

Science
Unit 6: Planetary Systems

Essential Understandings	<ul style="list-style-type: none"> ▪ Planetary systems are composed of subsystems that interact with one another. ▪ Celestial objects are constantly changing. ▪ Climate is caused by the interactions of planetary subsystems, location in space, and its relationship to its star. ▪ Planetary resources are limited. ▪ Scientists use fossils to explore how life, climate, and geological features have changed throughout history. ▪ Rocks and minerals have “life” cycles.
Essential Questions	<ul style="list-style-type: none"> ▪ How do scientists estimate a celestial object’s age? ▪ What forces cause short and long term changes to the Earth and a celestial object? ▪ What forces cause rocks to cycle? ▪ How do planetary resources act as limiting factors? ▪ What are the planetary sub-systems and how do they interact? ▪ How are climates formed and how can they change? ▪ How are fossils used to give clues about the past?
Essential Knowledge	<ul style="list-style-type: none"> ▪ The Earth has distinct layers. ▪ Scientists collect evidence to determine the age of the Earth and other celestial objects. ▪ Relative and absolute dating methods are used to determine the ages of rocks. ▪ The Geological Time Scale divides the history of the Earth into major eras, epochs, and periods. ▪ The lithosphere of the Earth moves over the asthenosphere. ▪ Geological plates are always moving due to convection currents that cause major shifts in the Earth’s landscape. ▪ Earthquakes and volcanoes are examples of events that cause short-term changes to the Earth’s surface. ▪ Wind and water erosion are examples of processes that can cause long-term changes to the Earth’s surface. ▪ Stages of the rock cycle include igneous, sedimentary, and metamorphic.
Vocabulary	<ul style="list-style-type: none"> ▪ <u>Term Categories:</u> <ul style="list-style-type: none"> ○ Rock types ○ Dating methods ○ Long and short-term changes
Essential Skills	<ul style="list-style-type: none"> ▪ Describe how scientists determine the age of a planetary object. ▪ Identify short and long-term changes to the Earth’s surface. ▪ Explain how scientists use fossils to explore how life, climate, and geological features have changed throughout time.

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<p>Related Maine Learning Results</p>	<p><u>Science</u> A. Unifying Themes A1. Systems Students describe and apply principles of systems in man-made things, natural things, and processes. a. Explain how individual parts working together in a system (including organisms, Earth systems, solar systems, or man-made structures) can do more than each part individually. c. Describe how systems are nested and that systems may be thought of as containing subsystems (as well as being a subsystem of a larger system) and apply the understanding to analyze systems. A2. Models Students use models to examine a variety of real-world phenomena from the physical setting, the living environment, and the technological world and compare advantages and disadvantages of various models. a. Compare different types of models that can be used to represent the same thing (including models of chemical reactions, motion, or cells) in order to match the purpose and complexity of a model to its use. b. Propose changes to models and explain how those changes may better reflect the real thing. A3. Constancy and Change Students describe how patterns of change vary in physical, biological, and technological systems. a. Describe systems that are changing including ecosystems, Earth systems, and technologies. b. Give examples of systems including ecosystems, Earth systems, and technologies that appear to be unchanging (even though things may be changing within the system) and identify any feedback mechanisms that may be modifying the changes.</p>
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<p>Related Maine Learning Results</p>	<p>D. The Physical Setting</p> <p>D2.Earth Students describe the various cycles, physical and biological forces and processes, positions in space, energy transformations, and human actions that affect the short-term and long-term changes to the Earth.</p> <ul style="list-style-type: none"> b. Describe Earth Systems – biosphere, atmosphere, hydrosphere and lithosphere – and cycles and interactions within them (including water moving among and between them, rocks forming and transforming, and weather formation). c. Give several reasons why the climate is different in different regions of the Earth. f. Give examples of abrupt changes and slow changes in Earth Systems. <p>D3.Matter and Energy Students describe physical and chemical properties of matter, interactions and changes in matter, and transfer of energy through matter.</p> <ul style="list-style-type: none"> c. Describe the difference between physical and chemical change. j. Describe how heat is transferred from one object to another by conduction, convection, and/or radiation. <p>D4.Force and Motion Students describe the force of gravity, the motion of objects, the properties of waves, and the wavelike property of energy in light waves.</p> <ul style="list-style-type: none"> a. Describe the similarities and differences in the motion of sound vibrations, earthquakes, and light waves. <p>E. The Living Environment</p> <p>E2.Ecosystems Students examine how the characteristics of the physical, non-living (abiotic) environment, the types and behaviors of living (biotic) organisms, and the flow of matter and energy affect organisms and the ecosystem of which they are part.</p> <ul style="list-style-type: none"> e. Explain that the total amount of matter in the environment stays the same even as its form and location change. <p>E5.Evolution Students describe the evidence that evolution occurs over many generations, allowing species to acquire many of their unique characteristics and adaptations.</p> <ul style="list-style-type: none"> a. Explain how the layers of sedimentary rock and their contained fossils provide evidence for the long history of Earth and for the long history of changing life.
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Sample Lessons And Activities	<ul style="list-style-type: none"> ▪ Compile major events on a geologic time scale. ▪ Use seismic data to infer plate boundaries. ▪ Use Internet resources for interactive lessons and research. ▪ Use diagrams to explain geologic processes.
Sample Classroom Assessment Methods	<ul style="list-style-type: none"> ▪ Geologic timeline with major events highlighted ▪ Classify galaxies ▪ Classify planetary orbits according to habitability
Sample Resources	<ul style="list-style-type: none"> ▪ <u>Publications:</u> <ul style="list-style-type: none"> ○ http://library.thinkquest.org/CR0212089/micr.htm ○ http://hubblesite.org/hubble_discoveries/hubble_deep_field/ ○ http://hubblesite.org/hubble_discoveries/discovering_planets_beyond/ ○ http://nai.arc.nasa.gov/astrotech/solarindex.cfm ▪ <u>Videos:</u> <ul style="list-style-type: none"> ○ DVD–Astrobiology Lynn Rothschild