7th Grade Science

COURSE OUTLINE		
Unit One	*Structure and Properties of Matter*	*9 weeks*
Unit Two	*Chemical Reactions*	*4 weeks*
Unit Three	*Cells and Genetics*	*12 weeks*
Unit Four	*Natural Selection and Adaptations*	*7 weeks*
Unit Five	*Human Body Systems*	*4 weeks*

School-wide Academic Expectations Taught In This Course

- Communication
- Collaboration
- **Analysis**
- Literacy

School-wide Social and Civic Expectations Taught in This Course

- Demonstrate Honesty
- Demonstrate Responsibility
- Demonstrate Respect
- Demonstrate Safety

Performance Expectations Taught in This Course		
Unit 1	MS-PS1	MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures.
		MS-PS1-4 Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
		MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
Unit 2	MS-PS1	MS-PS1-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
		MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved

		MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
Unit 3	MS-LS1	MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
		MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function.
	MS-LS3	MS-LS3-1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
	MS-LS4	MS-LS4-5. Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.
	MS-LS1	MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
Unit 4	MS-LS1	MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
		MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
	MS-LS3	MS-LS3-2. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
	MS-LS4	MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.
		MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
		MS-LS4-3. Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.

		MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment
		MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.
Unit 5	MS-LS1	MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
		MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
		MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Unit 1: Structure and Properties of Matter

Introduction: Everything around us is created from tiny atoms. There are a finite known number of types of atoms that exist thus far, and how they act and react determines how the world exists- if things are big or small, hard or soft, reactive or unreactive, living or non-living. The periodic table allows for organization and understanding of how these atoms interact and what their properties are.

Next Generation Science Standard:
MS-PS1

Science & Engineering Practices:
Developing and Using Models
Obtaining, Evaluating and Communicating Information

Crosscutting Concepts:
Cause and Effect
Scale, Proportion and Quantity

Structure and Function

Common Core Standard(s):

ELA/Literacy –

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions (MS-PS1-3)

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-PS1-1),(MS-PS1-4)

WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-PS1-3)

Mathematics –

MP.2 Reason abstractly and quantitatively. (MS-PS1-1)

Essential Question(s):

Is the world made of microscopic atoms?
What are the subatomic particles, and how do they interact?
How does heat influence the position of subatomic particles?
What role do synthetic and natural materials play in our daily lives?

Key Terms/Concepts:

Atoms, protons, neutrons, electrons, thermal energy, molecular formulas, Bohr models, mass, volume, density, characteristic properties, states of matter, kinetic energy, potential energy, metals, nonmetals, metalloids, covalent bonds, ionic bonds, protons, neutrons, electrons, valence electrons, orbitals, atomic mass, Dmitri Mendeleev

LEARNING PLAN

Performance Expectation	Disciplinary Core Ideas (DCI):	**INSTRUCTIONAL STRATEGIES**	**ASSESMENT EVIDENCE**
MS-PS1-1 **Developing and using models** **Structure and Function**	1. PS1.A: Structure and Properties of Matter • Substances are made from different types of atoms, which combine with one another in various	• Color periodic table groups • Solve molecular formulas • Make atoms with manipulatives • Element Bingo • Element research	• "Redesign the periodic table" project • Draw atoms • Quizzes and tests • Element

	ways. Atoms form molecules that range in size from two to thousands of atoms. • Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. • Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals).	project • Readings	research project presentation
MS- PS 1-4 **Developing and using models** **Scale, Proportion and Quantity**	2. PS1.A • Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. • In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations • The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter PS3.A • The term "heat" as used in everyday language refers both to thermal energy (the motion of atoms or	• Hot/cold demonstration water tank • "You're an atom" thermal demonstration • Readings • Solid/liquid/ gas chart • Density bottle • "Dead Sea" exploration • Density tube demonstration	• Density block lab

	molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects.		

MS-PS 1-3 **Obtaining, Evaluating and Communicating Information** **Scale, Proportion, and Quantity**	**4. PS1.A:** • Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.	• Class discussion • Readings	• Research paper and presentation

Suggested Resources and Texts: Prentice Hall Science Explorer, *Chemical Building Blocks*

Suggested Technology:

Film: “Chemistry: The Basics”

Atoms (Bill Nye): http://www.youtube.com/watch?v=EeLL3yCea4c

Mixing chemicals (Brainiacs- Alkali metals): http://www.youtube.com/watch?v=m55kgyApYrY

Periodic table (bozemanbiology): http://www.youtube.com/watch?v=fLSfgNxoVGk

Dmitri Mendeleev (Bill Nye): http://www.youtube.com/watch?v=gIwsU1kPLmA

Film: “Elements and Compounds”

Film: “Fireworks”

Unit 2: Chemical Reactions

Introduction: Students make the connections between microscopic and macroscopic factors in this unit. The interior subatomic particles are the driving force behind how chemicals will interact, as bonds break or are created. It explains why some substances are volatile, while others are extremely dangerous.

Next Generation Science Standard:

MS-PS1

Science & Engineering Practices:

Developing and Using Models
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions

Crosscutting Concepts:

Patterns
Energy and Matter

Common Core Standard(s):

ELA/Literacy –
RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions (MS-PS1-2)
RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. (MS-PS1-6)
RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-PS1-2),(MS-PS1-5)
WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-PS1-6)
Mathematics –
MP.2 Reason abstractly and quantitatively. (MS-PS1-2),(MS-PS1-5)
MP.4 Model with mathematics. (MS-PS1-5)
6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-PS1-2),(MS-PS1-5)
6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (MS-PS1-2)
6.SP.B.5 Summarize numerical data sets in relation to their context (MS-PS1-2)

Essential Question(s):

What physical and chemical properties should be assessed to determine when a chemical reaction occurs?
Where do atoms go when a chemical reaction occurs?
Can we control thermal energy- either containing or releasing it?

Key Terms/Concepts:
Thermal energy, density, melting point, boiling point, solubility, flammability, odor, Law of Conservation of Atoms

LEARNING PLAN

Performance Expectation	Disciplinary Core Ideas (DCI):	**INSTRUCTIONAL STRATEGIES**	**ASSESMENT EVIDENCE**
MS-PS1-2 **Analyzing and Interpreting Data** **Patterns**	**PS1.A: Structure and Properties of Matter** • Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it.	• Video analysis, class discussion • Paper chromatography lab • Readings	• quiz
MS- PS1-5 **Developing and Using Models** **Energy and Matter**	**PS1.B: Chemical Reactions** • Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. • The total number of each type of atom is conserved, and thus the mass does not change. • Some chemical reactions release energy, others store energy	• Molecular formula worksheets • Video analysis, class discussion • Radon poster project • Popcorn conservation demonstration • Demonstration reactions (ooblek, baking soda/vinegar) • “Controlling chemical reactions” book section • Readings	• Worksheets • Quizzes • Test
MS-PS1-6 **Constructing**	**ETS1.B: Developing Possible Solutions** • A solution needs to be	• Heat Pack Labs • Readings	Post lab questions, evaluation

Explanations and Designing Solutions **Patterns**	tested, and then modified on the basis of the test results, in order to improve it. **ETS1.C: Optimizing the Design Solution** • Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of the characteristics may be incorporated into the new design. • The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately		

Suggested Resources and Texts: Prentice Hall Science Explorer, *Chemical Interactions*

Suggested Technology:

Film: "Fireworks"

Chemical reactions (Bill Nye): http://www.youtube.com/watch?v=PlwuxpMh8nk

Chemical reaction and temperature (sciencetheater): http://www.youtube.com/watch?v=t0xl0CXjB04&list=UUhe_jODgmX3YymLdD4hERNg&index=31

"Backyard Scientist" reaction experiment movies

Unit 3: Cells and Genetics

Introduction:

All past or present living organisms are composed of cells. The microscopic interior organelles operate together to make cells function independently of other organisms, or as part of a larger being. One important aspect of the content of a cell is the DNA. Understanding the complexity and enormous amount of information locked inside the DNA of a cell is an on-going process that will stretch far in to the future.

Science & Engineering Practices:

Developing and Using Models
Planning and Carrying Out Investigations
Engaging in Argument from Evidence

Crosscutting Concepts:

Scale, Proportion and Quantity
Systems and System Models
Structure and Function

Common Core Standard(s):

ELA/Literacy –
RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-3)
RI.6.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not. (MS-LS1-3)
WHST.6-8.1 Write arguments focused on discipline content. (MS-LS1-3)
WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-LS1-1)
WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-LS1-8)
SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS1-2)
Mathematics –
6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

Essential Question(s):

How do microscopic cell organelles function as a unit to keep the cell, and possibly the entire multicellular organism, alive?
How does the structure of DNA allow it to contain such a large volume of information?
What information passes from one generation to the next to allow for the continuation of a species?

Key Terms/Concepts:
unicellular, multicellular, cells, organelles, nucleus, nucleolus, cytoplasm, mitochondria, DNA/chromatin, ribosome, nuclear envelope, cell membrane, cell wall, chloroplast, vacuole, endoplasmic reticulum, lysosome, golgi body, Venn diagram, osmosis, diffusion, active transport, passive transport, mitosis, somatic cells, interphase, prophase, metaphase, anaphase, telophase, cytokinesis, cancer, meiosis, germ cells, DNA, adenine, guanine, cytosine, thymine, sugar-phosphate backbone, heredity, traits, fertilization, offspring, genes, alleles, mutations, genetic disorders, sex-linked traits, punnett squares, homozygous and heterozygous alleles, genotype, phenotype, selective breeding, cloning, nature vs. nurture, evolution

LEARNING PLAN

Performance Expectation	Disciplinary Core Ideas (DCI):	**INSTRUCTIONAL STRATEGIES**	**ASSESMENT EVIDENCE**
MS-LS1-1 **Developing and Using Models** **Scale, Proportion, and Quantity**	LS1.A: Structure and Function • All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular)	• "How do you know something is alive?" discussion/prompt • Draw, discuss, view mitosis • Bacteria game • Readings •	• Quizzes • Tests
MS-LS1-2 **Developing and Using Models** **Structure and Function**	• Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves	• Readings • Microscope investigations • Plant/animal cell comparison colorings • Jello cells demonstrations	• Venn diagram of organelles • Cell organelle comparison project

	the cell. •		
MS-LS3-1 **Developing and Using Models** **Structure and Function**	**LS3.A: Inheritance of Traits** • Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. **LS3.B: Variation of Traits** • In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism.	• Readings • Watson, Crick and Franklin discussion • Use DNA models • Gregor Mendel pea plant experiment explorations • Punnett squares • DNA extraction lab • Number of chromosomes investigation • Meiosis exploration, diagram, discussion • Dragon genetics activity • Cancer reading and discussion	• Dominant and recessive allele chart • Independent Punnett squares • Quizzes • Tests • Review questions • Breeding dragon genetics activity
MS-LS4-5 **Obtaining, Evaluating, and Communicating Information** **Cause and Effect**	**LS4.B: Natural Selection** • In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose	• Readings • Nature vs. nurture discussion and debate • Compare wild turkeys to domestic turkeys, dogs to wolves • P/F_1/F_2 generations	• “Clone” movie debate/quiz

	desired parental traits determined by genes, which are then passed on to offspring.		
MS-LS1-6 **Constructing Explanations and Designing Solutions** **Energy and Matter**	**LS1.C: Organization for Matter and Energy Flow in Organisms** • Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. **PS3.D: Energy in Chemical Processes and Everyday Life** • The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen.	• Readings • Photosynthesis leaves informational organization • Hypothetical photosynthesis lab experiment • Grow seedlings • Photosynthesis diagram and discussion of parts	• Hypothetical photosynthesis lab experiment analysis questions

Suggested Resources and Texts: Prentice Hall Science Explorer, *Cells and Heredity*

Suggested Technology:

Film: “Cells”

Film: “The magic of cells”

Film: “Mitosis and cytokinesis”

Film: “Mammals”

Film: “Clone”

Online video clips of phototropism and gravitropism

Unit 4: Natural Selection

Introduction: With different pressures such as changes in the environment, predators, food sources or mate availability, organisms respond by changing and adapting to the new conditions. Failure to do so means a species can be wiped out. Over time, mutations and pressures result in dramatic changes to organisms. Evidence for this can be found in fossils, homologous structures and embryological similarities.

Science & Engineering Practices:

Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions

Crosscutting Concepts:

Patterns
Cause and Effect

Common Core Standard(s):

ELA/Literacy –
RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions (MS-LS4-1),(MS-LS4-2),(MS-LS4-3),(MS-LS4-4)
RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-LS4-1),(MS-LS4-3)
RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-LS4-3),(MS-LS4-4)
WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS4-2),(MS-LS4-4)
WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS4-2),(MS-LS4-4)
SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, teacher-led) with

diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. (MS-LS4-2),(MS-LS4-4)
SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation. (MS-LS4-2),(MS-LS4-4)
Mathematics –
MP.4 Model with mathematics. (MS-LS4-6)
6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS-LS4-4),(MS-LS4-6)
6.SP.B.5 Summarize numerical data sets in relation to their context. (MS-LS4-4),(MS-LS4-6)
6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-LS4-1),(MS-LS4-2)
7.RP.A.2 Recognize and represent proportional relationships between quantities. (MS-LS4-4),(MS-LS4-6)

Essential Question(s):

What forces drive natural selection?
What are the effects of the changes that occur over millions of years on organisms around us?

Key Terms/Concepts: heredity, traits, fertilization, offspring, genes, alleles, mutations, genetic disorders, sex-linked traits, punnett squares, homozygous and heterozygous alleles, genotype, phenotype, selective breeding, cloning, nature vs. nurture, evolution

LEARNING PLAN

Performance Expectation	Disciplinary Core Ideas (DCI):	INSTRUCTIONAL STRATEGIES	ASSESMENT EVIDENCE
MS-LS1-4 **Engaging in Argument from Evidence** **Cause and Effect**	**LS1.B: Growth and Development of Organisms** • Animals engage in characteristic behaviors that increase the odds of reproduction. • Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction.	• Readings • Examination of organisms working to protect their young • Examination of plants/animals working to create or protect their young • Plant reproduction powerpoint	• Writing prompt

MS-LS1-5 **Constructing Explanations and Designing Solutions** **Cause and Effect**	**LS1.B:** • Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5)	• Readings • Plant seedlings and outline plant requirements	• Quiz • Class discussion •
MS-LS3-2 **Developing and Using Models** **Cause and Effect**	**LS1.B: Growth and Development of Organisms** • Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring **LS3.A: Inheritance of Traits** • Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. **LS3.B: Variation of Traits** • In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other	• Readings • Reproduction examples in powerpoint • Sexual/asexual reproduction powerpoint • Display and discuss grass root "runners" • Potato eye growth, spider plant offshoots class demonstrations and discussion	• Quiz/test •
MS-LS4-1 **Analyzing and Interpreting Data** **Patterns**	**LS4.A: Evidence of Common Ancestry and Diversity** • The collection of fossils and their placement in chronological order	• Readings • Examine historical diagram of fossils with time eras	• Quizzes • Writing prompt

	(e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth.		
MS-LS4-2 Constructing Explanations and Designing Solutions **Patterns**	LS4.A • Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent.	• Readings • Examine historical diagram of fossils with time eras • Organism comparison with modern organisms	• Class discussion
MS-LS4-3 Analyzing and Interpreting Data **Patterns**	LS4.A • Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy.	• Readings and discussion	• Quiz •
MS-LS4-4 Using Mathematics and Computational Thinking **Cause and Effect**	**LS4.B: Natural Selection** • Natural selection leads to the predominance of certain traits in a population, and the suppression of others.	• Readings • Kaibab and Abert squirrel comparison	• Quiz • Natural selection progression worksheet
MS-LS4-6 Using Mathematics and Computational Thinking	**LS4.C: Adaptation** • Adaptation by natural selection acting over generations is one important process by which species change	• Darwin's Galapagos discoveries- finches, iguanas, tortoises • Readings • Moth hunting activity • Evolution powerpoint	• Quiz

Cause and Effect	over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes.	• Lynx and rabbit game	
	•		•

Suggested Resources and Texts: Prentice Hall Science Explorer, *Cells and Heredity*

Suggested Technology:

Film: National Geographic, “Clone”

Film: “Human Genome”

Film: “Galapagos”

Wolves introduced to Yellowstone Park video clip

Stated Clearly Productions: “Natural Selection”

Stated Clearly Productions: “Evolution”

Film: “Why Sex?” (PBS video)

Bird mating dance video clips

Unit 5: Human Biology

Introduction: Moving from the microscopic world to the macroscopic world, students begin their study of human body biology. With a focus on several of the major systems within the body, students learn how each system interacts with each other and supports each other to stay alive. No system is independent of the others, they overlap and work together continuously. Each system is broken down into its major structures and functions

Science & Engineering Practices:

Engaging in Argument from Evidence
Obtaining, Evaluating and Communicating Information
Developing and Using Models

Crosscutting Concepts:

Cause and Effect
Systems and System Models
Energy and Matter

Common Core Standard(s):

ELA/Literacy –
RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-3)
RI.6.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not. (MS-LS1-3)
WHST.6-8.1 Write arguments focused on discipline content. (MS-LS1-3)
WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-LS1-1)
WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-LS1-8)
SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS1-2)
Mathematics –
6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and

independent variables using graphs and tables, and relate these to the equation. (MS-LS1-1),(MS-LS1-2),(MS-LS1-3)

Essential Question(s):

How are humans structured to ensure their survival- as an individual and as a species?
How do the functions of individual organs contribute to the well-being of the organism?

Key Terms/Concepts:

tissue, organ, organ system, voluntary, involuntary, muscular system, skeletal muscle, smooth muscle, cardiac muscle, ligaments, tendons, bones in the body, respiration, epiglottis, trachea, bronchi, lungs, alveoli, larynx, diaphragm, circulatory system, heart, atrium, ventricle, red and white blood cells, aorta, arteries, veins, capillaries, digestive system, saliva, esophagus, stomach, small intestine, large intestine, rectum, anus, liver, mechanical digestion, chemical digestion, plasma, platelets, villi, kidneys, skim, epidermis, stimuli, neurons, nerves, spinal cords, ovaries, sperm, testes, estrogen, testosterone, fetus, embryo, amniotic sac, placenta, umbilical cord.

LEARNING PLAN

Performance Expectation	Disciplinary Core Ideas (DCI):	**INSTRUCTIONAL STRATEGIES**	**ASSESMENT EVIDENCE**
MS-LS1-3 **Engaging in Argument from Evidence** **Systems and System Models**	**LS1.A: Structure and Function** • In multicellular organisms, the body is a system interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions	• Outline all body systems and major functions/organs • “Lung volume” lab • Anatomy coloring activities • Blood donation activity • Stethoscopes to explore heartbeat • Chicken wing dissection • View x-rays and identify bones, discuss injuries • Use “Mr. Skeleton” to learn bone names • Use “Organ Man” to learn where internal	• Quiz/test

		organs are and how they interact with each other • Readings •	
MS-LS1-8 **Obtaining, Evaluating, and Communicating Information** **Cause and Effect**	**LS1.D: Information Processing** • Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories.	• "Blink" lab • Nervous system activities- tongue twisters, pupil dilation, ruler reactions, etc. • Readings • Memory functions and loss discussion	• Quiz/test
MS-LS1-7 **Developing and Using Models** **Energy and Matter**	**LS1.C: Organization for Matter and Energy Flow in Organisms** • Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy.	• Readings • Digestive system diagrams	• Quiz/test

Suggested Resources and Texts: Prentice Hall Science Explorer, *Human Biology and Health*

Suggested Technology:

Film: "Greatest Discoveries with Bill Nye: Medicine"

APPENDIXES

Link to NGSS:
https://www.google.com/search?q=next+generation+science+standards&sourceid=ie7&rls=com.microsoft:en-us:ie-searchbox&ie=&oe=&safe=active&ibss=1&gws_rd=ssl

Crosscutting Concepts:

1. **Patterns**.
Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.

2. **Cause and Effect: Mechanism and Explanation**.
Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.

3. **Scale, Proportion, and Quantity.**
In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.

4. **Systems and System Models**.
Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.

5. **Energy and Matter: Flows, Cycles, and Conservation**.
Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.

6. **Structure and Function**.
The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.

7. **Stability and Change**.
For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

Science and Engineering Practices

Asking Questions and Defining Problems

A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and which can be empirically tested.

Developing and Using Models

A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.

Planning and Carrying Out Investigations

Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters.

Analyzing and Interpreting Data

Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data. Scientists identify sources of error in the investigations and calculate the degree of certainty in the results. Modern technology makes the collection of large data sets much easier, providing secondary sources for analysis.

Using Mathematics and Computational Thinking

In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; statistically analyzing data; and recognizing, expressing, and applying quantitative relationships.

Constructing Explanations and Designing Solutions

The products of science are explanations and the products of engineering are solutions.

Engaging in Argument from Evidence

Argumentation is the process by which explanations and solutions are reached.

Obtaining, Evaluating, and Communicating Information

Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity.