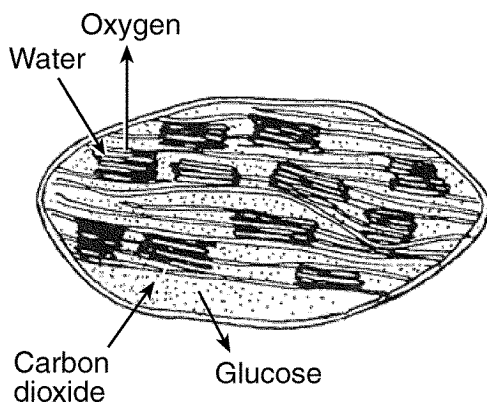


Name: _____

UNIT: PHOTOSYNTHESIS AND RESPIRATION

TOPIC: PHOTOSYNTHESIS

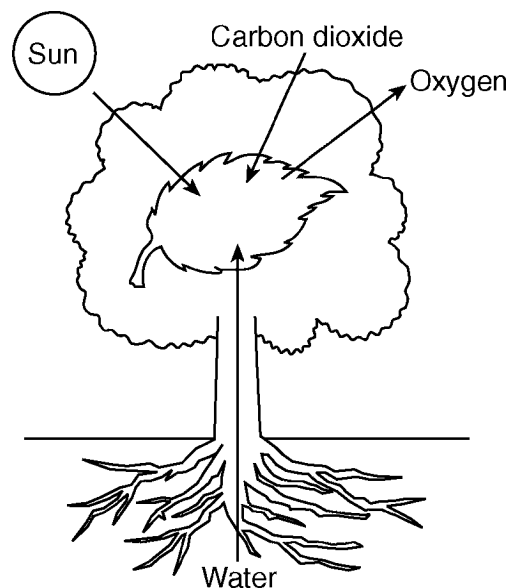
- 1) The diagram below illustrates the movement of materials involved in a process that is vital for the energy needs of organisms.



The process illustrated occurs within

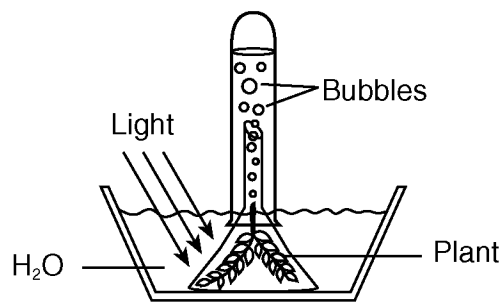
- | | |
|-----------------|-----------------|
| 1) ribosomes | 3) vacuoles |
| 2) mitochondria | 4) chloroplasts |
- 2) The interaction between guard cells and a leaf opening would *not* be involved in
- 1) feedback mechanisms
 - 2) heterotrophic nutrition
 - 3) maintaining homeostasis
 - 4) diffusion of carbon dioxide
- 3) An enzyme known as rubisco enables plants to use large amounts of carbon dioxide. This enzyme is most likely active in the
- | | |
|-----------------|-----------------|
| 1) chloroplasts | 3) mitochondria |
| 2) nucleus | 4) vacuoles |
- 4) Scientists studying ocean organisms are discovering new and unusual species. Which observation could be used to determine that an ocean organism carries out autotrophic nutrition?
- 1) The organism lives close to the surface.
 - 2) The organism synthesizes enzymes to digest food.
 - 3) Chloroplasts are visible inside the cells.
 - 4) Digestive organs are visible upon dissection.

- 5) The diagram below represents events associated with a biochemical process that occurs in some organisms.



Which of the following statements concerning this process is correct?

- 1) The process represented is photosynthesis and the primary source of energy for the process is the Sun.
 - 2) This process converts energy in organic compounds into solar energy which is released into the atmosphere.
 - 3) This process uses solar energy to convert oxygen into carbon dioxide.
 - 4) The process represented is respiration and the primary source of energy for the process is the Sun.
- 6) The green aquatic plant represented in the diagram below was exposed to light for several hours.

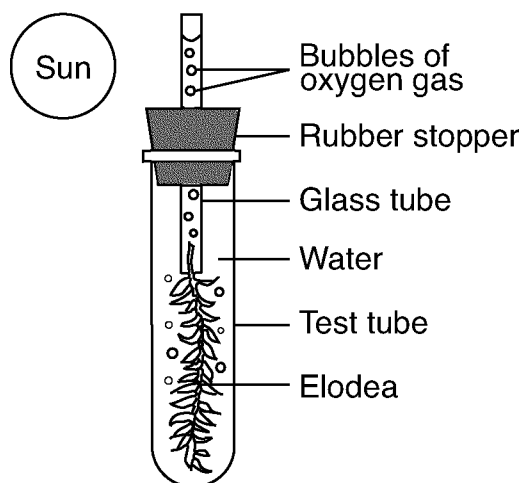


Which gas would most likely be found in the *greatest* amount in the bubbles?

- | | |
|-------------|-------------------|
| 1) oxygen | 3) ozone |
| 2) nitrogen | 4) carbon dioxide |

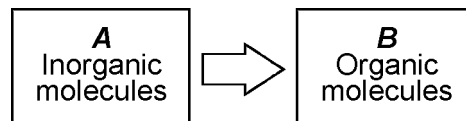
Questions 7 and 8 refer to the following:

A small water plant (elodea) was placed in bright sunlight for five hours as indicated below. Bubbles of oxygen gas were observed being released from the plant.



- 7) Since oxygen gas is being released in the experiment shown, it can be inferred that the plant is
- 1) carrying on active transport
 - 2) releasing energy from water
 - 3) producing glucose
 - 4) making protein
- 8) What substance did the plant shown most likely absorb from the water for the process that produces the oxygen gas?
- 1) dissolved nitrogen
 - 2) carbon dioxide
 - 3) a hormone
 - 4) an enzyme
- 9) In the transfer of energy from the Sun to ecosystems, which molecule is one of the first to store this energy?
- 1) DNA
 - 2) fat
 - 3) protein
 - 4) glucose
- 10) Starch molecules present in a maple tree are made from materials that originally entered the tree from the external environment as
- 1) amino acids
 - 2) enzymes
 - 3) inorganic compounds
 - 4) simple sugars

- 11) The diagram below represents a biological process.



Which set of molecules is *best* represented by letters A and B?

- 1) **A:** carbon dioxide and water
B: glucose
 - 2) **A:** oxygen and water
B: glucose
 - 3) **A:** glucose
B: oxygen and water
 - 4) **A:** glucose
B: carbon dioxide and water
- 12) Much of the carbon dioxide produced by green plants is *not* excreted as a metabolic waste because it
- 1) is too large to pass through cell membranes
 - 2) can be used for the synthesis of proteins
 - 3) can be used for photosynthesis
 - 4) is needed for cellular respiration
- 13) A word equation is shown as follows.
- $$\text{starch molecules} \xrightarrow{\text{biological catalyst}} \text{simple sugars}$$
- This reaction is most directly involved in the process of
- 1) replication
 - 2) heterotrophic nutrition
 - 3) protein synthesis
 - 4) reproduction
- 14) The chart below contains both autotrophic and heterotrophic organisms.

A	owl	cat	shark
B	mouse	corn	dog
C	squirrel	bluebird	alga

Organisms that carry out only heterotrophic nutrition are found in

- 1) rows A and C, only
 - 2) row A, only
 - 3) row B, only
 - 4) rows A and B, only
- 15) Which change in a sample of pond water could indicate that heterotrophic microbes were active?
- 1) increase in glucose level
 - 2) increase in ozone level
 - 3) decrease in carbon dioxide level
 - 4) decrease in oxygen level

Questions 16 and 17 refer to the following:

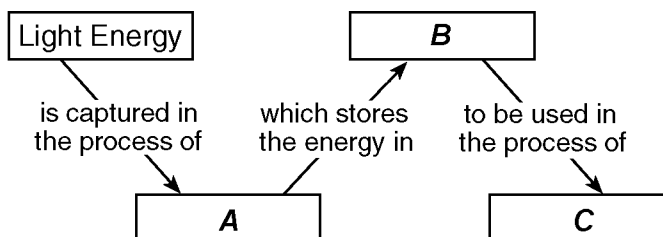
A biology student was given three unlabeled jars of pond water from the same source, each containing a different type of mobile unicellular organism: euglena, ameba, and paramecium. The only information the student has is that the ameba and paramecium are both heterotrophs and the euglena can be either heterotrophic or autotrophic, depending on its environment.

16) Based on the student's knowledge, state *one* way the euglena's two methods of nutrition provide a survival advantage the other unicellular organisms do not have.

17) In the experiment described, which procedure and resulting observation would help identify the jar that contains the euglena?

- 1) Prepare a wet-mount slide of specimens from each jar and observe each slide with a compound light microscope. Only the euglena will have chloroplasts.
- 2) Over a period of one week, determine the method of reproduction used by each type of organism. If mitotic cell division is observed, the jar will contain euglena.
- 3) Expose all sides of each jar to light. After 48 hours, the jar with the highest dissolved carbon dioxide content will contain the euglena.
- 4) Expose only one side of each jar to light. After 24 hours, only in the jar containing euglena will most of organisms be seen on the darker side of the jar.

18) Which numbered set of terms *best* identifies the letters in the diagram below?



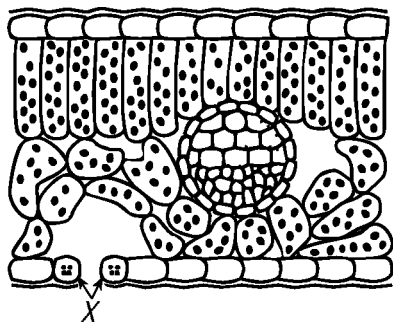
- 1) A — photosynthesis, B — inorganic molecules, C — decomposition
- 2) A — photosynthesis, B — organic molecules, C — respiration
- 3) A — respiration, B — inorganic molecules, C — photosynthesis
- 4) A — respiration, B — organic molecules, C — digestion

TOPIC: GUARD CELLS

19) Which process illustrates a feedback mechanism in plants?

- 1) Chloroplasts release more oxygen in response to a decreased rate of photosynthesis.
- 2) Guard cells release oxygen from the leaf at night.
- 3) Chloroplasts take in more nitrogen, which increases the rate of photosynthesis.
- 4) Guard cells change the size of leaf openings, regulating the exchange of gases.

20) The diagram below represents a cross section of part of a leaf.



Which life functions are directly regulated through feedback mechanisms associated with the actions of the structures labeled X?

- 1) excretion and immunity
- 2) circulation and reproduction
- 3) respiration and photosynthesis
- 4) digestion and coordination

21) In some land plants, guard cells are found only on the lower surfaces of the leaves. In some water plants, guard cells are found only on the upper surfaces of the leaves. Explain how guard cells in both land and water plants help maintain homeostasis. In your answer be sure to:

- (1) Identify *one* function regulated by the guard cells in leaves.
- (2) Explain how guard cells carry out this function.
- (3) Give *one* possible evolutionary advantage of the position of the guard cells on the leaves of land plants.

TOPIC: RESPIRATION

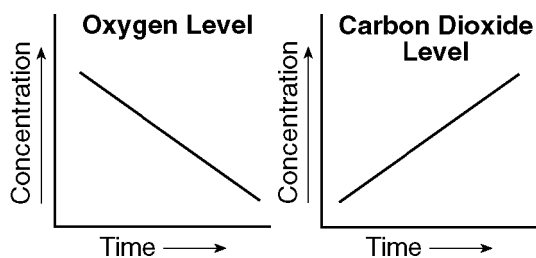
22) All life depends on the availability of usable energy. This energy is released when

- 1) respiration occurs in the cells of producers and high-energy molecules enter the atmosphere
- 2) cells carry out the process of respiration
- 3) organisms convert solar energy into the chemical energy found in food molecules
- 4) animal cells synthesize starch and carbon dioxide

23) In what way are photosynthesis and cellular respiration similar?

- 1) They both involve organic and inorganic molecules.
- 2) They both require oxygen and produce carbon dioxide.
- 3) They both require sunlight.
- 4) They both occur in chloroplasts.

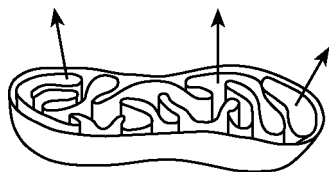
24) The graphs below show the changes in the relative concentrations of two gases in the air surrounding a group of mice.



Which process in the mice most likely accounts for the changes shown?

- 1) active transport
- 2) photosynthesis
- 3) evaporation
- 4) respiration

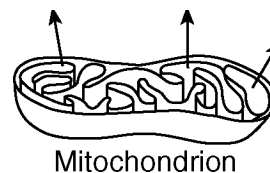
25) The diagram below represents a cell organelle involved in the transfer of energy from organic compounds.



The arrows in the diagram could represent the release of

- 1) oxygen from a mitochondrion carrying out photosynthesis
- 2) ATP from a chloroplast carrying out photosynthesis
- 3) carbon dioxide from a mitochondrion carrying out respiration
- 4) glucose from a chloroplast carrying out respiration

26) The diagram below represents a structure involved in cellular respiration.



The release of which substance is represented by the arrows?

- 1) carbon dioxide
- 2) oxygen
- 3) DNA
- 4) glucose

27) Which statement *best* describes cellular respiration?

- 1) It stores energy in food molecules.
- 2) It converts energy in food into a more usable form.
- 3) It uses carbon dioxide and produces oxygen.
- 4) It occurs in animal cells, but not in plant cells.

28) The rate at which all organisms obtain, transform, and transport materials depends on an immediate supply of

- 1) carbon dioxide and enzymes
- 2) solar energy and carbon dioxide
- 3) ATP and solar energy
- 4) ATP and enzymes

29) The production of energy-rich ATP molecules is the direct result of

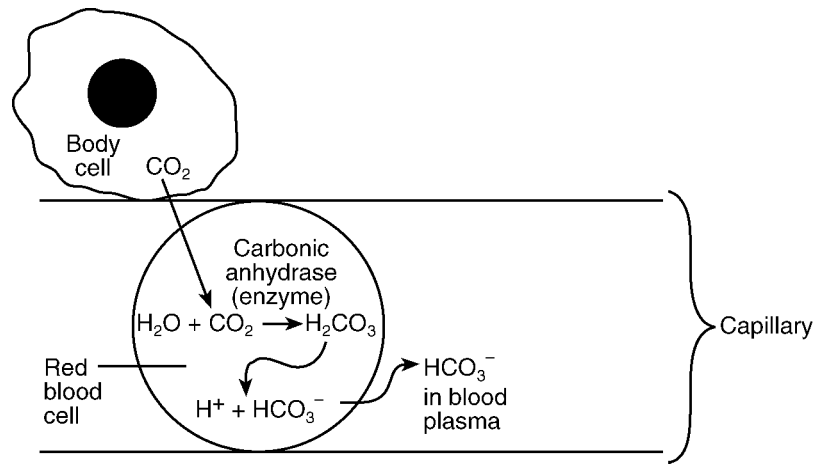
- 1) releasing the stored energy of organic compounds by the process of respiration
- 2) copying coded information during the process of protein synthesis
- 3) breaking down starch by the process of digestion
- 4) recycling light energy to be used in the process of photosynthesis

30) Energy from organic molecules can be stored in ATP molecules as a direct result of the process of

- 1) cellular reproduction
- 2) diffusion
- 3) digestion
- 4) cellular respiration

Questions 37 through 39 refer to the following:

The diagram below illustrates a transport pathway of CO_2 in the human body.



- 37) Identify the cellular process that most likely produced the CO_2 in the body cell shown.
- 38) Explain why the carbon dioxide in the diagram moves into red blood cells by diffusion rather than by active transport.
- 39) State what would happen to the production of bicarbonate ions (HCO_3^-) if the carbonic anhydrase in the red blood cell shown in the diagram was *not* present.

TOPIC: QUESTIONS ABOUT BOTH PHOTOSYNTHESIS AND RESPIRATION

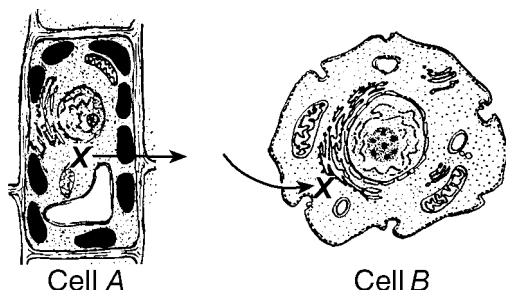
Questions 40 and 41 refer to the following:

Carbon exists in a simple organic molecule in a leaf and in an inorganic molecule in the air humans exhale.

- 40) Based on the given statement, identify the simple organic molecule formed in the leaf and the process that produces it.
- 41) Based on the given statement, identify the carbon-containing molecule that humans exhale and the process that produces it.

Questions 42 through 44 refer to the following:

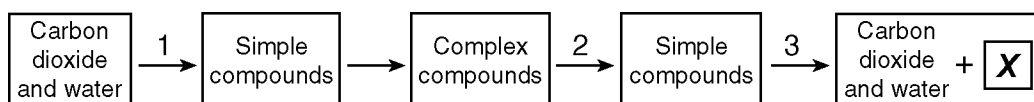
In the two different cells shown below, only cell A produces substance X. Both cells A and B use substance X.



- 42) Identify substance X in the diagram shown.
- 43) Identify the type of organelle in cell A that produces substance X in the diagram.
- 44) Identify the type of organelle found in *both* cell A and cell B in the diagram that uses substance X.
- 45) Photosynthesis and respiration are two important processes. Discuss *one* of these processes and explain its importance to an organism. In your answer, be sure to:
- (1) Identify the process being discussed.
 - (2) Identify the organelle where this process occurs.
 - (3) Identify *two* raw materials necessary for this process.
 - (4) Identify *one* energy-rich molecule that is produced by this process.
 - (5) State how organisms use the energy-rich molecule that is produced.
 - (6) State how a gas produced by this process is recycled in nature.

Questions 46 through 49 refer to the following:

The arrows in the diagram below represent biological processes.



- 46) Identify *one* type of organism that carries out process 1 in the diagram shown.
- 47) Explain why process 2 in the given diagram is essential in humans.
- 48) Identify process 3 in the given diagram.
- 49) Identify what letter X represents in the given diagram.