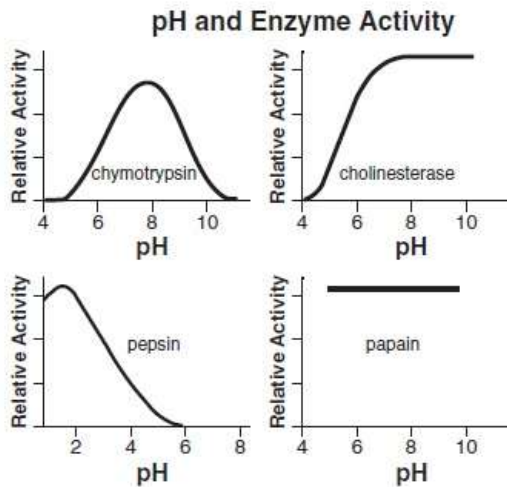


Base your answers to questions 1 and 2 on the information and graphs below and on your knowledge of biology. The graphs show the relative enzymatic activity of four different enzymes in acidic (below pH 7) and basic (above pH 7) environments.



Part of Digestive System	pH Range
mouth	6.5 – 7.5
stomach	1.5 – 4.0
small intestine	4.0 – 7.0
large intestine	4.0 – 7.0

1. Which enzyme would most likely function in the stomach? Support your answer.

Enzyme: _____

2. The activity of which enzyme decreases in both acidic and basic environments?

A) **chymotrypsin** B) pepsin C) cholinesterase D) papain

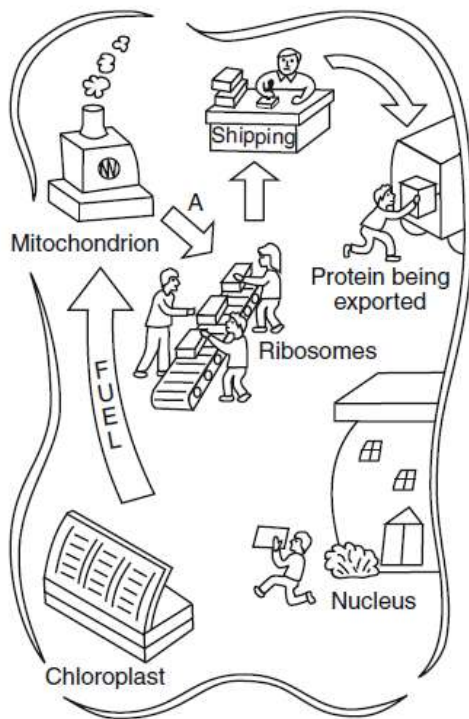
3. Two life functions performed by all living organisms are nutrition and respiration. Identify two other life functions that are essential for the survival of all living organisms. Explain how each of the two life functions you identified maintains homeostasis.

4. Base your answer to the following question on the statement below and on your knowledge of biology.

Some internal environmental factors may interfere with the ability of an enzyme to function efficiently.

Explain why changing the shape of an enzyme could affect the ability of the enzyme to function.

Base your answers to questions 5 through 7 on the diagram below and on your knowledge of biology. The diagram compares cell functions with jobs in a factory.

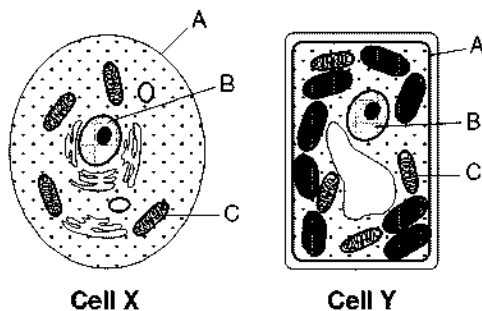


5. What chemical substance produced by the mitochondrion is represented by arrow *A*?
6. Which cell structure synthesized the "Protein being exported"?
7. Which *two* chemical waste products are most likely represented by the smoke above the mitochondrion?

_____ and _____

-
8. Just like complex organisms, cells are able to survive by coordinating various activities. Complex organisms have a variety of systems, and cells have a variety of organelles that work together for survival. Describe the roles of two organelles. In your answer be sure to include:
 - a* the names of two organelles and the function of each
 - b* an explanation of how these two organelles work together
 - c* the name of an organelle and the name of a system in the human body that have similar functions

Base your answers to questions 9 and 10 on the diagrams below of two cells, *X* and *Y*, and on your knowledge of biology.



9. Identify one process that is carried out in cell *Y* that is *not* carried out in cell *X*.

10. State one function of the organelle that you identified in the previous question.

11. Base your answer to the following question on the diagram of a cell below.



Describe how structures 1 and 2 interact in the process of protein synthesis.

12. In desert environments, organisms that cannot maintain a constant internal body temperature, such as snakes and lizards, rarely go out during the hot, sunny daylight hours. They stay in the shade, under rocks, or in burrows during the day. Explain how this behavior helps maintain homeostasis in these organisms.

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13. Enzymes and antibodies are molecules that have specific shapes that give them different functions. Select either enzyme or antibody, and explain how the shape of the molecule you chose helps it carry out its normal function.

Molecule: _____

Base your answers to questions **14** and **15** on the information below and your knowledge of Biology.

Nutrients in a diet, such as proteins, carbohydrates, and minerals, play an important role in homeostasis within the human body. Lack of these nutrients can lead to malfunctions that disrupt this internal balance. Explain how diet can influence homeostasis. In your answer, be sure to:

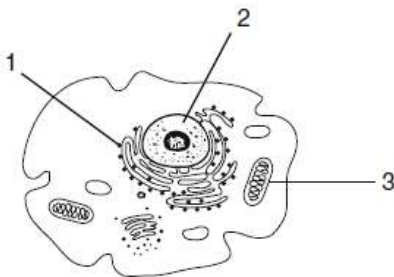
14. Describe, using *one* specific example, how a *decrease* in this nutrient can alter homeostasis

Nutrient: _____

15. Select a nutrient from the passage and write it on the line below and state *one* role this nutrient plays in the body.

16. Base your answer to question on the diagram below and on your knowledge of biology.

In a cell, a variety of structures perform specific functions and interact to maintain homeostasis. The diagram below represents a typical cell with three cell structures labeled 1, 2, and 3.



Select *one* cell structure labeled in the diagram and write its number in the space below. Explain how the cell structure you selected helps maintain homeostasis in a cell.

In your answer, be sure to:

- identify the cell structure you selected

- state *one* function of this cell structure

- identify *one* substance that is often associated with the cell structure you selected and state how that substance is associated with the cell structure

- identify *one* other cell structure and explain how it interacts with the cell structure you selected to maintain homeostasis in the cell

Answer Key

Cell Processes and Life Processes

1. – The pH of the stomach is acidic (1.5–4.0). and pepsin works best at very low pH values.
 2. A
 3. Circulation or transport moves essential materials through the cell or organism. Excretion gets rid of potentially harmful wastes.
Note: Do not accept digestion (part of nutrition) or reproduction (not necessary to maintain homeostasis).
 4. Responses include, but are not limited to: If the shape changes, it will not fit with the same substrate; The enzyme no longer fits with the molecules with which it interacted before; Shape determines function.
 5. ATP
 6. ribosome
 7. carbon dioxide *and* water.
 8. *Examples:*
a the cell membrane allows oxygen, carbon dioxide, and water to enter a cell or a chloroplast uses water and carbon dioxide to make glucose or mitochondria use food and oxygen to release energy.
b The cell membrane allows carbon dioxide to enter a plant cell to be used by chloroplasts.
c food vacuole and digestive system or cell membrane and respiratory system or nucleus and nervous system
 9. *Examples:* — photosynthesis — production of cellulose — produces chlorophyll — producing its own food
 10. *Examples:* — *A* (cell membrane) regulates what enters and leaves the cell. — *B* (nucleus) controls cell activities or contains the genetic codes. (Do *not* accept “brain” or “control center” without further explanation.) — *C* (mitochondrion) respiration or energy release or production of ATP (Do*not* accept “power house” without further explanation.)
 11. — Structure 2 provides the code for assembling a protein at structure 1.
 12. *Examples:* – This behavior helps maintain a relatively cooler body temperature. – Staying in the shade keeps the body temperature low enough so that dehydration will not occur, or so that enzyme action (body chemistry) is not affected.
 13. – antibody: The antibody binds to a specific pathogen, *or*, – enzyme: An enzyme has a specific shape that must match the shape of the molecules with which it interacts (lock and key or induced fit).
 14. — Decreased levels of carbohydrates might result in fatigue/less energy. — Lack of protein in the diet might lead to muscle loss/enzyme deficiency. — Lack of minerals might cause loss of bone density.
 15. — Carbohydrates are a source of energy. They can be used to produce the ATP needed for carrying out body activities. — Proteins are necessary for growth and repair. — Minerals are needed for strong bones and teeth.
 16. **Structure 1**
• ribosome • site of protein synthesis • amino acid — used to make proteins • nucleus — the ribosome gets instructions from the nucleus determining which proteins are produced by the cell

Structure 2
• nucleus • control of cell processes • DNA — makes up the chromosomes in the nucleus
• ribosome — nucleus sends instructions to ribosomes for protein synthesis

Structure 3
• mitochondrion • site of energy release/cell respiration • ATP — produced in the mitochondrion
• cell membrane — allows glucose to enter cell and be used by the mitochondrion for energy release
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