Honors Biology
Semester 1 Review

Chapter 1 – Unit 1

1) Describe the seven properties that all forms of life share.
2) List the hierarchy of organization of life from smallest to largest.
3) What are the six major statements that comprise the modern cell theory?
4) What main feature distinguishes eukaryotes from prokaryotes?
5) Discuss the cycle of matter through a food chain and compare it to the flow of energy through a similar food chain (a diagram may help).
6) Name the three domains that life is currently grouped into, name the kingdom(s) in each, and give an example of an organism from each kingdom. (see intro to bio lesson)

Chapter 2 – Unit 2

1) 96% of the matter in all living organisms is comprised of four main elements. Name these four elements.
2) Discuss why elements such as Fe, I, and F are important to our survival even though they are found in incredibly small amounts in our bodies.
3) Define "isotope".
4) Compare compounds and molecules. How are they similar? How are they different?
6) Compare and contrast the following: ionic bonds, covalent (both polar and non-polar) bonds, and hydrogen bonds. Once you have done this, list the bond types in order of diminishing strength and give an example of each in compounds found in living organisms.
8) Discuss the four life-supporting properties of water (surface tension, cohesion and adhesion count as one property) as presented in the reading.
9) Define "buffer" and give an example of a roll that buffers play in the human body.
10) Compare properties of acids and bases:

Chapter 3 – Unit 2

1) What element do all organic compounds contain?
2) Describe four ways that carbon skeletons can vary (you may wish to draw the structure rather than describe them).
3) Define "isomer".
4) Name the six functional groups and give examples of molecules that we have discussed in class that contain each or processes that are regulated by these functional groups.
5) Using the following terms, describe the making of large molecules from smaller ones and the breaking down of large molecules into smaller molecules:

hydrolysis, monomer, dehydration, polymer

6) What are the four major classes of organic compounds?
7) What are the building blocks of carbohydrates?
8) What two functional groups are always attached to a sugar?
9) What is the main functional use of a monosaccharide?
10) Name four major polysaccharides and give a function for each. Discuss how the bonds and structure of polysaccharides can determine their function.
11) What trait do all lipids share?
12) Name the three main groups of lipids and give two functions for each.
13) How do saturated fats differ from unsaturated fats. How does this difference impact their appearance at room temperature?
14) What macromolecule are amino acids the building block for?

15) What two functional groups do all amino acids share?
16) Discuss how amino acids are linked together to form a polypeptide.
17) What property determines the function of a protein?
18) What are the four levels of structure for a protein (if possible, discuss the types of bonds formed at each level)?
19) What are the two types of nucleic acids and what are the building blocks for each?

Chapter 4 – Unit 3

**Page 69 is a great page to refer to as a review for this chapter.*

1) Compare a eukaryotic plant cell vs. and animal cell.
2) Draw a diagram of a plasma membrane. Include the following terms in your diagram:
glycerol/phosphate group, fatty acid chain, channel protein, hydrophilic, hydrophobic
3) What domain(s) contain only prokaryotic organisms?
4) What are three features/components that all cells (prokaryotic and eukaryotic) share?
5) What are two ways in which prokaryotic cells differ from eukaryotic cells?
6) Name the six components of a cell that are considered part of the endomembrane system and give the main function of each.
7) What is the function of the nucleolus?
8) What component of the endomembrane system functions to make more membrane?
9) Why would you expect liver cells of an alcoholic or a drug addict to have large amounts of smooth endoplasmic reticulum?
10) What component of the endomembrane system serves as a packing and shipping factory for the cell?
11) Compare and contrast the functions of lysosomes and vacuoles.
12) What are the two energy converting organelles found in eukaryotes (not all eukaryotes have both)?
13) What are three pieces of evidence that indicate that mitochondria and chloroplasts were once free-living organisms?
14) Name the fiber which performs each of the following functions:
    a) acts as a tract along which organelles can move
    b) reinforce cell shape, anchor organelles
    c) help support cell, involved in cellular movement

Chapter 5 – Unit 3

1) Name two molecules that move across the plasma membrane through passive transport?
2) How does facilitated transport differ from passive transport? What molecules are moved by facilitated transport?
3) Describe what would happen to a plant and an animal cell when placed in the following:
    a) isotonic solution
    b) hypotonic solution
    c) hypertonic solution
4) How does active transport differ from facilitated transport?
5) Draw diagrams which show the process of exocytosis and endocytosis.
6) When ATP transfers its phosphate group to another molecule (phosphorylation), is this considered a endergonic or exergonic reaction?
7) What about an enzyme makes it selective in the types of reactions is can catalyze? Use the words substrate, active site, and induced fit in your response.
8) What two conditions seem to control the functioning of enzymes?

Chapter 6 – Unit 4

1) What percent of the energy stored in glucose is captured in ATP?
2) What happens to a molecule when it is oxidized? When it is reduced?
3) When NAD+ accepts an electron becomes NADH, is it oxidized or reduced?
4) Name the three main stages of cellular respiration and identify where each stage occurs.
5) For each molecule of glucose that enters glycolysis,
    a) how many net ATP molecules are produced?
    b) how many NADH molecules are produced?
    c) what three carbon chain is produced?
6) What is substrate-level phosphorylation?
7) What major energy storing molecules are created during the Citric Acid Cycle?
8) During what stage of cellular respiration is CO_2 produced?
9) During what stage of cellular respiration is O_2 consumed?
10) What function does ATP synthase serve?
11) How is the hydrogen ion gradient created during the Oxidative Phosphorylation?
12) When do muscle cells switch to lactic acid production?

Chapter 7 – Unit 4

1) What are the two main stages of the photosynthesis and in what plant cell organelle does photosynthesis take place?
2) Where do the Light Reactions of photosynthesis take place? Where does the Calvin Cycle of photosynthesis take place?
3) What reactant is used by the Light Reactions? What product then comes out of these reactions (and is ultimately given off by the plant as a whole)?
4) What reactant is used by the Calvin Cycle and what product is then created?
5) What energy-transfer molecules are produced by the Light Reactions that are used to drive the steps of the Calvin Cycle? What are the energy-poor versions of these energy-transfer molecules that then make their way back to the Light Reactions?
6) If the purpose of cellular respiration is to turn unuseable chemical energy into useable chemical energy, what is the purpose of photosynthesis?
7) How is the hydrogen ion gradient created during the Light Reactions and what purpose does this gradient serve?
8) Where does the energy in ATP and NADPH end up once it has been passed into the Calvin Cycle?
9) What can the sugars created by photosynthesis be used for?
10) Explain why all life on Earth depends on the process of photosynthesis.

Chapter 8 – Unit 5

1) What are the main differences between asexual and sexual reproduction?
2) How is binary fission similar to mitotic cell division in eukaryotes?
3) Be able to distinguish between the various forms of DNA seen during the cell cycle, from chromatin to chromosomes, as well the different parts of the chromosome, from the centromere to sister chromatids.
4) Draw a labelled diagram that represents all of the stages of the cell cycle, the relative length of time it takes for each stage to occur, and the major events that happen in each stage.
5) Be able to distinguish between cytokinesis in animals cells vs. plant cells.
6) Be able to understand all of the reasons for mitotic cell division, as well as the factors that can inhibit cell division.

7) Understand how the cell cycle is controlled and regulated.
8) Be able to distinguish between the purpose of mitotic cell division and meiotic cell division.
9) Understand the major differences between what happens to chromosomes during mitosis and what happens to them during meiosis.
10) Understand why gametes contain half (haploid) the normal number (diploid) of chromosomes in a sexually-reproducing organism.