Integrated Science 6-8

Middle School

Curriculum Committee Members

Tanya Cross-Roberts, Southeast Middle

Dr. Myko Vaughn, Southeast Middle

Tanna Reiter, Southeast Middle

Karis Jackson, Central Middle

Dr. Tiffany Fane, East Middle, Instructional Coach

Mary Ruether, Science Curriculum Coach

Dr. Christina Hughes, Science Curriculum Coordinator

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Hazelwood School District

Mission Statement

We are a collaborative learning community guided by a relentless focus to ensure each student achieves maximum growth

Vision Statement

HSD will foster lifelong learners, productive citizens, and responsible leaders for an ever-evolving society.

Board of Education on January 5, 2010

Goals

Goal #1: Hazelwood students will meet or exceed state standards in all curricular area with emphasis in reading, writing, mathematics, science and social studies.

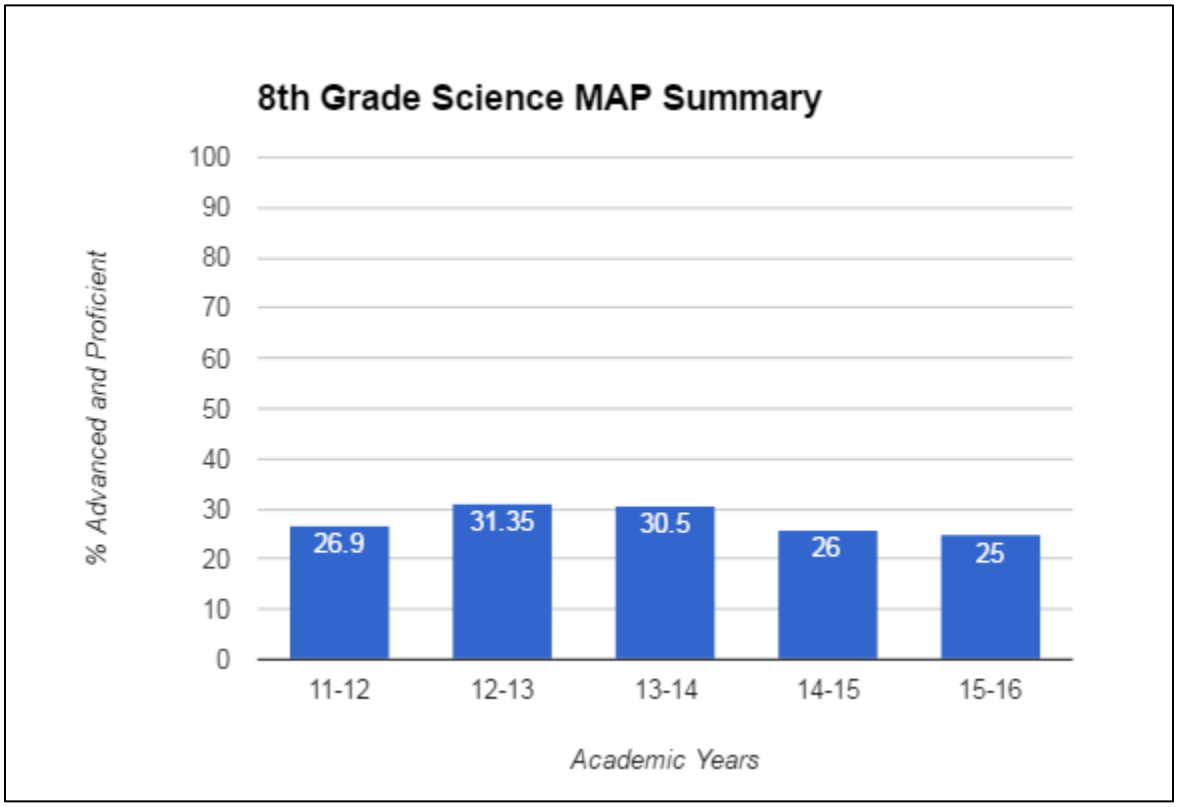
Goal #2: Hazelwood staff will acquire and apply skills necessary for improving student achievement.

Goal #3: Hazelwood School District, the community, and all families will support the learning of all children.

Curriculum Overview

Middle School Science scores from the Missouri Assessment Program (MAP) indicated a need for improvement. The district averages for proficient and advanced for Middle School Science have not adequately progressed for some time. The graph below depicts the percentages of students scoring advanced and proficient over a period of five academic years.

Figure 1



A Science Improvement Plan was developed to address issues with instruction, monitoring, and professional development as a means of addressing curriculum implementation gaps.

The Middle School Science Course has been renamed to Integrated Science to better reflect the integrated instructional format in grades six through eight. Previously, the grade levels were content specific with sixth grade Life Science, seventh grade Physical Science, and eighth grade Earth Science. Trimester assessment data has revealed pronounced weaknesses in student content retention of previous year's content. The integrated format allows students to experience Life, Physical and Earth science during each year of middle school. The curriculum is spiraled to allow students to review and extend previously learned concepts. The transition to integrated science was initiated in 2015 beginning with 6th grade, followed by 7th grade in 2016, and 8th grade in 2017. The new curricular format sought to clarify assessed standards for each grade level by providing activities aligned to standards-derived learning targets.

Instructional Model

The Unit Guides are arranged according to the Biological Sciences Curriculum Study's (BSCS) 5-E Instructional Model. This model places intentional focus on different aspects of the learning process and serves as a guide for teachers to make sure a strong conceptual framework is established, expanded, reiterated and applied across the content and course. The 5-E model promotes research on how science instruction should be sequenced in order to facilitate learning. Table 1 below provides an outline of each step of the 5-E model.

Table 1. Summary of the BSCS 5E Instructional Model

Phase	Summary
Engagement	The teacher or a curriculum task accesses the learners' prior knowledge and helps them become engaged in a new concept through the use of short activities that promote curiosity and elicit prior knowledge. The activity should make connections between past and present learning experiences, expose prior conceptions, and organize students' thinking toward the learning outcomes of current activities.
Exploration	Exploration experiences provide students with a common base of activities within which current concepts (i.e., misconceptions), processes, and skills are identified and conceptual change is facilitated. Learners may complete lab activities that help them use prior knowledge to generate new ideas, explore questions and possibilities, and design and conduct a preliminary investigation.
Explanation	The explanation phase focuses students' attention on a particular aspect of their engagement and exploration experiences and provides opportunities to demonstrate their conceptual understanding, process skills, or behaviors. This phase also provides opportunities for teachers to directly introduce a concept, process, or skill. Learners explain their understanding of the concept. An explanation from the teacher or the curriculum may guide them toward a deeper understanding, which is a critical part of this phase.
Elaboration	Teachers challenge and extend students' conceptual understanding and skills. Through new experiences, the students develop deeper and broader understanding, more information, and adequate skills. Students apply their understanding of the concept by conducting additional activities.
Evaluation	The evaluation phase encourages students to assess their understanding and abilities and provides opportunities for teachers to evaluate student progress toward achieving the educational objectives.

BSCS, 2006

Standards

In 2016, the Missouri Department of Elementary and Secondary Education (DESE) approved the new Missouri Learning Standards for Science. The standards, a hybrid of the Next Generation Science Standards, promotes a 3-dimensional learning model that includes focus on Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas. The Science and Engineering Practices (SEP) describe behaviors and habits of minds scientists utilize as they investigate phenomena and build models to explain the world around them. The

Crosscutting Concepts are applicable across all science disciplines and grade spans. They are a way of linking different domains of science and displaying the connectedness of content through pattern recognition, identifying causes and effects, understanding energy and matter relationships, and relating systems and system models, to name a few. Finally, the Disciplinary Core Ideas delineate the specific content to be learned by the students and the instructional practices to be utilized as students work towards mastery of the overarching performance expectations.

COURSE TITLE: Integrated Science

GRADE LEVEL: 6-8

CONTENT AREA: Science

Course Description:

Integrated Science 6-8 combines essential topics from Life, Physical and Earth Science to provide students with a comprehensive survey of the nature of science, its practices, its limitations, and its capabilities. Students will explore topics from varying perspectives, from a macroscopic view of organisms and their place in the universe to a microscopic analysis of the factors that affect organisms and their environments, and visa versa. Topics studied include populations and ecosystems, Energy needs of organisms, heredity and natural selection, properties of matter, weather and climate, Earth's geologic past, the Universe and more.

Course Rationale:

In each course, students will be exposed to an integrated and spiraled curriculum where they will touch upon topics in Life, Physical and Earth Science. As students progress to the next grade, the concepts they learned previously will be spiraled into new concepts where they will attain an in-depth understanding of science phenomena. Integrated Science 6-8 is designed to meet the unique developmental needs of students through a collaborative environment, student-centered educational program, multi-modal instructional formats, and hands-on, inquiry-based investigations.

Course Scope and Sequence Integrated Science 6		
Trimester 1	**Trimester 2**	**Trimester 3**
Unit 1: Populations and Ecosystems *(12 weeks)*	Unit 2: Characteristics of Living Things and Cells *(6 weeks)* Unit 3: Changing the Face of Earth: Water, Weathering and Erosion *(6 weeks) +*	Unit 4: Properties of Matter *(11 weeks)*
Integrated Science 7		
Unit 5: PLTW Gateway: Magic of Electrons *(12 weeks)*	Unit 6: How Life Continues: Cell Reproduction, Heredity, and Natural Selection *(8 weeks)* Unit 7: Weather and Climate *(4 weeks)*	Unit 8: Force, Motion, and Energy *(12 weeks)*
Integrated Science 8		
Unit 9: The Universe: Far and Wide *(12 weeks)*	Unit 10: Fossils, Rocks, and Plate Tectonics (7 weeks) Unit 11: Exploring the Water Cycle *(5 weeks)*	Unit 12: Living Things Need Energy! Photosynthesis and Cellular Respiration *(6 weeks)* Chemical and Physical Changes (2 weeks)

Approved Course Materials and Resources:

Text:
Glencoe/McGraw Hill Science

- *Life: iScience.* (2012). Columbus, Ohio: Glencoe/McGraw Hill Education.
- *Physical: iScience*. (2012). Columbus, Ohio: Glencoe/McGraw Hill Education.
- *Earth and Space:* iScience. (2012). Columbus, Ohio: Glencoe/McGraw Hill Education.

The textbooks and digital subscription is valid through 2019. No new text will be purchased at this time.

Essential Terminology/Vocabulary

Unit 1:
Abiotic, Atmosphere, Biodiversity, Biotic, Birth rate, Carrying capacity, Classify, Climate, Commensalism, Competition, Conservation of energy, Consumer, Death rate, Decomposer, Density, Density-dependent, Density-independent, Disease, Distribution, Ecosystem, Energy, Food Chain, Food Web, Growth rate, Habitat, Interaction, Limiting Factor, Matter, Mutualism, Organism, Parasitism, Pollution, Predation, Predator, Prey, Primary Succession, Producer, Resource, Secondary Succession, Symbiotic Relationship

Unit 2:
Abiotic , Biotic, Carbon Dioxide, Cell, Cell Differentiation, Cell Membrane, Cell Wall, Characteristic, Chromosome, Circulatory System, Cytoplasm, DNA, Digestive System, Endoplasmic Reticulum, Eukaryote, Excretion, Golgi Bodies, Growth, Integumentary System, Living, Mitochondria, Movement, Multicellular, Muscular System, Nervous System, Non-living, Nucleus, Nutrient, Organ, Organelle, Organ system, Prokaryote, Reproduction, Respiration, Response, Ribosome, Sensitivity, Spontaneous Generation, Tissue, Unicellular, Waste

Unit 3:
Acid, Base, Chemical weathering, Contraction, Constructive, Density, Deposition, Destructive, Dissolve, Erosion, Expansion, Fertility, Freshwater, Heat Capacity, Insoluble, Neutral, Parent materials, Permeability, pH, Physical weathering, Porosity, Resource, Saltwater, Soil, Soil Texture, Soluble, Solute, Solution, Solvent, Topography, Weathering

Unit 4:
Aluminum (Al), Calcium (Ca), Cast fossil, Cementation, Compaction, Convection Currents, Crustal Plate, Crystal, Deformation, Deposition, Earthquake, Erosion, Fossil, Fossilization, Geological time, Half-life, Igneous, Iron (Fe), Law of Superposition, Lithosphere, Luster, Magnesium (Mg), Magnetism, Mantle, Metamorphic, Mineral, Mold fossil, Non-renewable resources, Oxygen, Pangea, Plate boundaries, Plate motion, Plate tectonics, Potassium (K), Reactivity, Renewable Resources, Rock, Rock Cycle, Sedimentary, Shear, Silicon (Si), Sodium (Na), Streak, Stress, Tension, Trace fossil, Trench, True form fossil, Volcanic eruption, Weathering

Unit 5:
Agitation, Atom, Atomic mass, Atomic number, Chemical property, Compounds, Conductivity, Conservation of Mass, Density, Displacement, Electron, Element, Flammability, Gas, Graduated cylinder, Gram, Heterogeneous, Homogeneous, Insoluble, Kinetic theory, Liquid, Mass, Matter, Metal, Metalloid, Mixture, Molecular Motion, Molecule, Neutron, Non-metal, Particle, Physical Property, Pressure, Proton, Pure Substance, Reactivity, Solid, Soluble, Temperature, Viscosity, Volume

Unit 6:
Ampere (A), Anode, Armature, Atom, Atomic Number, Battery, Cathode, Circuit, Commutator, Conductor, Continuity, Current, Direct Current (DC), Electromagnet, Electron, Element, Field Magnet, Generator, Insulator, LED, Magnet, Matter, Molecule, Motor,

Multimeter, Neutron, Nucleus, Proton, Resistance, Semiconductors, Static Electricity, Valence Electrons, Voltage, Capacitor, Circuit Diagram, Diode, Electronic Circuit, Parallel Circuit, Resistor, Series Circuit, Switch, Thermistor, Transistor, Volt (V), Binary Code, Bit, Byte, Decimal Number, Digital, Flow Chart, Gate, Logic Gate

Unit 7:
Adaptation, Allele, Anther, Artificial Selection, Asexual reproduction, Binary fission, Budding, Bulb, Chromosome, Daughter Cell, DNA, Dominant, External Reproduction, Exponential Growth, Filament, Fragmentation, Gene, Genotype, Internal Reproduction, Natural Selection, Nucleus, Offspring, Ovary, Parthenogenesis, Phenotype, Pollination, pollinator, Probability, Recessive, Regeneration, Selective Breeding, Sexual Reproduction, Spore Formation, Stigma, Style, Trait, Tuber, Variation, Vegetative Propagation, Vertebrate

Unit 8:
Air mass, Air pressure, Albedo, Altitude, Altocumulus, Altostratus, Anemometer, Atmosphere, Barometer, Barometric pressure, Cirrus, Cirrocumulus, Cirrostratus, Climate, Cold front, Conduction, Convection, Coriolis Effect, Cumulonimbus, Cumulus, Elevation, Exosphere, Greenhouse Effect, Hurricane, Infrared light, Latitude, Leeward, Mesosphere, Ozone, Prevailing wind current, Radiation, Rain Gauge, Snow gauge, Solar radiation, Stratus, Temperature, Thermosphere, Warm front, Weather, Windward, Wind vane

Unit 9:
Acceleration, Air resistance, Balanced forces, Centrifugal force, Centripetal force, Circular motion, Constant force, Constant speed, Contact forces, Elastic force, Electrical force, Fixed point, Force, Force diagram, Friction, Frictional force, Gravitational force, Gravity, Inertia, Lever, Magnetic Force, Mass, Motion, Net force, Newton, Newton's First Law, Newton's Second Law, Newton's third Law, Non-Contact Forces, Projectile Motion, Pulley, Reference Point, Simple machine, Speed, Unbalanced forces, Velocity, Vibrational Movement, Weight

Unit 10:
Artificial satellite, Asteroids, Asteroid belt, Average star, Axial tilt, Big bang, Black hole, Celestial body, Centripetal force, Constellation, Equinox, Fist Quarter moon, Full moon, Galaxy, Gravitational Pull, Gravity, Habitable, H-R diagram, Inner Planet, Last quarter, Light Intensity, Light year, Lunar, Mass, Meteor, Moon Phase, Moonrise, Moonset, Natural Satellite, Nebula, Neutron Star, New moon, Orbit, Outer planet, Penumbra, Planet, Revolution, Rotation, Satellite, Solar Declination, Solar Eclipse, Solar system, Solstice, Star, Sunrise, Sunset, Super Giant, Supernova, Universe, Velocity, Waning crescent, Waning gibbous, Waxing crescent, Waxing gibbous, White dwarf

Unit 11:
Adhesion, Aquifer, Atmosphere, Clouds, Cohesion, Condensation, Conduction, Convection, Density, Diffusion, Entropy, Evaporation, Filtration, Freshwater, Gas, Geosphere, Glaciers, Groundwater, Hydrogen, Hydrogen bond, Hydrosphere, Humidity, Infiltration, Liquid, Lithosphere, Mass, Molecular movement, Molecule, Oxygen, Percolation, Polar, Precipitation,

Radiation, Saltwater, Solid, Surface run-off, Surface tension, Thermal energy, Transpiration, Volume, Water Cycle

Unit 12:
Algae, Calorie, Calorimetry, Carbon Dioxide, Cellular Respiration, Conservation of Matter, Energy, Energy Flow, Energy Transfer, Enzyme, Glucose, Matter, Microorganism, Molecule, Nutrient, Organism, Oxygen, Photosynthesis, Radiant, Respiration, Ten Percent Rule, Thermal, Waste

Unit Objectives:

Unit 1:
Students will be able to:

- Describe populations in terms of distribution, density and growth rate.
- Develop and use models to measure population growth over time
- Identify and explain density-dependent and density-independent factors that impact population growth.
- Explain the carrying capacity of an ecosystem as the number of organisms that can be supported by a given ecosystem
- Explain the effects of abiotic and biotic factors on living things in an ecosystem
- Explain the cause and effect between living things due to competition for resources
- Describe the types of interactions between organisms in an ecosystem (e.g., competition for resources; predator/prey; symbiotic relationships)
- Distinguish between the main types of interactions in an ecosystem (e.g., mutualism, predator/prey, commensalism, and parasitism)
- Describe the effects of competition in an ecosystem
- Classify organisms as producers, consumers, and/or decomposers
- Explain how abiotic factors in an environment (e.g., water, minerals, air) provide matter to living organisms and how living things provide matter to the nonliving parts of the environment.
- Discuss energy transfer into and out a system
- Use a food web/food chain explain how energy is transferred between the environment and living things.
- Describe how energy is conserved and “lost” as it is transferred between the environment and living things
- Identify and describe changes in the physical and biological components of an ecosystem. (e.g., data about rainfall, fire(s, predator removal, species introduction)
- Describe how populations in an ecosystem change
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- Describe how populations in an ecosystem change

Unit 2:
Students will be able to:

- List and describe basic characteristics of living things

- Distinguish between living and nonliving things
- Design an experiment to disprove misconceptions about the origin of life.
- Develop and use a model to describe the function of a cell as a whole
- Develop and use a model to describe ways parts of cells contribute to the function.
- Develop an argument supported by evidence for how multicellular organisms are organized by cells, tissues, organs and organ systems.
- Provide evidence of how body systems interact to provide nutrients and oxygen to cells.
- Provide evidence of how body systems interact to remove carbon dioxide and waste from cells and the body.
- Provide evidence of how body systems interact to control body motion/activity and coordination.
- Provide evidence of how body systems interact to protect the body.
- Describe different types of sensory receptors and the types of inputs to which they respond (e.g., electromagnetic, mechanical, chemical stimuli)
- Sequence sensory information transfer along nerve cells from receptors to the brain
- Describe how the brain processes sensory information as memories or immediate behavioral responses
- Diagram the pathway from sound to brain impulses. I can distinguish between a stimulus and a response

Unit 3:

Students will be able to:

- Compare the amounts of freshwater and saltwater on Earth
- Describe the importance of water as a resource for living things and human activity.
- Describe properties of water that make it a good solvent
- Explain why water is liquid at most Earth temperatures
- Describe the different types of weathering
- Explain the process of erosion
- Demonstrate the effects of water expansion and contraction on earth surfaces
- Describe the effects of human activities on the quality of water
- Explain what water quality tests measure
- Describe the components of soil
- Describe factors that influence soil texture, fertility and resistance to erosion
- Describe how Earth's surface and surface materials can change abruptly and slowly
- Analyze ways humans affect erosion, and deposition of soil and rock materials

Unit 4:

Students will be able to:

- Identify elements that can be found in natural and man-made compounds
- I can demonstrate how simple molecules are configured from 2 or more atoms.
- I can provide examples of synthetic materials that were derived from natural sources
- I can provide evidence to support the idea that synthetic material originate from some natural sources.
- I can predict how various solids will behave when mixed with water
- I can differentiate between the terms soluble and insoluble
- I can describe evidence that supports the theory that matter is composed of small particles that are in constant, random motion

- I can describe evidence that supports the theory that matter is composed of moving particles too small to be seen.
- I can use the Kinetic Theory model to illustrate and account for the physical properties of a solid, liquid, or gas in terms of the arrangement of molecules in a substance.
- I can use the Kinetic Theory model to explain how matter changes in shape, volume and viscosity in response to changes in temperature
- I can describe the properties of each component in a mixture/solutions and their distinguishing properties
- I can describe appropriate ways to separate components of different types of mixtures based on physical properties of substances

Unit 5:

Students will be able to:

- Identify the roles of protons, neutrons, and electrons in an atom.
- Explain how charges interact to hold an atom together.
- Identify metals, metalloids, and non-metals on the periodic table.
- Explain the relationship between current, voltage, and resistance.
- Describe the properties of a magnet including polarity and defining characteristics.
- Explain the role of an electromagnet in the function of a DC motor and generator.
- Describe how electron transfer between atoms and the flow of electricity are related.
- Evaluate whether a material is a conductor, insulator, or semiconductor based upon its number of valance electrons and its position on the periodic table.
- Identify an element based on the atomic number given a periodic table.
- Identify metals, metalloids, and non-metals on the periodic table.
- Measure voltage and current using a multimeter.
- Demonstrate the characteristics and functions of an electromagnet.
- Identify the primary parts of a DC motor and demonstrate how it functions.
- Identify the primary parts of a generator and demonstrate how it functions.
- Compare and contrast the characteristics of a basic motor and generator.
- Identify the characteristics of series, parallel, and combination electrical circuits.
- Identify standardized schematic symbols using a chart.
- Distinguish between the functions and operations of fixed resistors, variable resistors, and photo resistors.
- Construct series, parallel, and combination electrical circuits.
- Sketch circuit diagrams using standardized schematic symbols.
- Construct and test physical electrical circuits based upon circuit diagrams.
- Integrate DC sources, lamps, switches, diodes, light emitting diodes, resistors, and capacitors into electrical circuits to achieve specific functions.
- Determine the value of a fixed resistor based upon the color codes on those resistors.
- Measure voltage, current, and resistance using a multi meter.
- Mathematically calculate voltage, current, and resistance using Ohm’s law.
- Design a circuit that uses a transistor as a switch.
- Identify the relationship between the binary number system and the decimal number system.
- Describe the functions of NOT, AND, OR, NAND, NOR, and XOR gates.
- Convert binary numbers to Base-10.

- Convert ACII characters to binary.
- Interpret logic scenarios to determine outputs based upon possible conditions within those scenarios.
- Create truth tables for logic scenarios and match those gates to truth tables.
- Create a digital wave form and graph it for a binary sequence.
- Communicate using electronic circuit diagrams.
- Use transistors as switches to create circuits that function as AND and OR gates.
- Determine the logic, sensors, gates, outputs, and other components needed to emulate existing electronic devices that utilize logic.
- Design, construct, and test device solutions for emulating common electronic devices that utilize logic.

Unit 6:

Students will be able to:

- Identify and describe given evidence that individuals in a population have variation in traits.
- Describe the structure and function of DNA
- Describe what chromosomes are and identify the relationship between chromosomes and genes
- Explain and model how dominant and recessive alleles inherited from the parents determine an offspring's genotype and phenotype.
- Develop a model to explain how organisms inherit specific traits from their parents during sexual reproduction (i.e., Punnett Square)
- Compare and contrast asexual and sexual reproduction
- Use a model to identify and describe why there is genetic variation
- Recognize and describe how the same genetic information is copied and passed down from parent to offspring during asexual reproduction and that the daughter cell is identical to the parent cell
- Use a model to predict the probability of parents and offspring's genotype.
- Observe and describe how environments affect the probability of an organism's survival.
- Evaluate information to find evidence that supports how technology and humans influence the inheritance of desired traits in organisms.
- Compare and contrast natural selection and artificial selection
- Use multiple resources to construct an explanation of how an organism's survival and growth is influenced by behavioral, environmental, and genetic factors
- Compare and contrast internal vs external reproduction
- Describe how flowering plants reproduce sexually
- Identify examples of asexual reproduction.
- Use multiple resources to construct an explanation of how an organism's survival and growth is influenced by behavioral, environmental, and genetic factors.
- Interpret diagrams and graphs to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Unit 7:

Students will be able to:

- Conduct an experiment to note the differences in heating and cooling rates of soil and other surfaces and media

- Explain how differences in surface temperatures affect temperature and movement of air above
- Characterize air masses with high and low barometric pressure
- Explain how barometric pressure affects weather in a given location
- Explain how temperature affects air masses.
- Predict the effects temperature of masses has on weather in a given location
- Distinguish between warm and cold fronts
- Identify factors that affect weather patterns in a particular location
- Categorize the effects of large bodies of water, latitude, altitude, prevailing wind currents, amount of solar radiation and location with respect to mountain ranges on the weather patterns in a particular region
- Use weather instruments to collect weather data
- Use maps and collected weather data to describe present day weather and predict next day's weather
- Distinguish between temperature and barometric pressure
- Describe how changes in temperature and barometric pressure may cause dramatic weather phenomena
- Characterize weather
- Characterize climate
- Differentiate between weather and climate
- Describe the effects of latitude on climate
- Describe the effects of altitude on climate
- Describe the effects of prevailing wind currents on climate
- Describe the effects of solar radiation on climate

Unit 8:

Students will be able to:

- Classify different types of motion (e.g., straight line, projectile, vibrational, etc.)
- Describe circular motion of a moving object.
- Identify factors that affect the motion of an object.
- Describe motion in terms of a reference point.
- Describe different types of forces.
- Use a force diagram to explain how forces impact motion of objects
- Compare forces action on an object by using a spring scale to measure them to the nearest Newton.
- Distinguish between balanced and unbalanced forces
- Calculate NET force to determine the effect on the motion of an object
- Describe how motion is impacted by forces like friction, mass, and velocity.
- Summarize Newton's 3 Law of Motion
- Conduct various investigations to provide evidence for Newton's 3 Laws
- Calculate the speed of an object in motion knowing its distance and time it traveled.
- Interpret a line graph that represents an object's motion and speed (e.g., type of motion, direction of motion and speed).
- Analyze and interpret observable data about the impact of forces on the motion of objects.
- Identify forces acting on an object in motion, at rest, floating, sinking

- Compare forces acting on an object by using a spring scale to measure them to the nearest Newton
- Explain how every object exerts a gravitational force of attraction on every other object
- Recognize that an object's weight is a measure of gravitational force of a planet/moon acting on that object
- Calculate my weight if I were on the moon or other planets
- Compare the amount of gravitational force acting between objects
- Distinguish between contact forces and non-contact forces.
- Demonstrate how non-contact forces exert a push or a pull even without touching the second object
- Investigate and describe how forces affect an object's motion.
- Recognize when work is being done on an object with or without the use of simple machine
- Use the work formula (W = f x d) to calculate the amount of work done when a force is applied to an object over a distance
- Explain how simple machines affect the amount of effort force
- Conduct an investigation to demonstrate that the amount of work output is never greater than the amount of work input, with or without the use of a simple machine
- Design a complex simple machine that requires the least amount of effort force

Unit 9:

- Describe how the Sun's gravitational pull holds the Earth and other planets in their orbits
- Describe how the Earth's gravity pulls any object on or near the Earth towards it
- Distinguish between natural and artificial satellites and the effect of gravity on them.
- Describe how the planets' gravitational pull keeps satellites and moons in orbit around them
- Classify celestial bodies in the solar system into categories based on their physical properties
- Compare and contrast the size, composition, atmosphere and surface of the inner and outer planets of our solar systems and the Earth's moon.
- Describe the relative proximity of common celestial bodies in the sky to the Earth
- Describe how the Earth's placement in the solar system is favorable to sustain life
- Compare and contrast the characteristics of Earth that support life with characteristics of other planets
- Distinguish between favorable and unfavorable characteristics to supporting life.
- Explain that stars are separated from one another by great distances and the effect this has on the apparent size and brightness of the stars
- Compare the distance light travels from the Earth to the distance light travels from other stars to Earth using light years
- Note the pattern of the moonrise and moonset over the course of a month
- Describe the effects of the Moon's revolution on the time it rises each day
- Describe how the moon is in the sky for roughly 12 hours in a 24-hour period.
- Describe why one half of the moon is always lit.
- Relate the apparent changes in the Moon's position as it moves from east to west over the course of the day.
- Describe how the moon appears to change every 28 days

- Explain the relationships between a planet's period of revolution and its position in the solar system
- Explain how the phases of the moon are due to its position with respect to the Earth and Sun
- Relate the apparent east-to-west changes in the positions of the Sun, other stars, and planets in the sky over the course of a day to Earth's counterclockwise rotation about its axis
- Describe the pattern that can be observed in the changes in the number of hours of visible sunlight
- Describe the patterns in the time and location of sunrise and sunset throughout the year
- Describe how the sun appears lower in the sky in the winter and higher in the sky in the summer (in the northern hemisphere)
- Describe how the sun appears to rise/set in the southeast/southwest in the winter and rise/set in the northeast/northwest in the summer
- Use data and evidence to account for differences in day length in the winter and summer
- Use a model and evidence to answer the question: Is the sun ever directly overhead in North America?

Unit 10:

- Classify minerals according to texture, smell, luster, hardness, crystal shape, streak, reaction to magnets and acid
- Describe methods used to identify the distinguishing properties of minerals
- Describe characteristics of minerals
- Describe characteristics of rocks
- Differentiate between minerals and rocks
- Explain how rock layers are affected by the folding, breaking, and uplifting of rock layers during plate motion.
- Identify the layers of the Earth and describe how they differ in terms of temperature and composition
- Explain how convection currents cause the uneven heating and cooling inside the Earth's mantle.
- Classify rocks as sedimentary, igneous, or metamorphic
- Make inferences about the formation of sedimentary rocks from their physical properties
- Explain and demonstrate how sedimentary rocks are formed as a result of weathering, erosion and deposition
- Explain the types of fossils and how they are formed
- Use fossil evidence to identify changes on Earth and in the environment over time
- Describe methods used to estimate geological time and the age of Earth
- Explain how mountains and trenches are formed
- Describe how the movement of crustal plates can cause earthquakes and volcanic eruptions
- Identify events such as earthquakes and volcanic eruptions that cause the formation of landforms along different plate boundaries.

Unit 11:
Students will be able to:

- Use a model to demonstrate my understanding of water properties (i.e., attraction to other water molecules, attraction to non-water molecules, influence of temperature on state of water; water's density)
- Identify and classify the earth spheres through which water cycles
- Trace the possible path of water through the hydrosphere
- Develop or use a model to relate the different forms water can take as it moves through the water cycle to various atmospheric conditions.
- Describe what thermal energy is and give examples of thermal energy.
- Distinguish between convection, conduction and radiation
- Explain how thermal energy is transferred throughout the water cycle
- Describe how different organisms are impacted by the water cycle
- Use a model to demonstrate the impact of human water use on the environment

Unit 12:

Students will be able to:

- Describe how plants, algae, and photosynthetic microorganisms require energy (in the form of sunlight) along with carbon dioxide and water to make food for survival
- Explain how sunlight is combined with other molecules to make food that is used and stored by plants
- Conduct an investigation to provide evidence that carbon dioxide and oxygen are produced by living things and cycle through the ecosystem.
- Provide evidence of how body systems interact to remove carbon dioxide and waste from cells and the body.
- Develop a model to describe how matter cycles through the living and nonliving parts of an ecosystem
- Diagram the flow of energy throughout an ecosystem.
- Explain how animals acquire the energy needed from the foods they eat
- Explain how energy is transferred from the sun to other organisms in a food chain
- Apply the law of conservation of matter to the cycling of matter in an ecosystem
- Provide evidence of how body systems interact to remove carbon dioxide and waste from the cells and the body.
- Describe different types of energy.
- Explain how energy is transformed from one form to another.