

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

# LIVING ENVIRONMENT

Thursday, June 24, 1999 — 9:15 a.m. to 12:15 p.m., only

The answer paper is stapled in the center of this examination booklet. Open the examination booklet, carefully remove the answer paper, and close the examination booklet. Then fill in the heading on your answer paper.

This examination has 3 parts. You are to answer all the questions in each part. Your answers to Parts A and B are to be recorded on the separate answer paper. Your answers to Part C are to be written on paper provided by the school.

For each question in Part A and the multiple-choice questions in Part B, write the number preceding the word or expression that best completes the statement or answers the question. For questions in Part B that are not multiple-choice questions and the questions in Part C, record your answers according to the directions given in the examination booklet.

When you have completed the examination, you must sign the statement printed at the end of the answer paper, 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 paper cannot be accepted if you fail to sign this declaration.

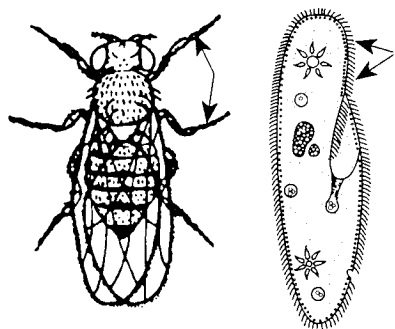
**DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.**

Part A

Answer all 35 questions in this part. [35]

Directions (1–35): For each statement or question, select the choice that best completes the statement or answers the question. Record your answer on the separate answer paper.

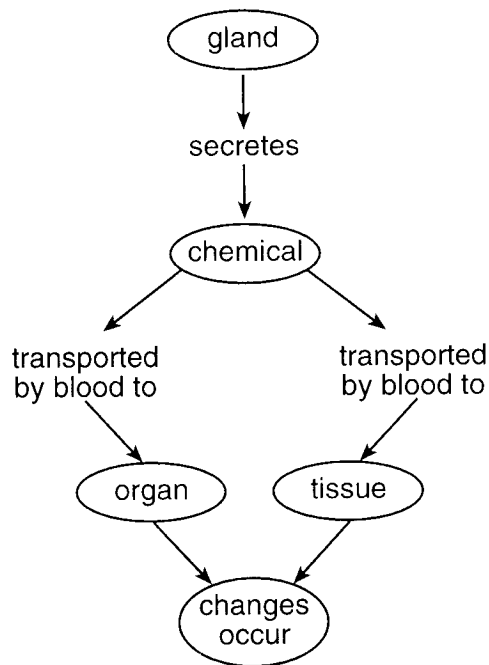
- 1 What occurs during the digestion of proteins?
- 1 Specific enzymes break down proteins into amino acids.
  - 2 Specific hormones break down proteins into simple sugars.
  - 3 Specific hormones break down proteins into complex starches.
  - 4 Specific enzymes break down proteins into simple sugars.
- 2 Two organisms are shown in the diagrams below.



The arrows in the diagrams indicate structures that help these organisms to

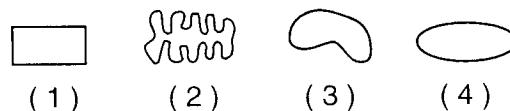
- 1 carry out respiration
  - 2 carry out photosynthesis
  - 3 obtain food
  - 4 excrete wastes
- 3 During a long-distance run on a hot day, an athlete produces large quantities of sweat. As a result, the kidneys change the rate of urine production. Why is this change important?
- 1 Decreased urine production increases the amino acids in the blood.
  - 2 Increased urine production removes amino acids produced as a result of running.
  - 3 Decreased urine production allows the body to conserve water.
  - 4 Increased urine production allows more water to remain in the bloodstream.

- 4 An important method of communication between cells in an organism is shown in the diagram below.



What is the chemical referred to in the diagram?

- (1) a hormone important in maintaining homeostasis
  - (2) an enzyme detected by a cell membrane receptor
  - (3) DNA necessary for regulating cell functions
  - (4) a food molecule taken in by an organism
- 5 All of the cell shapes shown in the diagrams below have the same volume. Which form could absorb nutrients most efficiently and quickly?

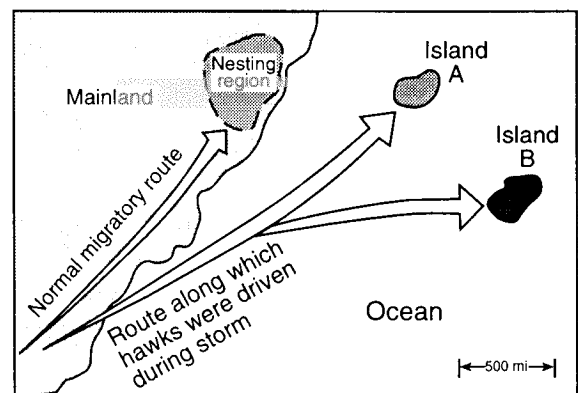


- 6 Molecules *A* and *B* come in contact with the cell membrane of the same cell. Molecule *A* passes through the membrane readily, but molecule *B* does not. Which statement could describe molecules *A* and *B*?
- 1 Molecule *A* is a protein, and molecule *B* is a fat.
  - 2 Molecule *A* is a starch, and molecule *B* is a simple sugar.
  - 3 Molecule *A* is an amino acid, and molecule *B* is a simple sugar.
  - 4 Molecule *A* is a simple sugar, and molecule *B* is a starch.
- 7 When the bacterium *Serratia marcescens* is grown on a sterile culture medium in a petri dish at 30°C, the bacterial colonies are cream colored. When this same bacterium is cultured under identical conditions, except at a temperature of 25°C, the colonies are brick red. This difference in color is most likely due to the
- 1 type of nutrients in the culture medium
  - 2 sterilization of the culture medium
  - 3 effect of temperature on the expression of the gene for color
  - 4 effect of colony size on the synthesis of color pigments

**Note that question 8 has only three choices.**

- 8 Which statement best describes the relationship between the number of genes and the number of chromosomes in human skin cells?
- 1 There are more genes than chromosomes in skin cells.
  - 2 There are more chromosomes than genes in skin cells.
  - 3 There are equal numbers of genes and chromosomes in skin cells.
- 9 A colony of red bacteria is allowed to reproduce for 16 generations. A scientist examines the colony at the end of this time and notes that all the individuals are almost identical in all characteristics. This evidence suggests that the bacteria
- 1 did not receive the proper nutrients
  - 2 reproduced sexually
  - 3 exchanged genetic material
  - 4 reproduced asexually

- 10 A woman has a gene that causes a visual disorder. To prevent the disorder from appearing in future generations, the defective gene would have to be repaired in the mother's
- |                      |          |
|----------------------|----------|
| 1 nervous system     | 3 eye    |
| 2 reproductive cells | 4 uterus |
- 11 According to modern evolutionary theory, genes responsible for new traits that help a species survive in a particular environment will usually
- 1 not change in frequency
  - 2 decrease gradually in frequency
  - 3 decrease rapidly in frequency
  - 4 increase in frequency
- 12 Thousands of years ago, a large flock of hawks was driven from its normal migratory route by a severe storm. The birds scattered and found shelter on two distant islands, as shown on the map below. The environment of island *A* is very similar to the hawk's original nesting region. The environment of island *B* is very different from that of island *A*. The hawks have survived on these islands to the present day with no migration between the populations.



Which statement most accurately predicts the present-day condition of these island hawk populations?

- 1 The hawks that landed on island *B* have evolved more than those on island *A*.
- 2 The hawks that landed on island *A* have evolved more than those on island *B*.
- 3 The populations on islands *A* and *B* have undergone identical mutations.
- 4 The hawks on island *A* have given rise to many new species.

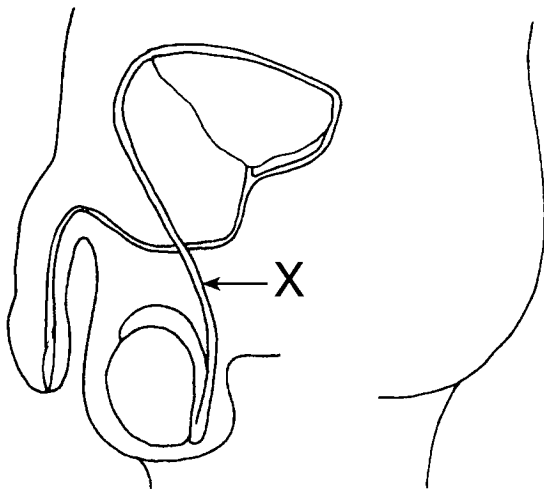
13 Exposure to cosmic rays, x rays, ultraviolet rays, and radiation from radioactive substances may promote

- 1 the production of similar organisms
- 2 diversity among organisms
- 3 an increase in population size
- 4 a change from sexual to asexual reproduction

14 Which statement best explains the significance of meiosis in the evolution of a species?

- 1 Meiosis produces eggs and sperm that are alike.
- 2 Meiosis provides for chromosomal variation in the gametes produced by an organism.
- 3 Equal numbers of eggs and sperm are produced by meiosis.
- 4 The gametes produced by meiosis ensure the continuation of any particular species by asexual reproduction.

15 The diagram below represents the male reproductive system in humans.



If structure X was cut and tied off at the arrow, which change would occur immediately?

- 1 Hormones would no longer be produced.
- 2 Sperm would no longer be produced.
- 3 Sperm would be produced but no longer released from the body.
- 4 Urine would be produced but no longer released from the bladder.

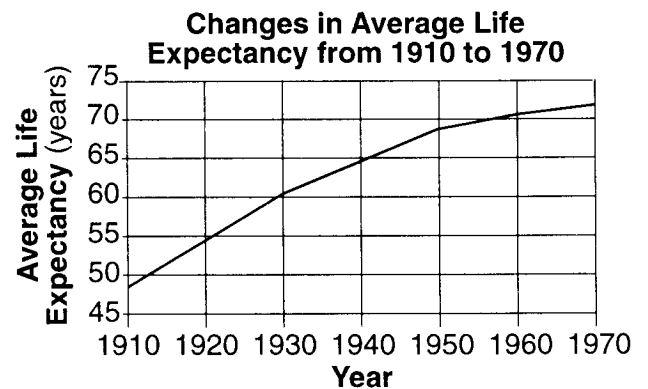
16 It was once thought that decaying meat turned into maggots (fly larvae). Careful experimentation by scientists demonstrated that maggots actually come from fly eggs and not meat. These experiments illustrate that new individuals result only from

- 1 genetic engineering
- 2 reproduction and development
- 3 nutrition and replication
- 4 metabolic homeostasis

17 Which event occurring in the life cycle of a bacterium most directly involves the replication of DNA?

- 1 The bacterium copies its single chromosome.
- 2 As the cell grows, the two copies of the chromosome separate.
- 3 The cell divides as a partition separates it into equal halves.
- 4 Each new cell receives one copy of the chromosome.

18 The graph below shows data on the average life expectancy of humans.



The change in life expectancy from 1910 to 1970 is most likely the result of

- 1 an increase in poor land-use management that affected the quality of topsoil
- 2 the introduction of technology that had a negative impact on air quality
- 3 a decrease in natural checks, such as disease, on the population
- 4 a widespread increase in the presence of lead and other heavy metals in water supplies

- 19 What will most likely result if a diabetic injects an overdose of insulin?
- 1 a serious infection in the pancreas
  - 2 an increase in the production of pancreatic enzymes
  - 3 an accumulation of wastes in the bloodstream
  - 4 a dangerous drop in blood sugar levels

- 20 Cyanide is a poison that limits the ability of an animal cell to manufacture ATP. In a cell containing a small amount of cyanide, which process would be *least* affected?

- 1 movement
- 2 cell division
- 3 active transport
- 4 diffusion

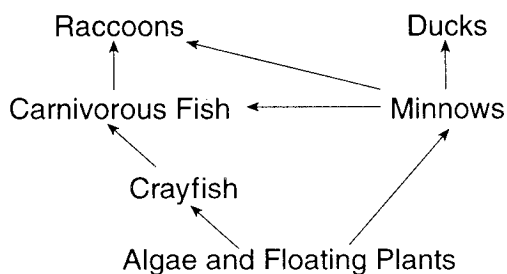
- 21 One similarity between cell receptors and antibodies is that both

- 1 are produced by nerve cells
- 2 are highly specific in their actions
- 3 slow the rates of chemical reactions
- 4 are involved in digestion

- 22 Which phrase does *not* describe a way the human body responds to fight disease?

- 1 destruction of infectious agents by white blood cells
- 2 production of antibodies by white blood cells
- 3 increased production of white blood cells
- 4 production of pathogens by white blood cells

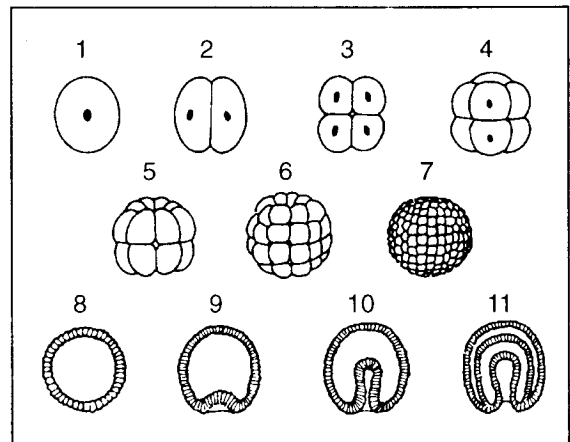
- 23 The diagram below illustrates the relationships between organisms in an ecosystem.



In addition to sunlight, which factor would need to be added to make this a stable ecosystem?

- 1 predators
- 2 prey
- 3 decomposers
- 4 herbivores

- 24 Which event does *not* occur between stages 2 and 11 in the process represented in the diagram below?



- (1) a decrease in cell size
- (2) DNA replication
- (3) the development of embryonic layers
- (4) fertilization

- 25 The table below shows the rate of water loss in three different plants.

Plant	Liters of Water Lost Per Day
Cactus	0.02
Potato plant	1.00
Apple tree	19.00

One reason each plant loses a different amount of water is that each has

- 1 different guard cells adapted to maintain homeostasis
- 2 different types of insulin-secreting cells that regulate water levels
- 3 the same number of chloroplasts but different rates of photosynthesis
- 4 the same rate of photosynthesis but different numbers of chloroplasts

- 26 A person with AIDS is likely to develop infectious diseases because the virus that causes AIDS

- 1 destroys cancerous cells
- 2 damages the immune system
- 3 increases the rate of antibody production
- 4 increases the rate of microbe destruction

27 Two test tubes were filled with a solution of bromthymol blue. A student exhaled through a straw into each tube, and the bromthymol blue turned yellow. An aquatic green plant was placed into each tube, and the tubes were corked. One tube was placed in the dark, and one was placed in direct sunlight. The yellow solution in the tube in sunlight turned blue, while the one in the dark remained yellow. Which statement best explains why the solution in the tube placed in sunlight returned to a blue color?

- 1 Oxygen was produced by photosynthesis.
- 2 Oxygen was removed by respiration.
- 3 Carbon dioxide was removed by photosynthesis.
- 4 Carbon dioxide was produced by respiration.

28 Organisms that eat cows obtain less energy from the cows than the cows obtain from the plants they eat because the cows

- 1 pass on most of the energy to their offspring
- 2 convert solar energy to food
- 3 store all their energy in milk
- 4 use energy for their own metabolism

29 Which human activity is most responsible for the other three human activities?

- 1 increasing demand for food
- 2 increasing loss of farmland
- 3 increasing human population
- 4 increasing air pollution

30 Endangered peregrine falcons have been bred in captivity and released in areas where they prey on pigeons and rodents. These activities are examples of

- 1 species preservation and biological control
- 2 overhunting and direct harvesting
- 3 recycling and technological development
- 4 conservation of resources and habitat destruction

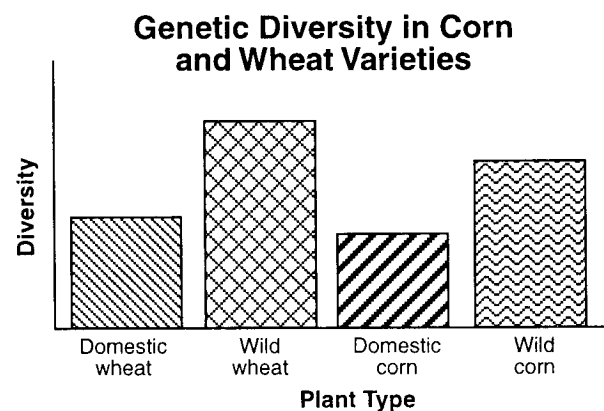
31 Which change would usually increase competition among the squirrel population in a certain area?

- 1 an epidemic of rabies among squirrels
- 2 an increase in the number of squirrels killed on the highways
- 3 an increase in the number of hawks that prey on squirrels
- 4 a temporary increase in the squirrel reproduction rate

32 *Monocystis* is an organism that feeds on the sperm cells of earthworms. The activities of *Monocystis* eventually cause the infected earthworm to become sterile. The relationship between the earthworm and *Monocystis* is classified as

- 1 host — parasite
- 2 predator — prey
- 3 producer — consumer
- 4 scavenger — decomposer

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



33 If the environment were to change dramatically or a new plant disease were to break out, which plant type would most likely survive?

- |                  |                 |
|------------------|-----------------|
| 1 wild wheat     | 3 wild corn     |
| 2 domestic wheat | 4 domestic corn |

Base your answers to questions 34 and 35 on the table below, which shows the type of food consumed by various animals in a community, and on your knowledge of biology.

Animals in the Community	Food Consumed in the Community				
	Shrews	Grasshoppers	Hawks	Snakes	Plants
Shrews		X			
Hawks	X			X	
Grasshoppers					X
Spiders		X			
Snakes	X				

34 Under normal conditions, which organisms in this community would have the greatest amount of stored energy?

- |                |          |
|----------------|----------|
| 1 grasshoppers | 3 plants |
| 2 snakes       | 4 hawks  |

35 Which animals in the community would be classified as herbivores?

- |          |                |
|----------|----------------|
| 1 snakes | 3 spiders      |
| 2 hawks  | 4 grasshoppers |

## Part B

Answer all 30 questions in this part. [30]

For those questions that are followed by four choices, select the choice that best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question. Record your answers on the separate answer paper.

Base your answers to questions 36 through 41 on the information below and on your knowledge of biology.

A student performed a laboratory investigation to determine the effect of temperature on the heart rate of *Daphnia* (water flea). The following temperatures and heart rates were recorded:

20°C — 260 beats/min; 10°C — 152 beats/min;  
25°C — 300 beats/min; 5°C — 108 beats/min;  
15°C — 200 beats/min

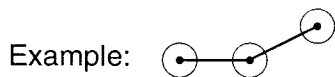
- 36 Organize the data by filling in the data table *provided on your answer paper*. Complete both columns in the data table so that the temperature either increases or decreases from the top to the bottom of the table. The data table below is provided for practice purposes only. Be sure your final answer appears *on your answer paper*.

**Data Table**

Temperature (°C)	Heart Rate (beats/min)

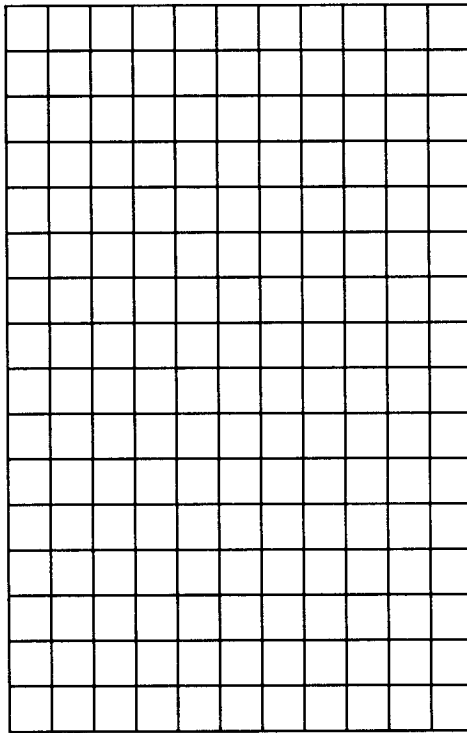
*Directions (37–39):* Using the information provided, construct a line graph on the grid *provided on your answer paper*, following the directions below. The grid on the next page is provided for practice purposes only. Be sure your final answer appears *on your answer paper*.

- 37 Mark an appropriate scale on the axis labeled “**Temperature** (°C).”
- 38 Mark an appropriate scale on the axis labeled “**Heart Rate** (beats/min).”
- 39 Plot the data from your data table. Surround each point with a small circle and connect the points.





Heart Rate (beats/min)



Temperature (°C)

40 During which temperature interval did the greatest change in heart rate occur?

- (1) 5–10°C
- (2) 10–15°C

- (3) 15–20°C
- (4) 20–25°C

41 Using one or more complete sentences, state a valid conclusion that relates increasing temperature to heart rate in *Daphnia*.

---

Base your answers to questions 42 through 45 on the passage below and on your knowledge of biology.

### The Mystery of Deformed Frogs

Deformities, such as legs protruding from stomachs, no legs at all, eyes on backs, and suction cup fingers growing from sides, are turning up with alarming frequency in North American frogs. Clusters of deformed frogs have been found in California, Oregon, Colorado, Idaho, Mississippi, Montana, Ohio, Vermont, and Quebec.

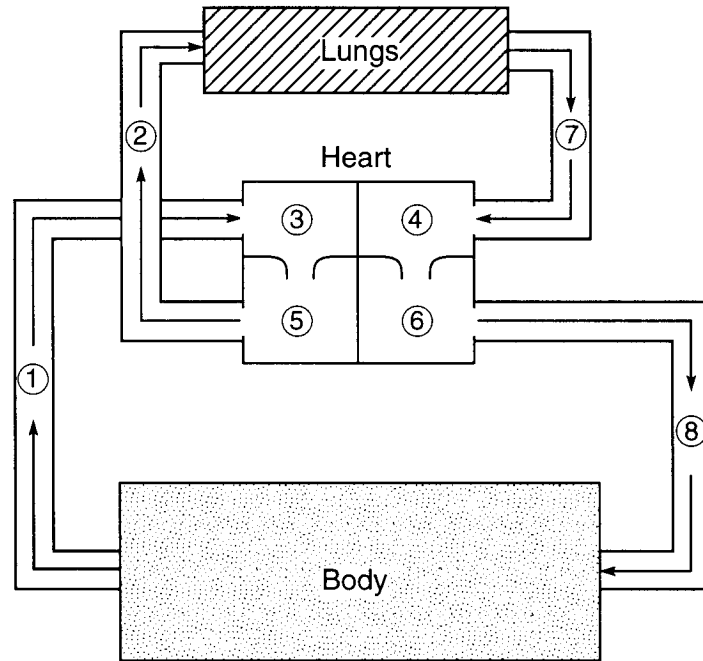
Scientists in Montreal have been studying frogs in more than 100 ponds in the St. Lawrence River Valley for the past 4 years. Normally, less than 1% of frogs are deformed, but in ponds where pesticides are used on surrounding land, as many as 69% of the frogs were deformed. A molecular biologist from the University of California believes that the deformities may be linked to a new generation of chemicals that mimic growth hormones. The same kinds of deformities found in the ponds have been replicated in laboratory experiments.

Some scientists have associated the deformities with a by-product of retinoid, which is found in acne medication and skin rejuvenation creams. Retinoids inside a growing animal can cause deformities. For this reason, pregnant women are warned not to use skin medicines that contain retinoids. Recent laboratory experiments have determined that a pesticide can mimic a retinoid.

A developmental biologist from Hartwick College in Oneonta, New York, questioned whether a chemical could be the culprit because there were no deformed fish or other deformed animals found in the ponds where the deformed frogs were captured. He believes parasites are the cause. When examining a three-legged frog from Vermont, the biologist found tiny parasitic flatworms packed into the joint where a leg was missing. In a laboratory experiment, he demonstrated that the invasion of parasites in a tadpole caused the tadpole to sprout an extra leg as it developed. Scientists in Oregon have made similar observations.

- 42 Pregnant women are advised not to use skin medicines containing retinoids because retinoid by-products
- 1 may cause fetal deformities
  - 2 may cause parasites to invade developing frogs
  - 3 are the main ingredient in most pesticides
  - 4 reduce abnormalities in maternal tissue
- 43 Which statement is most likely true, based on the information in the passage?
- 1 Only a few isolated incidents of frog deformities have been observed.
  - 2 If frog parasites are controlled, all frog deformities will stop.
  - 3 Deformities in frogs are of little significance.
  - 4 Factors that affect frogs may also affect other organisms.
- 44 A possible reason for the absence of deformed fish in the ponds that contained deformed frogs is that
- 1 fish can swim away from chemicals introduced into the pond
  - 2 fish cannot develop deformities
  - 3 parasites that affect frogs usually do not affect fish
  - 4 frogs and fish are not found in the same habitat
- 45 Using one or more complete sentences, describe how pesticides could cause deformities in frogs.

Base your answers to questions 46 through 48 on the diagram below, which represents the pathway of blood throughout the body, and on your knowledge of biology.



46 Which structure carries oxygenated blood to the body?

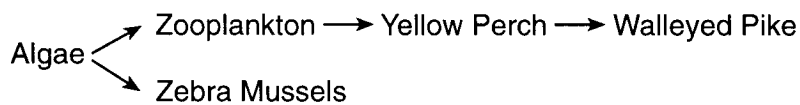
- (1) 1
- (2) 2
- (3) 7
- (4) 8

47 Which structure represents the chamber of the heart that receives oxygenated blood directly from the lungs?

- (1) 5
- (2) 6
- (3) 3
- (4) 4

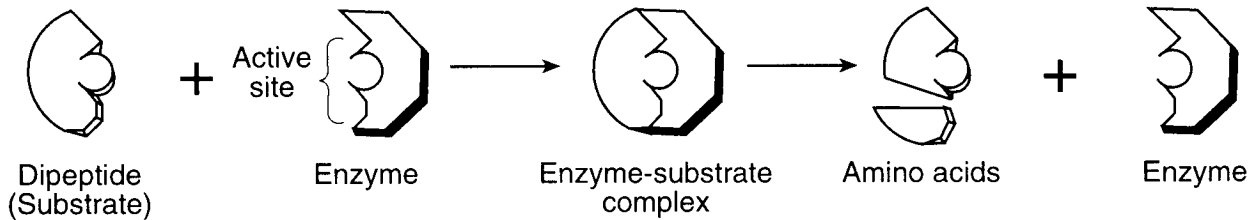
48 Using one or more complete sentences, state one specific change that occurs in the gas composition of the blood as the blood moves from structure 6 to structure 3. Specify whether the change is an increase or a decrease in composition.

49 An aquatic food web is represented in the diagram below.



Using one or more complete sentences, predict how one of the populations in the food web will most likely change if the yellow perch population increases over a period of 3 years.

50 A process that occurs in the human body is shown in the diagram below.



What would happen if a temperature change caused the shape of the active site to be altered?

- 1 The dipeptide would digest faster.
- 2 The dipeptide would digest slower or not at all.
- 3 The amino acids would combine faster.
- 4 The amino acids would combine slower or not at all.

51 A biologist in a laboratory reports a new discovery based on experimental results. If the experimental results are valid, biologists in other laboratories should be able to

- 1 repeat the same experiment with a different variable and obtain the same results
- 2 perform the same experiment and obtain different results
- 3 repeat the same experiment and obtain the same results
- 4 perform the same experiment under different experimental conditions and obtain the same results

52 A small piece of black paper was folded in half and used to cover part of the top and bottom portions of a leaf on a living geranium plant. After the plant was kept in sunlight for several days, the paper was removed. The leaf was then boiled in alcohol to remove the chlorophyll and placed in Lugol's iodine solution, which turns blue-black in the presence of starch. Only the part of the leaf that had *not* been covered turned blue-black. This investigation was most likely testing the hypothesis that

- 1 light is necessary for photosynthesis to occur
- 2 alcohol plus chlorophyll forms Lugol's iodine solution
- 3 green plants use carbon dioxide in photosynthesis
- 4 plants use alcohol in the production of chlorophyll

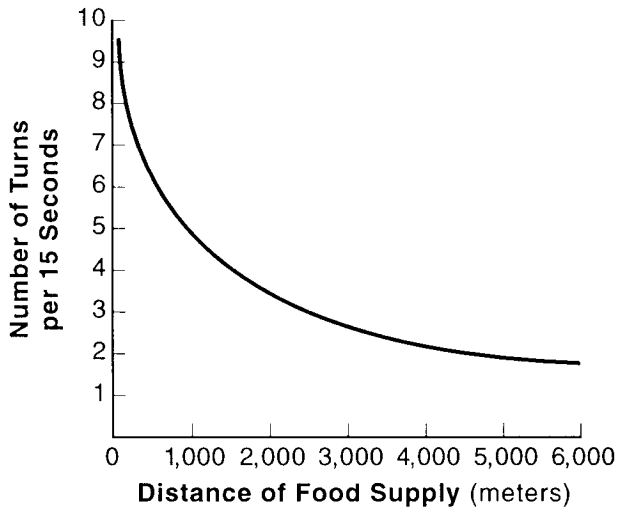
53 To locate a specimen on a prepared slide with a compound microscope, a student should begin with the low-power objective rather than the high-power objective because the

- 1 field of vision is smaller under low power than under high power
- 2 field of vision is larger under low power than under high power
- 3 specimen does not need to be stained for observation under low power but must be stained for observation under high power
- 4 portion of the specimen that can be observed under low power is less than the portion that can be observed under high power

54 Male reproductive cells from numerous lubber grasshoppers, lake trout, and field mice were examined and found to have flagella. A valid conclusion that can be made based on this observation is that

- 1 only lubber grasshoppers, lake trout, and field mice produce reproductive cells with flagella
- 2 all organisms produce male reproductive cells with flagella
- 3 only male organisms produce reproductive cells with flagella
- 4 all male lubber grasshoppers, lake trout, and field mice produce reproductive cells with flagella

55 Worker bees acting as scouts are able to communicate the distance of a food supply from the hive by performing a "waggle dance." The graph below shows the relationship between the distance of a food supply from the hive and the number of turns in the waggle dance every 15 seconds.



Using one or more complete sentences, state the relationship between the distance of the food supply from the hive and the number of turns the bee performs in the waggle dance every 15 seconds.

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

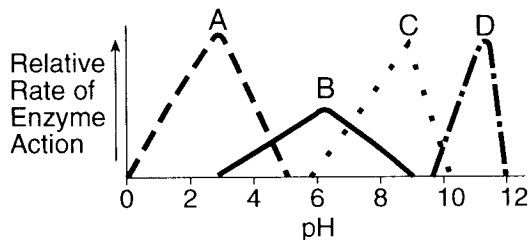
As part of an investigation, 10 bean seedlings in one setup were grown in the dark, while 10 seedlings in another setup were grown in sunlight. All other growth conditions were kept the same in both setups. The seedlings grown in the dark were white with long, slender stems. These seedlings soon died. The seedlings grown in the sunlight were green and healthy.

- 56 Which hypothesis was most likely being tested in this investigation?
- 1 Plants grown in the dark cannot perform the process of respiration.
  - 2 Sunlight is necessary for the normal growth of bean plants.
  - 3 Light is necessary for the germination of bean seeds.
  - 4 Light is necessary for proper mineral absorption by plants.
- 57 Identify the independent variable in this investigation.
- \_\_\_\_\_

58 Substance X has a unique characteristic in that it fluoresces (glows) when exposed to ultraviolet light. An investigator added substance X to a dish containing a culture of cells. The investigator exposed the cells to ultraviolet light and found that substance X was highly concentrated only within mitochondria (cell organelles). Which assumption could the investigator make regarding the results of this experiment?

- 1 Substance X could be used to identify mitochondria in living cells.
- 2 Substance X could be used to stain nuclei of living cells.
- 3 All fluorescent substances will be absorbed by mitochondria.
- 4 All mitochondria synthesize fluorescent substances.

Base your answers to questions 59 through 61 on the graph below and on your knowledge of biology. The graph shows the relative rates of action of four enzymes, A, B, C, and D.



59 Which enzyme shows the greatest change in its rate of action with the *least* change in pH?

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

60 A solution with a pH of 6 contains enzyme C and its substrate. If a base is gradually added to this solution, the rate of action of enzyme C would most likely

- 1 remain constant
- 2 increase, then decrease
- 3 decrease, then increase
- 4 decrease constantly

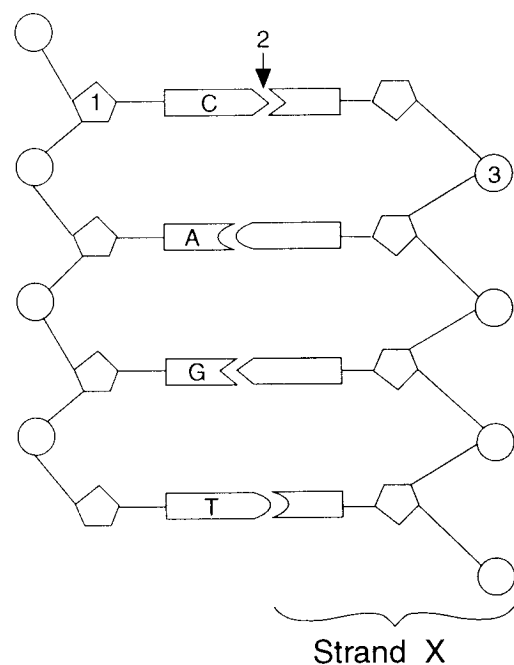
61 Which two enzymes would function in a region of the human body having a neutral pH?

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

62 An investigation was designed to determine the effect of ultraviolet light on mold spore growth. Two groups of mold spores were grown under identical conditions, except one group was exposed only to ultraviolet light, while the other group was grown in total darkness. In this investigation, the group of mold spores grown without receiving any ultraviolet light is known as the

- |              |                      |
|--------------|----------------------|
| 1 control    | 3 dependent variable |
| 2 hypothesis | 4 limiting factor    |

Base your answers to questions 63 and 64 on the diagram below of a DNA molecule and on your knowledge of biology.



63 What is the base sequence of strand X?

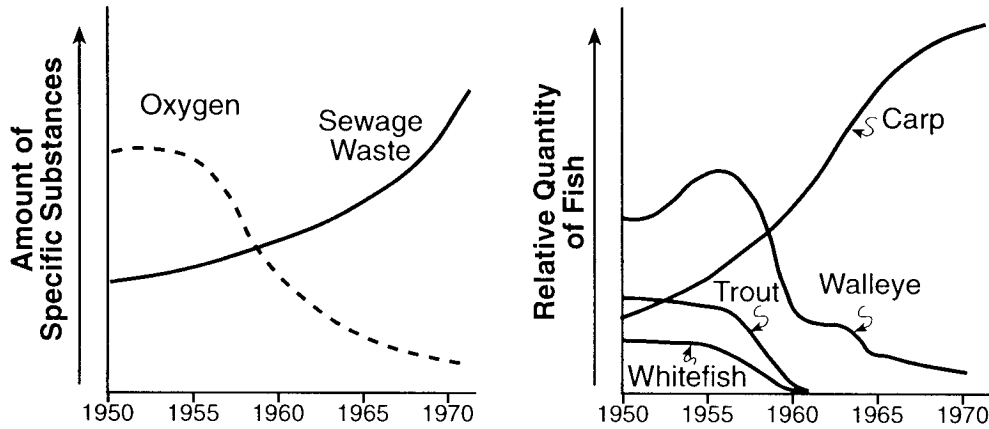
- |             |             |
|-------------|-------------|
| (1) G-T-A-C | (3) G-T-C-A |
| (2) T-G-C-A | (4) A-T-C-G |

64 What occurs in the process of replication?

- 1 Structure 1 is hydrolyzed.
- 2 Chemical bonds are broken in region 2.
- 3 Structure 3 is synthesized.
- 4 Proteins are formed in region 2.

65 Which relationship can correctly be inferred from the data presented in the graphs below?

### Oxygen Content and Fish Population in a Lake



- 1 As sewage waste increases, oxygen content decreases.
  - 2 As sewage waste increases, oxygen content increases.
  - 3 As oxygen content decreases, carp population decreases.
  - 4 As oxygen content decreases, trout population increases.
-

## Part C

Answer all 11 questions in this part. [20]

Answers to the following questions are to be written on paper provided by the school.

Base your answers to questions 66 and 67 on the information below and on your knowledge of biology. Use one or more complete sentences to answer each question.

In July 1997, about 25,000 *Galerucella pusilla* beetles were released at Montezuma Wildlife Refuge in western New York State. These beetles eat purple loosestrife, a beautiful but rapidly spreading weed that chokes wetlands. Purple loosestrife is native to Europe, but here it crowds out native wetland plants, such as cattails, and does not support wildlife the way the native plants do. Purple loosestrife grows too thick to allow birds to nest. Most native insects do not eat it, leaving little for insect-eating birds to eat. Bernd Blossey, a professor at Cornell University, spent 6 years in Europe trying to find out what limited the loosestrife population there.

66 Explain why the introduction of the beetle is an advantage over the use of herbicides to control the purple loosestrife population. [1]

67 Describe one possible environmental problem that may result from the introduction of this beetle. [1]

---

Base your answers to questions 68 through 70 on the information below and on your knowledge of biology. Use one or more complete sentences to answer each question.

When a drug manufacturer develops a new drug to treat some form of disease, the drug should be tested to ensure that it does what it is supposed to do. Usually, the drug is tested on animals and, if these tests are successful, it is then tested on humans.

A drug called Lowervil was developed by a drug company to lower blood pressure. Lowervil has been tested successfully on animals, and the drug company is now ready to test it on humans. The drug company claims that one dose of Lowervil per day will decrease blood pressure in individuals experiencing high blood pressure.

A researcher has been hired to determine whether or not Lowervil lowers blood pressure. Answer the following questions related to the experimental testing of the new drug Lowervil.

68 How should the experimental group and control group be treated differently? [1]

69 Why would it be important to use a large number of people in this experiment? [1]

70 How could the researcher determine if the drug is effective in reducing blood pressure? [1]

---



74 Using a specific example, illustrate how a feedback mechanism maintains homeostasis in a living organism. [2]

75 Give three examples of how the technology of genetic engineering allows humans to alter the genetic makeup of organisms. [3]

76 Habitat destruction is an environmental problem that affects our own generation and will affect future generations if it is not solved. Write an essay in which you identify a habitat that is being destroyed and explain how the destruction of this habitat relates to humans and the overall ecosystem. Your essay must include at least:

- *two* human activities that contribute to the destruction of this habitat [2]
  - *three* ways the destruction of this habitat has affected plants, humans, and other animals [3]
  - *two* ways to limit further destruction of this habitat [2]
-

Base your answers to questions 71 through 73 on the information and data tables below and on your knowledge of biology. Use one or more complete sentences to answer each question.

Drinking alcohol during pregnancy can cause the class of birth defect known as fetal alcohol syndrome (FAS). Scientists do not yet understand the process by which alcohol causes damage to the fetus. There is evidence, however, that the more a pregnant woman drinks, the greater the chances that the child will be affected and the birth defects will be serious. Some evidence indicates that even low levels of alcohol consumption can cause intellectual and behavioral problems.

**Infant Characteristics**

Characteristics (Average)	Alcohol Use During Pregnancy	
	Drinker	Nondrinker
Weeks of development before birth	36.9	38.7
Birth weight (g)	2,555	3,094
Birth length (cm)	46.8	50.1
Head circumference (cm)	32.1	34.5

**Physical Abnormalities Detected in Infants at Birth**

Physical Abnormalities	Alcohol Use During Pregnancy	
	Drinker (Percentage of 40 Infants)	Nondrinker (Percentage of 80 Infants)
Low birth weight	73	12
Small brain	33	0
Flattened nasal bridge	8	0
Abnormal facial features	15	0
Spinal defects	8	0
Heart defects	8	0

- 71 Do the data in the tables justify scientists' conclusions that alcohol causes physical abnormalities at birth by interfering with the normal development of the fetus? Defend your position with supporting data. [1]
- 72 What additional data would be needed to better support the scientists' conclusions? [1]
- 73 Explain why alcohol consumption by the mother is especially harmful during the early stages of pregnancy. [1]

# LIVING ENVIRONMENT

Thursday, June 24, 1999 — 9:15 a.m. to 12:15 p.m., only

ANSWER PAPER

<b>Part A Score</b> (max 35 credits)	.....
<b>Part B Score</b> (max 30 credits)	.....
<b>Part C Score</b> (max 20 credits)	.....
<b>Total Raw Score</b>	.....

<b>Regents Grade = Sum of Computations Below</b>	
$\frac{\text{Total Raw Score}}{85} \times .50 =$	.....
$\frac{\text{Laboratory Test Score}}{15} \times .15 =$	.....
<b>Class Average</b> $\times .35 =$	.....
<b>Sum</b>	.....

Student ..... Sex:  Male  Female

Teacher ..... School .....

### Part A

Answer all questions in Part A.

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

**Part B**

Answer all questions in Part B.

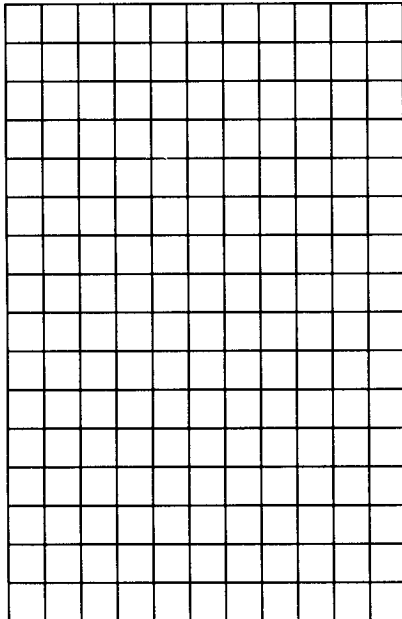
36

**Data Table**

Temperature (°C)	Heart Rate (beats/min)

37–39

Heart Rate (beats/min)



Temperature (°C)

40 .....

41 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

42 .....

43 .....

44 .....

45 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

46 .....

47 .....

48 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

49 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

50 .....

51 .....

52 .....

53 .....

54 .....

55 _____ _____ _____ _____ _____	58 ..... 59 ..... 60 ..... 61 ..... 62 .....
56 .....	63 .....
57 _____ _____ _____ _____ _____	64 ..... 65 .....

**Your answers for Part C should be placed on paper provided by the school.**

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

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

---

Signature

# FOR TEACHERS ONLY

# Le

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

## LIVING ENVIRONMENT

Thursday, June 24, 1999—9:15 a.m. to 12:15 p.m., only

### SCORING KEY

#### Part A (35 credits)

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

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

**Part B (30 credits)**

Allow a total of 30 credits for Part B, one credit for each correct answer.

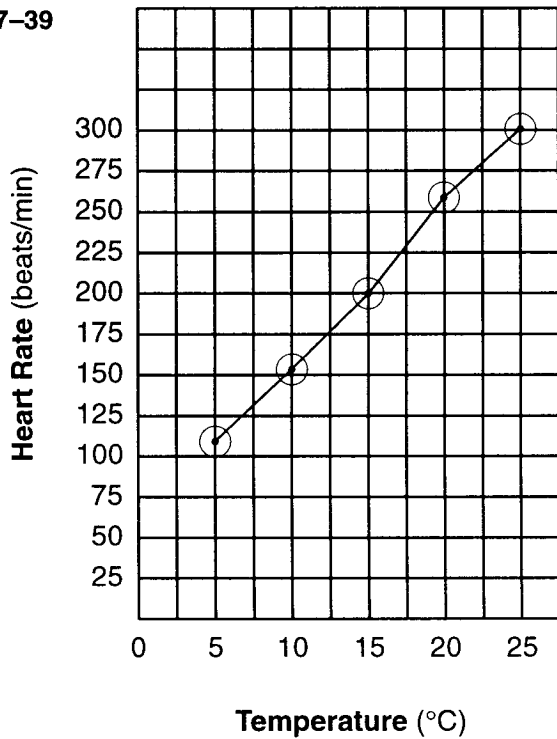
36

**Data Table**

Temperature (°C)	Heart Rate (beats/min)
5	108
10	152
15	200
20	260
25	300

The data table may also be completed with temperature decreasing from the top to the bottom of the data table.

37–39



**Rating instructions for questions 37–39.**  
Allow one credit for each of the following:

- 37 Marking an appropriate scale on the axis labeled “Temperature”
- 38 Marking an appropriate scale on the axis labeled “Heart Rate”
- 39 Plotting the data correctly, surrounding each point with a small circle, and connecting the points

40 ... 3 ...

The answer below represents a sample response. Other complete-sentence responses are acceptable. Allow no partial credit.

41 As the temperature increases, the heart rate in *Daphnia* increases.

42 ... 1 ...

43 ... 4 ...

44 ... 3 ...

The answer below represents a sample response. Other complete-sentence responses are acceptable. Allow no partial credit.

45 Pesticides are chemicals that might interfere with DNA replication and gene production.

46 ... 4 ...

47 ... 4 ...

The answers below represent sample responses. Other complete-sentence responses are acceptable. Allow no partial credit.

48 Oxygen decreases. *or* Carbon dioxide increases.

49 If the yellow perch population increases, the zooplankton population would decrease.

50 ... 2 ...

51 ... 3 ...

52 ... 1 ...

53 ... 2 ...

54 ... 4 ...

<p>The answer below represents a sample response. Other complete-sentence responses are acceptable. Allow no partial credit.</p> <p><b>55</b> The farther away the food supply is, the fewer the turns in the waggle dance.</p> <p><b>56</b> ... <b>2</b> ...</p> <p>The answer below represents a sample response. Other responses are acceptable. Allow no partial credit.</p> <p><b>57</b> The independent variable is sunlight.</p>	<p><b>58</b> ... <b>1</b> ...</p> <p><b>59</b> ... <b>4</b> ...</p> <p><b>60</b> ... <b>2</b> ...</p> <p><b>61</b> ... <b>2</b> ...</p> <p><b>62</b> ... <b>1</b> ...</p> <p><b>63</b> ... <b>3</b> ...</p> <p><b>64</b> ... <b>2</b> ...</p> <p><b>65</b> ... <b>1</b> ...</p>
---	---

**Part C (20 credits)**

<p>Allow one credit for each correct answer to questions 66–73. The answers below represent sample responses. Other complete-sentence responses are acceptable. Allow no partial credit.</p> <p><b>66</b> The herbicides might kill other plants besides purple loosestrife.</p> <p><b>67</b> The beetle might eat a lot of the other plants instead, and the native species would not have enough food.</p> <p><b>68</b> The experimental group should be given Lowervil, and the control group should be given a sugar pill.</p> <p><b>69</b> The use of a large number of people would give better statistics.</p> <p><b>70</b> The researcher could take people’s blood pressure before they are given the medicine and then take it again after the treatment to see if the blood pressure decreased.</p> <p><b>71</b> Yes. The babies whose mothers drank alcohol were smaller (2,555 g and 46.8 cm) than the babies whose mothers did not drink alcohol (3,094 g and 50.1 cm).</p> <p><b>72</b> Scientists could get I.Q.’s of the children when they get older to determine if they have intellectual problems.</p> <p><b>73</b> Alcohol is a poison, and it could interfere with cell division as the fetus is developing.</p>
---



Allow two credits for a correct answer to question 74. Allow no partial credit. The answer below represents a two-credit response.

- 74** If a person holds his or her breath too long, carbon dioxide can build up in the body. The person would faint, and normal breathing would start automatically to restore oxygen levels.

Allow a maximum of three credits for a correct answer to question 75, one credit for each correct example. The answer below represents a three-credit response.

- 75** Genetic engineering allows scientists to create disease-resistant plants, to clone sheep, and to make antibiotics.

Allow a maximum of seven credits for the answer to essay question 76, one credit for each of two human activities, one credit for each of three effects of the destruction of the habitat, and one credit for each of two ways the destruction of the habitat could be limited. The answer below represents a seven-credit response.

- 76** The rain forest is being destroyed by timber logging and by plants being burned to clear the land. These activities affect organisms by destroying their food supply, breeding grounds, and nesting areas. These activities also kill predators, leading to increases in some animals' populations. These populations cannot be sustained, so the animals die.

This destruction can be limited by using better farming methods on land that is already cleared or by finding alternatives to the mahogany wood being harvested.

### How to Compute Student Regents Grades

Each student's Regents grade will be obtained by using the following: 50% on-demand State examination, 15% locally developed laboratory performance test, and 35% course grade. The formula for calculating the students' Regents grades is provided on the front of the student answer paper. Computations for a sample score are shown below.

#### Formula:

$$\left( \frac{\text{Total Raw Score}}{85} \times .50 \right) + \left( \frac{\text{Laboratory Test Score}}{15} \times .15 \right) + (\text{Class Average} \times .35) = \text{Regents Grade}$$

All calculations should be carried to three decimal places. Rounding to two decimal places should be done only on the final result of the calculations.

#### Sample Score:

Total Raw Score (State Examination): 60

Laboratory Test Score: 13

Class Average: 85

$$\left( \frac{60}{85} \times .50 \right) + \left( \frac{13}{15} \times .15 \right) + (.85 \times .35) = \text{Regents Grade}$$

$$.353 + .130 + .298 = .781 = 78$$

Regents Grade = 78