Biology	Content	Skills
Unit 1: Science of Life Week 1	1. There are components to watch for in an experiment and the variables you can manipulate directly affect your results if you keep other variables the same. 2. Element composition 3. Chemical bonding and reactions within living organisms and their tendency to move toward homeostasis	1. Identify control vs. experimental groups within lab 2. Describe how energy changes are involved in chemical reactions 3. Compare and contrast dependent and independent variables 4. Differentiate between qualitative and quantitative data 5. Develop and perform labs that incorporate scientific method
Unit 2: Biochemistry 2-3 Weeks	1. Explain water role as a universal solvent and in the construction of organic molecules 2. Compare and contrast the different groups of organic compounds (Carbohydrates, Proteins, Lipids and Nucleic Acids) 3. Describe the roles of enzymes in chemical reactions	1. Students will be able to explain the relationship between elements and atoms. 2. Students will be able to describe the role of reactants of and products in chemical compounds 3. Students will be able to explain the relationship between enzymes and activation energy. 4. Students will be able to describe the structure of a water molecule and how water's polar nature affect its ability as a solvent 5. Students will be able to outline the relationship between hydrogen bonding and the different properties of water. 6. Students will be able to identify the roles of solutes and solvents in solutions 7. Students will be able to differentiate between acids and bases 8. Students will be able to distinguish between organic and inorganic compounds 9. Students will be able to explain the importance of carbon bonding in biological molecules 10. Students will be able to summarize how large carbon

		molecules are synthesized and broken down 11. Students will be able to describe how the breaking down of ATP supplies energy to drive chemical reactions 12. Students will be able to distinguish between monosaccharides, disaccharides and polysaccharides. 13. Students will be able to explain the relationship between amino acids and protein structure. 14. Students will be able to describe the induced fit model of enzyme action. 15. Students will be able to compare the nucleic acids DNA and RNA.
Unit 3: Cell Structure and Function 2-3 Weeks	1. The Cell Theory 2. Structures that all cells have in common 3. Structures that differentiate prokaryotic and eukaryotic cells 4. Structures that differentiate plant and animal cells 5. The different types of microscopes and how they function 6. The main functions of cell organelles	1. Students will be able to describe how scientists measure the length of objects. 2. Students will be able to relate magnification and resolution in the use of microscopes. 3. Students will be able to analyze how light microscopes function. 4. Students will be able to compare light microscopes with electron microscopes. 5. Students will be able to contrast describe the scanning tunneling microscope. 6. Students will be able to describe the scanning tunneling microscope. 7. Students will be able to describe the three parts of the cell theory. 8. Students will be able to determine why cells must be relatively small. 9. Students will be able to compare the structure of prokaryotic cells with that of eukaryotic cells.

		10. Students will be able to describe the structure of cell membranes. 11. Students will be able to describe the role of the nucleus in cell activities. 12. Students will be able to analyze the role of internal membranes in protein production. 13. Students will be able to summarize the importance of mitochondria in eukaryotic cells. 14. Students will be able to identify three structures in plant cells that are absent from animal cells.

Unit 4: Homeostasis and the Plasma Membrane 2-3 Weeks	**1.** Passive transport versus active transport **2.** Understanding how the movement of molecules relates to the cells ability to achieve homeostasis **3.** Communicate common applications of homeostasis and transport concepts	1. Students will be able to explain how an equilibrium is established as a result of diffusion 2. Students will be able to distinguish between diffusion and osmosis 3. Students will be able to explain how substances cross the cell membrane through facilitated diffusion 4. Students will be able to distinguish between passive and active transport 5. Students will be able to compare and contrast endocytosis and exocytosis
Unit 5: Cellular Respiration 2 Weeks	1. Define cellular respiration 2. Compare and contrast lactic acid and alcoholic fermentation 3. Describe how the Krebs cycle and Electron Transport Chain produce ATP for the cell	1. Students will be able to how glucose is broken down during glycolysis 2. Students will be able to describe how ATP is made during the Krebs Cycle and the Electron Transport Chain 3. Students will be able to identify the role of fermentation in cellular respiration 4. Students will be able to describe uses of fermentation processes in the production of food products 5. Students will be able to compare lactic acid fermentation with alcoholic fermentation

		6. Students will be able to relate aerobic respiration to the structure of the mitochondrion 7. Students will be able to evaluate the importance of oxygen in aerobic respiration 8. Students will be able to write the cellular respiration chemical formula 9. Students will be able to describe how cellular respiration is related to photosynthesis
Unit 6: Photosynthesis 2 Weeks	**1.** Define photosynthesis **2.** Compare and contrast autotrophs and heterotrophs **3.** Describe how the Electron Transport Chain produce ATP for the cell **4.** Describe how the Calvin Cycle produces organic compounds	**1.** Students will be able to analyze the flow of energy through living systems **2.** Students will be able to compare the metabolism of autotrophs with that of heterotrophs **3.** Students will be able to describe how energy is released from ATP **4.** Students will be able to summarize how energy is captured from sunlight in the first stage of photosynthesis **5.** Students will be able to analyze the function of electron transport chains in the second stage of photosynthesis **6.** Students will be able to relate the Calvin cycle to carbon dioxide fixation in the third stage of photosynthesis **7.** Students will be able to identify three environmental factors that affect the rate of photosynthesis **8.** Students will be able to write the photosynthesis chemical formula **9.** Students will be able to describe how cellular respiration is related to photosynthesis

Unit 7: **Cell Growth and Division** **3 Weeks**	1. Describe the structure of a chromosome 2. Analyze how prokaryotic and eukaryotic cells reproduce 3. Analyze how the cell cycle is controlled and how the control is related to cancer	**1.** Students will be able to structure of a chromosome and numbers of chromosomes in different species. **2.** Students will be able to identify the differences in structure between prokaryotic and eukaryotic chromosomes. **3.** Students will be able to explain the differences between sex chromosomes and autosomes. **4.** Students will be able to distinguish between diploid and haploid cells. **5.** Students will be able to describe the events of cell division in prokaryotes. **6.** Students will be able to name the two parts of the cell that are equally divided during cell division in eukaryotes. **7.** Students will be able to summarize the events of interphase and mitosis, cytokinesis in animal cell and plant cells **8.** Students will be able to explain how cell division is controlled. **9.** Students will be able to compare the end products of meiosis with those of mitosis **10.** Students will be able to summarize the events of meiosis I and II. **11.** Students will be able to explain crossing-over and how it contributes to the production of unique individuals **12.** Students will be able to compare spermatogenesis and oogenesis
Unit 8: **Meiosis** **1-2 Weeks**	**1.** Compare and contrast the steps of mitosis and meiosis	**1.** Students will be able to compare the end products of meiosis with those of mitosis **2.** Students will be able to summarize the events of meiosis I and II. **3.** Students will be able to explain crossing-over and how it contributes to the production of unique individuals **4.** Students will be able to compare spermatogenesis and oogenesis

Unit 9: Mendelian Genetics 1-2 Weeks	1. The origins of genetics 2. Mendel's Theory 3. Studying Heredity	1. Students will be able to Identify the investigator whose studies formed the basis of modern genetics 2. Students will be able to list characteristics that make the garden pea a good subject for genetic study 3. Students will be able to summarize the three major steps of Gregor Mendel's garden pea experiments including the ratios he observed. 4. Students will be able to describe the four major hypothesis Mendel developed 5. Students will be able to compare Mendel's two laws of heredity 6. Students will be able to predict the results of a monohybrid genetic crosses by using a Punnett Square 7. Students will be able to apply a test-cross to determine the genotype of an organism with a dominant phenotype
Unit 10: Extending Mendelian Genetics 2-3 Weeks	1. Complex Patterns of Heredity 2. Phenotype is affected by many different factors 3. A combination of methods is used to study human genetics. 4. Chi Square Analysis	1. Describe patterns of inheritance in sex-linked versus autosomal inheritance. 2. Describe different types of allele interactions 3. Identify polygenic traits and the effect of environmental factors on phenotypes 4. Explain how linkage maps can be used to estimate differences between genes. 5. Students will be able to analyze a simple pedigree

Unit 11: DNA, RNA 3-4 Weeks	1. Describe the structure of DNA 2. Describe the role of DNA in the cell 3. Analyze the experiments that lead to the discovery of DNA 4. Relate the DNA sequence to the amino acid of each protein made by the cell	1. Students will be able to describe how the work of many scientists led to the discovery of DNA's role in heredity. 2. Students will be able to evaluate the how the contribution of many scientists led to the discovery of the structure of DNA. 3. Students will be able to describe the three parts of a nucleotide. 4. Students will be able to relate the role of the base-pairing rules to the structure of DNA. 5. Students will be able to summarize the process of DNA replication. 6. Students will be able to compare the structure of RNA with that of DNA. 7. Students will be able to summarize the process of transcription. 8. Students will be able to summarize the major steps of translation. 9. Students will be able to compare the roles of mRNA, rRNA, and tRNA. 10. Students will be able to describe the importance of the genetic code.
Unit 12: Biotechnology 3 Weeks	1. Define genetic engineering 2. Describe different uses of genetic engineering 3. Analyze the goals and findings of the Human Genome Project 4. Analyze different ethical issues that arise with the development of new genetic technologies	1. Students will be able to describe the four basic steps commonly used in genetic engineering experiments. 2. Students will be able to explain the use of restriction enzymes, cloning vectors, and probes in making recombinant DNA. 3. Students will be able to summarize two major goals of the Human Genome Project. 4. Students will be able to describe how drugs produced by genetic engineering are being used. 5. Students will be able to summarize the steps involved in making a genetically engineered vaccine. 6. Students will be able to discuss the uses of genetic engineering and gene technology in medicine and agriculture

		7. Students will be able to explain cloning and its technologies 8. Students will be able to discuss ethical issues associated with genetic engineering
Unit 13: History of Life and Evolution 4 Weeks	1. Define evolution 2. Compare and contrast various scientific theories of how life evolved 3. Analyze fossil record and how it applies to evolutionary theory 4. Compare and contrast Darwin and Larmark's theories.	1. Students will be able to explain how species evolve over time through the interactions of: • the potential for a species to increase its numbers • the genetic variability of offspring due to mutation and recombination of genes • a finite supply of the resources required for life • the ensuing selection by the environment of those offspring better able to survive and leave offspring. 2. Students will be able to explain how evolution accounts for the diversity of species developed through gradual processes over many generations. 3. Students will be able to explain how species acquire many of their unique characteristics through biological adaptation, which involves the selection of naturally occurring variations in populations. 4. Students will be able to explain how adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment. 5. Students will be able to explain how behaviors have evolved through natural selection. Behaviors often have an adaptive logic when viewed in terms of evolutionary principles.

Unit 14: Classification 2 Weeks	1. Define a species 2. Compare and contrast Linnaeus classification system with Aristotle's system 3. Describe how scientists use proteins and chromosomes to relate classification and evolutionary history	1. Students will be able to relate biodiversity to biological classification 2. Students will be able to explain why naturalists replaced Aristotle's classification system 3. Students will be able to identify the main criterion that Linnaeus used to classify organisms 4. Students will be able to list the common levels of modern classification from general to specific 5. Students will be able to identify the kinds of evidence that modern biologists use in classifying organisms 6. Students will be able to explain what information a phylogenetic diagram explains 7. Students will be able to discuss how proteins and chromosomes are used to classify organisms 8. Students will be able to describe how a cladogram is made
Unit 15: Ecology and Populations 3 Weeks	1. Principles of populations grow and the growth equation 2. Populations change in composition 3. The make-up of an ecosystem 4. Energy flow in ecosystems 5. Cycling of materials in an ecosystem	1. Students will be able to distinguish among patterns of dispersion in a population 2. Students will be able to contrast exponential growth and logistic growth 3. Students will be able to differentiate r-strategists from k-strategists 4. Students will be able to summarize the Hardy-Weinberg principle 5. Students will be able to contrast directional, stabilizing and other forms of selection 6. Students will be able to distinguish an ecosystem from a community 7. Students will be able to describe the diversity of a representative ecosystem 8. Students will be able to sequence the process of succession 9. Students will be able to distinguish between producers and consumers and the importance of decomposers 10. Students will be able to compare food webs and food

		chains and why food chains are rarely longer than 3 or 4 links 11. Students will be able to analyze the roles of water, carbon, and nitrogen in the cycling of nutrients 12. Students will be able to differentiate between biotic and abiotic factors
Unit 16: Dissection	1. Identify structures and functions of organs and systems through fetal pig dissection.	1. Students will analyze the nature of the relationships between structures and functions in living organisms.