

**Unit:** Astronomy

**Essential Question:** How do parts of a system work together?

VOCABULARY: scale, distance, rotate, revolve, yearly cycle, monthly cycle, daily cycle, season, phase, planet, moon, constellation, inner planet, outer planet, composition, tilt, axis, eclipse, universe, gravity

**National Standards or Core Standards**

Humans are a small part of a vast Universe; planet Earth is part of the Solar System, which is part of the Milky Way galaxy, which is one of hundreds of billions of galaxies in the Universe.

Guiding Questions	Big Ideas of Science	Knowledge and Skills	Teaching Resources & Technology
<p>What is earth's relationship to other objects in the solar system?                      How big is our solar system? How big are the planets and how far away they from the sun, and from each other?                      How far away are sky objects?                      What is the make up of planets?                      How have your experience with scale models changed your view of our solar system?                      What keeps people on earth? Why do planets orbit the sun?                      What are constellations?                      What is our address in the universe?</p> <p>What causes daily, monthly and yearly cycles?                      Are daily and yearly cycles the same on every planet?                      How can we use the words rotation and revolution to explain daily and yearly cycles?                      Are daily and yearly cycles the same on every planet?                      Why do we have seasonal change?                      Does the sun always rise and set in the same place?                      Why does the moon look different and different times of the month?</p>	<p><b>The stars, planets, and galaxies move in patterns controlled by gravity</b>                      The pull of Earth's gravity is always toward the center of the Earth.                      The gravitational pull of the Sun on the Earth and other planets keeps the planets orbiting the Sun.                      The Earth's gravity pulls the Moon toward the Earth.                      All objects have gravity.                      There is a relationship between gravity and mass.</p> <p><b>Scale models help us understand relationships of systems</b>                      Earth is not flat                      The way that the Earth rotates and revolves affects how objects appear to move in the sky.                      Day and night are caused by earth's rotation                      Our yearly cycle is caused by earth's revolution                      Our Sun is a star that appears larger and brighter than all the rest because it is much closer to us than any other star.                      Things look smaller when they are farther away. Although it looks smaller, the sun is much bigger than the Earth.                      Models can be used to demonstrate the Moon's phases and eclipses.                      The tilt of the Earth on its axis, combined with its revolution, causes seasonal climatic changes in some places.</p>	<p><b>Formative Understandings</b>                      Compare the composition, size and distances of planetary objects.                      Use experiences with scale modeling to describe the solar system and the position of the planets.                      Discuss our place in the universe.                      Discuss gravity: (All objects have gravity, objects with more mass have more gravity, gravitational pull between objects diminishes with distance, the Earth's gravity pulls objects towards the center of the earth)                      Understand how a model represents size and distance                      Associate rotation with Earth's day/night cycle and revolution with Earth's yearly cycle.                      Compare Earth's daily and yearly cycles with those of other planets.                      Explain moon phenomena. (Moon phases, solar eclipse, lunar eclipse) Illustrate.                      Interpret data from multiple observations of the same event. (i.e. Tracking of the sun's position throughout the year)                      Describe seasonal change in relationship to the tilt of the earth on its axis.</p>	<p><b>CORE MATERIALS:</b></p> <p>GEMS Space Science Curriculum Sequence Kit</p> <p>Kids Discover: Space Science</p> <p>Our Solar System Theme Set from National Geographic</p> <p>Bill Nye Planets: segment on scale of solar system</p> <p><a href="http://planetquest.jpl.nasa.gov/timeline/timeline.html">http://planetquest.jpl.nasa.gov/timeline/timeline.html</a>  <a href="http://www.jpl.nasa.gov/solar-system/index.cfm">http://www.jpl.nasa.gov/solar-system/index.cfm</a></p>

**UNIT: Force and Motion**

**Essential Question: How do parts of a system work together?**

**Vocabulary:** force (push/pull), motion, tradeoff, simple machine, claim, evidence, friction, balanced force, unbalanced force, action/reaction, motion, energy, speed, direction, gear, wedge, screw, pulley, lever, inclined plane, distance

**National Standards or Core Standards**

Forces due to fundamental interactions underlie all matter structures and transformations; balance or imbalance of forces determines stability and change within all systems. (Interaction, Stability and Change).

Transfers of energy within and between systems never change the total amount of energy.

<b>Guiding Questions</b>	<b>Big Ideas of Science</b>	<b>Knowledge and Skills</b>	<b>Teaching Resources &amp; Technology</b>
<p>What are the relationships between force and motion?</p> <p>How can we measure and compare forces?</p> <p>What kind of forces are gravity and friction?</p> <p>What examples of gravity and friction do you experience in everyday life?</p> <p>What is the tradeoff when you use a simple machine?</p>	<p>Pushes and pulls between objects are called forces. Forces can be measured and their values can be compared.</p> <p>Forces can cause changes in speed or direction of an object.</p> <p>The heavier the object the greater force is needed to achieve the same change in motion.</p> <p>For a given object a larger force causes a larger change in motion.</p> <p>Motion is a form of energy. The faster a given object is moving the more of this energy it has.</p> <p>The causal relationships between forces and motion can be determined by conducting fair tests.</p> <p>There is a relationship between an action and a reaction.</p> <p>Objects at rest tend to remain at rest. Objects in motion tend to stay in motion.</p> <p>Gravity can be described as pull force.</p> <p>Friction can be described as a push or a pull force.</p> <p>Simple machines make doing work easier, however there is a trade-off when a simple machine is use.</p>	<p><b>Formative Understandings</b></p> <p>Identify all forces as pushes and pulls.</p> <p>Determine relationship between force and motion by conducting fair tests.</p> <p>Describe causal relationships of forces and motions in terms of action/reaction.</p> <p>Identify gravity as a pull force.</p> <p>Identify friction as a pull or push force.</p> <p>Describe how simple machines make doing work easier.</p> <p>Describe the tradeoff when using a simple machine.</p>	<p>DSM II</p> <p>Force and Motion Complete Kit</p> <p>Delta Science Readers - Force and Motion - Reader Forces and Motion Work and</p> <p>National Geographic Machines Push and Pull All Aboard!</p>

**UNIT:** Plant Life Cycles

**Essential Question:** How do parts of a system work together?

**VOCABULARY:** ecosystems, interactions, energy, organisms, dynamics, structure, function, anatomy, morphology, physiology, predict, organism, structure, function, claim, evidence

**National Standards or Core Standards**

Organisms have structures and functions that facilitate their life processes, growth, and reproduction.

Organisms and populations of organisms obtain necessary resources from their environment which includes other organisms and physical factors.

Guiding Questions	Big Ideas of Science	Knowledge and Skills	Teaching Resources & Technology
<p>How do organisms use their structures to grow, survive, and reproduce? (Plant life cycle)</p> <p>How do the structure and functioning of organisms change as they grow and develop?</p> <p>How do different organisms depend on their environment for food?</p> <p>Where to organisms get the matter and energy they need?</p> <p>What is the relationship between an organism and its environment?</p> <p>How are prairie plants equipped to survive harsh environments?</p>	<p><b>Organisms have characteristic structures (anatomy and morphology) and functions (physiology) to ensure survival.</b></p> <ul style="list-style-type: none"><li>▪ The internal and external structures of plants and animals serve various functions in growth, survival, and reproduction</li></ul> <p><b>The characteristic structures and functions of organisms change in predictable ways.</b></p> <ul style="list-style-type: none"><li>▪ Reproduction is essential to the continuation of every kind of organism</li><li>▪ Plants and animals have life cycles that include being born (sprouting in plants), developing into adults, reproducing and eventually dying</li><li>▪ The details of the life cycle vary for different organisms.</li></ul> <p><b>Organisms Interact with one another.</b></p> <ul style="list-style-type: none"><li>▪ The food of almost all kinds of animals can be traced back to plants. Some animals eat plants for food. Other animals eat animals that eat plants.</li><li>▪ Organisms can survive only in environments in which their needs are met.</li></ul> <p><b>Organisms obtain the necessary resources for life from their environment.</b></p> <ul style="list-style-type: none"><li>▪ Some sources of energy is needed for all organisms to stay alive and grow</li><li>▪ Organisms have relationships with other plant and animals.</li></ul> <p><b>Organisms have adaptations that ensure their survival in an environment.</b></p> <p>For any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.</p>	<p><b>Formative Understandings</b></p> <p>Explain the connection between a plant's structure and its function</p> <p>Explain the relationship between a pollinator and a plant</p> <p>Identify the stages of a plant life cycle</p> <p>Given a stage, predict what will come next</p> <p>Identify the sun as the energy source for plants</p> <p>Build a prairie food chain</p> <p>Chart with three categories (Structure, Function, Why important in the harsh conditions of the prairie?)</p> <p>Explain one way in which prairie plants survive in a harsh environment</p>	<p><b>CORE MATERIALS:</b></p> <p><b>STC/Carolina</b> Plant Growth and Development Unit Kit Literacy Enhancement: Bees</p> <p>America's Prairies Prairie Plants by Terri Sievert</p>

Guiding Questions	Scientific, Technological, and Engineering Practices	CONNECTED/ 21st Century Learning
<p>What process do you use to invent?</p> <p>What technological advances represent an understanding of astronomy?</p> <p>How can I design and carry out a fair test to investigate astronomy?</p> <p>How do theories become accepted or refuted?</p> <p>What is the relationship of scientific claims to evidence?</p>	<p>Scientists:</p> <ul style="list-style-type: none"> <li>Create and draw design plans using background knowledge.</li> <li>Build and test their prototypes.</li> <li>Analyze their results.</li> <li>Use the results to improve or begin a new design.</li> <li>Share their findings with others.</li> <li>Use observations to ask scientific questions.</li> <li>Collect qualitative and quantitative data.</li> <li>Use applicable metric units.</li> <li>Construct charts and visualizations to display data.</li> <li>Analyze data trends.</li> <li>Explain reasons for differences or discrepancies in data.</li> <li>Communicate results and draw conclusions.</li> <li>Generate further questions for investigation.</li> <li>Explain how scientific theories change over time.</li> <li>Describe science careers related to the unit of study.</li> <li>Identify scientists who furthered our understanding of astronomy.</li> <li>Use appropriate scientific tools required to conduct an inquiry.</li> <li>Give examples of how technology has improved our study of space exploration.</li> <li>Analyze a timeline of space exploration.</li> <li>Begin a fair test with a question</li> <li>Make predictions based upon their observations, experiences, and things they read.</li> <li>Only change one thing in a fair test.</li> <li>Develop a plan to follow.</li> <li>Observe, record, measure, and analyze data to acquire evidence.</li> <li>Use tables and graphs to identify patterns and relationships within data.</li> <li>Develop claims based on their evidence.</li> <li>Embrace unexpected results.</li> </ul> <p>Science is an imaginative endeavor that is subject to modification as new information challenges current theories. It involves the collection of data, the use of logical reasoning, argumentation and the devising of hypotheses and explanations informed by evidence.</p> <p>Scientists keep honest/unbiased, clear and accurate records, value hypotheses and understand that more than one explanation can be given for the same evidence.</p> <p>Scientists question claims based on vague attributions and are skeptical of arguments based on small data samples.</p>	<p><b>Cultivating Collaboration:</b></p> <ul style="list-style-type: none"> <li>Small group work</li> <li>Project based learning</li> <li>Peer mentoring</li> </ul> <p><b>Transforming Technology:</b></p> <ul style="list-style-type: none"> <li>Wikis</li> <li>Word Processing</li> <li>SMART Boards</li> <li>SMART Response</li> </ul> <p><b>Evolving our Teaching Styles, Learning Process, and Learning Environment</b></p> <ul style="list-style-type: none"> <li>Manipulatives</li> <li>Virtual experiences</li> <li>Hands-on-learning</li> <li>Brain Pop</li> <li>Jigsaw strategy</li> <li>Differentiation strategies</li> <li>Centers and Stations</li> <li>Inquiry-based learning</li> <li>Flexible seating arrangements</li> </ul> <p><b>Opening Minds to our Global Perspective</b></p> <ul style="list-style-type: none"> <li>Research</li> <li>Text-to World</li> </ul> <p><b>Nurturing the Characteristics of Successful Learners</b></p> <ul style="list-style-type: none"> <li>Creativity, Risk taking, Persistence, Problem Solving.</li> <li>Student goal setting, Student Self-evaluation and self assessment</li> </ul> <p><b>Cultivating Collaboration and Transforming Technology</b></p> <ul style="list-style-type: none"> <li>Small group collaborative work</li> <li>Electronic communication with community, experts</li> <li>Student design work</li> <li>Peer feedback</li> <li>Project based learning</li> </ul>