

**South Conway County School District**

**Grade/Subject Pacing Guide**

Arkansas Curriculum Framework (SLE)	Learning Goal (Objective)	Assessment/Bloom's	Essential Vocabulary *teacher word (For Future Use)	Materials/Resources (For Future Use)

**First Quarter**

**FIRST NINE WEEKS**

**1.1 Enduring Understanding - Scientific knowledge is gained using structured processes that allows us to**

**1.1a Essential Question - Why is experimentation needed for scientific knowledge?**

NS.10.B.1	Explain why science is limited to natural explanations of how the world works	*state that science is information about the natural world collected in a measurable and repeatable process called the scientific method		
NS.10.B.2	Compare and contrast hypotheses, theories, and laws	*explain the difference between a theory and law, and the difference between a hypothesis and theory	hypothesis law theory	
NS.10.B.3	Distinguish between a scientific theory and the term theory used in general conversation	*give examples of a scientific theory and general conversation theory	scientific theory general theory	
NS.10.B.4	Summarize the guidelines of science	*state that explanations are based on observations, evidence and testing *explain that hypothesis must be testable *compare and contrast empirical data with measurable data *state that scientific knowledge must have peer review and verification before acceptance *recognize that science changes with additional data	empirical data measurable data observation conclusion evidence	

**1.1b Essential Question - What guidelines must be followed to design and conduct a scientific**

NS.11.B.1	Develop and explain the appropriate procedure, controls, and variables in scientific experimentation	*analyze a scientific experiment and point out the variables, procedure, and control *identify dependent (responding) and independent (manipulated) variables	independent (manipulated) variable control dependent (responding) variable	Sponge Bob The Simpsons (www.biologycorner.com)
NS.11.B.2	Research and apply appropriate safety precautions when designing and/or conducting scientific investigations	*list inappropriate behaviors and actions that can occur in a laboratory setting *perform at a mastery level on a safety themed quiz *state the meaning of the various safety symbols given the symbol	safety symbol	Lab Safety Quiz
NS.11.B.3	Identify sources of bias that could affect experimental outcome	*explain the meaning of bias *explain how scientist properly setup an experiment to eliminate bias *describe how bias can effect experiments and explanation of results	bias	
NS.11.B.4	Gather and analyze data using appropriate summary statistics	*describe the proper way to uniformly collect data *apply techniques which ensure uniformity of data *state how mean, median, and mode are calculated and applied to science research	mean median mode data	Sponge Bob and Scientific method (Massengale website)
NS.11.B.5	Formulate valid conclusions without bias	*describe how unbiased interpretation of data leads to conclusions		
NS.11.B.6	Communicate experimental results using appropriate reports, figures, and tables	*form a data table, report, and graph given a set of data *determine proper x & y axes	axis data table	
NS.12.B.1	Recognize that theories are scientific explanations that require empirical data, verification, and peer review	*explain how theories are formulated and are used as the foundation of modern science *explain that data is peer reviewed and verified by outside sources *state that theories have been tested and verified many times	empirical data peer review verification	

NS.12.B.2	Understand that scientific theories may be modified or expanded based on additional empirical data, verification, and peer review	*recognize that science is dynamic and will change with additional data and technology	technology	
<b>1.1c Essential Question - How can technology be appropriately used in solving and communicating life</b>				
NS.12.B.7	Research current events and topics in biology	*prepare a report on a current trend or topic in biology	research evaluate	mainstream media websites (popsci; sciam; nat geo)
NS.13.B.1	Collect and analyze scientific data using appropriate mathematical calculations, figures, and tables	*apply mathematics in interpreting scientific data *analyze and extrapolate data from a chart, graph or table		metric system activity
NS.13.B.2	Use appropriate equipment and technology as tools for solving problems	*demonstrate appropriate microscopic techniques *utilize available technology in scientific research and reporting		Examine pond water and prepared slides
NS.13.B.3	Utilize technology to communicate research findings	*recommend ways in which research findings can be transmitted to others using technology		
<b>1.1d Essential Question - What are the connections between pure science and science applied to the real</b>				
NS.14.B.1	Compare and contrast biological concepts in pure science and applied science	*state the differences between pure and applied sciences *list examples of each type of science	pure science applied science	
NS.14.B.2	Discuss why scientists should work within ethical parameters	*list possible ethical issues in science *state a definition of ethical parameters *explain how research is conducted with regards to ethics	parameter ethics	Student debate over genetic modification of organisms

NS.14.B.3	Evaluate long range plans concerning resource use and by-product disposal in terms of their environmental, economic, and political impact	*list major local, state, national and international governmental and non-governmental agencies which are involved in the protection of the environment *state various plans which have been formed to deal with resource use and by-product disposal *identify local concerns of resource use and by-product disposal *invent plans for resource use and by-product disposal with regards to environmental, economic, and political impact	by-product natural resource recycle pollution contaminate EPA endangered species	
NS.14.B.4	Explain how the cyclical relationship between science and technology results in reciprocal advancements in science and technology	*define technology *give examples of prior technological advances	technology cyclical relationship reciprocal advancements	Discuss development of antibiotics, bombs, invitro
NS.15.B.1	Research and evaluate science careers	*list different careers in science *relate the career in science to what field of science it studies	research evaluate	Research careers for presentation Library/out of class research for presentation

## 1.2 Enduring Understanding - Chemistry is essential to understanding the life process.

### 1.2a Essential Question - How do the structure and function of organic molecules effect living systems?

MC.1.B.1	Describe the structure and function of the major organic molecules found in living systems	*identify the monomers of each organic macro-molecule *state the function of each of the macro-molecules	organic molecule protein carbohydrates enzymes lipids nucleic acids amino acids nucleotides monosaccharides monomer polymer hydrolysis condensation reaction (i.e. dehydration synthesis)	Simple sugar lab (Glencoe p.154) <a href="http://home.earthlink.net/~heinabilene/apbiology/organicwkshtblank.htm">home.earthlink.net/~heinabilene/apbiology/organicwkshtblank.htm</a>
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MC.1.B.2	Describe the relationship between an enzyme and its substrate molecule(s)	<ul style="list-style-type: none"> <li>*define enzyme</li> <li>*define substrate</li> <li>*describe "Lock &amp; Key" system of enzyme/substrate complex</li> <li>*explain the concept of induced fit.</li> <li>*recognize that enzymes are reusable</li> <li>*describe the role of a catalyst in reducing activation energy</li> </ul>	<ul style="list-style-type: none"> <li>enzyme</li> <li>substrate</li> <li>active site</li> <li>induced fit</li> <li>catalyst</li> <li>activation energy</li> </ul>	<ul style="list-style-type: none"> <li>Enzyme Lab (Glencoe p.159)</li> <li>Factors effecting enzyme action (Glencoe p/ 179)</li> <li>Enzyme models from swimming noodles</li> <li>Toothpickase (<a href="http://sps.k12.ar.us/massengale/toothpickase.htm">sps.k12.ar.us/massengale/toothpickase.htm</a>)</li> </ul>
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**1.2b Essential Question - How do the properties and importance of water effect life?**

MC.1.B.3	Investigate the properties and importance of water and its significance for life	<ul style="list-style-type: none"> <li>*describe how water's structure allows for cohesion, adhesion, and surface tension</li> <li>*describe the role of water for life's functions</li> <li>*diagram polarity and hydrogen bonding in a series of water molecules</li> </ul>	<ul style="list-style-type: none"> <li>cohesion</li> <li>adhesion</li> <li>surface tension</li> <li>capillary action</li> <li>solvent</li> <li>solution</li> <li>polarity</li> <li>pH</li> <li>acid</li> <li>base</li> <li>pH scale</li> <li>diffusion</li> <li>osmosis</li> <li>hydrogen bonding</li> </ul>	<ul style="list-style-type: none"> <li>Water on a penny v. alcohol on a penny</li> <li>Water in a cup v. alcohol in a cup</li> <li>Water throw demo</li> <li>pH (Massengale website)</li> </ul>
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**1.2c Essential Question - What is the role of energy in the chemical reactions of living things?**

MC.1.B.4	Explain the role of energy in chemical reactions of living systems	<ul style="list-style-type: none"> <li>*list the parts of a chemical reaction</li> <li>*distinguish between an exergonic and endergonic reaction</li> <li>*interpret an energy diagram</li> </ul>	<ul style="list-style-type: none"> <li>activation energy</li> <li>exergonic reactions</li> <li>endergonic reactions</li> <li>energy</li> <li>reactants</li> <li>products</li> <li>reaction</li> <li>energetics</li> </ul>	
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**1.3 Enduring Understanding - The structure and function of cells determines the foundation for all living**

**1.3a Essential Question - What is cell theory and how does it relate to the hierarchy of life?**

NS.12.B.4	Relate the development of the cell theory to current trends in cellular biology	*recognize that our understanding of the cell and cellular processes is closely related to our current level of technology *state the applications of current cell biology such as cloning, stem cell research, and recombinant technology	clone stem cell recombinant technology cell theory	Student report on stem cells
MC.2.B.1	Construct a hierarchy of life from cells to ecosystems	*sequence the levels of organization	cell tissue organ organ system organism population community ecosystem hierarchy	Discover cells (Glencoe p. 184)  Develop mnemonic device to learn hierarchy
<b>1.3b Essential Question - What are the similarities and differences of animal and plant cells and their</b>				
MC.3.B.1	Compare and contrast the structure and function of mitochondria and chloroplasts	*identify structure of mitochondria *identify structure of chloroplast *identify role of mitochondria in cellular respiration *identify the role of chloroplast in photosynthesis	cellular respiration photosynthesis Electron transport chain	Photosynthesis and cell respiration lab (Glencoe p. 220) Compare/contrast chart chloroplast & mitochondria color w/s (Massengale webpage)
MC.2.B.2	Compare and contrast prokaryotes and eukaryotes	*identify characteristics of prokaryotes and eukaryotes *identify three characteristics of all cells	prokaryote eukaryote nucleus organelle plasma membrane	Compare/contrast chart

MC.2.B.3	Describe the role of sub-cellular structures in the life of a cell	<ul style="list-style-type: none"> <li>*identify the organelles</li> <li>*identify the function of each organelle</li> </ul>	<ul style="list-style-type: none"> <li>Golgi apparatus</li> <li>nucleus</li> <li>ribosome</li> <li>endoplasmic reticulum</li> <li>nucleolus</li> <li>mitochondria</li> <li>cytosol</li> <li>lysosomes</li> <li>chloroplast</li> <li>vacuole</li> <li>centrioles</li> <li>cell wall</li> <li>cell membrane</li> <li>cytoskeleton</li> <li>chromatin</li> <li>cilium</li> <li>flagellum</li> </ul>	<ul style="list-style-type: none"> <li>Chloroplasts lab (Glencoe p. 223)</li> <li>cellcolor.html (biology corner)</li> <li>cellsalive.com</li> <li>observe onion, Elodea and cheek cells for organelles</li> <li>Chromotography lab</li> </ul>
MC.2.B.4	Relate the function of the plasma (cell) membrane to its structure	<ul style="list-style-type: none"> <li>*recognize the parts of a plasma membrane</li> <li>*describe the function of a plasma membrane</li> <li>*identify the roles of proteins, carbohydrates, and cholesterol in the plasma membrane</li> <li>*identify the structure and properties of a phospholipid</li> </ul>	<ul style="list-style-type: none"> <li>phospholipid bilayer</li> <li>selective permeability</li> <li>phospholipid</li> <li>fluid mosaic model</li> <li>transport protein</li> </ul>	Student models of membrane
MC.2.B.5	Compare and contrast the structures of an animal cell to a plant cell	<ul style="list-style-type: none"> <li>*identify the structure and function of the parts of a typical eukaryotic cell</li> <li>*produce Venn Diagram comparing and contrasting plant and animal cell structures</li> <li>*identify parts that are unique to plant and animal cells.</li> </ul>	Review vocabulary from MC.2.B.3 with emphasis on structures that differ between plant and animal cells	Compare/contrast chart
<b>1.3c Essential Question - How do active and passive transport effect balance within an organism?</b>				

MC.2.B.7	Compare and contrast active transport and passive transport mechanisms	*describe the movement of materials through a cell membrane *distinguish between the various forms of active transport *distinguish between hypertonic, hypotonic, and isotonic solutions and predict their effects on a cell	diffusion osmosis endocytosis exocytosis phagocytosis hypertonic hypotonic isotonic dynamic equilibrium active transport facilitated diffusion pinocytosis	Osmosis (Glencoe p.203)  Osmosis Lab (Glencoe p.209)  Diffusion in potatoes  Grape lab (Patrick)
MC.2.B.11	Discuss homeostasis using thermoregulation as an example	*describe the importance of a constant internal environment *identify processes that maintain thermoregulation and homeostasis	homeostasis thermoregulation ectothermic endothermic	Pulse rate and exercise lab
<b>1.3d Essential Question - How do cells obtain and use energy?</b>				
MC.2.B.6	Compare and contrast the functions of autotrophs and heterotrophs	*recognize an autotroph *recognize a heterotroph *correctly classify various organisms as a heterotroph or autotroph	heterotroph autotroph producer consumer	
MC.3.B.2	Describe and model the conversion of stored energy in organic molecules into usable cellular energy (ATP)	*summarize the main steps of cellular respiration, glycolysis, and the citric acid cycle (Krebs) *describe the role of ATP in the body *describe how ATP stores energy	ATP ADP hydrogen bond glycolysis citric acid cycle (Krebs) electron transport chain ATP Synthase	
MC.3.B.3	Compare and contrast aerobic and anaerobic respiration	*describe the difference between aerobic and anaerobic processes *identify the location of aerobic and anaerobic processes *list examples of organisms which undergo lactic acid fermentation and alcoholic fermentation	aerobic anaerobic alcoholic fermentation lactic acid fermentation	Yeast lab
MC.3.B.4	Describe and model the conversion of light energy to chemical energy by photosynthetic organisms	*state the chemical equation for photosynthesis *identify the major events involved in the light dependent and light independent reactions (Calvin)	light independent reactions light dependent reactions ATP glucose carbon dioxide	

MC.3.B.5	Compare and contrast cellular respiration and photosynthesis as energy conversion pathways	*establish that the product of photosynthesis is the reactant for cellular respiration and vice-versa	glucose pyruvate Carbon dioxide oxygen glycolysis ATP	
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## Second Quarter

### 2.1 Enduring Understanding - The structure and function of cells determines the foundation for all living

#### 2.1a Essential Question - What are the events of the cell cycle?

MC.2.B.8	Describe the main events in the cell cycle, including the differences in plant and animal cell division	*compare plant and animal cell division *describe the main stages of the cell cycle	cell cycle interphase mitosis G1 G2 synthesis mitosis cytokinesis	
MC.2.B.9	List, in order, and describe the stages of mitosis	*list the major events of each phase of mitosis *identify the purpose of mitosis *sequence the stages of mitosis	mitosis spindle fiber chromatids chromosomes centrioles prophase metaphase equator anaphase telophase cytokinesis centromere cleavage furrow daughter cell parent cell cell cycle	Mitosis flip book  Mitosis activity (Massengale website)

MC.2.B.10	Analyze the meiotic maintenance of a constant chromosome number from one generation to the next	<ul style="list-style-type: none"> <li>*list the major events of each phase of meiosis</li> <li>*identify the cells that undergo meiosis as well as location of meiosis</li> <li>*differentiate between haploid and diploid chromosome numbers</li> <li>*compare the processes/purposes of mitosis to meiosis</li> </ul>	<ul style="list-style-type: none"> <li>meiosis</li> <li>gamete</li> <li>diploid</li> <li>haploid</li> <li>gonads</li> <li>crossing over</li> <li>sexual reproduction</li> <li>asexual reproduction</li> </ul>	Meiosis 2 (biology corner)
MC.2.B.8	Describe the main events in the cell cycle, including the differences in plant and animal cell division	<ul style="list-style-type: none"> <li>*compare plant and animal cell division</li> <li>*describe the main stages of the cell cycle</li> </ul>	<ul style="list-style-type: none"> <li>cell cycle</li> <li>interphase</li> <li>mitosis</li> <li>G1</li> <li>G2</li> <li>synthesis</li> <li>mitosis</li> <li>cytokinesis</li> </ul>	
MC.2.B.9	List, in order, and describe the stages of mitosis	<ul style="list-style-type: none"> <li>*list the major events of each phase of mitosis</li> <li>*identify the purpose of mitosis</li> <li>*sequence the stages of mitosis</li> </ul>	<ul style="list-style-type: none"> <li>mitosis</li> <li>spindle fiber</li> <li>chromatids</li> <li>chromosomes</li> <li>centrioles</li> <li>prophase</li> <li>metaphase</li> <li>equator</li> <li>anaphase</li> <li>telophase</li> <li>cytokinesis</li> <li>centromere</li> <li>cleavage furrow</li> <li>daughter cell</li> <li>parent cell</li> <li>cell cycle</li> </ul>	<p>Mitosis flip book</p> <p>Mitosis activity (Massengale website)</p>

MC.2.B.10	Analyze the meiotic maintenance of a constant chromosome number from one generation to the next	*list the major events of each phase of meiosis *identify the cells that undergo meiosis as well as location of meiosis *differentiate between haploid and diploid chromosome numbers *compare the processes/purposes of mitosis to meiosis	meiosis gamete diploid haploid gonads crossing over sexual reproduction asexual reproduction	Meiosis 2 (biology corner)
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## 2.2 Enduring Understanding - Heredity is determined by genetics

### 2.2a Essential Question - What are historical and current findings in genetics?

HE.4.B.5	Analyze the historically significant work of prominent geneticists	*research different works of prominent geneticists	Gregor Mendel Hershey & Chase Avery Morgan Griffith McClintock Watson & Crick Rosalind Franklin	Research report
NS.12.B.6	Relate the chromosome theory of heredity to recent findings in genetic research	*state that the human genome project is mapping human genes for human health, and genetic disease *describe the application of chromosome therapy in genetic counseling, and the possibility of adding or removing genes	Human Genome Project Genome	Restriction enzyme (Glencoe p. 365)  Solve a crime (Glencoe p. 381)  Paper plasmid  Research report

### 2.2b Essential Question - How do the laws of genetics apply to determining heredity?

HE.4.B.1	Summarize the outcomes of Gregor Mendel's experimental procedures	*explain the significance of Mendel's experiments to the study of genetics	dominant allele recessive allele genetics homozygous heterozygous phenotype genotype hybrid heredity Theory of Heredity	Population sampling (Glencoe p. 314)  Baby Face (Glencoe p. 317)  Reebops lab  Monohybrid & dihybrid cross practice
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HE.4.B.2	Differentiate among the laws and principles of inheritance	<ul style="list-style-type: none"> <li>*summarize the law of segregation and the law of independent assortment</li> <li>*explain the difference between dominant and recessive alleles</li> <li>*relate the phases of meiosis to Mendel's laws of inheritance</li> </ul>	<p>Law of independent assortment</p> <p>Law of segregation</p>	
HE.4.B.3	Use the laws of probability and Punnett squares to predict genotypic and phenotypic ratios	<ul style="list-style-type: none"> <li>*create a Punnett square</li> <li>*analyze the genotypes within a Punnett square</li> <li>*compute the genotypic and phenotypic ratios from Punnett square crosses</li> <li>*summarize how the process of meiosis produces genetic recombination</li> </ul>	<p>probability</p> <p>Punnett square ratio</p> <p>monohybrid cross</p> <p>dihybrid cross</p> <p>genetic recombination</p>	<p>Punnett Squares lab (Glencoe p. 281)</p> <p>Probability (beads)</p> <p>Baby face or Reebops</p>
<b>2.2c Essential Question - What factors effect the expressions of genetic traits?</b>				
HE.4.B.4	Examine different modes of inheritance	<ul style="list-style-type: none"> <li>*determine that some traits are effected by multiple alleles</li> <li>*identify that sex chromosomes determine gender &amp; sexual characteristics</li> <li>*relate sex linked inheritance to the sex chromosomes</li> <li>*recognize that polygenetic inheritance is on a continuum</li> </ul>	<p>simple dominance</p> <p>incomplete dominance</p> <p>codominance</p> <p>multiple alleles</p> <p>autosome</p> <p>sex chromosome</p> <p>sex-linked inheritance</p> <p>polygenetic inheritance</p> <p>pedigree</p> <p>crossing over</p> <p>recessive gene</p> <p>sex influenced</p>	<p>Pedigrees (Glencoe p. 300)</p> <p>Analyze various pedigrees (Massengale)</p> <p>Design a species (biology corner)</p>
HE.4.B.6	Evaluate karyotypes for abnormalities	<ul style="list-style-type: none"> <li>*analyze different karyotypes for the evidence of genetic abnormalities</li> <li>*relate the information from a karyotype to expressed abnormalities within the offspring</li> <li>*list example of monosomy and trisomy</li> </ul>	<p>nondisjunction</p> <p>karyotype</p> <p>fetal testing</p> <p>Amniocentesis</p> <p>Chorionic villous sampling</p> <p>fetal blood sampling</p>	

HE.5.B.5	Compare and contrast the different types of mutation events, including point mutation, frameshift mutation, deletion, and inversion	*define mutation *differentiate between the types of mutations	mutation frameshift mutation deletion inversion point mutation	
HE.5.B.6	Identify effects of changes brought about by mutations	*explain the possible results of mutations in individuals *cite examples of genetic diseases	cystic fibrosis Muscular dystrophy sickle-cell Crohn's disease Huntington's disease	

**2.3 Enduring Understanding - DNA is the molecular basis of genetics and the continuation of life.**

**2.3a Essential Question - What is the structure of DNA and RNA?**

HE.5.B.1	Identify the components of a DNA nucleotide and an RNA nucleotide using a scientific model	*distinguish the RNA and DNA nucleotide based on the type of sugar *recognize that uracil replaces thymine in RNA nucleotides	molecular biology molecular genetics RNA DNA nucleotide ribose deoxyribose phosphate hydrogen bond adenine cytosine guanine thymine uracil	Build a DNA molecule
HE.5.B.2	Describe the Watson-Crick double helix model of DNA, using the base-pairing rule	*recognize that the specific pairing is due to a chemical structuring of the nitrogen bases *recognize complementary base pairs *describe the DNA backbone being composed of alternating phosphate and sugar molecules *classify purines & pyrimidines	Watson & Crick double helix thymine cytosine guanine adenine deoxyribose phosphate hydrogen bond purine pyrimidine	

HE.5.B.3	Compare and contrast the structure and function of DNA and RNA	<ul style="list-style-type: none"> <li>*distinguish between the structure of DNA and RNA</li> <li>*differentiate between the function of DNA &amp; RNA</li> <li>*recognize that DNA holds the genetic information while RNA copies the information</li> <li>*show that the sides of DNA are anti-parallel</li> </ul>	DNA RNA nitrogen bases sugars	
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**2.3b Essential Question - How does DNA control the activities of a cell?**

HE.5.B.4	Describe and illustrate/model the processes of replication, transcription, and translation	<ul style="list-style-type: none"> <li>*explain replication as the RNA copy of a DNA template</li> <li>*explain transcription as the reading of the RNA strand</li> <li>*explain translation as the making of the protein from the RNA strand</li> <li>*explain the role of codons and anti-codons</li> </ul>	replication transcription translation mRNA rRNA tRNA ribosome DNA codon anticodon base pair protein synthesis gene	DNA model (Glencoe p. 331) DNA replication (Glencoe p. 334) DNA extraction (Glencoe p. 351) Codon bingo DNA extraction <a href="http://www.dnai.org/a/index.html">www.dnai.org/a/index.html</a>
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**Third Quarter**

**3.1 Enduring Understanding - Biological evolution is the change in the population of organisms over**

**3.1a Essential Question - What evidence supports the theory of evolution?**

HE.6.B.1	Compare and contrast Lamarck's explanation of evolution with Darwin's theory of evolution by natural selection	<ul style="list-style-type: none"> <li>*relate Lamarck to acquired traits and Darwin to natural selection</li> <li>*list the principles of natural selection</li> </ul>	acquired traits natural selection biological evolution	Natural Selection (Glencoe p. 443) Compare/contrast chart
NS.12.B.3	Summarize biological evolution	<ul style="list-style-type: none"> <li>*indicate that evolution occurs because of a change in allele frequency in a population</li> </ul>		

HE.6.B.2	Recognize that evolution involves a change in allele frequencies in a population across successive generations	*discuss the evidence that convinced Darwin that species could change over time *show how natural selection can change a population *cite specific examples of natural selection & artificial selection	allele frequency population generation natural selection artificial selection genetic equilibrium	Modified AP lab  Teddy Graham (Massengale)  Corn kernel lab (Villines)
HE.6.B.3	Analyze the effects of mutations and the resulting variations within a population in terms of natural selection	*describe factors that influence speciation	variation population natural selection Hardy-Weinberg Principle speciation	Mimicry (Glencoe p. 429)  Teddy Graham (Massengale)  bio.kimunity.com (Natural selection)
HE.6.B.4	Illustrate mass extinction events using a time line	*identify and describe major events using the geological timescale	geologic timescale mass extinction extinction	
HE.6.B.5	Consider evolution in terms of scientific evidence	*relate current organisms to past organisms based on the included evidences *cite examples supporting scientific evidence	fossil morphology DNA analysis artificial selection embryology viral evolution geographic distribution antibiotics pesticides resistance	Fossils (Glencoe p. 396)  Group project and report
HE.6.B.6	Compare the processes of relative dating and radioactive dating to determine the age of fossils	*differentiate between relative dating and radioactive dating	fossil relative dating radioactive dating carbon 14 potassium 40	Penny/newspaper lab  Penny lab (Glencoe)
HE.6.B.7	Interpret a Cladogram	*define derived traits *explain the characteristics that are used to find relationships between organisms *explain how a cladogram is constructed	phylogeny cladogram cladistics derived traits	Cladogram (Glencoe p. 505)  Cladogram ology.amnh/org/biodiversity/tre eoflife/pages/howtoreadclado.h tml

CDL.7.B.11	Describe the characteristics used to classify protists *plant-like *animal-like *fungal-like	*differentiate between heterotrophic and autotrophic organisms *differentiate among the methods of movement	protozoan heterotroph autotroph flagella cilia pseudopodia parasite contractile vacuole spore aquatic	Photosynthesis in algae (Glencoe p. 558) Protozoan behavior (Glencoe p. 567)  www.lanesville.k12.in.us/lcsyellowpages/Tickit/Carl/protist.html
CDL.7.B.12	Evaluate the medical and economic importance of protists	*explain the importance of beneficial protists *recognize examples of diseases caused by protists *compare methods of treatment and prevention of diseases caused by protists	trypanosome plasmodium Giardia diatom carrageenan agar	www.rogers.k12.ar.us/users/ehutches/protista.html
CDL.7.B.8	Compare and contrast life cycles of protists	*state the steps of sexual reproduction *recognize the different types of asexual reproduction	alternation of generations reproduction conjugation	

### 3.2 Enduring Understanding - Diverse organisms are classified into major kingdoms.

#### 3.2a Essential Question - How are organisms classified and named?

CDL.7.B.1	Differentiate among the different domains	*explain the characteristics of the three domains	domain bacteria archaea eukarya	Compare bacteria types (Glencoe p. 500)
CDL.7.B.2	Differentiate the characteristics of the six kingdoms	*explain the traits of each different kingdom in regards to complexity of cell and nutrition	Kingdom	Make a foldable
CDL.7.B.3	Identify the seven major taxonomic categories	*state the order of classification of living things *recognize that kingdom is the most broad, and species is the most specific taxonomic category *classify several organisms down to species	kingdom taxonomy species genus	Develop a mnemonic device

CDL.7.B.4	Classify and name organisms based on their similarities and differences applying taxonomic nomenclature using dichotomous keys	*group similar objects based on selected characteristics *utilize rules of binomial nomenclature to determine scientific names	taxonomic nomenclature (binomial nomenclature) dichotomous key	Dichotomy Key (Glencoe p. 488) Shark key Build a chocolate key Trees of Arkansas key (Fulton)
CDL.7.B.5	Investigate Arkansas biodiversity using appropriate tools and technology	*use a dichotomous key *construct a dichotomous key *interpret information collected about Arkansas' organisms	biodiversity	
CDL.7.B.15	Differentiate between vascular and nonvascular plants	*list defining features of vascular and nonvascular plants	root shoot xylem phloem root hairs rhizome sporophyte gametophyte vascular plants nonvascular plants	Tree ID (Glencoe p. 623) Plant cell observation (Glencoe p. 634) Compare/contrast chart
CDL.7.B.16	Differentiate between cycads, gymnosperms, and angiosperms	*explain how seeded vascular plants reproduce *describe the reproductive structures of seeded vascular plants	gymnosperm angiosperm seed fruit cone	Compare conifer leaves (Glencoe p. 620) Compare conifer cones (Glencoe p. 666)
CDL.7.B.8	Compare and contrast life cycles of plants	*state the steps of sexual reproduction *recognize the different types of asexual reproduction *distinguish between the gametophyte and the sporophyte phase in a life cycle	alternation of generations reproduction gametophyte sporophyte vegetative reproduction	

CDL.7.B.17	Describe the structure and function of the major parts of a plant	*differentiate between monocotyledon & dicotyledon *label a diagram of a plant	roots stems flower leaves pistil stamen anther stigma sepal style ovary petal monocotyledon dicotyledon cotyledon	Compare monocot to dicot (Glencoe p. 681)  helpwanted.html (biologycorner.com)  Flower dissection Seed dissection Yard safari
CDL.7.B.18	Relate the structure of plant tissue to its function	*state the function of each plant tissue *differentiate between xylem and phloem as vascular tissue	epidermal tissue ground tissue vascular tissue stomata xylem phloem guard cell meristem cuticle vascular cambium cork cambium	users.ren.com/jkimball.ma.ultranet/BiologyPages/P/PlantTissues.html
CDL.7.B.19	Evaluate the medical and economic importance of plants	*list the major uses of plants *describe medical uses of plants	agriculture medicine	
<b>3.3 Enduring Understanding - Ecosystems are effected by the relationships between living and non living</b>				
<b>3.3a Essential Question - How do matter and energy move through the biosphere?</b>				
EBR.8.B.1	Give examples of abiotic and biotic factors of ecosystems	*differentiate between biotic and abiotic factors *identify components of an ecosystem *list examples of abiotic and biotic factors	Ecology biotic abiotic	Outdoor sampling activity

EBR.8.B.2	Compare and contrast the characteristics of biomes	*identify major biomes based on flora and fauna, climate, geographical location	biome flora fauna weather climate terrestrial aquatic	Climate model (Glencoe p. 66) Biome Research Presentation <a href="http://www.lcusd.net/lchs/mewoldsen/APES.biomes.htm">www.lcusd.net/lchs/mewoldsen/APES.biomes.htm</a>
EBR.8.B.3	Diagram the carbon, nitrogen, phosphate, and water cycles in an ecosystem	*sequence diagrams of the carbon, nitrogen, phosphate, and water cycles in an ecosystem	denitrification nitrification transpiration precipitation evaporation run-off combustion respiration biogeochemical cycle cycle nitrogen fixing bacteria legumes	Nitrates in H2O (Glencoe p.98) <a href="http://www.longman.cauk/foundation/science/docs/chem/chem/doc/insrtuct/cit.cornell.edu/courses/css412/modl/files/n%20cycle%20worksheet.doc">www.longman.cauk/foundation/science/docs/chem/chem/doc/insrtuct/cit.cornell.edu/courses/css412/modl/files/n%20cycle%20worksheet.doc</a>
MC.2.B.6	Compare and contrast the functions of autotrophs and heterotrophs	*recognize an autotroph *recognize a heterotroph *correctly classify various organisms as a heterotroph or autotroph	heterotroph autotroph producer consumer	Move to ecology portion
EBR.8.B.4	Analyze an ecosystem's energy flow through food chains, food webs, and energy pyramids	*explain the difference between a food chain and food web *summarize trophic levels *calculate energy transfer between trophic levels in an energy pyramid *describe the loss of biomass in a biomass pyramid *describe the reduction in numbers in a number pyramid *construct a food web using one of the biomes *recognize that the sun is the ultimate source of energy in MOST ecosystems	food chain food web trophic level herbivore carnivore predator prey omnivores detritivores decomposers biomass producer primary consumer secondary consumer tertiary consumer nutrient energy pyramid	Construct a food web (Glencoe p 92) <a href="http://www.lcusd.net/lchs/mewoldsen/APES.biomes.htm">www.lcusd.net/lchs/mewoldsen/APES.biomes.htm</a> construct local web using at least ten animals

**3.3b Essential Question - What are the relationships between living organisms in an environment?**

EBR.8.B.5	Identify and predict the factors that control population, including predation, competition, crowding, water, nutrients, and shelter	*list factors necessary for organisms to survive *list limiting factors in an ecosystem *describe predator-prey cycles *analyze how individuals in a community interact with each other	community limiting factors competition population niche habitat carrying capacity r-strategist K-strategist	Biolab (Glencoe p. 107)  Oh Deer activity (Project Wild)  Use examples from student generated food chain/web identify predator, prey, niche, habitat and also identify as r- or K- strategist
EBR.8.B.6	Summarize the symbiotic ways in which individuals within a community interact with each other	*recognize close relationships that exist between two or more species living together *restate the concept of symbiosis in terms of beneficial and harmful interactions *cite examples of each relationship	symbiosis commensalism parasitism mutualism host	Biodiversity Lab (Glencoe p.127)

### 3.3c Essential Question - How do ecosystems change over time?

EBR.8.B.7	Compare and contrast primary succession with secondary succession	*state the situations or examples in which primary and secondary succession occur *describe how communities progress through a series of changes *recognize that each biome has a specific climax community	disturbance climax community primary succession secondary succession	Compare plant growth between Yellowstone pre/post fire and lave flow plant growth in Hawaii
EBR.8.B.8	Identify the properties of each of the five levels of ecology	*recognize that the biosphere contains all biotic and abiotic factors *recognize that the biosphere can be broken down into smaller hierarchal units *identify a living organism and its place in its population, community, and ecosystem	hierarchy      biosphere ecosystem community population organism	Take 1 animal from food web and show its place

### 3.3d Essential Question - How do humans impact the environment?

EBR.9.B.1	Analyze the effects of human population growth and technology on the environment/biosphere	<ul style="list-style-type: none"> <li>*describe the positive and negative effects humans have on the environment</li> <li>*describe how technology benefits and harms the environment</li> <li>*analyze human population growth rates by graphs and histograms</li> <li>*analyze demographic trends worldwide in human populations</li> </ul>	<ul style="list-style-type: none"> <li>population density</li> <li>dispersion</li> <li>density independent factors</li> <li>density dependent factors</li> <li>zero population growth</li> <li>demography</li> <li>exponential growth</li> </ul>	<a href="http://www.biologycorner.com/worksheets/humanpop_graph.html">www.biologycorner.com/worksheets/humanpop_graph.html</a>
EBR.9.B.2	Evaluate long range plans concerning resource use and by-product disposal in terms of their environmental, economic, and political impact	<ul style="list-style-type: none"> <li>*list major local, state, national and international governmental and non-governmental agencies which are involved in the protection of the environment</li> <li>*state various plans which have been formed to deal with resource use and by-product disposal</li> <li>*identify local concerns of resource use and by-product disposal</li> <li>*invent plans for resource use and by-product disposal with regards to environmental, economic, and political impact</li> </ul>	<ul style="list-style-type: none"> <li>by-product</li> <li>natural resource</li> <li>recycle</li> <li>pollution</li> <li>contaminate</li> <li>EPA</li> <li>endangered species</li> </ul>	Invent scenario for kids to solve
EBR.9.B.3	Assess current world issues by applying scientific themes	<ul style="list-style-type: none"> <li>*identify major historical epidemics and pandemics and their causes</li> <li>*identify the relationship between ozone depletion, carbon dioxide, and ultraviolet radiation</li> <li>*recognize that natural resources are limited</li> <li>*describe the role of technology in monitoring worldwide environmental, and global health issues</li> </ul>	<ul style="list-style-type: none"> <li>epidemics</li> <li>pandemics</li> <li>vector (carrier organism)</li> <li>carbon dioxide</li> <li>ozone</li> <li>ultraviolet radiation</li> <li>ozone layer</li> <li>greenhouse gases</li> </ul>	<ul style="list-style-type: none"> <li>Student research on past or present epidemic</li> <li>SARS</li> <li>AIDS</li> <li>Malaria</li> <li>Polio</li> <li>Hanta</li> <li>Avian flu</li> <li>The Hot Zone</li> </ul>

## Fourth Quarter

### 4.1 Enduring Understanding - Bacteria and viruses effect the balance of ecosystems.

#### 4.1a Essential Question - How do the characteristics and adaptations of bacteria effect society?

CDL.7.B.9	Classify bacteria according to their characteristics and adaptations	*differentiate between anaerobic and aerobic conditions *recognize the three shapes of bacteria *identify bacterial structures	Gram stain aerobic anaerobic pili flagella peptidoglycan pathogen chemoautotroph endospore photoautotroph cocci bacilli spirochete microbe	Classifying bacteria (Glencoe p. 519)  Antibiotic effectiveness (Glencoe p. 533)  Prepared bacteria slides  <a href="http://www.ucmp.berkeley.edu/bacteria/bacteria">www.ucmp.berkeley.edu/bacteria/bacteria</a>  <a href="http://www.textbookofbacteriology.net/normalflora.html">www.textbookofbacteriology.net/normalflora.html</a>
CDL.7.B.10	Evaluate the medical and economic importance of bacteria	*explain the importance of beneficial bacteria *illustrate the historical impact of bacterial diseases *recognize examples of bacterial diseases *compare methods of treatment and prevention of bacterial diseases	nitrogen fixation genetic engineering normal flora vaccine immunity	
NS.12.B.5	Describe the relationship between the germ theory of disease and our current knowledge of immunology and control of infectious diseases	*state the germ theory *describe the science of immunology *describe and give examples of infectious diseases and their controls	germ theory immunology pathogen infectious disease vaccine quarantine antibiotic sterilization purification antibiotic resistance	Passing of infectious disease (NaOH/ phenylthalanine)  <a href="http://www.mansfield.ohio-state.edu/~sabedon/biol2007.htm#A4">www.mansfield.ohio-state.edu/~sabedon/biol2007.htm#A4</a>  Disease spreading/epidemiologist lab
<b>4.1b Essential Question - How do the characteristics and adaptations of viruses effect society?</b>				
CDL.7.B.6	Compare and contrast the structures and characteristics of viruses (lytic and lysogenic cycles) with non-living and living things	*explain the characteristics of viruses *list the characteristics necessary for living things *distinguish between the lytic and the lysogenic cycles *label the parts of a virus	virus lytic cycle lysogenic cycle nucleic acid capsid	Student models of virus/bacteria

CDL.7.B.7	Evaluate the medical and economic importance of viruses	*explain the effects of viral reproduction on a host *illustrate the historical impact of viral diseases *recognize examples of viral diseases *compare methods of treatment and prevention of viral diseases	retrovirus AIDS HIV SARS influenza polio epidemic pandemic endemic vaccine infection disease host	
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**4.2 Enduring Understanding - Protists are a group of uniquely diverse organisms.**

**4.2a Essential Question - How do the characteristics, uses, and life cycles of protists relate to other**

CDL.7.B.11	Describe the characteristics used to classify protists *plant-like *animal-like *fungal-like	*differentiate between heterotrophic and autotrophic organisms *differentiate among the methods of movement	protozoan heterotroph autotroph flagella cilia pseudopodia parasite contractile vacuole spore aquatic	
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CDL.7.B.12	Evaluate the medical and economic importance of protists	*explain the importance of beneficial protists *recognize examples of diseases caused by protists *compare methods of treatment and prevention of diseases caused by protists	trypanosome plasmodium Giardia diatom carrageenan agar	
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CDL.7.B.8	Compare and contrast life cycles of protists	*state the steps of sexual reproduction *recognize the different types of asexual reproduction	alternation of generations reproduction conjugation	
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**4.3 Enduring Understanding - Fungi are eukaryotic organisms that absorb their nutrients.**

**4.3a Essential Question - How are fungi classified based on their characteristics, uses, and life cycle?**

CDL.7.B.13	Compare and contrast fungi with other eukaryotic organisms	<ul style="list-style-type: none"> <li>*define eukaryote</li> <li>*distinguish between unicellular and multicellular organisms</li> <li>*differentiate between heterotrophic and autotrophic organisms</li> <li>*recognize the major features of fungi</li> <li>*describe methods of fungal reproduction</li> </ul>	<ul style="list-style-type: none"> <li>fungi</li> <li>decomposer</li> <li>chitin</li> <li>hypae</li> <li>mycellium</li> <li>spore</li> <li>septum</li> <li>lichen</li> <li>mychorriza</li> <li>multicellular</li> <li>eukaryote</li> </ul>	
CDL.7.B.14	Evaluate the medical and economic importance of fungi	<ul style="list-style-type: none"> <li>*explain the importance of beneficial fungi</li> <li>*recognize examples of diseases caused by fungi</li> <li>*compare methods of treatment and prevention of diseases caused by fungi</li> </ul>	<ul style="list-style-type: none"> <li>ringworm</li> <li>fungi</li> <li>decomposers</li> <li>lichen</li> <li>penicillin</li> </ul>	
CDL.7.B.8	Compare and contrast life cycles of fungi	<ul style="list-style-type: none"> <li>*state the steps of sexual reproduction</li> <li>*recognize the different types of asexual reproduction</li> <li>*distinguish between the gametophyte and the sporophyte phase in a life cycle</li> </ul>	<ul style="list-style-type: none"> <li>alternation of generations</li> <li>reproduction</li> <li>budding</li> <li>fission</li> <li>gametophyte</li> <li>sporophyte</li> </ul>	
<b>4.4 Enduring Understanding - Plants are multicellular organisms that produce their own food.</b>				
<b>4.4a Essential Question - How are plants classified by their structures, functions, uses, and life cycles?</b>				
CDL.7.B.15	Differentiate between vascular and nonvascular plants	<ul style="list-style-type: none"> <li>*list defining features of vascular and nonvascular plants</li> </ul>	<ul style="list-style-type: none"> <li>root</li> <li>shoot</li> <li>xylem</li> <li>phloem</li> <li>root hairs</li> <li>rhizome</li> <li>sporophyte</li> <li>gametophyte</li> <li>vascular plants</li> <li>nonvascular plants</li> </ul>	

CDL.7.B.16	Differentiate between cycads, gymnosperms, and angiosperms	*explain how seeded vascular plants reproduce *describe the reproductive structures of seeded vascular plants	gymnosperm angiosperm seed fruit cone	
CDL.7.B.8	Compare and contrast life cycles of plants	*state the steps of sexual reproduction *recognize the different types of asexual reproduction *distinguish between the gametophyte and the sporophyte phase in a life cycle	alternation of generations reproduction gametophyte sporophyte vegetative reproduction	
CDL.7.B.17	Describe the structure and function of the major parts of a plant	*differentiate between monocotyledon & dicotyledon *label a diagram of a plant	roots stems flower leaves pistil stamen anther stigma sepal style ovary petal monocotyledon dicotyledon cotyledon	Compare monocot to dicot (Glencoe p. 681)  helpwanted.html (biologycorner.com)  Flower dissection Seed dissection Yard safari
CDL.7.B.18	Relate the structure of plant tissue to its function	*state the function of each plant tissue *differentiate between xylem and phloem as vascular tissue	epidermal tissue ground tissue vascular tissue stomata xylem phloem guard cell meristem cuticle vascular cambium cork cambium	
CDL.7.B.19	Evaluate the medical and economic importance of plants	*list the major uses of plants *describe medical uses of plants	agriculture medicine	

**4.5 Enduring Understanding - Invertebrates are a distinct division of the animal kingdom that lack a true**

**4.5a Essential Question - How are the characteristics of body systems, symmetry, and life cycle used to**

CDL.7.B.20	Identify the symmetry of organisms	*differentiate between types of symmetry *describe how to differentiate between types of symmetry in organisms	symmetry bilateral radial asymmetrical	
CDL.7.B.8	Compare and contrast life cycles of invertebrates	*state the steps of sexual reproduction *recognize the different types of asexual reproduction *identify the different stages of metamorphosis	metamorphosis reproduction budding	
CDL.7.B.21	Compare and contrast the major invertebrate classes according to their nervous, respiratory, excretory, circulatory, and digestive systems	*identify the body systems and their components for each major group of invertebrates	nervous system nerve net ganglia respiratory system tracheal tubes book lungs spiracles excretory system nephridia open circulatory system closed circulatory system heart blood vessels digestive system gastrovascular pharynx gizzard crop stomach	Dissection

**4.5b Enduring Understanding - Vertebrates are a distinct division of the animal kingdom that exhibit a true**

CDL.7.B.22	Compare and contrast the major vertebrate classes according to their nervous, respiratory, excretory, circulatory, digestive, reproductive and integumentary systems	*identify the body systems and their components for each major group of vertebrates	brain nerves notochords dorsal nerve cord gills lungs kidneys heart veins arteries esophagus stomach intestine air sac diaphragm testes ovaries skin scales feathers	Dissection
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