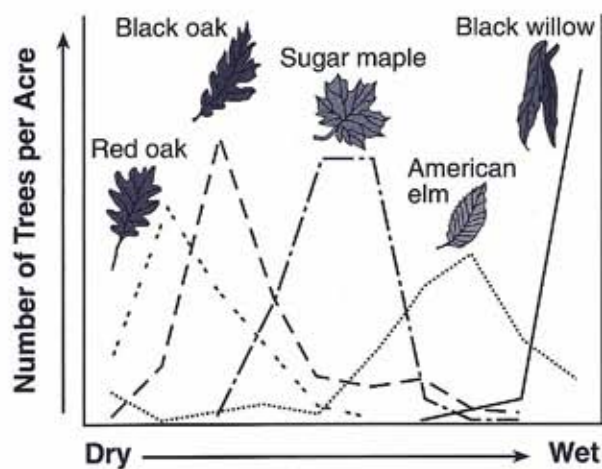


Part B-1

Answer all questions in this part. [13]

Directions (1-3): For each statement or question, write on the separate answer sheet the number of the word or expression that, of those given, best completes the statement or answers the question.

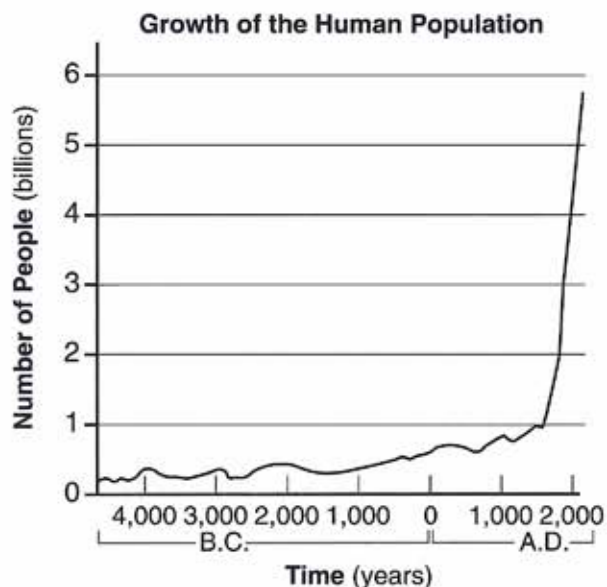
- 1 The graph below shows the effect of moisture on the number of trees per acre of five tree species.



Which observation best represents information shown in the graph?

- (1) All five species grow in the same habitat.
 - (2) The American elm grows in the widest range of moisture conditions.
 - (3) Red oaks can grow in wetter conditions than black willows.
 - (4) Sugar maples can grow anywhere black oaks can grow.
- 2 A science researcher is reviewing another scientist's experiment and conclusion. The reviewer would most likely consider the experiment *invalid* if
- (1) the sample size produced a great deal of data
 - (2) other individuals are able to duplicate the results
 - (3) it contains conclusions not explained by the evidence given
 - (4) the hypothesis was not supported by the data obtained

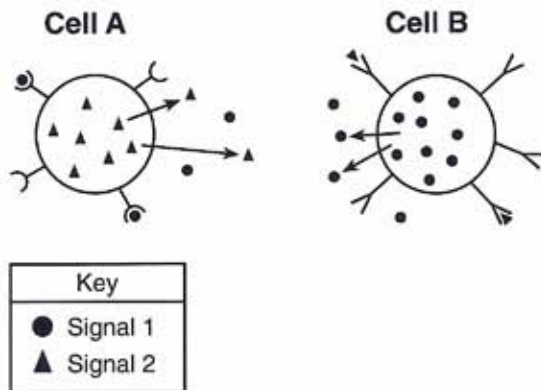
- 3 The graph below shows how the human population has grown over the last several thousand years.



Which statement is a valid inference that can be made if the human population continues to grow at a rate similar to the rate shown between 1000 A.D. and 2000 A.D.?

- (1) Future ecosystems will be stressed and many animal habitats may be destroyed.
- (2) Global warming will decrease as a result of a lower demand for fossil fuels.
- (3) One hundred years after all resources are used up, the human population will level off.
- (4) All environmental problems can be solved without a reduction in the growth rate of the human population.

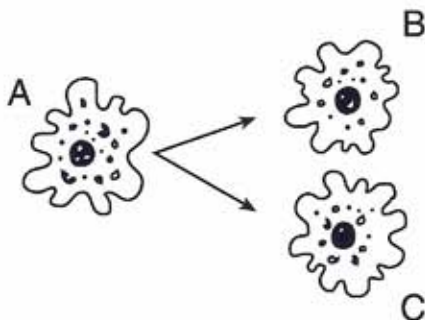
4 Cellular communication is illustrated in the diagram below.



Information can be sent from

- (1) cell A to cell B because cell B is able to recognize signal 1
- (2) cell A to cell B because cell A is able to recognize signal 2
- (3) cell B to cell A because cell A is able to recognize signal 1
- (4) cell B to cell A because cell B is able to recognize signal 2

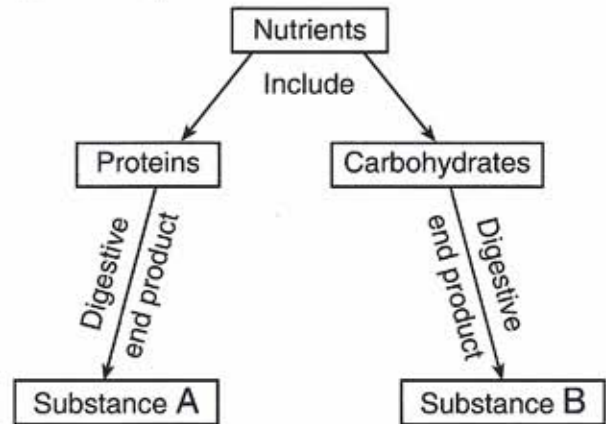
5 The diagram below represents single-celled organism A dividing by mitosis to form cells B and C.



Cells A, B, and C all produced protein X. What can best be inferred from this observation?

- (1) Protein X is found in all organisms.
- (2) The gene for protein X is found in single-celled organisms, only.
- (3) Cells A, B, and C ingested food containing the gene to produce protein X.
- (4) The gene to produce protein X was passed from cell A to cells B and C.

Base your answers to questions 36 and 37 on the information in the diagram below and on your knowledge of biology.



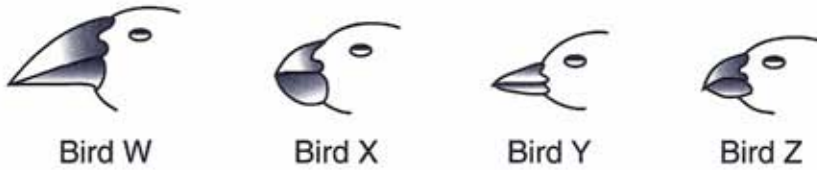
6 In an autotrophic organism, substance B functions as a

- (1) source of energy
- (2) hormone
- (3) vitamin
- (4) biotic resource

7 In a heterotrophic organism, substance A could be used directly for

- (1) photosynthesis
 - (2) synthesis of enzymes
 - (3) a building block of starch
 - (4) a genetic code
-

8 The dichotomous key shown below can be used to identify birds W, X, Y, and Z.

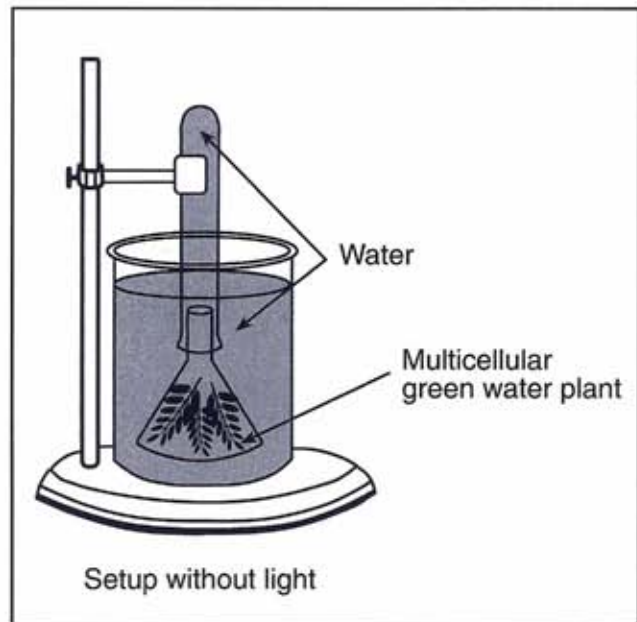
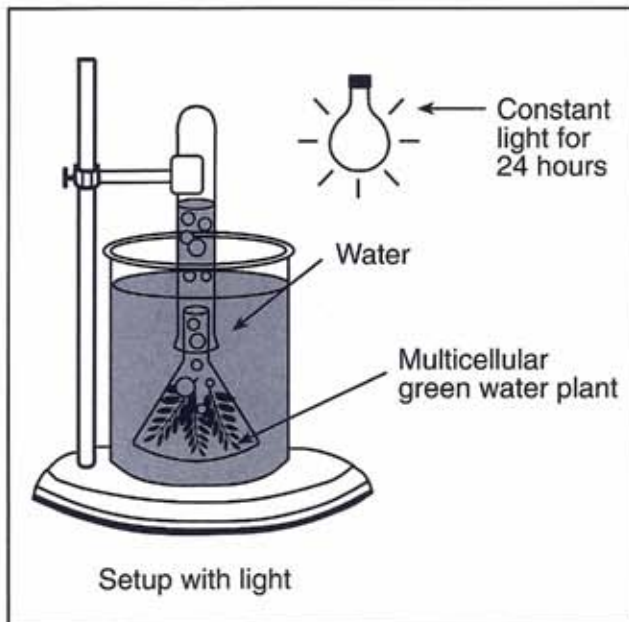


Dichotomous Key to Representative Birds	
1. a.	The beak is relatively long and slender..... <i>Certhidea</i>
b.	The beak is relatively stout and heavy.....go to 2
2. a.	The bottom surface of the lower beak is flat and straight <i>Geospiza</i>
b.	The bottom surface of the lower beak is curvedgo to 3
3. a.	The lower edge of the upper beak has a distinct bend <i>Camarhynchus</i>
b.	The lower edge of the upper beak is mostly flat <i>Platyspiza</i>

Bird X is most likely

- (1) *Certhidea*
- (2) *Geospiza*
- (3) *Camarhynchus*
- (4) *Platyspiza*

9 An experimental setup is shown in the diagram below.



Which hypothesis would most likely be tested using this setup?

- (1) Green water plants release a gas in the presence of light.
- (2) Roots of water plants absorb minerals in the absence of light.
- (3) Green plants need light for cell division.
- (4) Plants grow best in the absence of light.

Base your answers to questions 10 through 12 on the passage below which describes an ecosystem in New York State and on your knowledge of biology.

The Pine Bush ecosystem near Albany, New York, is one of the last known habitats of the nearly extinct Karner Blue butterfly. The butterfly's larvae feed on the wild green plant, lupine. The larvae are in turn consumed by predatory wasps. The four groups below represent other organisms living in this ecosystem.

Group A	Group B	Group C	Group D
algae mosses ferns pine trees oak trees	rabbits tent caterpillars moths	hawks moles hog-nosed snakes toads	soil bacteria molds mushrooms

10. The Karner Blue larvae belong in which group?

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

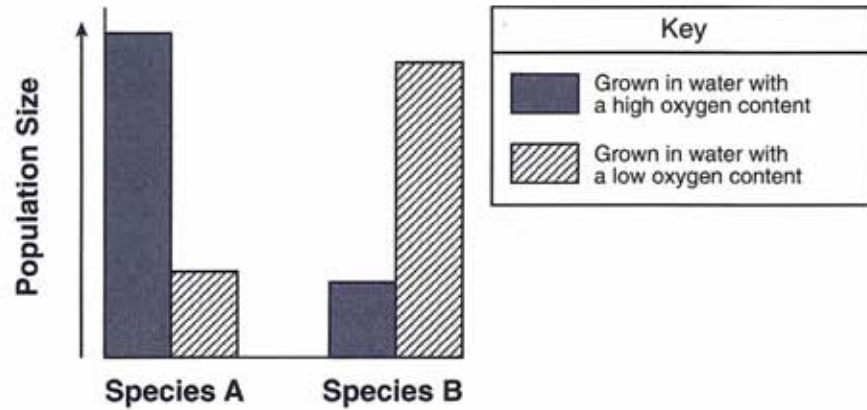
11. Which food chain best represents information in the passage?

- (1) lupine → Karner Blue larvae → wasps
- (2) wasps → Karner Blue larvae → lupine
- (3) Karner Blue larvae → lupine → wasps
- (4) lupine → wasps → Karner Blue larvae

12. Which group contains decomposers?

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

13 A graph of the population growth of two different species is shown below.



Which conclusion can be drawn from information in the graph?

- (1) Oxygen concentration affects population sizes of different species in the same manner.
 - (2) Species *A* requires a high oxygen concentration for maximum population growth.
 - (3) Species *B* requires a high oxygen concentration to stimulate population growth.
 - (4) Low oxygen concentration does not limit the population size of either species observed.
-

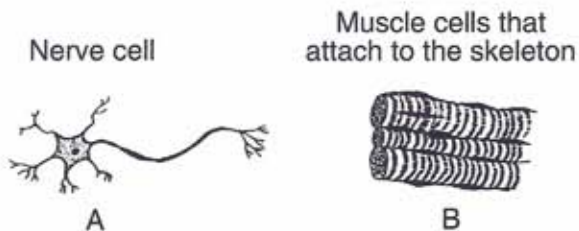
Part A

Answer all questions in this part. [35]

Directions (14-25): For each statement or question, write on the separate answer sheet the number of the word or expression that, of those given, best completes the statement or answers the question.

14. The pancreas produces one hormone that lowers blood sugar level and another that increases blood sugar level. The interaction of these two hormones most directly helps humans to
- (1) maintain a balanced internal environment
 - (2) digest needed substances for other body organs
 - (3) dispose of wastes formed in other body organs
 - (4) increase the rate of cellular communication

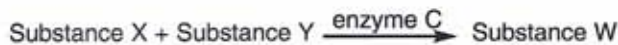
15. Two types of human cells are shown in the diagram below.



Cell A causes the cells at B to contract. This activity would be most useful for

- (1) lifting a book from a bookshelf
- (2) coordinating the functions of organelles
- (3) digesting food in the small intestine
- (4) carrying out the process of protein synthesis

The equation below represents a chemical reaction that occurs in humans.



16. What data should be collected to support the hypothesis that enzyme C works best in an environment that is slightly basic?
- (1) the amino acid sequence of enzyme C
 - (2) the amount of substance W produced in five minutes at various pH levels
 - (3) the shapes of substances X and Y after the reaction occurs
 - (4) the temperature before the reaction occurs

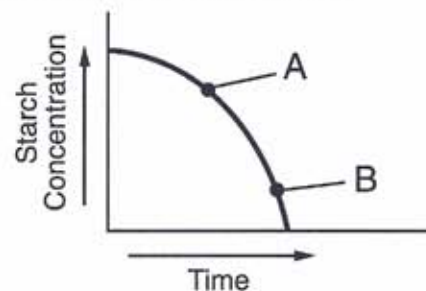
17. A student hypothesized that lettuce seeds would not sprout (germinate) unless they were exposed to darkness. The student planted 10 lettuce seeds under a layer of soil and scattered 10 lettuce seeds on top of the soil. The data collected are shown in the table below.

Data Table

Seed Treatment	Number of Seeds Germinated
Planted under soil	9
Scattered on top of soil	8

One way to improve the validity of these results would be to

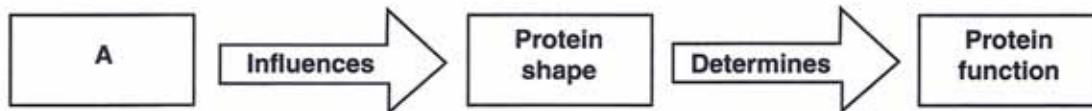
- (1) conclude that darkness is necessary for lettuce seed germination
 - (2) conclude that light is necessary for lettuce seed germination
 - (3) revise the hypothesis
 - (4) repeat the experiment
18. The graph below represents data obtained from an experiment on starch digestion.



Which statement best describes point A and point B on the graph?

- (1) The concentration of sugars is greater at point A than it is at point B.
- (2) The concentration of sugars is greater at point B than it is at point A.
- (3) The starch concentration is the same at point A as it is at point B.
- (4) The starch concentration is greater at point B than it is at point A.

19. The diagram below provides some information concerning proteins.



Which phrase is represented by A?

- (1) sequence of amino acids
- (2) sequence of simple sugars
- (3) sequence of starch molecules
- (4) sequence of ATP molecules

20. In a certain ecosystem, rattlesnakes are predators of prairie dogs. If the prairie dog population started to increase, how would the ecosystem most likely regain stability?

- (1) The rattlesnake population would start to decrease.
- (2) The rattlesnake population would start to increase.
- (3) The prairie dog population would increase rapidly.
- (4) The prairie dog population would begin to prey on the rattlesnakes.

21. In a particular variety of corn, the kernels turn red when exposed to sunlight. In the absence of sunlight, the kernels remain yellow. Based on this information, it can be concluded that the color of these corn kernels is due to

- (1) a different type of DNA that is produced when sunlight is present
- (2) a different species of corn that is produced in sunlight
- (3) the effect of sunlight on the number of chromosomes inherited
- (4) the effect of environment on gene expression

22. What determines the kind of genes an organism possesses?

- (1) type of amino acids in the cells of the organism
- (2) sequence of the subunits A, T, C, and G in the DNA of the organism
- (3) size of simple sugar molecules in the organs of the organism
- (4) shape of the protein molecules in the organelles of the organism

23. If a set of instructions that determines all of the characteristics of an organism is compared to a book, and a chromosome is compared to a chapter in the book, then what might be compared to a paragraph in the book?

- (1) a starch molecule
- (2) an egg
- (3) an amino acid
- (4) a DNA molecule

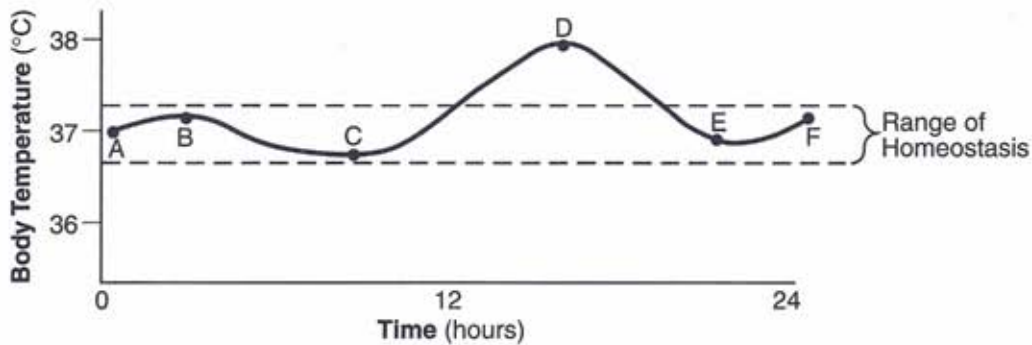
24. Research applications of the basic principles of genetics have contributed greatly to the rapid production of new varieties of plants and animals. Which activity is an example of such an application?

- (1) testing new fertilizers on food crops
- (2) selective breeding of plants and animals that exhibit high resistance to disease
- (3) developing new irrigation methods to conserve water
- (4) using natural predators to control insect pests

25. People with cystic fibrosis inherit defective genetic information and cannot produce normal CFTR proteins. Scientists have used gene therapy to insert normal DNA segments that code for the missing CFTR protein into the lung cells of people with cystic fibrosis. Which statement does *not* describe a result of this therapy?

- (1) Altered lung cells can produce the normal CFTR protein.
- (2) Altered lung cells can divide to produce other lung cells with the normal CFTR gene.
- (3) The normal CFTR gene may be expressed in altered lung cells.
- (4) Offspring of someone with altered lung cells will inherit the normal CFTR gene.

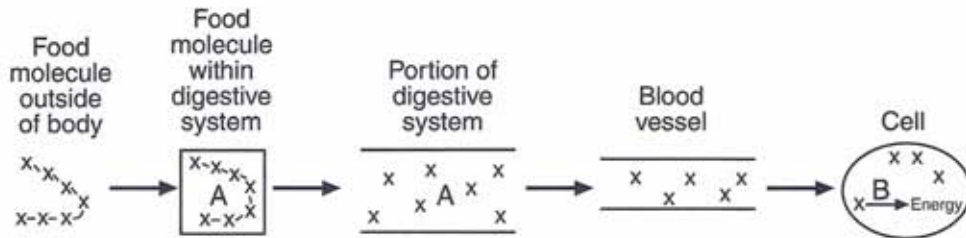
26. The data in the graph below show evidence of disease in the human body.



A disruption in dynamic equilibrium is indicated by the temperature change between points

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

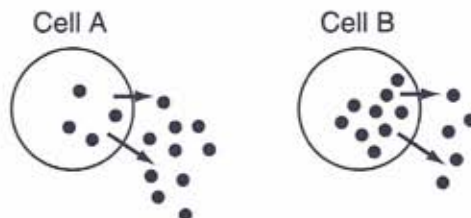
27. The diagram below represents events involved as energy is ultimately released from food.



Which row in the table below best represents the chain of Xs and letters A and B in the diagram?

X-X-X-X-X-X-X	A and B
(1) nutrient	antibodies
(2) nutrient	enzymes
(3) hemoglobin	wastes
(4) hemoglobin	hormones

28. In the diagram below, the dark dots indicate small molecules. These molecules are moving out of the cells, as indicated by the arrows. The number of dots inside and outside of the two cells represents the relative concentrations of the molecules inside and outside of the cells.



ATP is being used to move the molecules out of the cell by

- (1) cell A, only
- (2) cell B, only
- (3) both cell A and cell B
- (4) neither cell A nor cell B

29. Information concerning the diet of crocodiles of different sizes is contained in the table below.

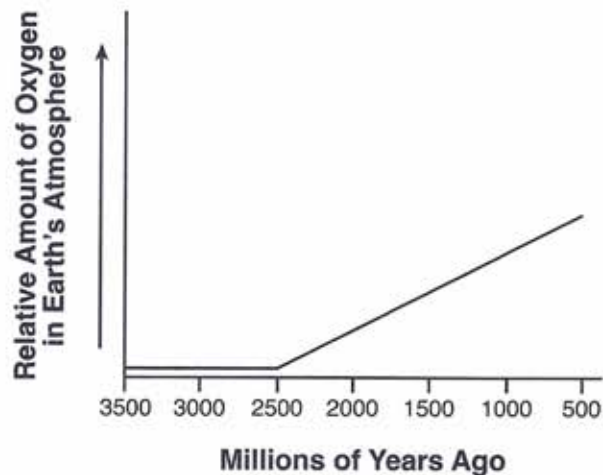
Percentage of Crocodiles of Different Lengths and Their Food Sources

Food Source	Group A 0.3–0.5 Meter	Group B 2.5–3.9 Meters	Group C 4.5–5.0 Meters
mammals	0	18	65
reptiles	0	17	48
fish	0	62	38
birds	0	17	0
snails	0	25	0
shellfish	0	5	0
spiders	20	0	0
frogs	35	0	0
insects	100	2	0

Which statement is *not* a valid conclusion based on the data?

- (1) Overharvesting of fish could have a negative impact on group C.
- (2) The smaller the crocodile is, the larger the prey.
- (3) Group B has no preference between reptiles and birds.
- (4) Spraying insecticides would have the most direct impact on group A.

30. The relative amount of oxygen in the atmosphere of Earth over millions of years is shown in the graph below.



At what point in the history of Earth did autotrophs most likely first appear?

- (1) 3500 million years ago
- (2) 2500 million years ago
- (3) 1500 million years ago
- (4) 500 million years ago