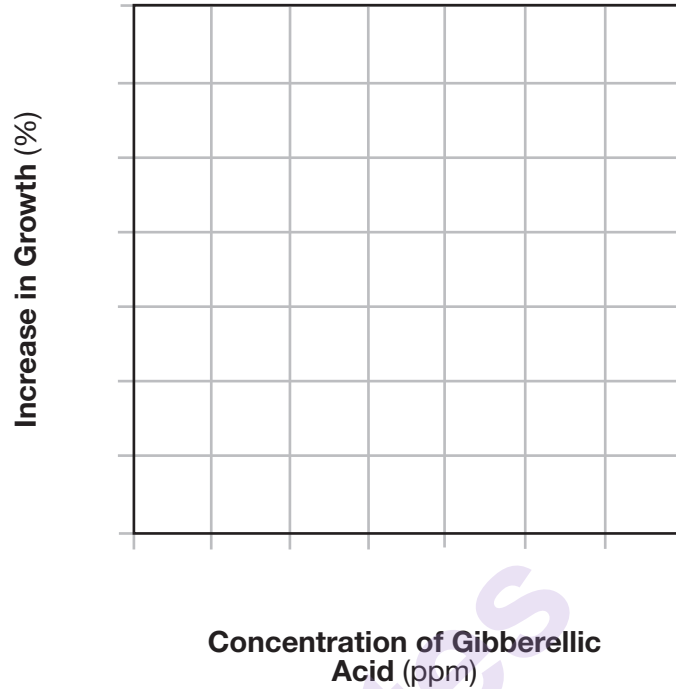
*Directions (44 and 45):* Using the information given in the data table, construct a line graph on the grid, following the directions below.

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

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

Example: 

**Growth Rate in Corn Plants  
Treated with Gibberellic Acid**



46 Identify the control group in this experiment. [1]

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

47 Which conclusion is supported by the data from this investigation?

- (1) A concentration of gibberellic acid under 300 ppm inhibits the growth of corn plants.
- (2) Plants from untreated corn seeds grow better than those treated with gibberellic acid at a concentration of 600 ppm.
- (3) A concentration of gibberellic acid over 300 ppm makes corn seeds germinate best.
- (4) Corn seedlings treated with gibberellic acid at concentrations between 225 and 600 ppm grow better than untreated seedlings.

48 State how farmers should use gibberellic acid to grow the largest plants. Support your answer with data from this experiment. [1]

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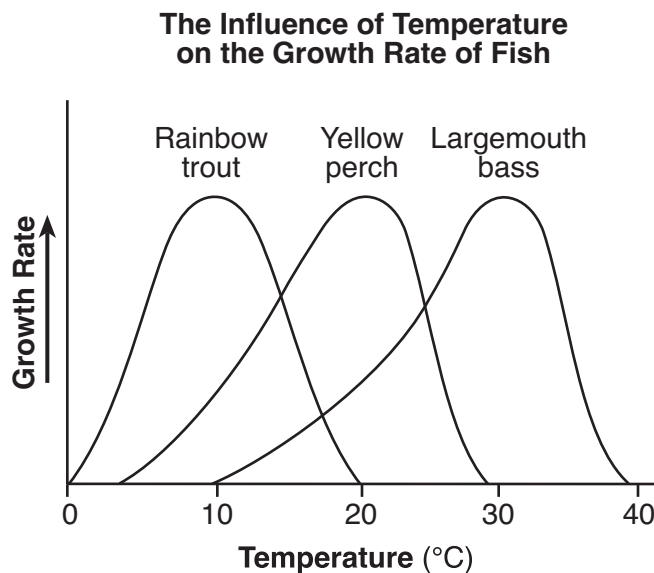


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Base your answers to questions 49 and 50 on the graph below and on your knowledge of biology.



**Note: The answer to questions 49 and 50 should be recorded on your separate answer sheet.**

- 49 The temperature range in a pond in which all three fish species could grow and survive is most likely
- |                  |                  |
|------------------|------------------|
| (1) 2°C to 8°C   | (3) 22°C to 28°C |
| (2) 12°C to 18°C | (4) 32°C to 38°C |

- 50 In the pond where these fish live, temperature is both a

- |  |  |
|--|--|
| (1) source of energy and biotic factor     | (3) limiting factor and biotic factor  |
| (2) source of nutrition and abiotic factor | (4) limiting factor and abiotic factor |
- 

- 51–52 The work of a cell is carried out by the many different types of molecules it assembles. Most of these molecules are proteins. Explain how the cell is able to make the many different proteins it needs. In your answer, be sure to:

- identify where in the cell the information necessary to construct a particular protein is located and the specific molecule that contains this information [1]
- identify *both* the cellular structure that assembles these proteins and the kinds of molecules that are used as the building blocks of the proteins [1]

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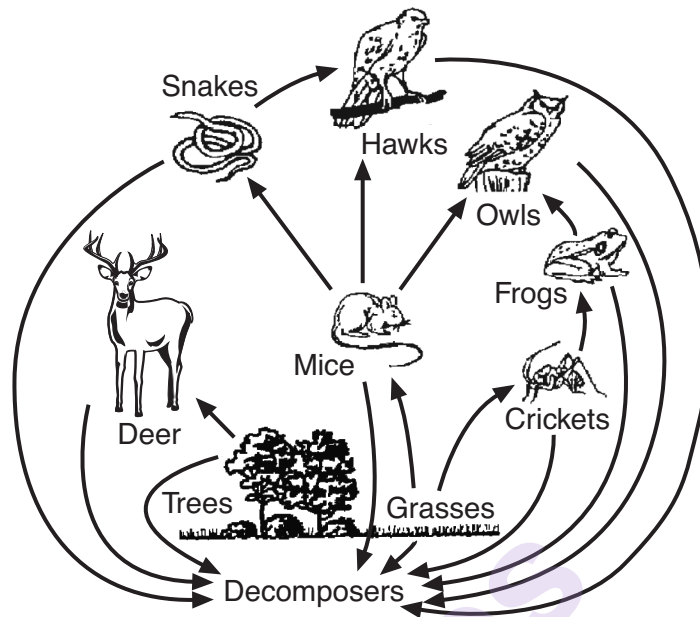
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Base your answers to questions 53 through 55 on the diagram below and on your knowledge of biology. The diagram represents a food web.



53 Identify *two* herbivores that compete for food in the food web above. [1]

Herbivores: \_\_\_\_\_ and \_\_\_\_\_

54 Even though both hawks and owls have two sources of food, explain why hawks would be *less* likely to survive if a disease wiped out the mice. [1]

\_\_\_\_\_  
\_\_\_\_\_

55 State the role of the decomposers in this food web. [1]

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Part C

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

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

Base your answers to questions 56 through 59 on the information below and on your knowledge of biology.

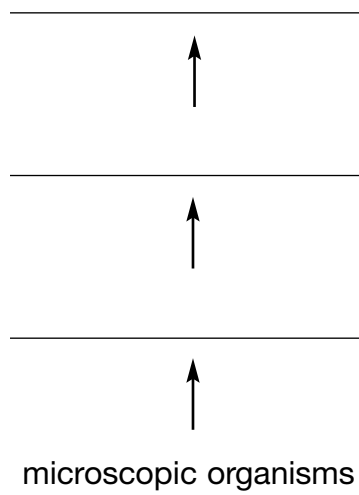
There has been an increase in the number of dead birds found on the beaches of the Great Lakes. These birds were poisoned by a bacterial toxin in the lake water. The birds do not ingest enough water to become sick directly from the toxin found in the lake water. Scientists think that the cause of the increasing bird deaths lies with an invasive species—the zebra mussel. This freshwater organism was introduced into the Great Lakes accidentally by humans, and has become well established in the Great Lakes. Zebra mussels filter out microscopic organisms, as well as the toxins found in the lake water. The toxins become concentrated in the zebra mussels, which are eaten by small fish called gobies, and the gobies are eaten by the birds. The concentration increases in each level of the food chain. It appears that the introduction of the zebra mussels into the Great Lakes has resulted in a new food chain that increases the concentration of the naturally occurring toxins and passes dangerous levels on to these top-level predators. This process is known as bioaccumulation.

56 Why are the accidentally introduced zebra mussels referred to as an invasive species? [1]

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57 On the diagram below, complete the food chain by filling in the correct organisms from the passage. [1]



58 How has bioaccumulation resulted in the deaths of large numbers of birds even though the toxin level in the lake water is not high enough to make them sick? [1]

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59 Describe *one* possible effect that the increased deaths of the birds could have on the rest of the ecosystem. [1]

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60–63 The immune system protects against foreign substances and even some cancers. Explain how the immune system functions. In your answer, be sure to:

- identify *one* way the immune system fights pathogens [1]
- identify the substance in a vaccine that stimulates the immune system [1]
- describe the response of the immune system to the vaccine [1]
- identify *one* disease that damages the immune system and state how it affects this system [1]

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Base your answer to question 64–68 on the information below and on your knowledge of biology.

Some poinsettia plants have green leaves that turn red. A garden club decided to study the color change of poinsettia plants. Knowing that poinsettias change color during the short daylight periods of winter, they decided to investigate the effect of different daylight lengths on color change.

64–68 Design a controlled experiment using three experimental groups that could be used to determine if the number of hours of daylight has an effect on the color change of poinsettias. In your experimental design, be sure to:

- state *one* hypothesis the experiment would test [1]
- state *one* way the three experimental groups would differ [1]
- identify *two* factors that must be kept the same in all three groups [1]
- identify the dependent variable in the experiment [1]
- describe experimental results that would support your hypothesis [1]

[illegible]

- 69 An accident resulted in a man's hand being cut off from his arm. Paramedics arriving first on the scene placed the cut-off hand in ice. The man and his hand were flown to a hospital, where doctors successfully reattached the hand to his arm. Explain, using *one* biological reason, why placing the hand in ice improved the chances of saving it. [1]

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Base your answer to question 70 on the information below and on your knowledge of biology.

Researchers monitoring the atmosphere of Earth report that the ozone shield has stopped shrinking and will most likely be on the mend over the next several decades. These findings were based on analyses of satellite records and instruments monitoring the surface of Earth. Scientists credit an international agreement to phase out the production of ozone-depleting chemicals for this turnaround.

- 70 State *one* reason why the ozone shield is important. [1]

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

### Climate Change for Biotechnology

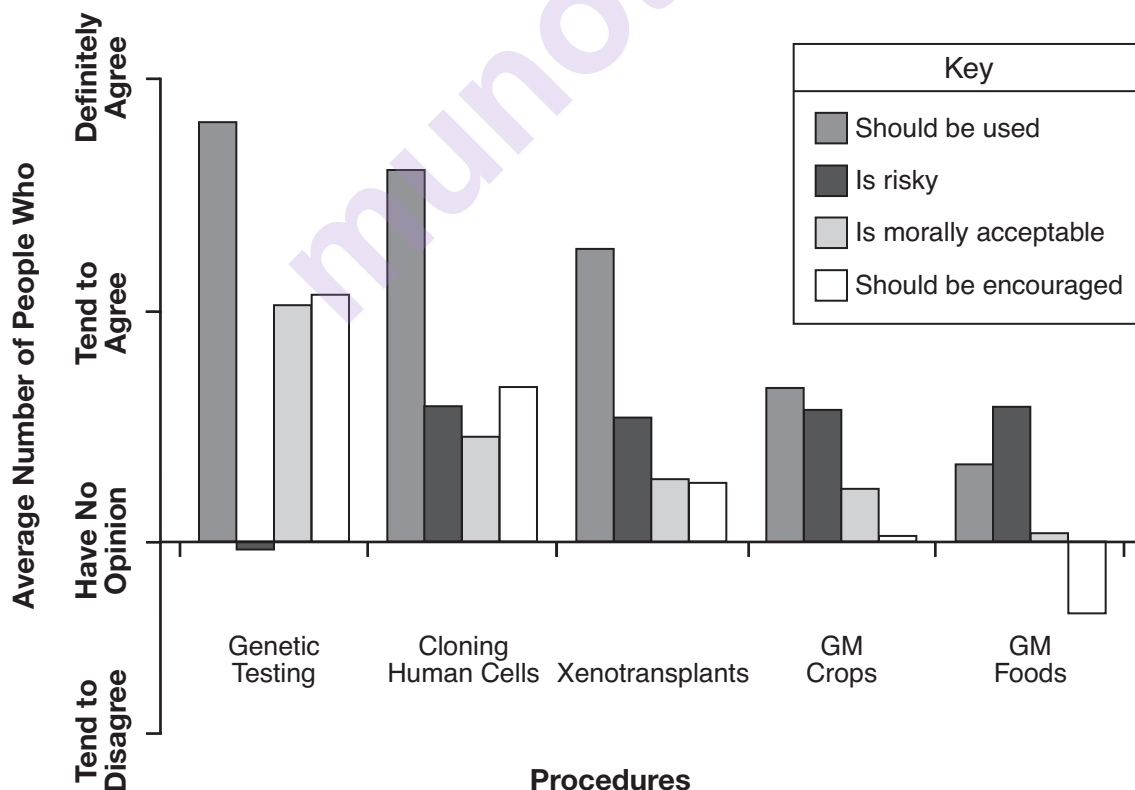
Many people were surveyed in 2002 and asked their opinion of some procedures that involved biotechnology. These procedures are listed below.

- Genetic testing to detect inheritable diseases, such as cystic fibrosis
- Cloning human cells to replace diseased cells in an individual with Parkinson's disease, diabetes, or heart disease
- Using xenotransplants introducing human genes into pigs to produce hearts for human transplants
- Genetically modifying crops (GM crops) to make crop plants insect resistant
- Genetically modifying foods (GM foods) to make them higher in protein

These people were asked whether the technology should be used, if the technology was risky, if the technology is morally acceptable, and if they would encourage the technology. Those surveyed rated each technology as “definitely agree,” “tend to agree,” “no opinion,” “tend to disagree,” and “definitely disagree.” The responses were given a numerical score and then averaged together. The results of the survey are shown below.

Adapted from: Gaskell, et. al., *AgBioForum*, 2003, Volume 6, Article 12

### Opinion of Biotechnology Procedures





71 Which biotechnology procedure did most people feel was the safest? Support your answer. [1]

Procedure: \_\_\_\_\_

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72 State *one* possible advantage of xenotransplants. [1]

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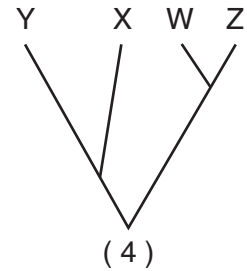
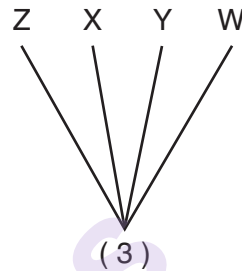
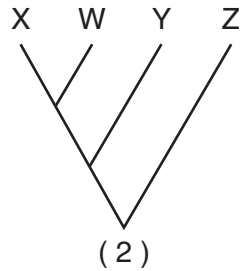
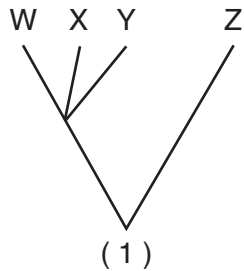
## Part D

**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.

**Note: The answer to question 73 should be recorded on your separate answer sheet.**

73 Which branching tree diagram shows that species W and Z are most closely related?



**Note: The answer to question 74 should be recorded on your separate answer sheet.**

74 Students noticed that some of their classmates have a hard time concentrating during class. They thought it may have some connection with the fact that these students consume energy drinks just before class. An experiment was proposed to find out if there is a connection between energy drinks and the lack of ability to concentrate in class. A properly designed experiment to determine this would include having





- (1) the whole class drink energy drinks and no water at all, for the entire time of the experiment
- (2) the whole class drink water and no energy drinks at all, for the entire time of the experiment
- (3) the students drink both water and an energy drink just before class
- (4) half the students drink water and the other half drink an energy drink just before class

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

75 Which technique could be used to separate pigments from a mixture?

- (1) preparing a wet-mount slide
- (2) staining
- (3) paper chromatography
- (4) dissection

Base your answers to questions 76 and 77 on the information below and on your knowledge of biology.

 <p>Warbler finch <i>Certhidea olivacea</i> Probing bill, insect eater, feeds in trees</p>	 <p>Woodpecker finch <i>Camarhynchus pallidus</i> Probing bill, insect eater, uses twig or cactus spine to remove insects from cactus</p>	 <p>Mangrove finch <i>Camarhynchus heliobates</i> Grasping bill, insect eater, feeds in trees</p>	 <p>Vegetarian finch <i>Camarhynchus crassirostris</i> Crushing bill, cactus seed eater</p>
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Source: <http://taggart.glg.msu.edu/isb200/beagle.htm>

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

- 76 The differences seen in the beaks of the four species of finches are most likely the result of
- (1) gene expression and asexual reproduction
  - (2) variation and natural selection
  - (3) migration and the need to adapt
  - (4) heredity and a diet of seeds
- 77 A person expressed concern that the vegetarian finch may face greater competition when other finch populations increase. State whether the vegetarian finch will face competition if the populations of warbler finches, woodpecker finches, and mangrove finches increase. Support your answer. [1]

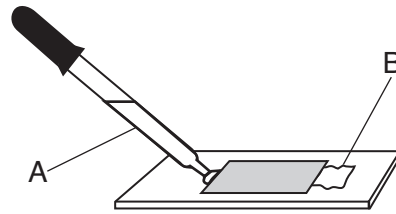
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Base your answers to questions 78 through 80 on the information below and on your knowledge of biology.

A laboratory procedure involving a microscope slide is represented in the diagram below.



78 State *one* purpose for this procedure. [1]

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79 Identify *one* specific substance represented by the liquid in A. [1]

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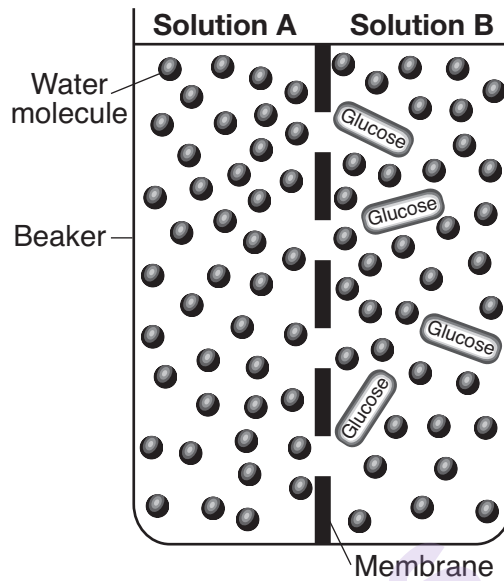
80 State the purpose of the paper towel labeled B. [1]

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Base your answers to questions 81 and 82 on the diagram below and on your knowledge of biology. The diagram represents two solutions, A and B, separated by a selectively permeable membrane.



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

81 A sample from solution A and solution B were each tested with blue-colored glucose indicator solution before the solutions were placed in the beaker. Which row represents the results?

Row	Solution A	Solution B
(1)	red or orange	blue
(2)	blue black	amber
(3)	blue	red or orange
(4)	amber	blue black

82 Which statement best describes the outcome after 20 minutes?

- (1) Solution A will contain approximately the same number of glucose molecules as solution B.
  - (2) Solution A will contain all of the water molecules.
  - (3) Solution B will remain unchanged.
  - (4) Solution B will lose all of the glucose molecules to solution A.
-

Base your answers to questions 83 through 85 on the information below and on your knowledge of biology.

The relationship between lung capacity and gender was studied in a laboratory investigation. Relative lung capacity was measured by having each student fill a balloon with a deep breath and then measuring the circumference of the balloon. Each student was given three trials and the average balloon circumference was recorded in the data table below.

**Lung Capacity of Lab Group Members**

<b>Gender (male/female)</b>	<b>Average Balloon Circumference (cm)</b>
female	51.6
female	52.7
female	53.3
female	55.0
male	54.6
male	56.0
male	56.3
male	62.3

83 A student calculated the group average to be 441.8. State the specific error made in this calculation. [1]

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84 A student concluded that “all females have a smaller lung capacity than males.” Is this a valid conclusion? Support your answer. [1]

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85 Identify *one* biological condition or personal activity that could make it difficult for a person to perform well on a test of lung capacity. [1]

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