Science Unit	**Nature of Science**
Engineering Unit	**Nature of Science & Engineering (NSE)**
Timeline	**August 10th-**
Science Standards	SC.4.N.1.1 Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information, conduct both individual and team investigations through free exploration and systematic investigations and generate explanations based on those explorations. SC.4.N.1.2 Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups. SC.4.N.1.3 Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence. SC.4.N.1.4 Attempt reasonable answers to scientific questions and cite evidence in support. SC.4.N.1.5 Compare the methods and results of investigations done by other classmates. SC.4.N.1.6 Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations. SC.4.N.1.7 Recognize and explain that scientists base their explanations on evidence. SC.4.N.1.8 Recognize that science involves creativity in designing experiments. SC.4.N.2.1 Explain that science focuses solely on the natural world. SC.4.N.3.1 Explain that models can be three dimensional, two dimensional, an explanation in your mind, or a computer model. SSC.4.E.6.5 Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things. **Standards for Engineering Design** 3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
Essential Questions	1. How are scientific processes, habits of mind and the Jamerson Design Process used to identify and solve problems? 2. Why is it important to work collaboratively and communicate effectively? 3. What are my traits, and how do I fit in? 4. How do scientists and engineers use tools and keep records which describe observations to make inferences? 5. What characteristics do scientists and engineers possess? How do they impact the world?
Science Vocabulary	volume, observation, investigation, experiment, explanation, exploration, description, conclusion, prediction, evidence, manipulated/independent variable, responding/ dependent variable, constant, inference, data, compare/control, classification, graph, mass, model, attract, magnets, repel, chemical change, physical change
Nonfiction Texts	Pencil Article- Scientists and Engineers, The Real McCoy, Various Biographies
Investigations	Introduction to tools and how they help us make sense of our investigations
Engineering Design Challenge	*Totem Pole Design Challenge*

Science Unit	**Physical Science**	
Engineering Unit	**Gravitational Force & Resultant Motion (GFRM)**	**Electromagnetic Force & Resultant Motion (EFRM)**
Timeline	**October**	**November**
Science Standards	SC.4.P.10.4 Describe how moving water and air are sources of energy and can be used to move things. SC.4.P.11.2 Identify common materials that conduct heat well or poorly. SC.4.P.12.1 Recognize that an object in motion always changes its position and may change its direction. SC.4.P.12.2 Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds. SC.4.P.10.1 Observe and describe some basic forms of energy, including light, heat, sound, electrical, and the energy of motion. SC.4.P.10.2 Investigate and describe that energy has the ability to cause motion or create change.	SC.4.P.8.2 Identify properties and common uses of water in each of its states. SC.4.P.8.3 Explore the Law of Conservation of Mass by demonstrating that the mass of a whole object is always the same as the sum of the masses of its parts. SC.4.P.9.1 Identify some familiar changes in materials that result in other materials with different characteristics, such as decaying animal or plant matter, burning, rusting, and cooking. SC.4.P.8.1 Measure and compare objects and materials based on their physical properties including: mass, shape, volume, color, hardness, texture, odor, taste, attraction to magnets. SC.4.P.10.3 Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates. SC.4.P.11.1 Recognize that heat flows from a hot object to a cold object and that heat flow may cause materials to change temperature.
Essential Questions	1. How is a model (vehicle) used to learn about the force and motion of real vehicles? 2. How does the performance of a vehicle in a gravitational force field change in relation to an outside force acting upon it? 3. How do engineers manipulate the energy, speed and power in a system to optimize results? 4. How can we transform energy from one type to another in order to create work? 5. How can engineers use knowledge of energy to improve people's lives?	1. How does knowledge gained through the use of the scientific process help engineers when designing solutions to problems? 2. How can matter be compared, measured, and combined in order to make sense of events? 3. How can materials be manipulated to construct an insulator? 4. How can an experiment be designed and manipulated in order to produce data which can be analyzed to explain the performance of a system? 5. How can I compare materials based on physical properties and changes over time.
Science Vocabulary	*Engineering vocabulary – scalars, vectors. load Conduction, direction, distance, force, forms of energy, heat energy, motion, position, speed, friction, potential energy, kinetic energy, temperature, insulators, unit of time	
Investigations	How do the number of turns on the vehicle's axle effect the distance traveled? Does a load impact the speed a vehicle travels? Does the surface (friction) affect the movement of a vehicle?	Magnets- Materials attracted Conservation of Mass- Melted ice Decomposition Trays
Engineering Design Challenge	*K'Nex Vehicle Design Challenge Competition*	*Build an Insulator*

Science Unit	**Earth Science**	
Engineering Unit	**Natural Resources (NR)**	**Space Exploration (SE)**
Timeline	**December-January**	**February-March**
Science Standards	SC.4.E.6.2 Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks. SC.4.E.6.3 Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable. SC.4.E.6.4 Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice). SC.4.E.6.1 Identify the three categories of rocks: igneous, (formed from molten rock); sedimentary (pieces of other rocks and fossilized organisms); and metamorphic (formed from heat and pressure). SC.4.E.6.6 Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).	SC.4.E.5.1 Observe that the patterns of stars in the sky stay the same although they appear to shift across the sky nightly, and different stars can be seen in different seasons. SC.4.E.5.2 Describe the changes in the observable shape of the moon over the course of about a month. SC.4.E.5.3 Recognize that Earth revolves around the Sun in a year and rotates on its axis in a 24-hour day. SC.4.E.5.4 Relate that the rotation of Earth (day and night) and apparent movements of the Sun, Moon, and stars are connected. SC.4.E.5.5 Investigate and report the effects of space research and exploration on the economy and culture of Florida. SC.4.E.6.5 Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things.
Essential Questions	1. How and why were natural resources used to better people's lives? 2. How did the geography of Florida affect where people lived? 3. Calculate volume and buoyant force. 4. Gather and interpret information about early Floridians used in presentations. 5. How and why engineers use diagrams to make sense of their world.	1. Explain how the relationship of the earth, moon and sun affected early settlers' decisions and exploration. 2. Explain how explorers use navigational tools and modified ship designs to explore worlds and how tools today are built upon this knowledge. 3. Evaluate how the settlers used the natural resources available to meet their needs. 4. Explain how an explorer is like an engineer.
Science Vocabulary	*Engineering vocabulary – scalars, vectors, free body diagram Boulder, culture, economy, erosion, formation, full moon, gravel, igneous, lava, luster, magma, metamorphic, minerals, moon phase, new moon, nonrenewable resources, physical weathering, orbit, pattern, pressure, renewable resources, revolve, rock, rotation, sand, sediment, sedimentary, soil, space, spherical, stone, streak color	
Investigations	Testing rocks and minerals for streak, color, luster, hardness Stream Tables (erosion and weathering demonstration)	Gazing at the Moon (moon phases) Build a model of the Earth, Sun and Moon (lab lesson)
Engineering Design Challenge	*Dugout design*	*Create a sundial*

Science Unit	**Life Science**	
Engineering Unit	**Life Processes (LP)**	**Ecosystems (ECO)**
Timeline	**April**	**May**
Science Standards	SC.4.L.16.1 Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination. SC.4.L.16.2 Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment. SC.4.L.16.3 Recognize that animal behaviors may be shaped by heredity and learning. SC.4.L.16.4 Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and non-flowering seed-bearing plants.	SC.4.L.17.1 Compare the seasonal changes in Florida plants and animals to those in other regions of the country. SC.4.L.17.2 Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them. SC.4.L.17.3 Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers. SC.4.L.17.4 Recognize ways plants and animals, including humans, can impact the environment.
Essential Questions	1. How do plants reproduce? 2. What is the life cycle of a butterfly, mealworm, or alligator? 3. How do people impact the environment for their benefit? 4. How do plant and animal adaptations help them survive?	1. How does energy flow from the sun to plants? (photosynthesis, transpiration) 2. How do plants and animals adapt to live in their habitat? 3. How does man use plants and animals to meet their needs? 4. How does understanding the elements of an ecosystem help students to understand man's impact on the environment, both positively and negatively? 5. How are animals classified (vertebrates/invertebrates, producers/consumers, and omnivore/herbivore/carnivore) and how do their habits impact their environment? 6. How does energy flow in an ecosystem?
Science Vocabulary	Adaptation, animal, plant, carnivore, complete metamorphosis, cone, consumers, environmental, fertilization (plants), flower, food chain, germination, habitat, herbivore, heredity, impact, incomplete, metamorphosis, inherit, interdependence, life cycle, migration, omnivore, pollination, producers, seasonal changes, seed dispersal, seed production, spore, transfer of energy	
Investigations	Seed Germination (light v dark) Parts of flowering and non-flowering plants	Water Testing
Engineering Design Challenge		*How can we design a filter that effectively and efficiently cleans "dirty" water?*