Biology Review

You should be able to...

Science Practices

- List the steps of the scientific method
- Design a controlled experiment
- Identify independent variables, dependent variables, and controls
- Construct a graph (by hand and digitally) that accurately portrays a data set
- Make a claim based on observations/data

Biochemistry

- Describe the **structure** (monomers) and **function** of the 4 classes of macromolecules: carbohydrates, lipids, proteins, and nucleic acids
- Describe the **function** of enzymes and factors that **affect** enzyme activity

Cells (7th grade)

- Describe **characteristics** shared by all living organisms
- Properly use a microscope
- Compare and contrast prokaryotic and eukaryotic cells
- Describe the **functions** of the following cellular organelles: nucleus, endoplasmic reticulum, Golgi apparatus, ribosomes, mitochondria, chloroplast, lysosome, vacuole, cell wall
- Describe the **structure** and **function** of cell membranes

Energy

- Identify the **products** and **reactants** of photosynthesis
- Identify the **products** and **reactants** of cellular respiration
- Identify which cellular organelle carries out each process and what types of organisms carry out each process
- Explain the **importance** of each process
- Define ATP, aerobic respiration, and anaerobic respiration

Ecology

- Define organism, population, community, ecosystem, biome, and biosphere
- Identify abiotic and biotic factors within ecosystems
- Describe the processes that involve the cycling of **carbon** in an ecosystem (photosynthesis, respiration, consumption, decomposition, combustion, dissolution)
- Describe how **energy** flows through ecosystems through trophic levels (food webs, 10% rule)

- Predict the **effects** of disruptions to an ecosystem, such as removing certain organisms or populations
- Define carrying capacity and analyze factors that can **affect** population growth
- Analyze at least 5 ways that humans **impact** biodiversity

Molecular Biology

- Explain how genetic information flows from genes to proteins (the Central Dogma)
- Describe the **structure** and **function** of DNA
- Describe the process of DNA replication
- Compare and contrast DNA and RNA
- Describe the processes of transcription and translation
- Use base-pairing rules and the genetic code to determine the amino acid sequence of a protein from a given gene
- Evaluate how mutations may or may not change the function of a protein
- Describe uses of biotechnology such as DNA fingerprinting, genetic engineering, gel electrophoresis, use of stem cells, and cloning
- Evaluate **ethical** issues that may arise from the use of biotechnology

Genetics

- Define chromosome and describe its **structure**
- Describe the process of sexual reproduction including the production of gametes through meiosis, crossing over, and fertilization
- Define gene, allele, genotype, phenotype, dominant, recessive, homozygous, and heterozygous
- Predict the genotypes and phenotypes of offspring by using Punnett squares
- BONUS: Solve Punnett square problems with dihybrid crosses or sex-linked genes

Evolution

- Explain why variation and adaptation are necessary for natural selection
- Define evolution with how it relates to the gene (allele) frequencies within a population
- Describe how each of the following are **mechanisms** of evolution – natural selection, gene flow, mutation, sexual selection, and genetic drift
- Evaluate how the fossil record, homologous structures, vestigial structures, embryology, and DNA comparison are **evidence** for evolution
- Create a phylogenetic tree/cladogram that illustrates relationships among species

Physiology

- Define the levels of organization within organisms: cell, tissue, organ, organ system
- Describe the **function** of major organ systems and how organ systems work together
- Describe the process of mitosis and predict the effects of unregulated cell division
- Define homeostasis and describe factors that can **disrupt** homeostasis
- Give examples of ways the human body tries to maintain homeostasis with regards to body temperature, oxygen level, or glucose level