NAS 2 Challenge Exam Study Guide

Chemical Concepts-- atomic structure, chemical bonding, and chemical reactions, to include the role of enzymes.

- Describe the structure of an atom and how changing the subatomic particles impacts atomic behavior.
- Describe the two intermolecular bonds (ionic and covalent) and the intramolecular bonds (hydrogen).
- Describe the two states of energy.
- Explain a chemical reaction, reaction rate, and distinguish between reactants and products.
- Describe enzymes and their role in chemical reactions.

Chemical Concepts-- physiological importance of pH and the four inorganic molecules: water, acids, bases, and salts.

- List the properties of water as a polar molecule and describe its interactions with charged and uncharged molecules.
- Explain solutions and their composition.
- Define acid, base, buffer, and pH.
- Explain what is meant by denaturation and list factors that can cause it.
- Describe salts and their importance in the body.

Chemical Concepts-- composition and general properties of organic compounds and their physiological significance.

- Define a monomer and polymer and the chemical reaction that create or destroy polymers (dehydration and hydrolysis).
- Identify the four major macromolecules, their subdivisions, and functions.

Chemical Concepts-- ATP synthesis and energy transfer within the cell.

- Explain ATP cycling.
- Write the overall formula for glucose oxidation.
- Explain the processes of producing ATP within the body.

Cytology-- functions of the components of a typical animal cell.

- Describe the characteristics of a typical animal cell.
- Identify the membrane-bound and non-membrane-bound organelles and their functions.
- List the components of the plasma membrane and explain the actions of each component.
- Distinguish the functions of cilia, flagella and microvilli.

- Compare and contrast the structure and function of the three major types of membrane junctions.
- Define transcription and translation.

Cytology-- mechanisms for movement of materials across cell membranes.

- Describe the concepts and types of diffusion, osmosis, and active transport.
- Explain the difference between exocytosis and endocytosis.

Inheritance-- basic patterns of inheritance, to include definitions of chromosomes, genes, alleles, homologous, homozygous, heterozygous, genotype and phenotype, autosomal dominant, autosomal recessive, and sex-linked traits.

- Differentiate the products of mitosis and meiosis.
- Define chromosome, gene, allele.
- Distinguish genotype and phenotype.
- Define homologous, homozygous, and heterozygous genotype.
- Using examples briefly explain inheritance patterns of autosomal dominance, autosomal recessive, and sex-linked trait.
- List examples of human traits that follow Mendelian patterns of inheritance.
- Explain the connection between chromosomal movement and meiosis.
- List different types of alterations to chromosome number and structure, with respect to various genetic disorders.