

Study Questions from the Text for Bio. Sci. 10

Chapter 1

1. What is science?
2. How does the word "theory" differ between everyday speech usage and scientific communication?
3. Are "fact" and "theory" the same? What is the difference?
4. How does Pasteur's experiment fit the "scientific method?"
5. What does "openness to revision" have to do with going from hypothesis to theory?
6. What does probability have to do with science?
7. In separating "living" from "non-living" what 8 characteristics do living things have? What is an example of an exception to these 8?
8. What is homeostasis?
9. What does it mean when the author writes that life is organized in a hierarchical manner? In the hierarchy of life where does the biosphere fit?
10. In what one major way does the living world differ from the non-living world?
11. What is biology's "chief unifying principle?"

Chapter 2

1. What are the 3 important constituent parts of an atom listed by the author? How are they different? In size? Electrical charge? Location in an atom?
2. Each element (how many naturally occurring ones are there?) can be defined by a number; what does the number represent?
3. What is an isotope?
4. Which particle of an atom accounts for its reactivity?
5. How can chemical bonding be defined?
6. By bonding, what do atoms achieve?
7. What is covalent bonding? Give an example of how it happens.
8. What is a molecule?
9. Why are some elements "reactive" and some "unreactive?"
10. What is the difference between "polar" and "non-polar" covalent bonding?
11. What 4 different ways does the author show of writing or drawing a molecular formula?
12. How is it that methane and water differ in their polarity with one being non-polar and the other polar?
13. What is ionic bonding? What is an ion? Can you describe an example of ionic bonding?
14. What is hydrogen bonding? Are hydrogen bonds strong or weak?
15. Why is molecular shape important in biology?
16. What is a free radical? Are they stable or unstable? Why are they harmful?
17. How are solutes, solvents and solutions related?
18. Why is water such an important solvent?
19. How does water act as a solvent - for example, with sodium and chlorine ions?
20. Why does ice float?

21. What does it mean to say that water has a high specific heat?
22. " " " " " " " " cohesion? How is that related to surface tension?
23. How does water relate to the terms: hydrophilic and hydrophobic? Give an example of each.
24. What is an acid? What is a base? What does pH scale tell you? What does a pH of 7 represent? Give an everyday example of an acid, of a base.
25. What is a buffering system?
26. What is acid rain? How is it caused?

Chapter 3

- 1.. For maximum stability, how many bonds are made with one carbon atom? What kind of bonds are these?
2. What are the names of the 4 functional groups on p. 44? What is it that they can provide when they are attached to a carbon atom?
3. What are the 4 groups of carbon compounds associated with living organisms?
4. What is a monomer? Give an example. What is a polymer? Give an example
5. Give an example of a monosaccharide. How are 2 monosaccharides linked together? What name is used for the product? What by-product (not the main product) is formed by the linkage?.
6. Name 2 important plant polysaccharides. Name 1 important animal polysaccharide.
7. All true lipids can be defined by their relationship to water, which is...?
8. To make a true lipid, what 2 categories of carbon compounds are necessary? How are they linked? and what 2 resulting products are formed?
9. What is the difference between saturated and unsaturated fatty acids with regard to their make-up? How is liquid versus solid related to saturated and unsaturated? How are the 2 kinds of lipid related to health?
10. What chemical structure or organization characterizes the steroids? Give a common example of a human steroid.
11. The main role of carbohydrates and fats is for what purpose? see Fig. 3-11.
12. What's wrong with using trans-fatty acid containing fats in cookies and french fries?
13. What are phospholipids? What relationship do they have with water?
14. Of what building block molecules are proteins made? How are these linked together? What is the by-product (not the main product) produced at linkage?
15. What reactive groups do all amino acids have?
16. Of the types of proteins listed in Table 3.3, what is the name of the one which quickens chemical reactions?
17. Why is protein shape so important? What determines the primary shape of a protein? What shapes are the most common at the next level of proteins shape?
18. Name a "hybrid" molecule made of 2 complex molecules you have studied so far. See p. 57.
19. What is the building block or structural unit of all nucleic acids called? Of what 3 parts is the building block composed? One of the building blocks occurs in 4 varieties; what are the first letters of each of these? One of the other building blocks is a sugar molecule called:.....

20. Examine Table 3.4 for an overall summary.

Chapter 4

1. All cells are either.....or..... What are 5 differences between them? see Fig. 4.2
Which one is the most important?
2. Why are cells so small?
3. Can you name 5 constituent parts of a eukaryotic cell? What is the definition of cytoplasm? What is a membrane?
4. In an animal cell, starting with the nucleus, name the 5 steps (see Fig. 4.5) from the beginning to the final exit out of the cell.
5. The main chemical compound inside the nucleus is.....? What is another name for the nuclear membrane?
6. What is the name of the nucleic acid containing the instructions for making, say, a protein? What is the name of the nucleic acid which moves out of the nucleus? What does it provide that is, what is it carrying?
7. What is a ribosome? How does it function?
8. What is rough endoplasmic reticulum (rough ER)? How does it function?
9. What makes this ER "rough?"
10. What is a nucleolus? Where is it located? What is its function? What is rRNA?
11. What are transport vesicles?
12. What is the Golgi complex? How does it function? From the Golgi complex, where can the transport vesicles it produces go?
13. What is smooth endoplasmic reticulum (smooth ER)? Why is it called "smooth?" What does it do?
14. What are lysosomes? What do they do? What happens to a worn-out or flawed cell part?
15. What are mitochondria? How do they function? How many membranes surround a mitochondrion?
16. What is the internal "scaffolding" of a cell called? Of what is it composed? In turn, what is the category of chemicals that they are composed of?
17. What are the 2 organelles, one occurs in both plant and animal cells, the other only in plant cells, that probably came from prokaryotic invader organisms?
18. What are cilia and flagella composed of? How do they function?
19. What are the 3 things or structures that plant cells have that animal cells don't have?
20. Of what chemical are plant cell walls composed? What do cell walls contribute to plant cells? Do they replace a plasma membrane?
21. Table 4.1 is an excellent summary of structures in plant and animal cells.
22. What is a central vacuole? How does it function? Is it an organelle?
23. What kind of organelle is the site of photosynthesis?

Chapter 5

1. What are the 4 components of the plasma membrane?
2. Of these 4, which is the chief component of the plasma membrane? How are the molecules of this chief component arranged? This layer allows some molecules

- to pass through easily, why? This layer DOES NOT allow some substances to pass through, why?
3. What 2 functions does the "2nd component" of the plasma membrane have?
 4. What 2 forms does the "3rd component" of the plasma membrane have? These have several functions, what are they?
 5. What is the "4th component" of the plasma membrane? What 2 roles does it have?
 6. Put into your own words the definition of plasma membrane.
 7. What is diffusion? What is a concentration gradient?
 8. How does a permeable membrane differ from a semi-permeable one in its action?
 9. What is osmosis?
 10. How are hypotonic, hypertonic and isotonic solutions different? What happens to an animal cell in each of these? What happens to a plant cell in each of these?
 11. What does passive transport mean? What 2 kinds of passive transport are there? How are they different?
 12. What makes active transport different from passive transport?
 13. Getting the Big Stuff In and Out involves 2 kinds of movement called:.....

END.