CELL COMPOUNDS

In order to understand how living things work, a biologist needs to have a general knowledge of some very important compounds that living cells require. Answering the following questions, after reading Chapter 2, will help you understand these compounds.

The Role of Water

(pp. 26 - p.)

1. Explain the role of water in living things using the following headings:
   a. its role as a solvent
   b. temperature regulation
   c. transportation in living systems
   d. its cohesive properties

2. Look at the diagram of a water molecules in *fig.* *p.* and explain why water is a polar molecule.

Acids and Bases

(p. 26)

1. Define the following terms:

   a. acid

   b. base

   c. pH

2. Why is pH important for normal cell function?

3. Buffers play a very important role in cell function. Describe this function.

4. Are the following pH readings acid, basic, or neutral? (pH scale in *fig.* 2.13 *p.* 29 *pp.*)

   a. pH 3

   b. pH 7

   c. pH 10

Biological Molecules of the Cell
(pp. 31 2)

An organic molecule is defined as one that contains carbon and hydrogens (See *Table* 5). Carbon compounds form the basis for all living cells. Enzymes, cell organelles, and hormones all contain organic molecules. The essential organic compounds in biological systems are proteins, carbohydrates, fats and nucleic acids. This next series of questions will develop your understanding of these biological compounds.

Overview

1. List the four major organic compounds of the cell.

   a. _____

   b. _____

   c. _____

   d. _____

Carbohydrates
(pp. 32)

Carbohydrates provide energy for many activities in the body. Carbohydrates contain chemical energy within their bonds. When these bonds are broken, energy is released.

Monosaccharides
(p. 32)

1. Describe the structure of a monosaccharide.

2. Name three common monosaccharides found in living cells.

   a. _____

   b. _____

   c. _____

Disaccharides
(p.32)

1. Define the term *disaccharide* and name two common ones.

2. Explain the difference between *hydrolysis* and *synthesis*.
(pp. 32)

3. The following word equations illustrate the synthesis of a disaccharide. On the left of the equation two monosaccharides are shown: they will react together to form a disaccharide on the right. I each of the reactions below write in the name of the correct disaccharide to the right of the arrow and indicate whether H_2O is required or given off.

   a. Glucose + Glucose ⟶

   b. Glucose + Fructose ⟶

Polysaccharides
(p.32-33)

1. Define the term *polysaccharide*. Explain how polysaccharides differ from mono and disaccharides.

2. Three important polysaccharides are starch, glycogen, and cellulose

   a. Describe where they are found in living things.

   b. Cellulose and starch have similar properties and yet they ar structurally different from each other. Describe these differences.

3. What is the storage form of glucose in:

   a. Animals?

   b. Plants?

4. Describe the role of carbohydrates in cells.

Proteins
(pp. 37)

1. Name six things that contain protein.

a. _____ d. _____

b. _____ e. _____

c. _____ f. _____

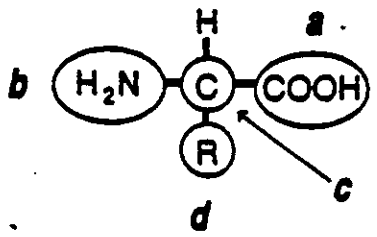
2. The following diagram illustrates the structural features of a single amino
Identify the labeled parts:

a. _____

b. _____

c. _____

d. _____



3. List the four atoms found in all amino acids.

4. Define the terms:
(Fig.2.26 p.38)

a. peptide bond

b. dipeptide

5. Define the term *polypeptide chain* and give an example.

6. Look at *fig.2.21, page 39* showing three different levels of protein structure Using the chart below, describe the differences between these three struct levels.

Level	*Main features*	*Type of bonding*
primary level	_____	_____
secondary level	_____	_____
tertiary level	_____	_____

7. Proteins all have their individual identity, skin protein is a different from muscle protein. How can you get so many different proteins with only 20 different amino acids?

8. Referring to *fig.2.20 p.38*, list the events that occur when proteins are:

   a. synthesized

   b. hydrolyzed

9. Define denaturation of proteins.

10. Name three factors that can cause denaturation and give an example of each. (*p. 38*)

11. What role do proteins play in:

    a. enzymes

    b. hormones

    c. cell organelles

Lipids
(*pp. 34*)

1. Which molecules are found in fats?

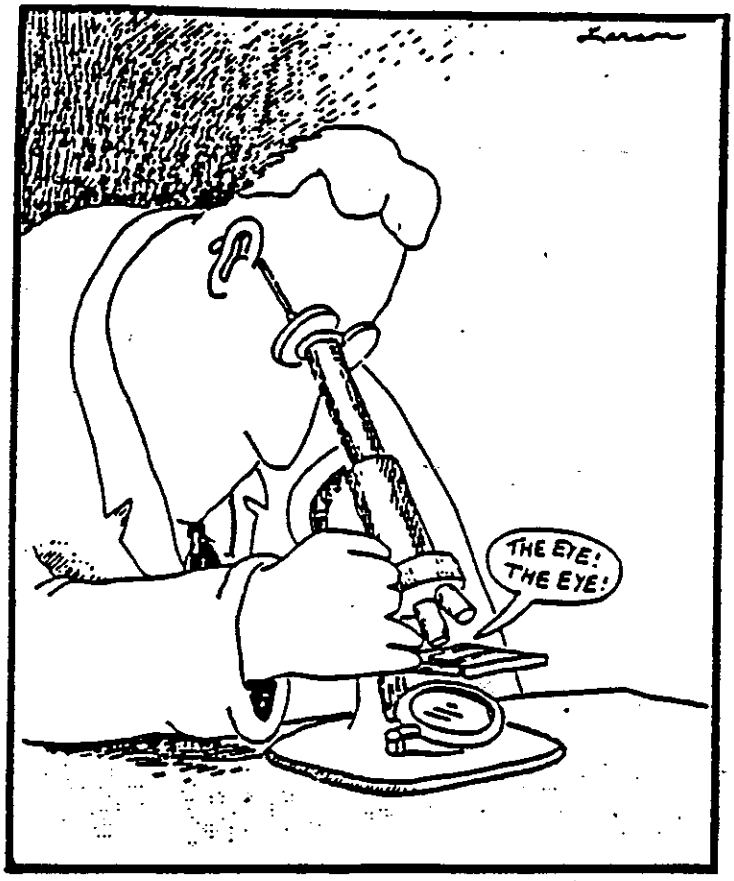
2. Which molecules would be formed if a fat were to be hydrolyzed?

3. *3 Fatty Acids + 1 Glycerol* ——> *Fat*. Is this hydrolysis or synthesis? Explain your answer.

4. The term *lipid* refers to a large group of compounds that are insoluble in water. Common lipids are listed below. Fill in the chart.

Lipid	*Chemical Structure*	*Important Biological Feature*
Neutral fats	_____	_____
Phospholipids	_____	_____
Steroids	_____	_____

5. Using *fig. 2.22) page 34* as your reference, compare and contrast *saturated* and *unsaturated* fats and give one example of each.



Sample Exam Questions

1. Explain the importance of the following organic compounds to cells.
   a. glucose
   b. proteins
   c. steroids
   d. fats
   e. phospholipids

2. Explain why each protein has its own physical and chemical identity.

3. Describe the chemical and physical properties of proteins.

4. Describe the relationship between monosaccharides, disaccharide, and polysaccharide.

5. Identify the following organic compounds: