Zoology
Standards Alignments
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New Standards for California

Standards	**Correlation**
Reaction Rates **8. Chemical reaction rates depend on factors that influence the frequency of collision of reactant molecules. As a basis for understanding this concept:**	
c. Students know the role a catalyst plays in increasing the reaction rate.	Class notes 5:3 Lab activity 5:2
d. Students know the definition and role of activation energy in a chemical reaction.	Class notes 5:3
Organic Chemistry and Biochemistry **10. The bonding characteristic of carbon allow the formation of many different organic molecules of varied sizes, shapes, and chemical properties and provide the biochemical basis of life. As a basis for understanding this concept:**	
a. Students know large molecules (polymers), such as proteins, nucleic acids, and starch, are formed by repetitive combinations of simple subunits.	Class notes 3:3 and 5:2
c. Students know amino acids are the building blocks of proteins.	Class notes 3:3 and 5:2
Cell Biology **1. The fundamental life processes of plants and animals depend on a variety of chemical reactions that occur in specialized areas of the organism's cells. As a basis for understanding this concept:**	
a. Students know cells are enclosed within semi-permeable membranes that regulate their interaction with their surroundings.	Class notes 1:2, 1:3 and 5:4 Lab activity 1:1, 1:2 and 5:3

Standards	**Correlation**
b. Students know enzymes are proteins that catalyze biochemical reactions without altering the reaction equilibrium and the activities of enzymes depend on the temperature, ionic conditions, and the pH of the surroundings	Class notes 5:3 Lab activity 5:2
c. Students know how prokaryotic cells, eukaryotic cells (including those from plants and animals), and viruses differ in complexity and general structure.	Class notes 1:2 and 1:4 Lab activity 1:1
d. Students know the central dogma of molecular biology outlines the flow of information from transcription of ribonucleic acid (RNA) in the nucleus to translation of proteins on ribosomes in the cytoplasm.	Class notes 3:3
e. Students know the role of the endoplasmic reticulum and Golgi apparatus in the secretion of proteins.	Class notes 1:2 and 3:3
h. Students know most macromolecules (polysaccharides, nucleic acids, proteins, lipids) in cells and organisms are synthesized from a small collection of simple precursors.	Class notes 5:2
Genetics **2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:**	

California Standards

Standards	**Correlation**
a. Students know meiosis is an early step in sexual reproduction in which the pairs of chromosomes separate and segregate randomly during cell division to produce gametes containing one chromosome of each type.	Class notes 3:1
b. Students know only certain cells in a multicellular organism undergo meiosis.	Class notes 3:1
c. Students know how random chromosome segregation explains the probability that a particular allele will be in a gamete.	Class notes 3:1, 3:2 and 3:3
d. Students know new combinations of alleles may be generated in a zygote through the fusion of male and female gametes (fertilization).	Class notes 3:1
e. Students know why approximately half of an individual's DNA sequence comes from each parent.	Class notes 3:1
f. Students know the role of chromosomes in determining an individual's sex.	Class notes 3:1
g. Students know how to predict possible combinations of alleles in a zygote from the genetic makeup of the parents.	Class notes 3:1, 3:2 and 3:4
3. A multicellular organism develops from a single zygote, and its phenotype depends on its genotype, which is established at fertilization. As a basis for understanding this concept:	
a. Students know how to predict the probable outcome of phenotypes in a genetic cross from the genotypes of the parents and mode of inheritance (autosomal or X-linked, dominant or recessive).	Class notes 3:1 Practice problems 3:1 and 3:2

California Standards

Standards	Correlation
4. Genes are a set of instructions encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism. As a basis for understanding this concept:	
a. Students know the general pathway by which ribosomes synthesize proteins, using tRNAs to translate genetic information in mRNA.	Class notes 3:3
b. Students know how to apply the genetic coding rules to predict the sequence of amino acids from a sequence of codons in RNA.	Class notes 3:3
c. Students know how mutations in the DNA sequence of a gene may or may not affect the expression of the gene or the sequence of amino acids in an encoded protein.	Class notes 3:3
e. Students know proteins can differ from one another in the number and sequence of amino acids.	Class notes 3:3 and 5:2
5. The genetic composition of cells can be altered by incorporation of exogenous DNA into the cells. As a basis for understanding this concept:	
a. Students know the general structures and functions of DNA, RNA, and protein.	Class notes 3:3 and 5:2
b. Students know how to apply base-pairing rules to explain precise copying of DNA during semi-conservative replication and transcription of information from DNA into mRNA.	Class notes 3:3
Ecology **6. Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:**	

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a. Students know biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats.	Class notes 4:1 Lab activity 4:1
b. Students know how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size.	Class notes 4:1
c. Students know how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration, and death.	Class notes 4:1 Lab activity 4:1
e. Students know a vital part of an ecosystem is the stability of its producers and decomposers.	Class notes 4:1 Lab activity 4:1
Evolution **7. The frequency of an allele in a gene pool of a population depends on many factors and may be stable or unstable over time. As a basis for understanding this concept:**	
c. Students know new mutations are constantly being generated in a gene pool.	Class notes 2:2, 2:3 and 3:4
d. Students know variation within a species increases the likelihood that at least some members of a species will survive under changed environmental conditions.	Class notes 2:2, 2:3 and 3:4 Practice Problems 3:1 and 3:2 Lab activity 4:1 and 4:2
e. Students know the conditions for Hardy-Weinberg equilibrium in a population and why these conditions are not likely to appear in nature.	Class notes 3:2 Practice problems 3:1 and 3:2
f. Students know how to solve the Hardy-Weinberg equation to predict the frequency of genotypes in a population, given the frequency of phenotypes.	Class notes 3:2 Practice problems 3:1 and 3:2
8. Evolution is the result of genetic changes that occur in constantly changing environments. As a basis for understanding this concept:	

California Standards

a. Students know how natural selection determines the differential survival of groups of organisms.	Class notes 2:3, 2:5, 3:2 and 3:4
b. Students know a great diversity of species increases the chance that at least some organisms survive major changes in the environment.	Class notes 2:3, 2:5, 3:2 and 3:4 Practice problems 3:1 and 3:2 Lab activity 4:2
c. Students know the effects of genetic drift on the diversity of organisms in a population.	Class notes 3:2 Practice problems 3:1 and 3:2
d. Students know reproductive or geographic isolation affects speciation.	Class notes 3:4 and 4:1 Practice problems 3:1 and 3:2
Physiology **9. As a result of the coordinated structures and functions of organ systems, the internal environment of the human body remains relatively stable (homeostatic) despite changes in the outside environment. As a basis for understanding this concept:**	
a. Students know how the complementary activity of major body systems provides cells with oxygen and nutrients and removes toxic waste products such as carbon dioxide.	Class notes 5:6 Lab activity 5:5

Next Generation Standards for Florida

Standards	**Correlation**
Standard SC.912.N.3: **The Role of Theories, Laws, Hypotheses and Models**	
N.3.1 Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena: thus, a scientific theory represents the most powerful explanation scientists have to offer.	Class notes 2:1
N.3.2 Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.	Class notes 2:1
Standard SC.912.L.14: **Organization and Development of Living Organisms**	
L.14.2 Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport)	Class notes 1:2, 5:1, 5:3 and 5:4
L.14.13 Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue and nervous tissue.	Class notes 1:2
L.14.14 Identify the major bones of the axial and appendicular skeleton.	Class notes 5:5 and lab activity 5:4

Standards	**Correlation**
L.14.15 Identfy major markings (such as foramina, fossae, tubercles, etc.) on a skeleton. Explain why these markings are important	Class notes 5:5
Standard SC.912.L.15: **Diversity and Evolution of Living Organisms**	
L.15.9 Explain the role of reproductive isolation in the process of speciation.	Class notes 3:4
L.15.12 List the conditions for Hardy-Weinberg equilibrium in a population and why these conditions are not likely to appear in nature. Use the Hardy-Weinberg equation to predict genotypes in a population from observed phenotypes.	Practice Problems 3:2
L.15.14 Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.	Class notes 2:3 and 3:2
L.15.15 Describe how mutation and genetic recombination increase genetic variation.	Lab activity 2:1
Standard SC.912.L.16: **Heredity and Reproduction**	
L.16.2 Discuss observed inheritance patterns caused by various models of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.	Class notes 3:1
L.16.3 Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.	Class notes 3:3

Standards	**Correlation**
L.16.4 Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.	Class notes 3:3
L.16.5 Explain the basic processes of transcription and translation and how they result in the expression of genes.	Class notes 5:3
Standard SC.912.L.17: Interdependence	
L.17.1 Discuss the characteristics of populations such as number of individuals, age structure, density and pattern of distribution.	Class notes 4:1
L.17.6 Compare and contrast the relationships among organisms including predation, parasitism, competition, commensalism and mutualism.	Class notes 4:1
L.17.8 Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity and the introduction of invasive non-native species.	Class notes 4:1
Standard SC.912.L.18: Matter and Energy Transformations	
L.18.1 Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.	Class notes 5:2

Standards	**Correlation**
L.18.4 Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.	Class notes 3:3 and 5:2
L.18.11 Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors such as pH and temperature, and their effect on enzyme activity.	Class notes 5:3 and Lab activity 5:2
L.18.12 Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing and versatility as a solvent.	Class notes 5:2

New Standards for Illinois

Standards	**Correlation**
HS-LS1-1 From Molecules to Organisms: Structures and Processes: **Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.**	
LS1.A: Structure and Function:	
• Systems of specialized cells within organisms help them perform the essential functions of life.	Class notes 3:3
HS-LS1-2 From Molecules to Organisms: Structures and Processes: **Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.**	
LS1.A: Structure and Function	
• Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.	Class notes 5:1
HS-LS1-3 From Molecules to Organisms: Structures and Processes: **Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.**	

Standards	Correlation
LS1.A: Structure and Function	
• Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.	Class notes 4:5 Lab activity 1:2, 5:2 and 5:3
HS-LS1-6 From Molecules to Organisms: Structures and Processes: **Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and / or other large carbon-based molecules.**	
LS1.C: Organization for Matter and Energy Flow in Organisms:	
• The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells.	Class notes 5:2 Lab activity 5:1
HS-LS-7 From Molecules to Organisms: Structure and Processes: **Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.**	

Standards	Correlation
LS1.C: Organization for Matter and Energy Flow in Organisms	
• As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.	Class notes 3:3 and 5:2
HS-LS2-1 Ecosystems: Interactions, Energy, and dynamics: **Use mathematical and/or computational representations to support explanations of factor that affect carrying capacity of ecosystems at different scales.**	
LS2.A: Interdependent Relationships in Ecosystems	
• Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and fro such challenges as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem.	Class notes 4:1
HS-LS2-6 Ecosystems: Interactions, Energy, and Dynamics: **Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.**	

Standards	**Correlation**
LS2.C: Ecosystem Dynamics, Functioning, and Resilience	
A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient) as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability.	Class notes 4:1 Lab activity 4:1
HS-LS2-7 Ecosystems: Interactions, Energy, and Dynamics: **Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.**	
LS2.C: Ecosystem Dynamics, Functioning, and Resilience	
• Moreover, anthropogenic changes (induced by human activity) in the environment – including habit destruction, pollution, introduction of invasive species, over exploitation, and climate change – can disrupt an ecosystem and threaten the survival of some species.	Class notes 4:1
HS-LS2-8 Ecosystems: Interactions, Energy, and Dynamics: **Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.**	

Standards	**Correlation**
HS-LS4-5 Biological Evolution: Unity and Diversity: Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	
LS4.C: Adaptation	
• Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline – and sometimes the extinction – of some species.	Class notes 2:2, 2:3, 2:5 and 3:4

New Standards for New Jersey

Standards	**Correlation**
Standard 5.1 (Scientific Practices) **All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.**	
Strand A. Understand Scientific Explanations: **Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.**	
5.1.12.A.2 Interpretation and manipulation of evidence-based models are used to build and critique arguments / explanations.	Practice problems 3:1 and 3:2 Lab activity 3:3
5.1.12.A.3 Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.	Class notes 2:2 and 2:3 Lab activity 1:2, 2:1, 5:2 and 5:3
Strand B. Generate Scientific Evidence Through Active Investigations: **Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.**	
5.1.12.B.1 Logically designed investigations are needed I order to generate the evidence required to build and refine models and explanations.	Class notes 2:2 and 2:3 Lab activity 1:2, 2:1, 5:2 and 5:3

Standards	**Correlation**
5.1.12.B.2 Mathematical tools and technology are used to gather, analyze, and communicate results.	Class notes 3:2 Practice problems 3:1 and 3:2
5.1.12.B.4 Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.	Clas notes 2:2, 2:3 and 3:4 Lab activity 1:2, 2:1, 5:2 and 5:3
Strand C. Reflect on Scientific Knowledge: **Scientific knowledge builds on itself over time.**	
5.1.12.C.1 Refinement of understandings, explanations, and models occurs as new evidence is incorporated.	Class notes 2:2 and 2:3
5.1.12.C3 Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.	Class notes 2:2 and 2:3
Strand D. Participate Productively in Science: **The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.**	
5.1.12.D.1 Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.	Lab activity 1:2, 2:1, 4:4, 5:2, 5:3, 5:5 and 6:1
5.1.12.D.2 Science involves using language, both oral and written, as a tool for making thinking public.	Lab activity 6:1
Standard 5.3 (Life Science) **All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the order of natural systems can be modeled and predicted through the use of mathematics.**	

Standards	Correlation
Strand A. Organization and Development: **Living organisms are composed of cellular units (structures) that carry out functions required for life. Cellular units are composed of molecules, which also carry out biological functions.**	
5.3.12.A.1 Cells are made of complex molecules that consist mostly of a few elements. Each class of molecules has its own building blocks and specific functions.	Class notes 1:2, 3:3, 5:2 and 5:3 Lab activity 1:1 and 5:2
5.3.12.A.2 Cellular processes are carried out by many different types of molecules, mostly by the group of proteins known as enzymes.	Class notes 5:3 Lab activity 5:2
5.3.12.A.3 Cellular function is maintained through the regulation of cellular processes in response to internal and external environmental conditions.	Class notes 1:3, 3:2, 3:3, 5:3 and 5:4 Lab activity 1:2, 5:1 and 5:2
5.3.12.A.6 There is a relationship between the organization of cells into tissues and the organization of tissues into organs.	Class notes 1:2, 5:1, 5:5 and 5:6
Strand B. Matter and Energy Transformations: **Food is required for energy and building cellular materials. Organisms in an ecosystem have different ways of obtaining food, and some organisms obtain their food directly from other organisms.**	
5.3.12.B.5 In both plant and animal cells, sugar is a source of energy and can be used to make other carbon-containing (organic) molecules.	Class notes 5:2
Strand C. Interdependence: **All animals and most plants depend on both other organisms and their environment to meet their basic needs.**	

Standards	**Correlation**
5.3.12.C.1 Biological communities in ecosystems are based on stable interrelationships and interdependence of organisms.	Class notes 4:1 and 4:2 Lab activity 4:1 and 4:3
5.3.12.C.2 Stability in an ecosystem can be disrupted by natural or human interactions.	Class notes 4:1 and 4:2
Strand D. Heredity and Reproduction: **Organisms reproduce, develop, and have predictable life cycles. Organisms contain genetic information that influences their traits, and they pass this on to their offspring during reproduction.**	
5.3.12.D.1 Genes are segments of DNA molecules located in the chromosome of each cell. DNA molecules contain information that determines a sequence of amino acids, which result in specific proteins.	Class notes 3:1 and 3:3
5.3.12.D.2 Inserting, deleting, or substituting DNA segments can alter the genetic code. An altered gene may be passed on to every cell that develops from it. The resulting features may help, harm, or have little or no effect on the offspring's success in its environment.	Class notes 3:1 and 3:2
5.3.12.D.3 Sorting and recombination of genes in sexual reproduction result in a great variety of possible gene combinations in the offspring of any two parents.	Class notes 3:1 and 3:3
Strand E. Evolution and Diversity: **Sometimes, differences between organisms of the same kind provide advantages for surviving and reproducing in different environments. These selective differences may lead to dramatic changes in characteristics of organisms In a population over extremely long periods of time.**	
5.3.12.E.1 New traits may result from new combinations of existing genes or from mutations of genes in reproductive cells within a population.	Class notes 3:1 and 3:3

Standards	**Correlation**
5.3.12.E.3 The principles of evolution (including natural selection and common descent) provide a scientific explanation for the history of life on Earth as evidenced in the fossil record and in the similarities that exist within the diversity of existing organisms.	Class notes 2:3, 2:4, 2:5, 3:2 and 3:4
Standard 5:4 (Earth Systems Science) **All students will understand that Earth operates as a set of complex, dynamic, and interconnected systems, and is a part of the all-encompassing system of the universe.**	
Strand B. History of Earth: **From the time that Earth formed from a nebula 4.6 billion years ago, it has been evolving as a result of geologic, biological, physical, and chemical processes.**	
5.4.12.B.2 Relative dating uses index fossils and stratigraphic sequences to determine the sequence of geologic events.	Class notes 2:4
5.4.12.B.3 Absolute dating, using radioactive isotopes in rocks, makes it possible to determine how many	Class notes 2:4

New Standards for Nevada

Standards	**Correlation**
Content Standard N12A **Students understand that a variety of communication methods can be used to share scientific information**	
N.12.A.2 Students know scientists maintain a permanent record of procedures, data, analyses, decisions, and understandings of scientific investigations.	Class notes 4:4 Lab activity 4:2, 4:3 and 4:4
N.12.A.3 Students know repeated experimentation allows for statistical analyses and unbiased conclusions.	Class notes 2:1, 2:2 and 2:3
Content Standard N12B **Students understand the impacts of science and technology in terms of costs and benefits to society.**	
N.12.B.2 Students know consumption patterns, conservation efforts, and cultural or social practices in countries have varying environmental impacts.	Class notes 4:1
N.12.B.4 Students know scientific knowledge builds on previous information.	Class notes 2:2 and 2:3 Film: "Walking with Prehistoric Beasts"
Content Standard L12A **Students understand how genetic information is passed from one generation to another.**	
L.12.A.1 Students know genetic information passes from parents to offspring is coded in the DNA molecule.	Class notes 3:1 and 3:3
L.12.A.2 Students know DNA molecules provide instructions for assembling protein molecules.	Class notes 3:1 and 3:3

Standards	Correlation
L.12.A.3 Students know all body cells in an organism develop from a single cell and contain essentially identical instructions.	Class notes 1:2, 3:1 and 3:3
L.12.A.5 Students know how to predict patterns of inheritance.	Class notes 2:5, 3:3 and 3:4 Lab activity 3:3
Content Standard L12B **Students understand that all life forms, at all levels of organization, use specialized structures and similar processes to meet life's needs.**	
L.12.B.1 Students know cell structures and their functions.	Class notes 1:2 and 3:3 Lab activity 1:1
Content standard L12C **Students understand that ecosystems display patterns of organization, change, and stability as a result of the interactions and interdependencies among the living and non-living components of Earth.**	
L.12.C.1 Students know relationships of organisms and their physical environments.	Class notes 2:5 and 4:1 Lab activity 4:1, 4:2 and 4:3
L.12.C.2 Students know how changes in an ecosystem can affect biodiversity and biodiversity's contribution to an ecosystem's stability.	Class notes 4:1 Lab activity 4:1
L.12.C.3 Students know the amount of living matter an environment can support is limited by the availability of matter, energy, and the ability of the ecosystem to recycle materials.	Class notes 4:1
Content Standard L12D **Students understand biological evolution and diversity of life.**	
L.12.D.1 Students know organisms can be classified based on evolutionary relationships.	Class notes 2:3 and 2:5 Lab activity 4:2 and 4:3

Standards	**Correlation**
L.12.D.2 Students know similarity of DNA sequences give evidence of relationships between organisms.	Class notes 3:3
L.12.D.3 Students know the fossil record gives evidence for natural selection and its evolutionary consequences.	Class notes 2:2, 2:4, 2:5 and 3:4
L.12.D.4 Students know the extinction of species can be a natural process.	Class notes 2:3, 2:5, 3:2 and 3:4
L.12.D.5 Students know biological evolution explains diversity of life.	Class notes 2:2, 2:3, 2:4, 2:5 and 3:2
L.12.D.6 Students know concepts of natural and artificial selection.	Class notes 2:3, 2:5, 3:2 and 3:4 Lab activity 2:1 Practice problems 3:1 and 3:2
Content Standard E12C **Students understand evidence for processes that take place on a geologic time scale.**	
E.12.C.1 Students know how successive rock strata and fossils can be used to confirm the age, history, and changing life forms of the Earth, including how this evidence is affected by the folding, breaking, and uplifting of layers.	Class notes 2:4

New Standards for New York

Standards	Correlation
1. Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions	
Mathematical Analysis 1: Abstraction and symbolic representation are used to communicate mathematically.	Class notes 3:2 Practice Problems 3:1 and 3:2
Mathematical Analysis 2: Deductive and inductive reasoning are used to reach mathematical conclusions.	Class notes 3:2 Practice Problems 3:1 and 3:2
Mathematical Analysis 3: The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.	Class notes 3:2 Practice Problems 3:1 and 3:2
Scientific Inquiry 1: The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.	Class notes 2:1, 2:2 and 2:3
Scientific Inquiry 3: The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.	Class notes 2:4
4. Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.	
Physical Setting 3: Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.	Class notes 3:3 Lab activity 5:2
The Living Environment 1: Living things are both similar to and different from each other and nonliving things.	Class notes 1:2, 1:4, 4:2, 4:3, 4:4 and 5:1 Lab activity 1:1, 2:1, 4:2, 4:3 and 4:4

Standards	**Correlation**
The Living Environment 2: Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.	Class notes 3:3 Lab activity 3:3
The Living Environment 3: Individual organisms and species change over time.	Class notes 2:3 and 3:4 Film: Prehistoric Beasts
The Living Environment 4: The continuity of life is sustained through reproduction and development.	Class notes 3:1 and 3:3 Lab activity 4:1
The Living Environment 5: Organisms maintain a dynamic equilibrium that sustains life.	Class notes 1:3 and 5:3 Lab activity 5:2 and 5:3
The Living Environment 6: Plans and animals depend on each other and their physical environment.	Class notes 2:5 Lab activity 4:1
Magnitude and Scale 3: The grouping of magnitudes of size, time, frequency, and pressures or other units of measurement into a series of relative order provides a useful way to deal with the immense range and the changes in scale that affect the behavior and design of systems.	Class notes 2:4
Equilibrium and Stability 4: Equilibrium is a state of stability due either to a lack of changes (static equilibrium) or a balance between opposing forces (dynamic equilibrium).	Class notes 1:3 and 2:5 Lab activity 1:2 and 5:2
6. Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning.	
Patterns of Change 5: Identifying patterns of change is necessary for making predictions about future behavior and conditions.	Class notes 1:3, 2:3 & 2:5; Lab activity 1:2 & 5:2
Models 2: Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design.	Class notes 2:4

New Standards for Pennsylvania

Standards	**Correlation**
Organizing Category – 3.1.A: **Organisms and Cells**	
3.1.B.A1 Describe the common characteristics of life. Compare and contrast the cellular structures and degrees of complexity of prokaryotic and eukaryotic organisms. Explain that some structures in eukaryotic cells developed from early prokaryotic cells (e.g., mitochondria, chloroplasts)	Class notes 1:2 Lab activity 1:1 and 1:2
3.1.B.A5 Relate the structure of cell organelles to their function (energy capture and release, transport, waste removal, protein synthesis, movement, etc). Explain the role of water in cell metabolism. Explain how the cell membrane functions as a regulatory structure and protective barrier for the cell. Describe transport mechanisms across the plasma membrane.	Class notes 1:2 Lab activity 1:1 and 1:2
3.1.B.A7 Analyze the importance of carbon to the structure of biological macromolecules. Compare and contrast the functioins and structures of proteins, lipids, carbohydrates, and nucleic acids. Explain the consequences of extreme changes in pH and temperature on cell proteins.	Class notes 3:3
3.1.B.A8 Change and Constancy: Recognize that systems within cells and multicellular organisms interact to maintain homeostasis. Patterns: Demonstrate the repeating patterns that occur in biological polymers.	Class notes 1:3, 3:3 and 5:3 Lab activity 5:4 and 5:5
3.1.B.A9 Know that both direct and indirect observations are used by scientists to study the natural world and universe.	Class notes 2:1 Lab activity 1:2, 4:1, 4:4 and 5:2

Standards	Correlation
Organizing Category – 3.1.B: Genetics	
3.1.B.B1 Explain that the information passed from parents to offspring is transmitted by means of genes which are coded in DNA molecules. Explain the basic process of DNA replication. Describe the basic processes of transcription and translation. Explain how crossing over, jumping genes, and deletion and duplication of genes results in genetic variation. Explain how mutations can alter genetic information and the possible consequences on resultant cells.	Class notes 3:3
3.1.B.B2 Describe how the process of meiosis results in the formation of haploid gametes and analyze the importance of meiosis in sexual reproduction. Compare and contrast the function of mitosis and meiosis. Illustrate that the sorting and recombining of genes in sexual reproduction results in a great variety of possible gene combinations in offspring.	Class notes 3:1
3.1.B.B3 Describe the basic structure of DNA, including the role of hydrogen bonding. Explain how the process of DNA replication results in the transmission and conservation of the genetic code. Describe how transcription and translation result in gene expression. Differentiate among the end products of replication, transcription, and translation. Cite evidence to support that the genetic code is universal.	Class notes 3:1 and 3:3

Standards	**Correlation**
3.1.B.B5 PATTERNS: Describe how Mendel's laws of segregation and independent assortment can be observed through patterns of inheritance. Distinguish among observed inheritance patterns caused by several types of genetic traits (dominant, recessive, codominant, sex-linked, polygenic, incomplete dominance, multiple alleles).	Class notes 3:1, 3:2, 3:3 and 3:4 Practice problems 3:1 and 3:2 Lab activity 3:3
3.1.B.B5 CONSTANCY AND CHANGE: Explain how the processes of replication, transcription, and translation are similar in all organisms. Explain how genes actions, patterns of heredity, and reproduction of cells and organisms account for the continuity of life.	Class notes 3:1, 3:2, 3:3 and 3:4 Practice problems 3:1 and 3:2 Lab activity 3:3
3.1.B.B6 Compare and contrast scientific theories.	Class notes 2:1, 2:2 and 2:3 Film: "Walking With Prehistoric Beasts"
3.1.B.B6 Examine the status of existing theories.	Class notes 2:1, 2:2 and 2:3 Film: "Walking With Prehistoric Beasts"
Organizing Category – 3.1.C: Evolution	
3.1.B.C.1 Describe species as reproductively distinct groups of organisms. Analyze the role that geographic isolation can play in speciation. Explain how evolution through natural selection can result in changes in biodiversity through the increase or decrease of genetic diversity within a population. Describe how the degree of kinship between species can be inferred from the similarity in their DNA sequences.	Class notes 3:4

3.1.B.C.2 Describe the theory suggesting that life on Earth arose as a single, primitive prokaryote about 4 billion years ago and that for the next 2 billion years, a huge diversity of single-celled organisms evolved. Analyze how increasingly complex multicellular organisms evolved once cells with nuclei developed. Describe how mutations in sex cells may be passed on to successive generations and that the resulting phenotype may help, harm, or have little or no effect on the offspring's success in its environment. Describe the relationship between environmental changes and changes in the gene pool of a population	Class notes 2:2, 2:3 and 2:4
3.1.B.C3 CONSTANCY AND CHANGE: Compare and contrast various theories of evolution. Interpret data from fossil records, anatomy and physiology, and DNA studies relevant to the theory of evolution.	Class notes 2:1, 2:2 and 2:3
3.1.B.C4 Know that both direct and indirect observations are used by scientists to study the natural world and universe.	Class notes 2:1, 2:2, 2:3 and 2:4 Lab activity 1:2, 4:1, 4:4, 5:1, 5:2 and 5:3

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