Packet #1

Base your answers to questions 1 through 5 on the information and data table below and on your knowledge of biology.

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A biology student performed an experiment to determine which of two species of single-celled organisms would survive best when cultured together in a certain environment. The student placed 10 organisms of each species into a large test tube. Throughout the experiment, the test tube was maintained at 30°C. After the test tube was set up, the population of each species was determined each day for 5 days. The data collected are shown in the table below.

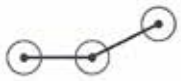
Data Table

Day	Population	
	Species A	Species B
1	10	10
2	16	16
3	32	32
4	48	12
5	60	4

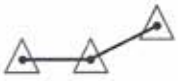
Directions (1 –5): Using the information in the data table, construct a line graph on the grid on the next page, following the directions below.

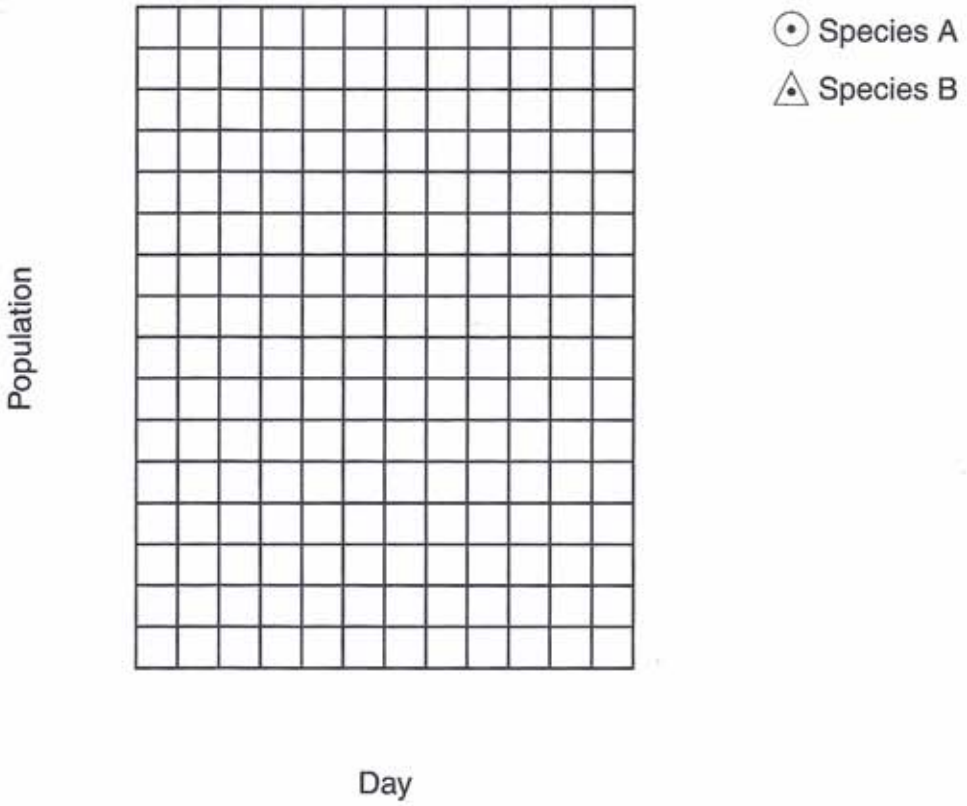
1. Mark an appropriate scale on each labeled axis. [1]

2. Plot the data for species *A* on the grid. Surround each point with a small circle and connect the points. [1]

Example: 

3. Plot the data for species *B* on the grid. Surround each point with a small triangle and connect the points. [1]

Example: 



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4. Based on the daily counts, on which day did it first become evident that one species was better adapted than the other species for survival in the environment provided? [1]

_____

5. The difference in the population sizes on the fifth day most likely resulted from

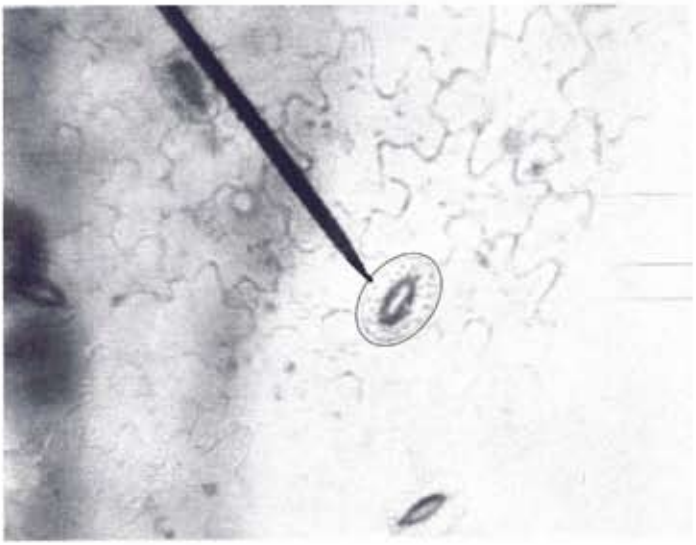
(1) temperature changes

(2) variations in light intensity

(3) competition between species

(4) the buildup of nitrogen gas

6. The photograph below shows a microscopic view of the lower surface of a leaf.



What is the main function of the cells indicated by the black pointer?

(1) regulate the rate of gas exchange

(2) store food for winter dormancy

(3) undergo mitotic cell division

(4) give support to the veins in the leaf

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7. An investigation was set up to study the movement of water through a membrane. The results are shown in the diagram below.

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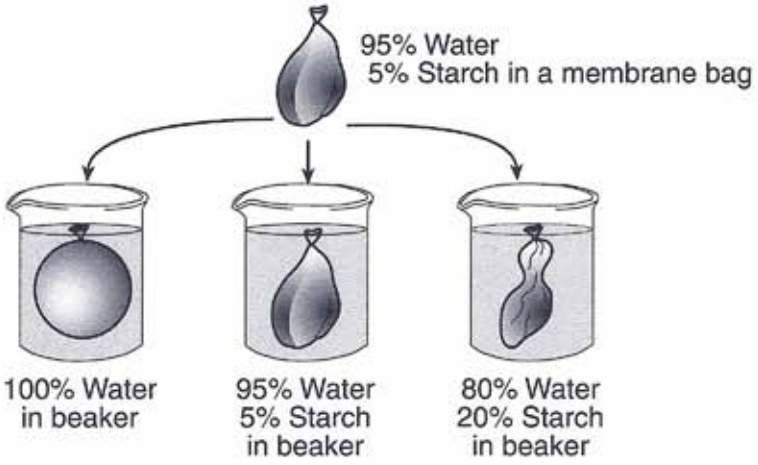

Based on these results, which statement correctly predicts what will happen to red blood cells when they are placed in a beaker containing a water solution in which the salt concentration is much higher than the salt concentration in the red blood cells?

(1) The red blood cells will absorb water and increase in size.

(2) The red blood cells will lose water and decrease in size.

(3) The red blood cells will first absorb water, then lose water and maintain their normal size.

(4) The red blood cells will first lose water, then absorb water, and finally double in size.

Base your answers to questions 8 through 12 on the information and diagrams below and on your knowledge of biology.

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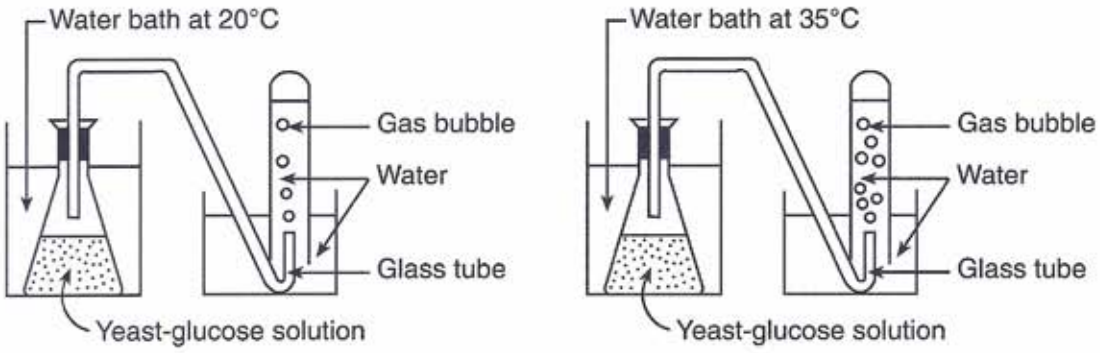
The laboratory setups represented below were used to investigate the effect of temperature on cellular respiration in yeast (a single-celled organism). Each of two flasks containing equal amounts of a yeast-glucose solution was submerged in a water bath, one kept at 20°C and one kept at 35°C. The number of gas bubbles released from the glass tube in each setup was observed and the results were recorded every 5 minutes for a period of 25 minutes. The data are summarized in the table below.



Data Table

Time (minutes)	Total Number of Bubbles Released	
	20°C	35°C
5	0	5
10	5	15
15	15	30
20	30	50
25	45	75

Directions (49–51): Using the information in the data table, construct a line graph on the grid on the next page, following the directions below.

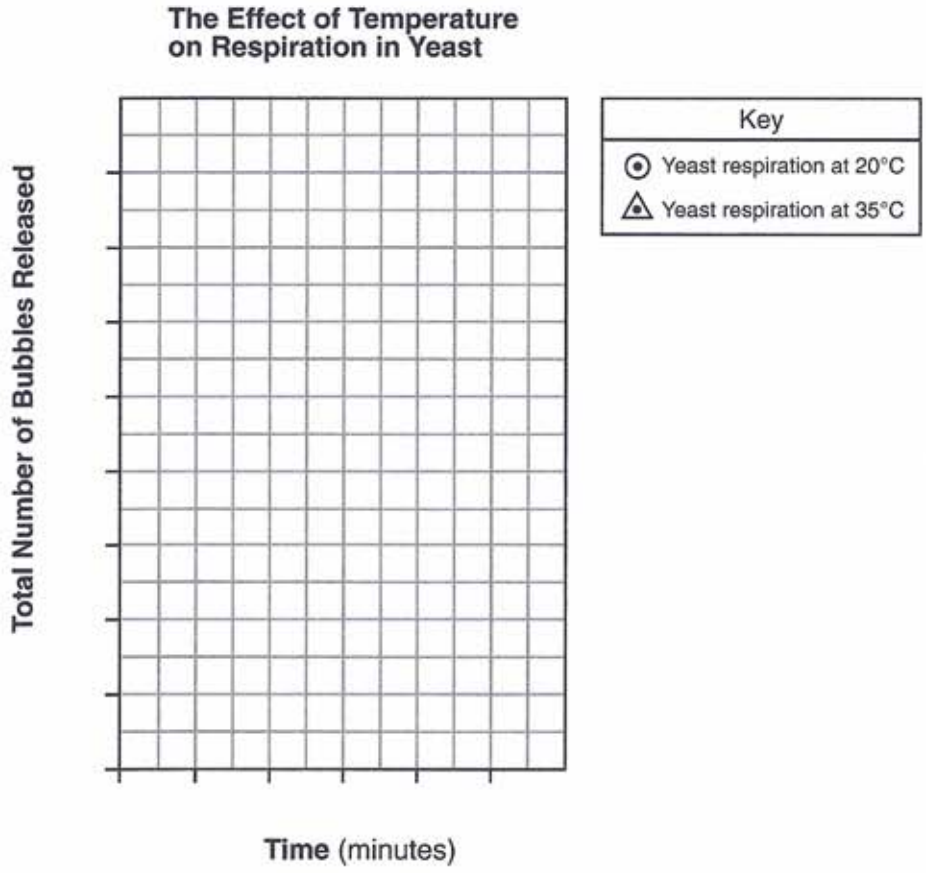
8. Mark an appropriate scale on each axis. [1]

9. Plot the data for the total number of bubbles released at 20°C on the grid on the next page. Surround each point with a small circle and connect the points. [1]

Example: 

10. Plot the data for the total number of bubbles released at 35°C on the grid. Surround each point with a small triangle and connect the points. [1]

Example: 



11. State *one* relationship between temperature and the rate of gas production in yeast. [1]

_____

_____

12. Identify the gas that would be produced by the process taking place in both laboratory setups. [1]

_____

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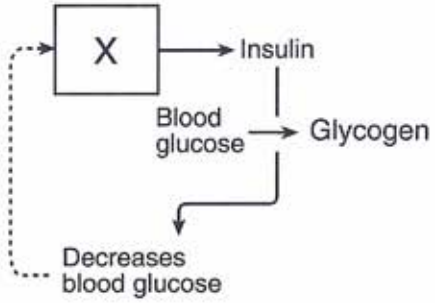
Base your answers to questions 13 and 14 on the diagram below and on your knowledge of biology.



13. Identify the organ labeled *X*. [1]

_____

14. The dashed line in the diagram represents

(1) a digestive process

(2) a feedback mechanism

(3) cellular differentiation

(4) recycling of organic chemicals

_____

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Base your answers to questions 15 through 17 on the food web and graph below and on your knowledge of biology. The graph represents the interaction of two different populations, *A* and *B*, in the food web.

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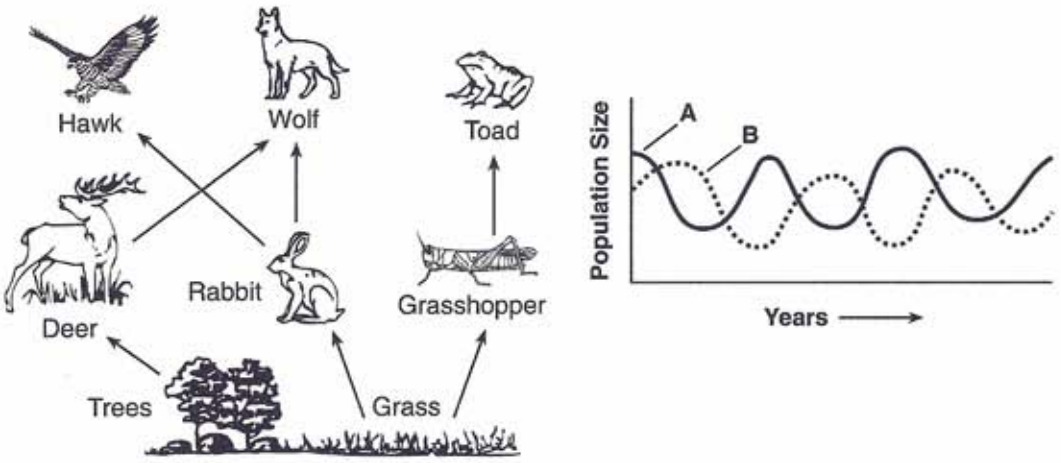

15. Population *A* is made up of living animals. The members of population *B* feed on these living animals. The members of population *B* are most likely

(1) scavengers

(2) autotrophs

(3) predators

(4) parasites

16. Identify one heterotroph from the food web that could be a member of population *A*. [1]

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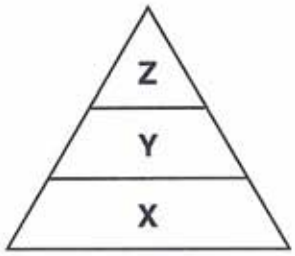
17. An energy pyramid is shown below.



Identify one organism shown in the food web that would be found at level *X*. [1]

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_____

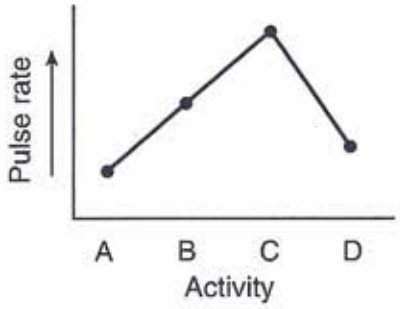
18. A student measures his pulse rate while he is watching television and records it. Next, he walks to a friend's house nearby and when he arrives, measures and records his pulse rate again. He and his friend then decide to run to the mall a few blocks away. On arriving at the mall, the student measures and records his pulse rate once again. Finally, after sitting and talking for a half hour, the student measures and records his pulse rate for the last time.

Which graph below best illustrates the expected changes in his pulse rate according to the activities described above?

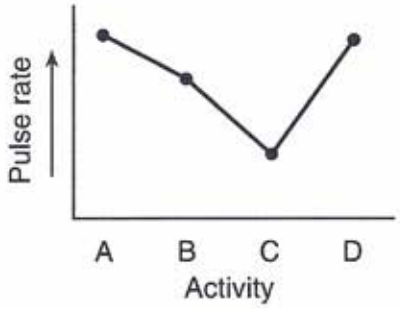
Key:Activity

A = after watching television
B = after walking to a friend's house
C = after running to the mall
D = after sitting and talking

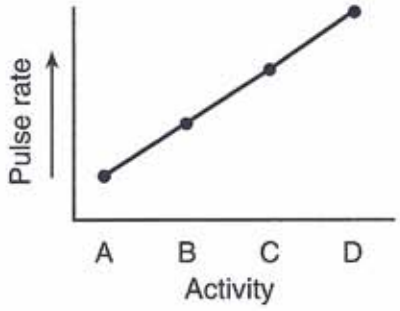
(1)



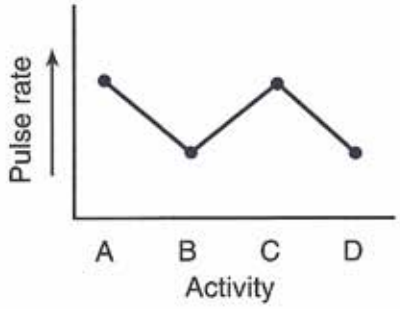
(2)



(3)



(4)



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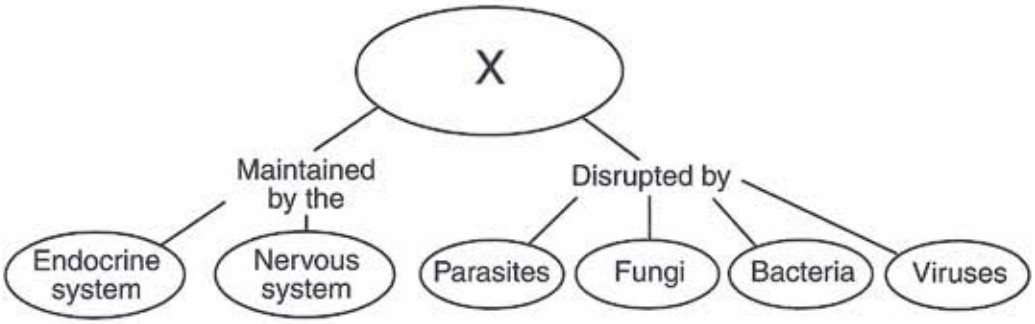
Answer all questions in this part.

Directions (19 – 20): For those questions that are followed by four choices, circle the number of 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.

19. Using appropriate information, fill in spaces *A* and *B* in the chart below. In space *A* identify an organ in the human body where molecules diffuse into the blood. In space *B* identify a specific molecule that diffuses into the blood at this organ. [2]

An organ in the human body where molecules diffuse into the blood	A specific molecule that diffuses into the blood at this organ
A	B

Base your answer to question 42 on the diagram below and on your knowledge of biology.



20. What term or phrase does letter *X* most likely represent? [1]

_____

_____