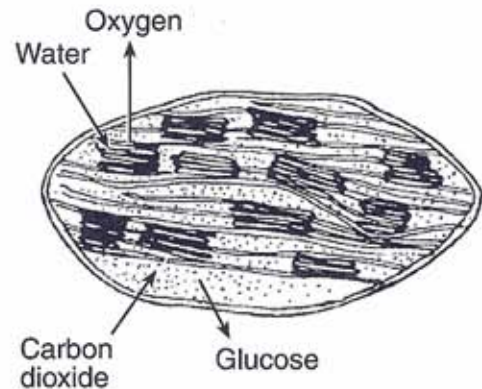


Packet # 3

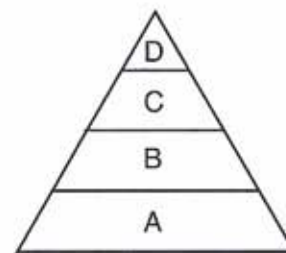
- The human brain, kidney, and liver all develop from the same zygote. This fact indicates that cells formed by divisions of the zygote are able to
 - differentiate
 - mutate
 - undergo cloning
 - be fertilized
- The reproductive cycle of a human is usually regulated by
 - gametes
 - hormones
 - natural selection
 - immune responses
- Which reproductive structure is correctly paired with its function?
 - uterus—usual site of fertilization
 - testis—usual location for egg development
 - ovary—delivers nutrients to the embryo
 - sperm—transports genetic material
- Toxins can harm a developing fetus. They usually enter the fetus by the process of
 - blood flow from the mother to the fetus
 - active transport from the ovary
 - diffusion across placental membranes
 - recombination of genes from the fetus and mother
- Which statement best describes cellular respiration?
 - It occurs in animal cells but not in plant cells.
 - It converts energy in food into a more usable form.
 - It uses carbon dioxide and produces oxygen.
 - It stores energy in food molecules.
- Antibody molecules and receptor molecules are similar in that they both
 - control transport through the cell membrane
 - have a specific shape related to their specific function
 - remove wastes from the body
 - speed up chemical reactions in cells

- The diagram below illustrates the movement of materials involved in a process that is vital for the energy needs of organisms.



The process illustrated occurs within

- chloroplasts
 - mitochondria
 - ribosomes
 - vacuoles
- Feedback interactions in the human body are important because they
 - determine the diversity necessary for evolution to occur
 - direct the synthesis of altered genes that are passed on to every cell in the body
 - regulate the shape of molecules involved in cellular communication
 - keep the internal body environment within its normal range
 - The diagram below represents an energy pyramid.

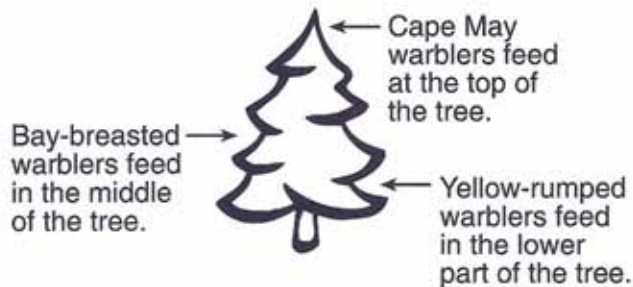


At each successive level from A to D, the amount of available energy

- increases, only
- decreases, only
- increases, then decreases
- remains the same

10. The purpose of introducing weakened microbes into the body of an organism is to stimulate the
- (1) production of living microbes that will protect the organism from future attacks
 - (2) production of antigens that will prevent infections from occurring
 - (3) immune system to react and prepare the organism to fight future invasions by these microbes
 - (4) replication of genes that direct the synthesis of hormones that regulate the number of microbes

11. The feeding niches of three bird species are shown in the diagram below.



What is the advantage of these different feeding niches for the birds?

- (1) less competition for food
 - (2) fewer abiotic resources for each bird species
 - (3) fewer biotic resources for each bird species
 - (4) less energy available as the birds feed higher in the tree
12. Cutting down a rain forest and planting agricultural crops, such as coffee plants, would most likely result in
- (1) a decrease in biodiversity
 - (2) an increase in the amount of energy recycled
 - (3) a decrease in erosion
 - (4) an increase in the amount of photosynthesis
13. Which long-term change could directly cause the other three?
- (1) pollution of air and water
 - (2) increasing human population
 - (3) scarcity of suitable animal habitats
 - (4) depletion of resources

14. Which statement describes all stable ecosystems?

- (1) Herbivores provide energy for the autotrophs.
- (2) The populations of predators are dependent on the populations of their prey.
- (3) The number of autotrophs equals the number of heterotrophs.
- (4) Consumers synthesize ATP from light energy.

15. The graph below shows the number of birds in a population.



Which statement best explains section X of the graph?

- (1) Interbreeding between members of this population increased the mutation rate.
 - (2) An increase in the bird population caused an increase in the producer population.
 - (3) The population reached a state of dynamic equilibrium due to limiting factors.
 - (4) Another species came to the area and provided food for the birds.
16. Humans have altered ecosystems in many ways. The most positive impact on an ecosystem would result from
- (1) planting a single economically valuable crop in a 25-acre area
 - (2) seeding an area with valuable plants that are from another ecosystem
 - (3) planting many different plants that are native to the area in a vacant lot
 - (4) filling in a swamp and planting grass and trees for a community park

Answer all questions in this part.

Directions (17-20): 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.

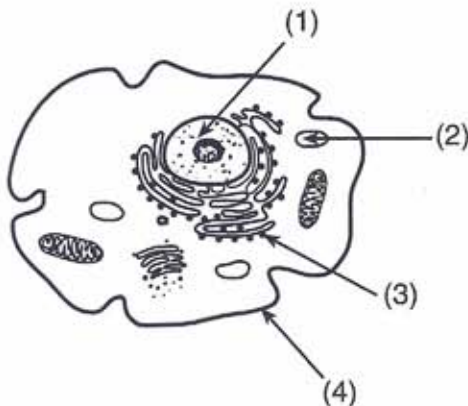
17. Some data concerning bird species are shown in the chart below.

Number of Bird Species	Location
26	northern Alaska
153	southwest Texas
600	Costa Rica

Which statement is a valid inference based on information in the chart?

- (1) The different species in northern Alaska can interbreed.
- (2) There are conditions in Costa Rica that account for greater biodiversity there.
- (3) The different species in southwest Texas evolved from those in northern Alaska.
- (4) The greater number of species in Costa Rica is due to a greater number of predators there.

18. In the diagram below, which structure performs a function similar to a function of the human lungs?

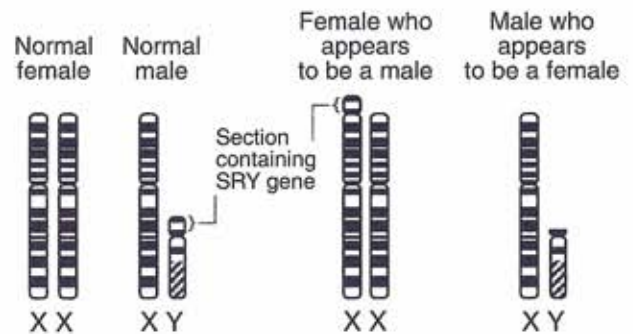


- | | |
|-------|-------|
| (1) 1 | (3) 3 |
| (2) 2 | (4) 4 |

19. Which source would provide the most reliable information for use in a research project investigating the effects of antibiotics on disease-causing bacteria?

- (1) the local news section of a newspaper from 1993
- (2) a news program on national television about antigens produced by various plants
- (3) a current professional science journal article on the control of pathogens
- (4) an article in a weekly news magazine about reproduction in pathogens

20. The Y-chromosome carries the SRY gene that codes for the production of testosterone in humans. Occasionally a mutation occurs resulting in the SRY gene being lost from the Y-chromosome and added to the X-chromosome, as shown in the diagram below.



Based on the diagram, which statement is correct?

- (1) The production of testosterone influences the development of male characteristics.
- (2) Reproductive technology has had an important influence on human development.
- (3) Normal female characteristics develop from a single X-chromosome.
- (4) Male characteristics only develop in the absence of X-chromosomes.

Base your answers to questions 21 through 23 on the information, diagram, and table below and on your knowledge of biology.

**For Teacher
Use Only**

A student wanted to test the hypothesis that rooting hormones will stimulate the production of new roots at a faster rate than would take place without rooting hormones. Two stem cuttings of equal length, similar to the one shown below, were taken from a rose, a begonia, and a geranium plant.



The cut end of one cutting from each plant was dipped into the hormone and then planted in wet sand. The other cutting from each plant was planted in wet sand without dipping it into the hormone. All cuttings were maintained in identical environmental conditions. At the end of 4 weeks, all the cuttings were removed from the sand and the lengths of the roots that had developed were measured. The results are summarized in the data table below.

Plant Cutting	Total Length of Roots in Centimeters	
	Treated with Hormone	Untreated
Begonia	1.50	1.00
Geranium	0.75	0.50
Rose	0.00	0.00

21. The effect of the rooting hormone on the production of new roots was most likely due to the influence of the hormone on the process of

- (1) photosynthesis
- (2) meiosis
- (3) mitosis
- (4) excretion

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22. Describe *one* way the student could make the experiment more valid. [1]

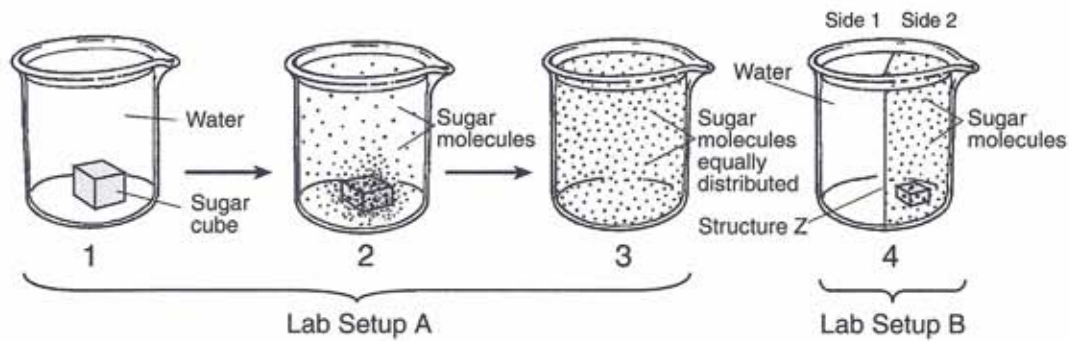
48

23. What purpose did the untreated cuttings serve in this experiment? [1]

For Teacher
Use Only

49

Base your answers to questions 50 and 51 on the diagram below of sugar in a beaker of water and on your knowledge of biology.



24. What process accounts for the change shown in lab setup A? [1]

50

25. In lab setup B, structure Z prevents the movement of sugar molecules into side 1. Which part of a living cell serves the same purpose as structure Z? [1]

51

Base your answers to questions 26 through 27 on the information and data table below and on your knowledge of biology.

**For Teacher
Use Only**

A student grew two separate cultures of single-celled organisms. One culture contained *Paramecium caudatum* and the other contained *Paramecium aurelia*. The cultures were grown under the same conditions and the number of paramecia (per drop) in each culture was estimated every 2 days for a period of 16 days. The results are shown in data table 1 below.

Data Table 1: Growth of *Paramecium aurelia* and *Paramecium caudatum* in Individual Cultures

Days	Number of <i>Paramecium caudatum</i> (per drop)	Number of <i>Paramecium aurelia</i> (per drop)
0	4	4
2	10	10
4	30	46
6	48	66
8	58	70
10	62	69
12	60	71
14	61	71
16	60	71

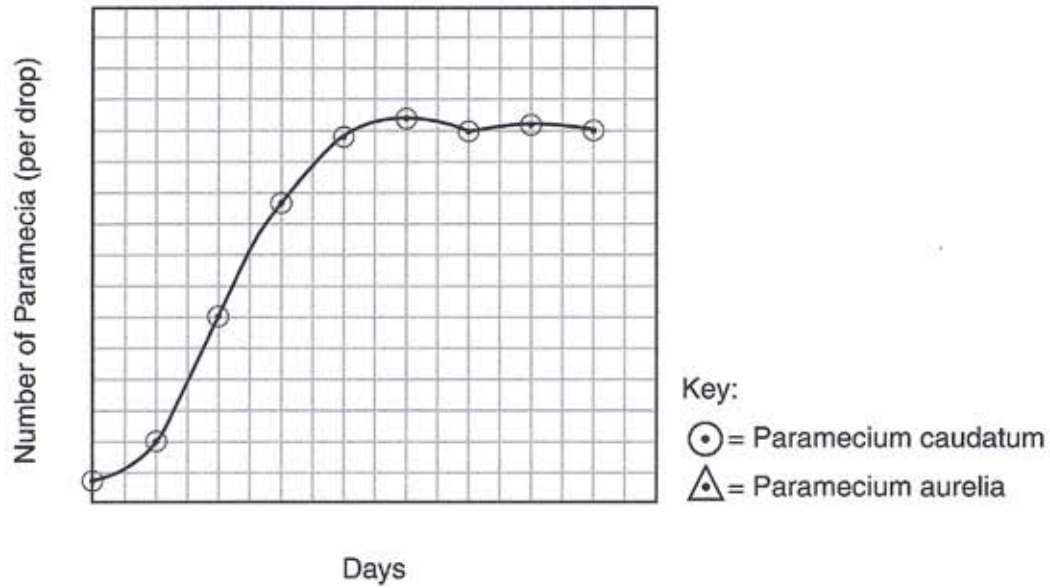
Directions (26–27): Using the information in the data table, construct a line graph on the grid provided on the next page, following the directions below.

26. Mark a scale on each labeled axis appropriate for the data for *Paramecium caudatum* that has already been plotted on the grid. [1]

27. Plot the data for *Paramecium aurelia* on the grid. Surround each point with a small triangle and connect the points. [1]

Example: 

Growth of *Paramecium aurelia* and *Paramecium caudatum* in Individual Cultures



39

40

28 Describe the change in the two populations between days 0 and 8. [1]

41

29 State one possible reason for the difference in the rates of change in the two populations of paramecia between days 0 and 8. [1]

42