





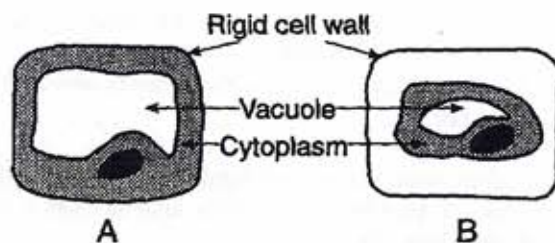
1. An experiment was performed to determine the effect of different mineral salts on plant growth. Forty pots containing genetically identical plants were divided into four equal groups and placed in a well-lighted greenhouse. Each pot contained an equal amount of nonmineral potting soil and one plant. Minerals were then added in equal amounts to each experimental group of pots as shown below.

Control Group	Experimental Groups		
			
	Water + Nitrogen salts	Water + Potassium salts	Water + Phosphorus salts

For the experiment to be valid, what should be added to the control group of pots?

- (1) water  
(2) nitrogen salts  
(3) potassium salts  
(4) potassium and phosphorus salts

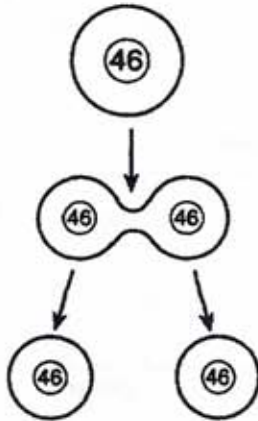
2. A biologist observed a plant cell in a drop of water as shown in diagram *A*. The biologist added a 10% salt solution to the slide and observed the cell as shown in diagram *B*.



The change in appearance of the cell resulted from

- (1) more salt moving out of the cell than into the cell  
(2) more salt moving into the cell than out of the cell  
(3) more water moving into the cell than out of the cell  
(4) more water moving out of the cell than into the cell
3. Which statement describing the cells in a body system is correct?
- (1) Each cell in the system is identical to the other cells in the system, and each cell works independently of the other cells.  
(2) Some cells in the system may be different from the other cells in the system, but all cells are coordinated and work together.  
(3) Each cell in the system is different from the other cells in the system, and each cell works independently of the other cells.  
(4) All cells in the system are identical to each other and work together.
4. The process of active transport requires the most direct use of
- (1) carbon dioxide  
(2) amino acids  
(3) ATP  
(4) glucose
5. Which substances may form in the human body due to invaders entering the blood?
- (1) nutrients  
(2) vaccines  
(3) antibodies  
(4) red blood cells
6. To communicate between cells, many multicellular animals use
- (1) nerve signals and respiratory gases  
(2) respiratory gases and hormones  
(3) bones and muscles  
(4) nerve signals and hormones
7. The function of the coded instructions contained in the body cells of an organism is to
- (1) form a variety of gametes that will pass on hereditary information  
(2) direct the synthesis of proteins necessary for proper cell function  
(3) synthesize different kinds of amino acids in a specific sequence  
(4) produce the inorganic molecules needed for normal cell growth

8. The diagram below can be used to illustrate a process directly involved in



- (1) tissue repair                      (3) recombination  
 (2) meiosis                              (4) sexual reproduction
9. Which characteristic allows enzymes to function in a specific way?
- (1) Enzymes are complex compounds composed of starch.  
 (2) Each enzyme has a characteristic shape.  
 (3) Enzymes are long, complex fats.  
 (4) Each enzyme is made up of four subunits.
10. Warts result when certain viruses cause skin cells to reproduce at a high rate. This rapid reproduction of skin cells is due to the viruses stimulating
- (1) cellular digestion                  (3) synthesis processes  
 (2) mitotic cell division              (4) meiotic cell division
11. The diagram below represents a reproductive process that takes place in humans.



- Which statement does *not* correctly describe this process?
- (1) The normal species chromosome number is restored.  
 (2) Males and females each contribute DNA to the offspring.  
 (3) The zygote will develop to become identical to the dominant parent.  
 (4) The sex of the zygote is determined by DNA in the gametes.
12. The energy found in ATP molecules synthesized in animal cells comes directly from
- (1) sunlight                              (3) minerals  
 (2) organic molecules                  (4) inorganic molecules

13. When a pregnant woman ingests toxins such as alcohol and nicotine, the embryo is put at risk because these toxins can
- (1) diffuse from the mother's blood into the embryo's blood within the placenta  
 (2) enter the embryo when it eats  
 (3) transfer to the embryo since the mother's blood normally mixes with the embryo's blood in the placenta  
 (4) enter the uterus through the mother's navel
14. Which substances are necessary for the synthesis of most materials in an organism?
- (1) hormones                              (3) antibodies  
 (2) carbohydrates                        (4) enzymes
15. Which statement best describes an immune response?
- (1) It always produces antibiotics.  
 (2) It usually involves the recognition and destruction of pathogens.  
 (3) It stimulates asexual reproduction and resistance in pathogens.  
 (4) It releases red blood cells that destroy parasites.
16. Which statement describes a feedback mechanism involving the human pancreas?
- (1) The production of estrogen stimulates the formation of gametes for sexual reproduction.  
 (2) The level of oxygen in the blood is related to heart rate.  
 (3) The level of sugar in the blood is affected by the amount of insulin in the blood.  
 (4) The production of urine allows for excretion of cell waste.
17. A green plant is kept in a brightly lighted area for 48 hours. What will most likely occur if the light intensity is reduced slightly during the next 48 hours?
- (1) Photosynthesis will stop completely.  
 (2) The rate at which nitrogen is used by the plant will increase.  
 (3) The rate at which oxygen is released from the plant will decrease.  
 (4) Glucose production inside each plant cell will increase.
18. A coverslip should be used for preparing a
- (1) frog for dissection  
 (2) solution of iodine for food testing  
 (3) wet mount of elodea (a simple plant)  
 (4) test to determine the pH of a solution
19. A sample of food containing one type of a large molecule was treated with a specific digestive enzyme. Nutrient tests performed on the resulting products showed the presence of simple sugars, only. Based on these test results, the original large molecules contained in the sample were molecules of
- (1) protein                                  (3) starch  
 (2) glucose                                  (4) DNA

Base your answers to questions 20 and 21 on the information and data table below and on your knowledge of biology.

In an investigation, three seeds of the same species were allowed to germinate and grow in three different locations. Each seedling was grown in the same amount and type of soil, and each received the same amount of water during a 6 day period. At the end of the investigation, the height of each seedling and the color of its leaves were recorded. The results are shown in the data table below.

Data Table		
Location	Height (cm)	Leaf Color
Sunny windowsill	7	green
Indirect sunlight	9	green
Closed closet	11	whitish yellow

20. State *two* ways that this investigation could be modified to lead to a more reliable conclusion.

---

---

21. Which hypothesis was most likely being tested in this investigation?

- (1) A plant grown in the dark will not be green.
- (2) The type of soil a plant is grown in influences how tall it will be.
- (3) Plants need water to grow.
- (4) Plants grown in red light are taller than plants grown in green light.

---

22. A television commercial for a weight-loss pill claims that it has been "scientifically tested." The advertisement includes statements from 10 people who say that the pill worked for them. State *two* reasons why someone should question the claims made in this advertisement.

---

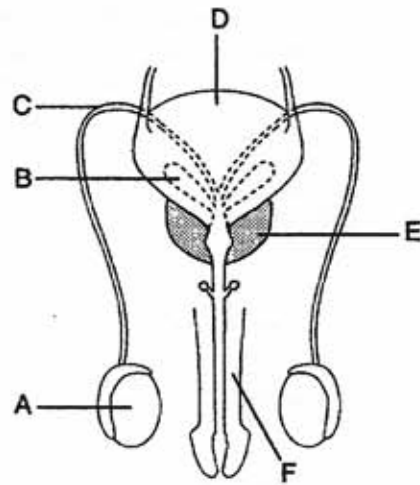
---

23. When HIV, which causes AIDS, invades the body of a person, that person often develops diseases. These diseases are caused by organisms that usually do not harm people who are not infected with HIV. Explain why the organisms are more harmful to people with HIV than to people without HIV.

---

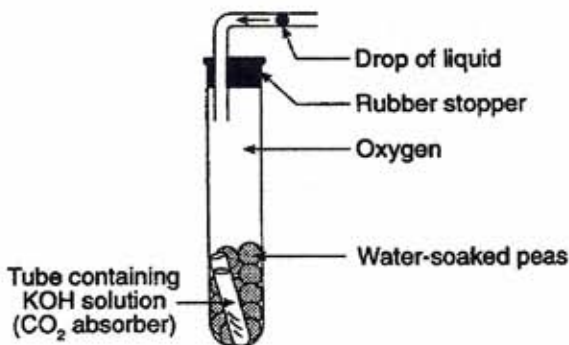
---

Base your answers to questions 24 through 26 on the diagram below.



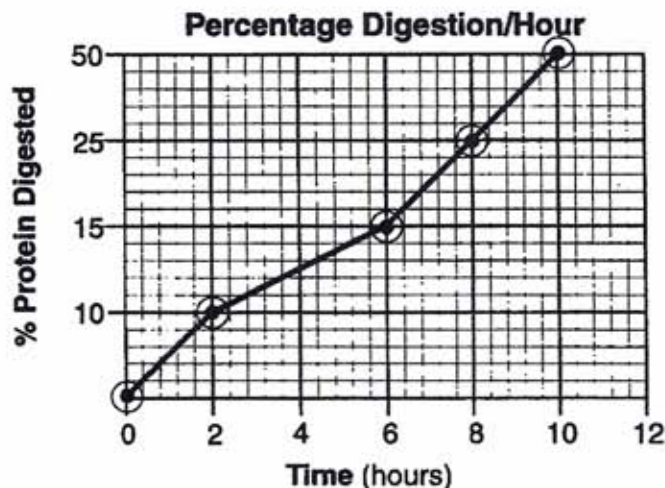
24. Which letter indicates a structure that secretes a hormone that promotes maturation of gametes?  
(1) A                      (2) B                      (3) C                      (4) D                      (5) E
25. Which letter indicates a structure that is *not* involved in the production or delivery of gametes?  
(1) A                      (2) B                      (3) C                      (4) D                      (5) F
26. Structures B and E provide nutrients and fluid for the gametes. Why are these substances necessary for fertilization?

- 
- 
27. In the demonstration shown below, which process performed by the peas when they start to grow causes the drop of liquid to move to the left?



- (1) protein synthesis                      (3) digestion  
(2) photosynthesis                      (4) cellular respiration

28. Describe *one* error that was made in the preparation of the graph shown below.



29. Explain how carbohydrates provide energy for life functions.

Base your answers to questions 30 through 33 on the information below.

#### Organ Transplants of the Future

While most people take good health for granted, thousands of others desperately need to replace a failing organ with one that is healthy. Most healthy organs come from people who agreed to donate them upon their death, although it is possible to remove some tissue and organs (such as kidneys and bone marrow) from living donors. Unfortunately, organs for transplant are in short supply. As of 1992, over 22,000 Americans were waiting for a transplant.

Although increasingly common, transplants are risky procedures. During the operation, veins and arteries must be blocked to prevent blood loss. This deprives parts of the body of oxygen and nutrients and may result in permanent damage. In addition, the body may recognize the transplanted organ as foreign and mount an immune response in which specialized white blood cells (T cells) attack the transplanted organ.

Drugs called immunosuppressants are given to transplant patients to prevent their immune system from rejecting the transplanted organ. However, these drugs weaken the ability of the body to fight disease and leave the patient less able to fight infection.

Scientists are exploring new technology for producing transplant tissues and organs. Unspecialized cells called stem cells are removed from the patient and then grown in a laboratory. Treating stem cells with the appropriate chemicals causes them to differentiate into various specialized tissues. In the future, scientists hope to develop chemical treatments that will cause stem cells to grow into complete organs needed for transplants. Transplants produced by this process would not be foreign material and, therefore, would not be rejected by the immune system of the patient.

30. Explain why a transplant might be dangerous to the health of a patient.

31. State *one* reason that transplant patients might take an immunosuppressant drug.

32. State *one* specific *disadvantage* of taking an immunosuppressant drug.

---

33. Explain why doctors would consider using tissues or organs that have been grown from stem cells.

---

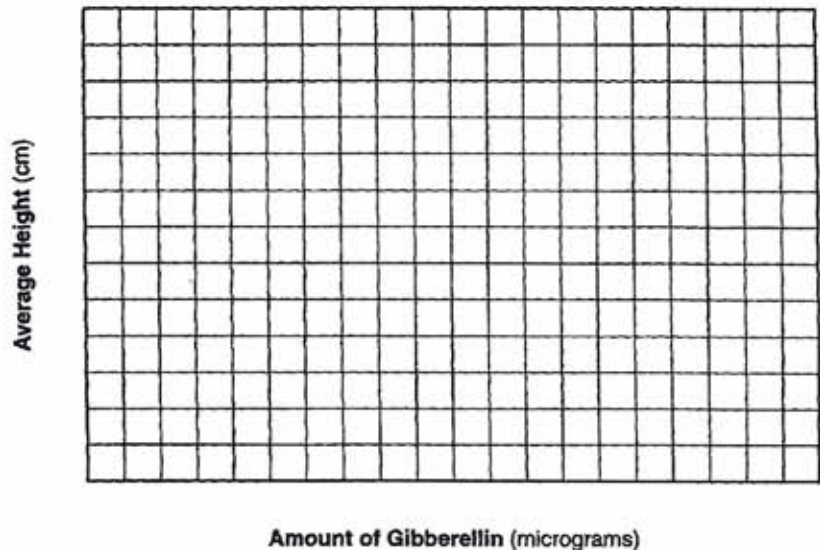
---

Base your answers to questions 34 through 37 on the information and data table below.

A student studied the effect of gibberellin (a plant hormone) on the growth of corn seedlings of the same height and species. A different concentration of gibberellin in a fixed volume of water was applied to 7 groups of 10 plants each maintained under the same environmental conditions for the duration of the experiment. At the end of this period, the height of each plant was measured. The data are shown in the table below.

**Data Table**

Micrograms of Gibberellin in a Water Solution	Average Height (cm)
0.00	20
0.05	40
0.10	60
0.25	70
0.50	75
1.00	80
2.00	80



34. Write an appropriate title for this graph in the space provided.

\_\_\_\_\_

35. Mark an appropriate scale on each labeled axis.

\_\_\_\_\_

36. Plot the data on the grid. Surround each point with a small circle and connect the points.

37. Explain the effect on corn seedling height of increasing the application amount of gibberellin from 0.05 to 0.50 microgram.

\_\_\_\_\_

\_\_\_\_\_

38. All living things carry out a variety of life functions such as coordination, excretion, digestion, circulation, and synthesis. Select *two* of the life functions listed. Define the two life functions you selected and explain how they interact to keep an organism alive.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

---

39. Write one or more paragraphs that compare the two methods of reproduction, asexual and sexual. Your answer must include at least:

- *one* similarity between the two methods
- *one* difference between the two methods
- *one* example of an organism that reproduces by asexual reproduction
- *one* example of an organism that reproduces by sexual reproduction

---

---

---

---

---

---

---

---

---

---