**M.4 Biology**

**Semester 1, 2020**

**Overview Sheet**

**Chapter 1:**

**1.1 The World of Biology**

Student Objectives:

1. Relate the relevance of biology to a person’s daily life.
2. Describe the importance of biology in human society.
3. List the seven characteristics of life.
4. Summarize the hierarchy of organization within complex multicellular organisms.
5. Distinguish between homeostasis and metabolism and between growth, development and reproduction.
6. Describe why viruses are not considered living organisms.
   1. **Themes in Biology**

Student Objectives:

1. Identify three important themes that help explain the living world.
2. Explain how life can be diverse, yet unified.
3. Describe how living organisms are interdependent.
4. Summarize why evolution is an important theme in biology.
   1. **The Study of Biology**

Student Objectives:

1. Outline the main steps in the scientific method.
2. Summarize how observations are used to form hypotheses.
3. List elements of a controlled experiment.
4. Describe how scientists use data to draw conclusions.
5. Compare a scientific hypothesis and a scientific theory.
6. State how communication in science helps prevent dishonesty and bias.
   1. **Tools and Techniques**

Student Objectives:

1. List the function of each of the major parts of a compound light microscope.
2. Compare two kinds of electron microscopes.
3. Describe the importance of having the SI system of measurement.
4. State some examples of good laboratory practice.

**Chapter 2: Chemistry of Life**

**2.1 Composition of Matter**

Student Objectives:

1. Define the term matter.
2. Explain the relationship between elements and atoms.
3. Draw and label a model of the structure of an atom.
4. Explain how compounds affect an atom’s stability.
5. Contrast covalent and ionic bonds.

Vocabulary: *matter, mass, element, atom, proton, neutron, atomic number, mass number, electron, orbital, isotope, compound, chemical bond, covalent bond, molecule, ion, ionic bond*

**2.2 Energy**

Student Objectives:

1. Describe the physical properties of each state of matter.
2. Describe the role of reactants and products in chemical reactions.
3. Explain the relationship between enzymes and activation energy.
4. Explain how oxidant and reduction reactions are linked.

Vocabulary: *energy, chemical reaction, reactant, product, metabolism, activation energy, catalyst, enzyme, redox reaction, oxidation reaction, reduction reaction*

**2.3 Water and Solutions**

Student Objectives:

1. Describe the structure of a water molecule.
2. Explain how water’s polar nature affect its ability to dissolve substances.
3. Outline the relationship between hydrogen bonding and the different properties of water.
4. Identify the roles of solutes and solvents in solutions.
5. Differentiate between acids and bases.

Vocabulary: *polar, hydrogen bond, cohesion, adhesion, capillarity, solution, solute, solvent, concentration, saturated solution, aqueous solution, hydroxide ion, hydronium ion, acid, base, pH scale, buffer*

**Chapter 3: Biochemistry**

**3.1 Carbon Compounds**

Student Objectives:

1. Distinguish between organic and inorganic compounds.
2. Explain the importance of carbon bonding in biological molecules.
3. Identify functional groups in biological molecules.
4. Summarize how large carbon molecules are synthesized and broken down.
5. Describe how the breaking down of ATP supplies energy to drive chemical reactions.

Vocabulary: *organic compound, functional group, monomer, polymer, macromolecule, condensation reaction, hydrolysis, adenosine triphosphate (ATP)*

**3.2 Molecules of Life**

Student Objectives:

1. Distinguish between monosaccharides, disaccharides, and polysaccharides.
2. Explain the relationship between amino acids and protein structure.
3. Describe the induced fit model of enzyme action.
4. Compare the structure and function of each of the different types of lipids.
5. Compare the nucleic acids DNA and RNA.

Vocabulary: *carbohydrate, monosaccharide, disaccharide, polysaccharide, protein, amino acid, peptide bond, polypeptide, enzyme, substrate, active site, lipid, fatty acid, phospholipid, wax, steroid, nucleic acid, deoxyribonucleic acid (DNA), ribonucleic acid (RNA), nucleotide*