

**Science**  
**Unit 3: Evolution**

<p><b>Essential Understandings</b></p>	<ul style="list-style-type: none"> <li>▪ Species may change over many generations in response to slow or abrupt changes in their environment.</li> <li>▪ Advances in genetics have changed our understanding of relatedness among living things.</li> <li>▪ Humans can affect evolution through the process of artificial selection and can evaluate its impact.</li> <li>▪ Organisms display both structural and behavioral adaptations.</li> <li>▪ Fossil evidence is one method scientists use to trace the history of a species.</li> <li>▪ Organisms that are better suited to an environment are more likely to live longer and have more offspring.</li> <li>▪ Genetic variation provides material for natural selection.</li> <li>▪ Different scales help to understand small and large spans of time.</li> <li>▪ Systems and sub-systems change over time.</li> </ul>
<p><b>Essential Questions</b></p>	<ul style="list-style-type: none"> <li>▪ How do species change over generations?</li> <li>▪ How does our understanding of species change as we develop new technologies?</li> <li>▪ What types of evidence supports evolution?</li> <li>▪ How does natural selection work?</li> <li>▪ How do we use math to help us understand large spans of time?</li> <li>▪ How do living things respond to slow and abrupt changes?</li> <li>▪ How can evolution be used as an example of change in a system?</li> </ul>
<p><b>Essential Knowledge</b></p>	<ul style="list-style-type: none"> <li>▪ Species can change over generations.</li> <li>▪ Math can be used to understand large and small spans of time.</li> <li>▪ Many types of evidence support evolution.</li> <li>▪ Technology supports our understanding of evolution and the way organisms are classified.</li> <li>▪ The biosphere is a system, containing sub-systems, which change over time.</li> </ul>
<p><b>Vocabulary</b></p>	<ul style="list-style-type: none"> <li>▪ <u>Terms:</u> <ul style="list-style-type: none"> <li>○ evolution, natural selection, artificial selection, selective breeding, scientific notation, fossil, species, classification, scale, system, sub-system, adaptation (structural and behavioral), mutation, gene, change</li> </ul> </li> </ul>
<p><b>Essential Skills</b></p>	<ul style="list-style-type: none"> <li>▪ Research evidence of evolution.</li> <li>▪ Use scientific notation to describe very large and very small numbers.</li> </ul>

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<p><b>Related Maine Learning Results</b></p>	<p><u>Science</u></p> <p>A. Unifying Themes</p> <p>A1. Systems</p> <p>Students apply the principles of systems, models, constancy and change, and scale in science and technology.</p> <p>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.</p> <p>A3. Constancy and Change</p> <p>Students describe how patterns of change vary in physical, biological, and technological systems</p> <p>a. Describe systems that are changing including ecosystems, Earth systems, and technologies.</p> <p>c. Describe rates of change and cyclic patterns using appropriate grade-level mathematics.</p> <p>A4. Scale</p> <p>Students use scale to describe objects, phenomena, or processes related to Earth, space, matter, and mechanical and living systems.</p> <p>a. Describe how some things change or work differently at different scales.</p> <p>b. Use proportions, averages, and ranges to describe small and large extremes of scale.</p> <p>D. The Physical Setting</p> <p>D2. Earth</p> <p>Students describe the various cycles, physical and biological forces and processes, position in space, energy transformations, and human actions that affect the short-term and long-term changes to the Earth.</p> <p>f. Give examples of abrupt changes and slow changes in Earth systems.</p>
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<p><b>Related Maine Learning Results</b></p>	<p>E. The Living Environment E1.Biodiversity Students differentiate among organisms based on biological characteristics and identify patterns of similarity. b. Explain how biologists use internal and external anatomical features to determine relatedness among organisms and to form the basis for classification systems. c. Explain ways to determine whether organisms are from the same species. d. Describe how external and internal structures of animals and plants contribute to the variety of ways organisms are able to find food and reproduce. E5.Evolution Students describe the evidence that evolution occurs over many generations allowing species to acquire any of their unique characteristics or adaptations. 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. b. Describe how small differences between parent and offspring can lead to descendents who are very different from their ancestors. c. Describe how variations in the behavior and traits of an offspring may permit some of them to survive a changing environment. d. Explain the new varieties of cultivated plants and domestic animals can be developed through genetic modification and describe the impacts of the new varieties of plants and animals.</p>
<p><b>Sample Lessons And Activities</b></p>	<ul style="list-style-type: none"> <li>▪ Present evidence of evolution, using an oral presentation rubric</li> <li>▪ Quizzes</li> <li>▪ Compare and contrast artificial and natural selection</li> <li>▪ Natural Selection Lab Report</li> <li>▪ Oh Deer! from Project WILD</li> </ul>
<p><b>Sample Classroom Assessment Methods</b></p>	<ul style="list-style-type: none"> <li>▪ Describe structural and behavior adaptations that allow an organism to survive.</li> <li>▪ Create a presentation to share concepts in classification and evolution.</li> <li>▪ Compare and contrast the levels of classification.</li> <li>▪ Identify an organism by order, family, genus, etc.</li> </ul>

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<p><b>Sample Resources</b></p>	<ul style="list-style-type: none"><li>▪ <u>Publications:</u><ul style="list-style-type: none"><li>○ Kids Discover Evolution Magazine</li><li>○ Project WILD book</li><li>○ <a href="http://paieobiology.si.edu/geotime/main/index.html">paieobiology.si.edu/geotime/main/index.html</a></li><li>○ <a href="http://www.well.com/~hernan/biomorphs_orig/biomorphs">http://www.well.com/~hernan/biomorphs_orig/biomorphs</a></li><li>○ <a href="http://www.techapps.net/interactives/pepperMoths.swf">http://www.techapps.net/interactives/pepperMoths.swf</a></li><li>○ <a href="http://www.fossilmuseum.net/GeologicalTimeMachine.htm">www.fossilmuseum.net/GeologicalTimeMachine.htm</a></li><li>○ NOVA website</li><li>○ <a href="http://www.pbs.org/wgbh/nova">www.pbs.org/wgbh/nova</a></li><li>○ <a href="http://cbsu.tc.cornell.edu/ccgr/behaviour/Fox_Behavior.htm">http://cbsu.tc.cornell.edu/ccgr/behaviour/Fox_Behavior.htm</a></li><li>○ <a href="http://www.pbs.org/wgbh/evolution/educators/lessons/index.html">http://www.pbs.org/wgbh/evolution/educators/lessons/index.html</a></li></ul></li><li>▪ <u>Other Resources:</u><ul style="list-style-type: none"><li>○ Russian fox experiment</li><li>○ Evodots software</li></ul></li><li>▪ <u>Videos:</u><ul style="list-style-type: none"><li>○ Why Does Evolution Matter Now?</li><li>○ Life on Earth series</li></ul></li></ul>
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