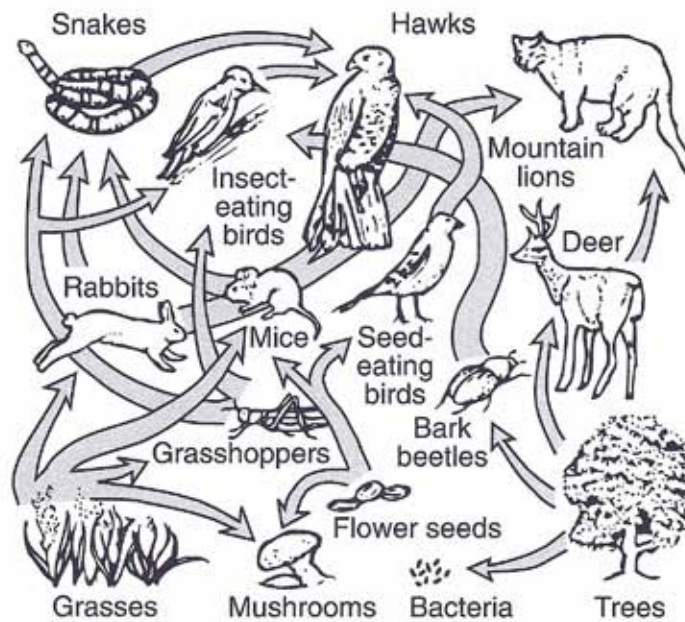


Packet #2

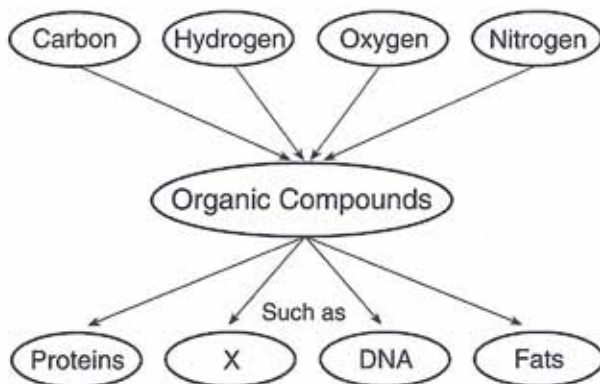
1. A food web is represented in the diagram below.



Which organisms are correctly paired with their roles in this food web?

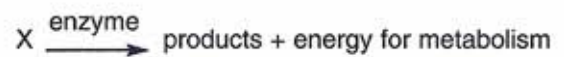
- | | |
|--|-----------------------------------|
| (1) mountain lions, bark beetles — producers | (3) all birds, deer — consumers |
| hawks, mice — heterotrophs | grasses, trees — producers |
| (2) snakes, grasshoppers — consumers | (4) seeds, bacteria — decomposers |
| mushrooms, rabbits — autotrophs | mice, grasses — heterotrophs |

2. What substance could be represented by the letter X in the diagram below?



- | | |
|-------------------|--------------------|
| (1) carbohydrates | (3) carbon dioxide |
| (2) ozone | (4) water |

3. Information concerning a metabolic activity is shown below.



Substance X is most likely

- | | |
|------------|-----------------|
| (1) DNA | (3) ATP |
| (2) oxygen | (4) chlorophyll |

4. A part of the Hepatitis B virus is synthesized in the laboratory. This viral particle can be identified by the immune system as a foreign material but the viral particle is not capable of causing disease. Immediately after this viral particle is injected into a human it

- (1) stimulates the production of enzymes that are able to digest the Hepatitis B virus
- (2) triggers the formation of antibodies that protect against the Hepatitis B virus
- (3) synthesizes specific hormones that provide immunity against the Hepatitis B virus
- (4) breaks down key receptor molecules so that the Hepatitis B virus can enter body cells

5* Which phrase would be appropriate for area A in the chart below?

Technological Device	Positive Impact	Negative Impact
Nuclear power plant	Provides efficient, inexpensive energy	A

- (1) produces radioactive waste
(2) results in greater biodiversity
(3) provides light from radioactive substances
(4) reduces dependence on fossil fuels
-

6. Which situation is *not* an example of the maintenance of a dynamic equilibrium in an organism?

- (1) Guard cells contribute to the regulation of water content in a geranium plant.
(2) Water passes into an animal cell causing it to swell.
(3) The release of insulin lowers the blood sugar level in a human after eating a big meal.
(4) A runner perspires while running a race on a hot summer day.

7. Which statement best describes what happens to energy and molecules in a stable ecosystem?

- (1) Both energy and molecules are recycled in an ecosystem.
(2) Neither energy nor molecules are recycled in an ecosystem.
(3) Energy is recycled and molecules are continuously added to the ecosystem.
(4) Energy is continuously added to the ecosystem and molecules are recycled.

8. Methods used to reduce sulfur dioxide emissions from smokestacks are an attempt by humans to

- (1) lessen the amount of insecticides in the environment
(2) eliminate diversity in wildlife
(3) lessen the environmental impact of acid rain
(4) use nonchemical controls on pest species

9. Deforestation will most directly result in an immediate increase in

- (1) atmospheric carbon dioxide
(2) atmospheric ozone
(3) wildlife populations
(4) renewable resources

10. Which statement concerning ecosystems is correct?

- (1) Stable ecosystems that are changed by natural disaster will slowly recover and may again become stable if left alone for a long period of time.
(2) Competition does not influence the number of organisms that live in ecosystems.
(3) Climatic change is the principal cause of habitat destruction in ecosystems in the last fifty years.
(4) Stable ecosystems, once changed by natural disaster, will never recover and become stable again, even if left alone for a long period of time.

11. Which human activity would be *least* likely to disrupt the stability of an ecosystem?

- (1) disposing of wastes in the ocean
(2) using fossil fuels
(3) increasing the human population
(4) recycling bottles and cans
-

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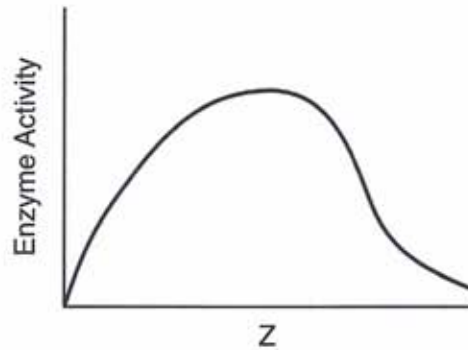
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12. An incomplete graph is shown below.

Effect of Z on Enzyme Activity



What label could appropriately be used to replace letter Z on the axis? [1]

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13. A farmer has been growing only corn in his fields for several years. Each year the corn stalks were cut off near the ground and processed to be used as food for cattle. The farmer observed that with each passing year, corn production in his fields decreased. Explain why removing the dead corn stalks reduced corn production in these fields. [1]

54

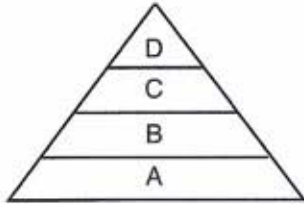
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Part B-1

Answer all questions in this part. [10]

Directions (14-16): 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.

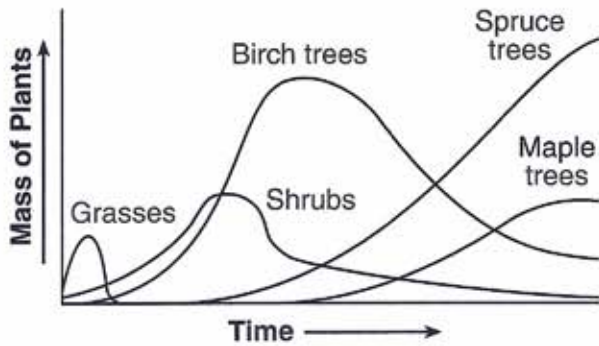
14. The diagram below represents a food pyramid.



The concentration of the pesticide DDT in individual organisms at level *D* is higher than the concentration in individuals at level *A* because DDT is

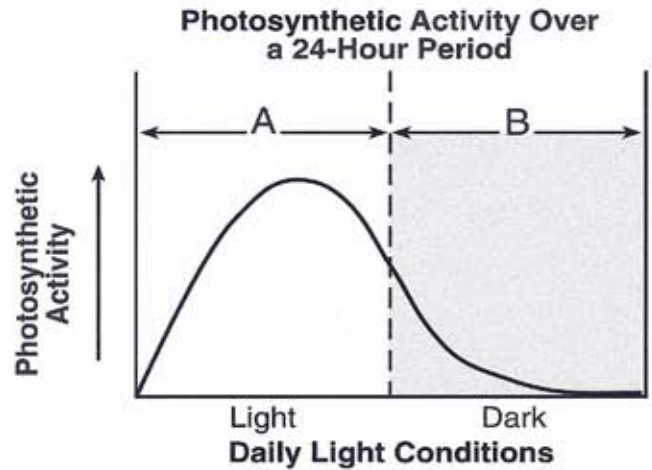
- (1) synthesized by organisms at level *D*
- (2) excreted by organisms at level *A* as a toxic waste
- (3) produced by organisms at level *C* which are eaten by organisms at level *D*
- (4) passed through levels *A*, *B*, and *C* to organisms at level *D*

15. Which concept is represented in the graph below?



- (1) ecological succession in a community
- (2) cycling of carbon and nitrogen in a forest
- (3) energy flow in a food chain over time
- (4) negative human impact on the environment

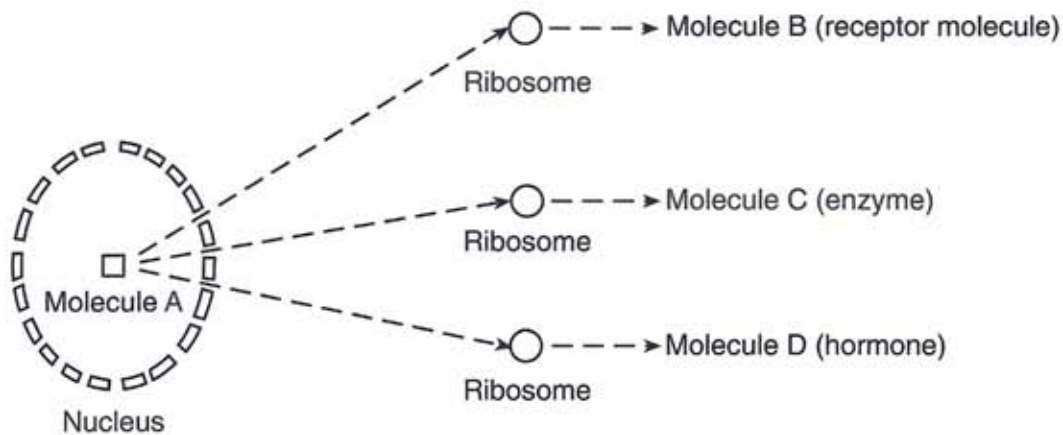
16. The graph below shows photosynthetic activity in an ecosystem over a 24-hour period.



Data for a study on respiration in this ecosystem should be collected during

- (1) interval *A*, from only the producers in the ecosystem
- (2) intervals *A* and *B*, from only the consumers in the ecosystem
- (3) intervals *A* and *B*, from both the producers and consumers in the ecosystem
- (4) interval *A* only, from abiotic but not biotic components of the ecosystem

Base your answers to questions *17* and *18* on the diagram below, which represents a sequence of events in a biological process that occurs within human cells and on your knowledge of biology.



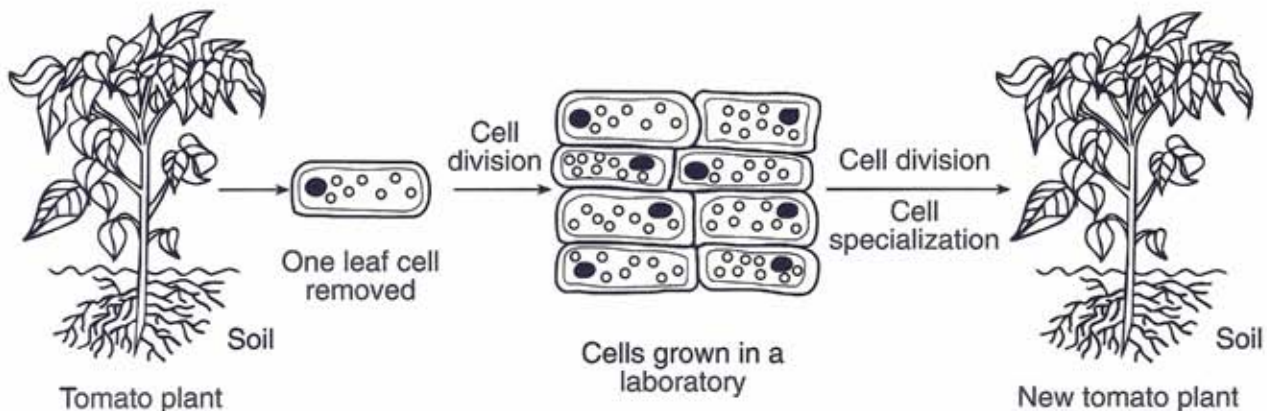
17. Molecule *A* contains the

- (1) starch necessary for ribosome synthesis in the cytoplasm
- (2) organic substance that is broken down into molecules *B*, *C*, and *D*
- (3) proteins that form the ribosome in the cytoplasm
- (4) directions for the synthesis of molecules *B*, *C*, and *D*

18. Molecules *B*, *C*, and *D* are similar in that they are usually

- (1) composed of genetic information
- (2) involved in the synthesis of antibiotics
- (3) composed of amino acids
- (4) involved in the diffusion of oxygen into the cell

19. A technique used to produce new plants is represented in the diagram below.



Which statement is best supported by the information in the diagram?

- (1) The one leaf cell removed formed a zygote that developed into a new plant by mitotic cell division.
- (2) This procedure is used to produce new tomato plants that are clones of the original tomato plant.
- (3) The cell taken from the leaf produced eight cells, each having one-half of the genetic information of the original leaf cell.
- (4) The new tomato plant will not be able to reproduce sexually because it was produced by mitotic cell division.

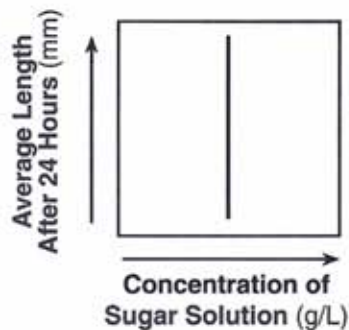
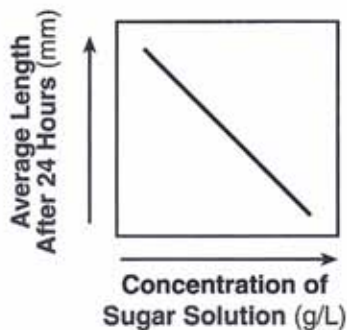
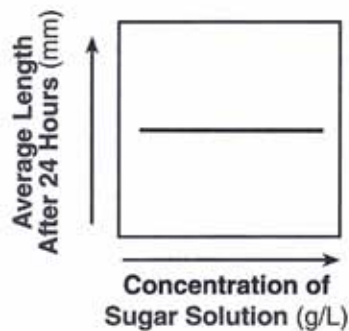
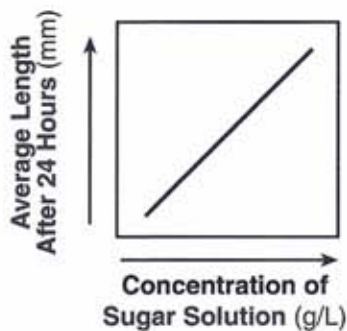
Base your answer to question 20 on the information below and on your knowledge of biology.

Students cut 20 rod-shaped pieces of potato of the same diameter and length. Five pieces of potato were placed into each of four beakers containing different concentrations of sugar solutions. Each potato piece was measured again after 24 hours. The table below shows the results of their experiment.

Change in Length

Concentration of Sugar Solution (grams per liter)	Original Length of Potato Pieces (mm)	Average Length After 24 Hours (mm)
0	50.0	52.0
5	50.0	44.0
8	50.0	43.5
10	50.0	42.5

20 Which graph best represents the information in the data table?



Part C

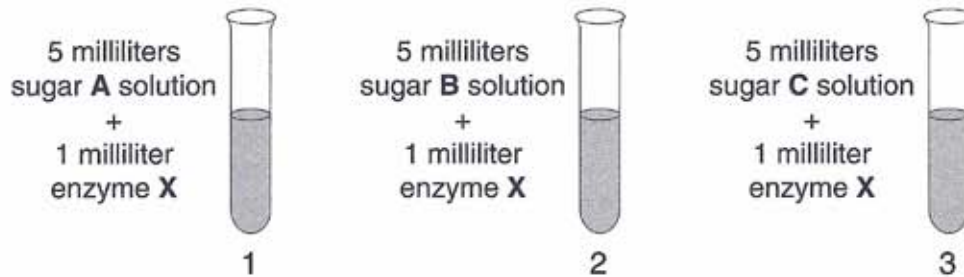
Answer all questions in Part C.

Directions (21-23): Record your answers in the spaces provided in this examination booklet.

Base your answers to questions 64 through 66 on the information below and on your knowledge of biology.

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An investigation was performed to determine the effects of enzyme X on three different disaccharides (double sugars) at 37°C. Three test tubes were set up as shown in the diagram below.



At the end of 5 minutes, the solution in each test tube was tested for the presence of disaccharides (double sugars) and monosaccharides (simple sugars). The results of these tests are shown in the table below.

	Test Tube 1	Test Tube 2	Test Tube 3
Monosaccharide	not present	not present	present
Disaccharide	present	present	not present

21. What can be concluded about the activity of enzyme X from the data table? [1]

22. With only the materials list supplied below and common laboratory equipment, design an investigation that would show how a change in pH would affect the activity of enzyme X. Your design need only include detailed procedure and a data table. [3]

Materials

- Enzyme X
- Sugar C solution
- Indicators
- Substances of various pH values —
 - vinegar (acidic)
 - water (neutral)
 - baking soda (basic)

Procedure:

Data Table:



23 State *one* safety precaution that should be used during the investigation. [1]

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24. A biologist collected the data shown in the table below.

Data Table

Type of Organism	Number of Organisms in a Field		
	May	July	September
grasshoppers	100	500	150
birds	25	100	10
spiders	75	200	50

Which statement is supported by the data in the table?

- (1) Populations do not vary from month to month.
- (2) The populations are highest in September.
- (3) The grasshoppers increased in length in July.
- (4) Seasonal variations may affect populations.

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

25. Which substances are found on cell surfaces and respond to nerve and hormone signals?

- (1) starches and simple sugars
- (2) subunits of DNA
- (3) vitamins and minerals
- (4) receptor molecules

26. Which sequence illustrates the increasing complexity of levels of organization in multicellular organisms?

- (1) organelle → cell → tissue → organ → organ system → organism
- (2) cell → organelle → tissue → organ → organ system → organism
- (3) organelle → tissue → cell → organ → organ system → organism
- (4) cell → organism → organ system → organ → tissue → organelle

27. Which statement best describes a scientific theory?

- (1) It is a collection of data designed to provide support for a prediction.
- (2) It is an educated guess that can be tested by experimentation.
- (3) It is a scientific fact that no longer requires any evidence to support it.
- (4) It is a general statement that is supported by many scientific observations.

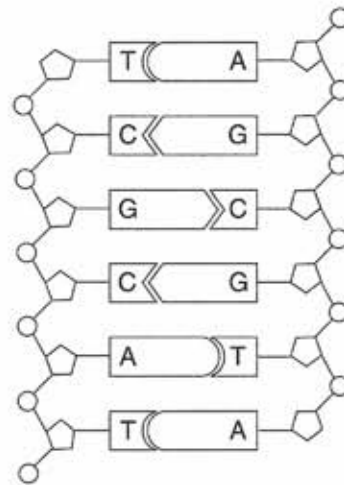
28. In one variety of corn, the kernels turn red when exposed to sunlight. In the absence of sunlight, the kernels remain yellow. Based on this information, it can be concluded that the color of these corn kernels is due to the

- (1) process of selective breeding
- (2) rate of photosynthesis
- (3) effect of environment on gene expression
- (4) composition of the soil

29. Which row in the chart below best describes asexual reproduction?

Row	Number of Parents	Comparison of Offspring to Parents
(1)	one	identical
(2)	one	different
(3)	two	identical
(4)	two	different

30. The diagram below represents a portion of an organic molecule.



This molecule controls cellular activity by directing the synthesis of

- | | |
|-------------------|--------------|
| (1) carbohydrates | (3) fats |
| (2) minerals | (4) proteins |