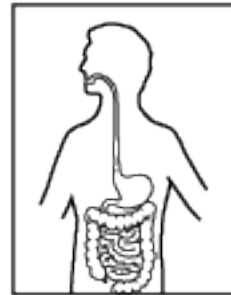
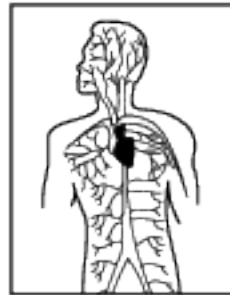
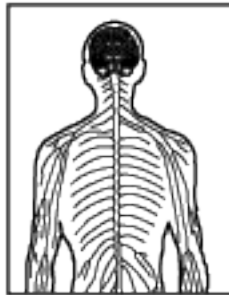


## Interaction And Control Mechanisms

1 Bumblebees show some ability to control their own body temperature. During cold weather, bumblebees have been observed warming their flight muscles by shivering. The bees are able to maintain a body temperature several degrees above that of the surrounding air. Regulation of their internal body temperature is an example of

- (1) diffusion                      (3) respiration  
 (2) synthesis                      (4) homeostasis

Base your answers to questions 2 on the diagrams below and on your knowledge of biology. The diagrams represent some of the systems that make up the human body.



2 A similarity between these systems is that they all

- (1) are made of cells that are identical in structure and function  
 (2) contain organs that work independently from other organs in that system  
 (3) work together to maintain a stable internal environment  
 (4) are separate and do not interact with other body systems

3 One characteristic of all living things is that they

- (1) develop organ systems                      (3) maintain internal stability  
 (2) produce identical offspring                      (4) synthesize only inorganic matter

4 In order for the human body to maintain homeostasis, the breakdown of glucose to release energy must be followed by the

- (1) production of oxygen                      (3) removal of wastes  
 (2) division of the cell                      (4) production of receptor molecules

5 A similarity between humans and many other multicellular animals is that they

- (1) occupy the same niche in most food webs                      (3) have the same DNA sequences  
 (2) are composed of organ systems                      (4) carry out autotrophic nutrition



Base your answers to questions 10 on the passage below and on your knowledge of biology.

### The Protein Shredder

In every cell, thousands of important processes are occurring around the clock. One of the ways a cell manages to coordinate all of these processes is by sending protein messages. After the protein messages are delivered and read, they need to be destroyed to prepare for the arrival of the next message.

The task of destroying these proteins falls on cell structures known as proteasomes. Think of a proteasome as a tubelike protein shredder. Protein molecules that have served their purpose are transported to the proteasome, unfolded, fed through the tube, and cut into smaller molecules that can then be used to synthesize new protein molecules. Proteasomes can shred any type of protein.

Individuals with a neurological disorder known as hereditary ataxia have been found to have an excess of protein in the cells of their brains and spinal cords. The abnormal level somehow leads to the death of cells in portions of the cerebellum. These areas of cell loss can be seen on a brain scan.

There are several forms of hereditary ataxia but all of them result in poor coordination. The symptoms progress over a period of years. In the beginning, the individuals experience only minor coordination problems. As time passes, the symptoms become worse. The affected individuals will have poor balance when walking. They will be clumsy and have difficulty talking and swallowing.

10 Based on the symptoms shown by individuals with hereditary ataxia, state two functions regulated by the cerebellum and spinal cord. [1]

Functions: \_\_\_\_\_ and  
\_\_\_\_\_

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

The fight-or-flight response in humans prepares the body to fight off or run away from a potential threat. This response results from a series of nerve and chemical signals that direct how cells function. This, in turn, determines the actions of organs in these situations.

Some of the changes experienced by the individuals as part of this response include:

increased pulse rate increased blood glucose levels increased breathing rate

11 Select one of the listed changes experienced by the individual and write it on the line below.

Explain how the change you chose allows the individual to effectively respond to a threat. [1]

Change:

## Answer Keys

1 4

2 3

3 3

4 3

5 2

6 2

7 4

8 1

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

- — The blood takes in oxygen as it flows through the respiratory system.
- — The oxygen level goes up/increases.
- — It releases water.
- — It releases carbon dioxide.

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

- — coordination
- — balance
- — walking
- — talking
- — swallowing
- Note: Do not accept symptoms, i.e, “poor balance” or “difficulty walking.”

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

- Change: Increased pulse rate:
  - — moves blood rich in glucose/oxygen to the cells faster
  - — allows the body to get rid of waste products/carbon dioxide faster
- Note: Do not accept an answer that only states that the blood moves faster without explaining how this helps an individual effectively respond.
- Change: Increased blood glucose levels:
  - — provide cells with a ready source of energy more rapidly
- Change: Increased breathing rate:
  - — eliminates carbon dioxide faster
  - — allows the body to get oxygen into the blood faster