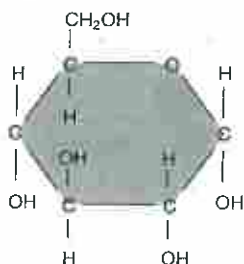


## Unit 2

## Biochemistry

1. The following diagram illustrates a glucose molecule.



Which of the following describes how the body uses molecules like the one illustrated above?

- A Sugars form carbohydrates, which are linked together to form fats that store energy.
- B Sugars form carbohydrates, which are broken down to release chemical energy that is used by the body's cells.
- C Sugars are broken down into proteins that become the building blocks of the body's tissues.
- D Carbohydrates are broken down into glucose, which is stored inside the body's cells.

2. What is the attractive force between two of the same kind of particle?

- A adhesion
- B capillary action
- C cohesion
- D polarity

3. Atoms, which have no electric charge, consist of positively charged protons, negatively charged electrons, and electrically neutral neutrons. Predict what would happen if one or more electrons were removed from an atom.

- A The atom would acquire an overall positive charge, because it would have more protons than electrons.
- B The atom would acquire an overall negative charge, because its electrons would be out of balance.
- C The atom would remain electrically neutral, because protons, not electrons, determine overall charge.
- D The atom would acquire an overall negative charge, because it would have fewer electrons than protons.

Unit 2 *continued*

## Biochemistry

4. Surface carbohydrates, branching chains of sugar units on the surface of some bacteria, are MOST similar to which of the following?

- A artificial sweetener
- B wood used for a campfire
- C a metal personal identification bracelet
- D the hide of an animal

5. Examine the chart below.

Substance	pH
Milk	6.4
Tomatoes	4.2
Egg whites	7.8
Lemons	2.3

Based on the information in the chart, which of the substances listed has the greatest number of hydrogen ions?

- A milk
- B tomatoes
- C egg white
- D lemons

6. Water is one of the most important nonliving (abiotic) components of any ecosystem. Water passes through plants and evaporates from their leaves in a process known as

- A photosynthesis.
- B precipitation.
- C respiration.
- D transpiration.

7. Explain what happens when you water a plant that has drooping leaves.

- A The environment changes from isotonic to hypotonic, water moves into cells by osmosis, vesicles in the plant cells swell, and the leaves stop drooping.
- B The environment changes from hypotonic to hypertonic, the cytoplasm swells, and the leaves stop drooping.
- C The environment changes from isotonic to hypertonic, mitochondria in the plant cells take up the additional water, and the leaves stop drooping.
- D The sudden movement of water by osmosis into the plant cells causes the cells to swell and burst.

**Unit 2** *continued***Biochemistry**

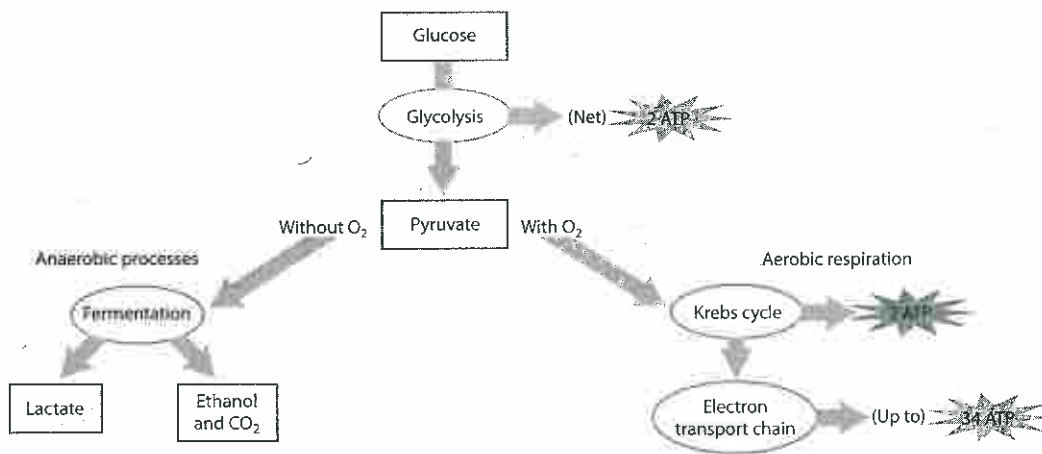
8. Which description represents the effects of osmosis on a plant cell when the concentration of sugar particles is greater inside the cell than outside the cell?

- A Water diffuses out of the cell, and the cell shrinks.
- B Water moves into and out of the cell at equal rates, and cell size remains the same.
- C Water diffuses into the cell, and the cell swells.
- D Water is blocked from moving into or out of the cell, and cell size remains the same.

9. Cells require more energy from food than is actually needed to perform their functions. Only about 60% of the Calories in a food are used by the body to perform cellular functions. What accounts for the other 40% of Calories?

- A released thermal energy
- B stored thermal energy
- C energy stored in chemical bonds
- D energy stored in fats

10. The diagram below shows steps involved in cellular respiration.



Which of the following processes of respiration could take place within an airtight bottle?

- A electron transport
- B Krebs cycle
- C fermentation
- D breakdown of starch

**Unit 2** *continued***Biochemistry**

11. What is the primary source of energy for photosynthesis?

- A ATP
  - B fermentation
  - C heat
  - D sunlight
- 

12. Which of the following processes is important to a runner at the end of a marathon?

- A alcoholic fermentation to release carbon dioxide
  - B the electron transport chain to produce ATP
  - C the Krebs cycle to produce NADH and FADH<sub>2</sub>
  - D lactic acid fermentation to produce ATP without oxygen
- 

13. What effect does a cold, sunny day have on the rate of photosynthesis?

- A The abundant sunshine speeds up photosynthesis.
  - B The amount of sunlight and the temperature have no effect on photosynthesis.
  - C Cold temperatures decrease the activity of some enzymes, so photosynthesis slows down.
  - D Photosynthesis stops because the chloroplasts freeze.
- 

14. Which of the following comprises an ATP molecule?

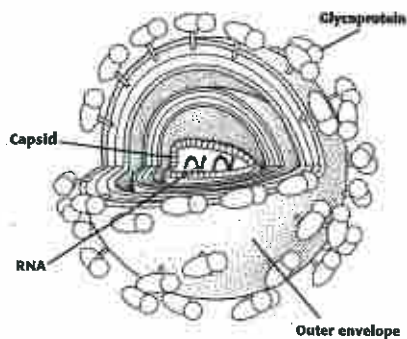
- A adenine, the sugar deoxyribose, and two phosphate groups
  - B a nitrogenous base, a phosphate group, and the sugar ribose
  - C adenine, the sugar ribose, and three phosphate groups
  - D a complex molecule of amino acids surrounding an iron atom
-

**Unit 2** *continued***Biochemistry**

15. Which of the following is correct concerning the relative Caloric values of organic molecules?

- A Fats contain fewer Calories than proteins or carbohydrates because of their low energy bonds.
- B Carbohydrates produce more Calories than any other type of food.
- C Lipids are used as storage molecules, because breaking their bonds releases more Calories than breaking bonds in sugars or proteins.
- D Proteins are essentially impossible to break down metabolically, so they provide close to zero Calories per gram.

16. The following illustration is of an HIV particle.

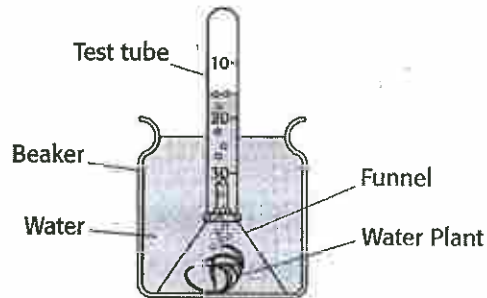


What is the function of the glycoproteins on the outside of the virus?

- A to carry genetic material
- B to help the virus invade cells
- C to propel the virus forward
- D to protect the HIV particle from antibiotics

**Unit 2** *continued***Biochemistry**

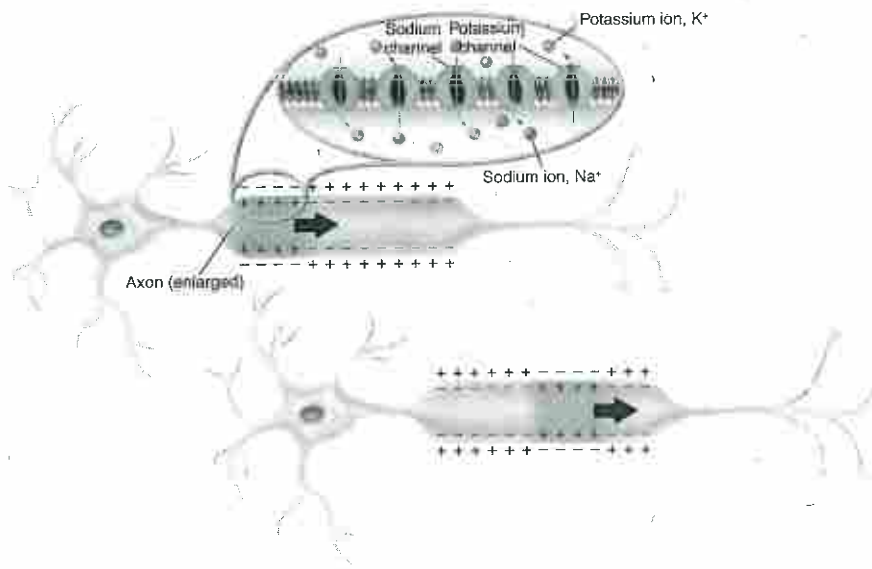
17. Latecia conducted an experimental investigation of the gas production of a water plant. She placed a beaker upside down over a water plant submerged in water and collected the gas that the water plant produced when kept in sunlight. After several days, a large bubble of gas collected in the upside-down beaker.



Given that the gas comes from the water plant, infer the contents of the bubble of gas collected in the test tube.

- A The gas contains one of the products of respiration, oxygen.
  - B The gas contains one of the products of photosynthesis, oxygen.
  - C The gas contains one of the reactants of respiration, carbon dioxide.
  - D The gas contains one of the products of photosynthesis, carbon dioxide.
- 
18. Which of the following correctly describes the way animals get their nutrition?
- A They make their own food through a process called photosynthesis.
  - B They eat other organisms, their parts, or products.
  - C They decompose dead plant matter.
  - D They make their own food through a process called cellular respiration.
- 
19. Muscles use ATP as an energy source for contraction. Usually, ATP is produced in the presence of oxygen. What happens when oxygen cannot be delivered fast enough to keep up with a muscle's demand for ATP?
- A The muscle tissue begins to die.
  - B Muscles break down glucose in a process called anaerobic respiration.
  - C Muscle cells use fat stores from inside the cell to provide the energy needed.
  - D Muscle tissues begin to use lactic acid as a source of energy.
-

20. The figure below illustrates the axon of a typical nerve cell.



When a nerve cell receives a stimulus, the cell membrane changes. The sodium (Na) channels open and positively charged Na ions flow into the cell, making that part of the cell membrane less negative on the inside. How does this action potential change over time?

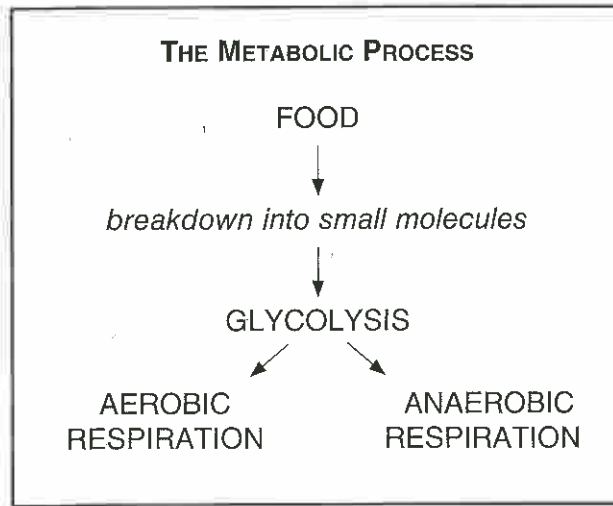
- A A chain reaction moves along the membrane, causing its length to also become more negative on the inside.
- B A chain reaction moves along the membrane, causing similar relatively positive charges on the outside of the membrane.
- C The relative charge stays in place until the nerve has carried all messages and the body goes to sleep.
- D A chain reaction moves along the membrane, causing similar relatively negative charges on the outside of the membrane.

21. A florist places a bouquet of white carnations in water containing blue dye. After a time, the flowers turn blue. What process helped the carnations to change color?

- A water's ability to form crystals
- B formation of covalent bonds between hydrogen and oxygen molecules
- C ability of H<sub>2</sub>O to dissolve NaCl
- D cohesion and adhesion of water molecules

**Unit 2** *continued***Biochemistry**

22. Living things use enzymes in the chemical reactions of metabolism. When food is digested, it is metabolized to release energy. This process is illustrated below.



Which statement best describes the role of an enzyme in this process?

- A The active site of the enzyme binds to a substrate on a food molecule and the enzyme changes shape slightly, causing a chemical reaction to happen.
  - B Because enzymes are proteins, they only react with other protein molecules, resulting in the production of glucose.
  - C The active site of the enzyme attached to the substrate of a food molecule produces carbon molecules, the building blocks of cells.
  - D The active site of an enzyme attached to a substrate prevents the chemical reactions involved in metabolism from happening too quickly.
- 
23. Most adult amphibians live in water or in moist habitats. What characteristic of amphibians makes a wet habitat necessary for their survival?
- A Amphibians are ectotherms.
  - B Amphibians eat small invertebrates.
  - C Adult amphibians can breathe through gills, lungs, or skin.
  - D Amphibians eggs could easily dry out on land.
-