

Environmental Foundations – Grade 9

Course Goal and Description: Through scientific inquiry students will learn concepts in four science areas:

- ↘ ATOMS AND ELEMENTS, an introductory study of substances and their properties
- ↘ ENERGY, introductory investigation of thermal energy, temperature, heat capacity, and an investigation of motion
- ↘ EARTH PROCESSES, the study of planet earth as a unified system involving the atmosphere, the earth's surface, internal dynamics of the earth, and interactions among these
- ↘ ENVIRONMENTAL QUALITY, the investigation of how natural phenomena affect human activity including population growth, resource use, technology, poverty, economics and the role of political and religious views of humans on earth.

Related Links	QUARTER 1	QUARTER 2
	<p><u>Students will:</u> inquire into the history and nature of science, address fundamental questions of introductory ecology and our environment, investigate properties of fresh water, and relate these concepts to the environment of Minnesota.</p> <p>Big Idea / Enduring Understanding</p> <ul style="list-style-type: none"> ↘ Patterns, cycles, and models help describe the nature of earth science. <p>Essential Questions</p> <ul style="list-style-type: none"> ↘ What is the difference between science and non-science? ↘ How has science changed throughout history? ↘ How can you describe the environment of Minnesota? <p>Content Topics</p> <ul style="list-style-type: none"> ↘ Review of: <ul style="list-style-type: none"> -Science investigation, skills -Safety issues -Properties of matter and introductory ecology ↘ Properties of water, especially fresh water. ↘ Ecosystems and environmental issues ↘ Cycles and weather patterns ↘ Density ↘ The local surrounding environment, including the state of Minnesota ↘ Energy transformations and fossil fuels <p>Skills</p> <ul style="list-style-type: none"> ↘ Science process skills, which may include: observing, inferring, measuring, performing experiments, etc. ↘ Lab equipment skills, which may include: use of the balance, bunsen burner, thermometer, etc. ↘ Literacy skills, which may include: math computation, writing, reading, scientific literacy etc. ↘ Affective skills, which may include: communication, cooperation, media preference, use of technology, etc. <p>Assessments</p> <ul style="list-style-type: none"> ↘ Use the correct lab equipment and skills to investigate a water issue. 	<p><u>Students will:</u> investigate introductory concepts of chemistry and how they are related to earth processes.</p> <p>Big Ideas / Enduring Understandings</p> <ul style="list-style-type: none"> ↘ The laws and theories of chemistry help explain patterns and cycles on the earth. <p>Essential Questions:</p> <ul style="list-style-type: none"> ↘ How are atoms, molecules and chemicals related to earth processes? <p>Content Topics</p> <ul style="list-style-type: none"> ↘ Atoms, molecules, elements ↘ Periodic table introduction ↘ Chemical and physical reactions and changes ↘ Solutions and mixtures ↘ Crystals and minerals ↘ Internal sources of energy of the earth ↘ Compounds common in the earth ↘ Rocks and the rock cycle ↘ Models of the Earth's core <p>Skills</p> <ul style="list-style-type: none"> ↘ Science process skills, which may include: observing, inferring, measuring, performing experiments, etc. ↘ Lab equipment skills, which may include: use of the balance, bunsen burner, thermometer, etc. ↘ Literacy skills, which may include: math computation, writing, reading, scientific literacy etc. ↘ Affective skills, Which may include: communication, cooperation, media preference, use of technology, etc.

	QUARTER 3	QUARTER 4
	<p><u>Students will:</u> investigate the core concepts of earth science, including: rock types, the rock cycle, plate tectonics theory, earth history, the water cycle, weather, and life on other planets.</p> <p>Big Idea / Enduring Understanding Planet earth can be understood by observing and investigating several global cycles that have been operating over the life of the planet, to are operating now, and will continue to operate in the future.</p> <p>Essential Questions</p> <ul style="list-style-type: none"> ✎ How are energy and motion related to earth processes? ✎ What are the structures, processes and cycles on planet earth? ✎ How do these affect our daily life on this planet? <p>Concepts</p> <ul style="list-style-type: none"> ✎ Newton's Laws of Motion ✎ Introduction to potential and kinetic energy ✎ Introduction to power and work ✎ Introduction to gravity and friction ✎ Weather cycles ✎ Weather and climate ✎ Wind, waves and ocean currents ✎ Plate tectonics ✎ Earth history ✎ The changing shape of the earth's surface ✎ The reasons for seasons ✎ Life on other planets <p>Skills</p> <ul style="list-style-type: none"> ✎ Science process skills, which may include: observing, inferring, measuring, performing experiments, etc. ✎ Lab equipment skills, which may include: use of the balance, bunsen burner, thermometer, etc. ✎ Literacy skills, which may include: math computation, writing, reading, scientific literacy etc. ✎ Affective skills, Which may include: communication, cooperation, media preference, use of technology, etc. <p>Assessments</p> <ul style="list-style-type: none"> ✎ Compare one global cycle (Rock cycle, Plate tectonics, Weathering/Erosion cycle) to the life cycle of a living organism. 	<p><u>Students will:</u> investigate ecosystems, the energy flow needed to maintain these systems, and how the impact of human activity affects the health of terrestrial ecosystems.</p> <p>Big Idea / Enduring Understandings Human activity can be beneficial or harmful to the environment and does change many of the vital processes that shape planet earth.</p> <p>Essential Questions</p> <ul style="list-style-type: none"> ✎ What are the limiting factors that determine healthy populations? ✎ How do humans affect the environment, and how does the environment affect humans? <p>Concepts</p> <ul style="list-style-type: none"> ✎ Water cycles ✎ Climate ✎ Study of ecosystems including: ecology, energy, entropy, populations, carrying capacity and trophic levels ✎ Natural resource use ✎ Trade-offs ✎ Water issues - quality, reuse, recycling ✎ Flow of energy in earth systems ✎ Human conservation and management issues ✎ An independent environmental investigation. <p>Skills</p> <ul style="list-style-type: none"> ✎ Science process skills, which may include: observing, inferring, measuring, performing experiments, etc. ✎ Lab equipment skills, which may include: use of the balance, bunsen burner, thermometer, etc. ✎ Literacy skills, which may include: math computation, writing, reading, scientific literacy etc. ✎ Affective skills, Which may include: communication, cooperation, media preference, use of technology, etc. <p>Assessments</p> <ul style="list-style-type: none"> ✎ Use the correct skills and lab equipment to design and complete an original experiment on an environmental issue.