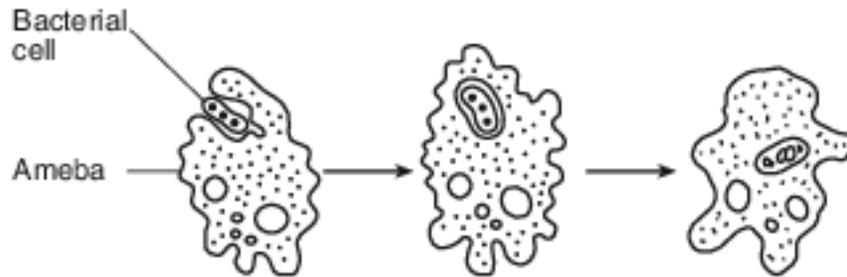


(Nysed) Cellular Respiration

Base your answers to questions 1 on the diagram below and your knowledge of biology. The diagram represents an ameba, a single-celled organism, carrying out an essential life process.



- 1 This process is essential to the survival of the ameba because it
 - (1) provides materials used in cellular respiration
 - (2) removes pathogens from the environment
 - (3) supplies the raw materials for photosynthesis
 - (4) protects the organism during development
- 2 In the cells of the human body, oxygen molecules are used directly in a process that
 - (1) releases energy
 - (2) digests fats
 - (3) synthesizes carbohydrate molecules
 - (4) alters the genetic traits of the cell
- 3 The energy released when sugar molecules are broken down is stored in
 - (1) minerals
 - (2) ATP
 - (3) DNA
 - (4) wastes
- 4 In the human body, carbon monoxide reduces the amount of oxygen that can be transported to cells. Breathing in too much carbon monoxide will most likely result in the production of
 - (1) less ATP
 - (2) less glucose
 - (3) more DNA
 - (4) more protein

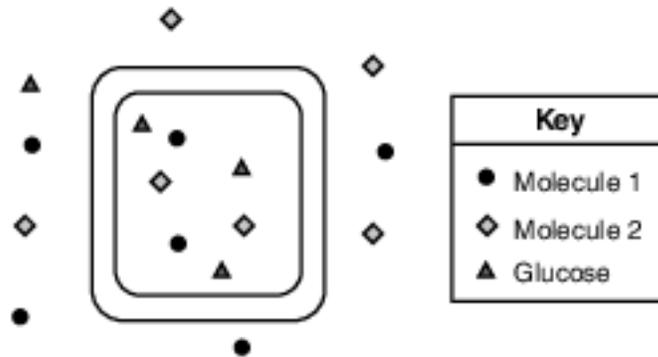
5 The diagram below shows part of the human body with some organs that help to carry out the removal of wastes.



The energy necessary to perform this function comes directly from the

- (1) exchange of H₂O and O₂ during respiration
- (2) blood flowing through the organs
- (3) ATP molecules produced during cellular respiration
- (4) water that is eliminated by the organs

Base your answers to questions 6 on the information and diagram below and on your knowledge of biology. The diagram represents a plant leaf cell and two different molecules used in the process of glucose synthesis.



6 Molecules 1 and 2 are most likely

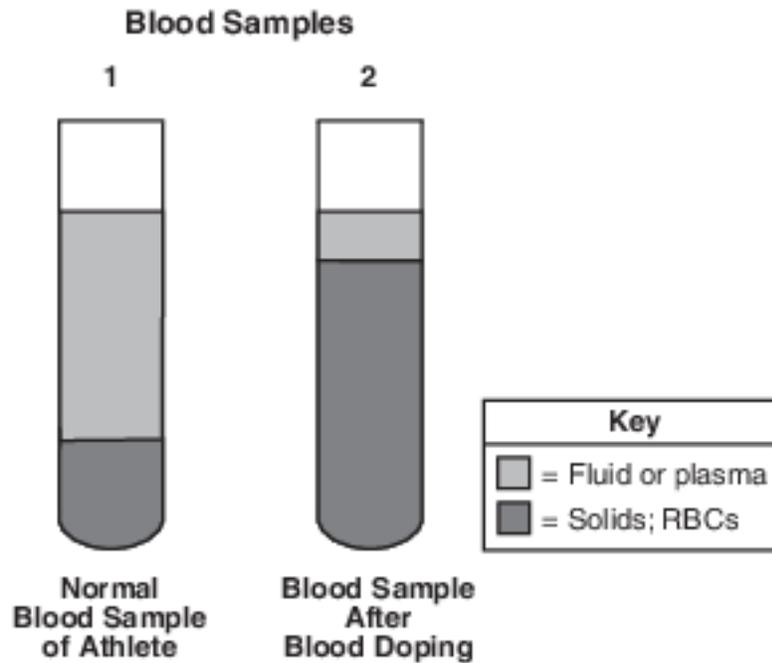
- (1) carbon dioxide and oxygen
- (2) carbon dioxide and water
- (3) nitrogen and oxygen
- (4) nitrogen and water

Base your answers to questions 11 on the information and diagram below and on your knowledge of biology.

Blood Doping

Blood is a fluid tissue, which means that blood cells are suspended in a fluid called plasma. Blood tests are concerned with not only the number of blood cells present, but with the amount of plasma that surrounds the cells.

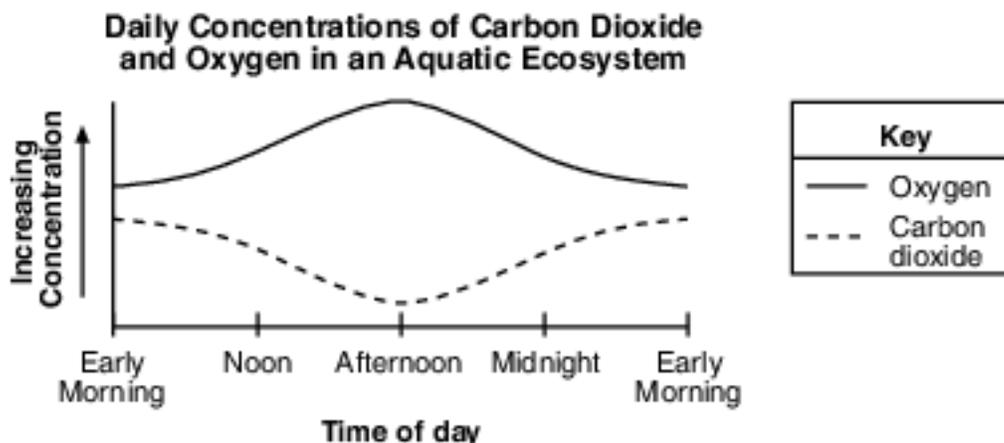
The diagram below represents tubes containing blood samples from an athlete before and after blood doping. Blood doping is an illegal practice reportedly used by some athletes a few weeks before an athletic event, and involves removing whole blood from an athlete, separating the oxygen-carrying red blood cells (RBCs), and then freezing them. These RBCs are thawed and returned to the athlete's body just before the athlete competes. Serious health risks are associated with this practice.



- 11 Explain why athletes who practice blood doping would be expected to perform better at an athletic event. [1]

Base your answer to question 12 on the information below and on your knowledge of biology.

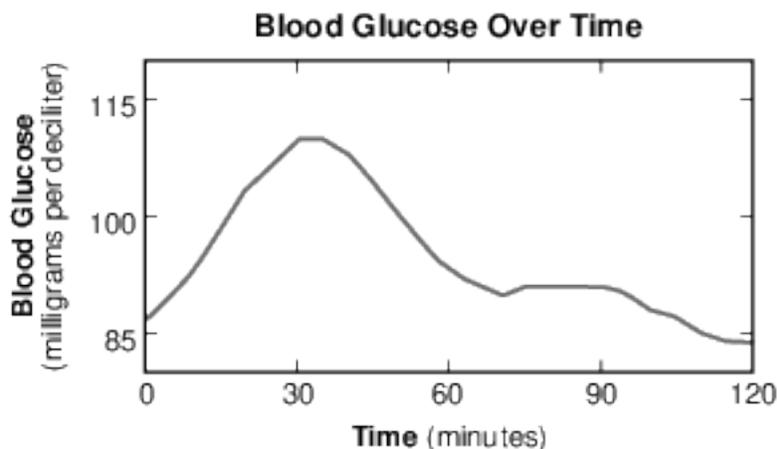
A student measured oxygen and carbon dioxide concentration levels in an aquatic ecosystem during a 24 hour period. The data are represented in the graph below.



12 Identify two biological processes that are responsible for the production of varying amounts of carbon dioxide and oxygen within the aquatic ecosystem. [1]

Processes: _____ and

Base your answers to questions 13 on the information and graph below and on your knowledge of biology. The graph shows the change in the blood glucose level of one person after eating a cookie.



Source: Adapted from <https://www.sciencenews.org/article/good-diet-you-may-be-bad-me>

13 Explain why most human cells require a supply of glucose. [1]

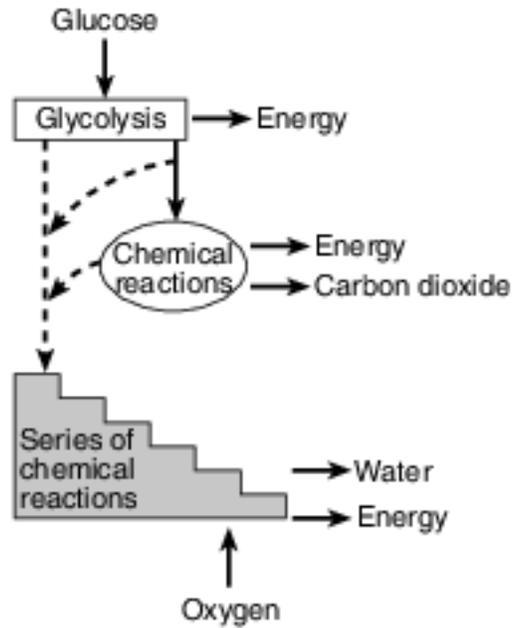
Base your answers to questions 14 on the word equations below and on your knowledge of biology. The equations represent two biochemical processes that occur in living organisms. The letter X represents a molecule produced from process 1.

Process 1: oxygen + glucose → carbon dioxide + water + X

Process 2: carbon dioxide + water → oxygen + glucose

14 Identify the molecule represented by letter X in process 1. [1]

Base your answers to questions 15 on the diagram below and on your knowledge of biology. The diagram illustrates the steps in a process that occurs in the cells of many organisms.



Adapted from: Biology: A Community Context,
W. H. Leonard and J. Penick, 1998

15 Identify one specific molecule used to store the energy being released during this process. [1]
Molecule:

Answer Keys

1 1

2 1

3 2

4 1

5 3

6 2

7 4

8 3

9 1

10 2

11 Allow 1 credit. Acceptable responses include, but are not limited to:

- — The practice increases the number of RBCs that would carry more oxygen to muscle cells.
- — Since muscle cells receive more oxygen for respiration, they would have more energy for the athletic event.
- — They would have more energy because they have extra oxygen.

12 Allow 1 credit. Acceptable responses include, but are not limited to:

- — respiration and photosynthesis
- — photosynthesis and aerobic respiration
- — photolysis and respiration

13 Allow 1 credit. Acceptable responses include, but are not limited to:

- — Cells require a supply of glucose to produce ATP.
- — Cells need glucose to carry out cellular respiration.
- — Cells need glucose to release energy/for energy/as a source of energy.
- — Glucose is needed to provide energy for cells.

14 Allow 1 credit for ATP or adenosine triphosphate.

15 Allow 1 credit for ATP/ADP or NADH/NAD.